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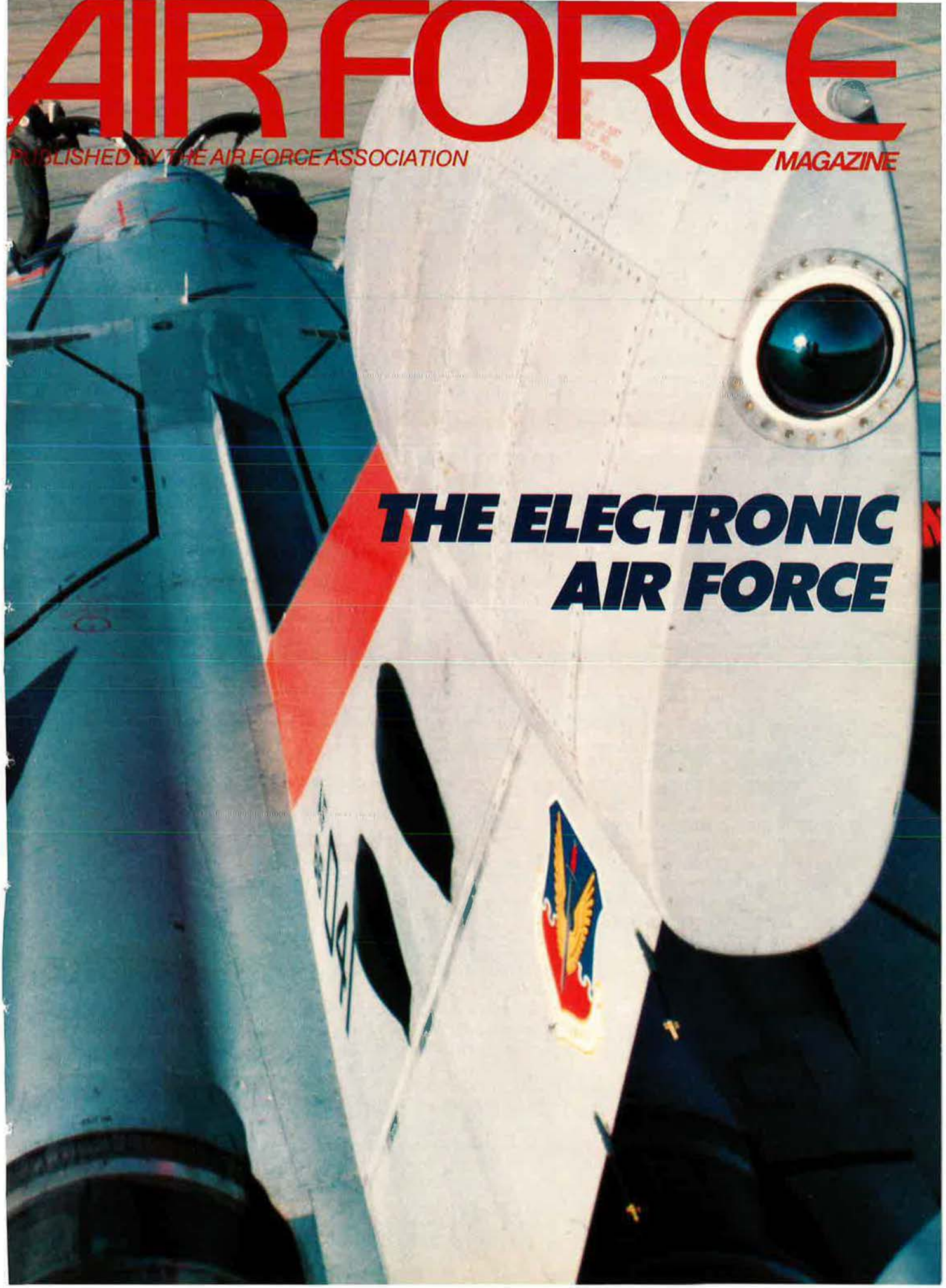
MAGAZINE

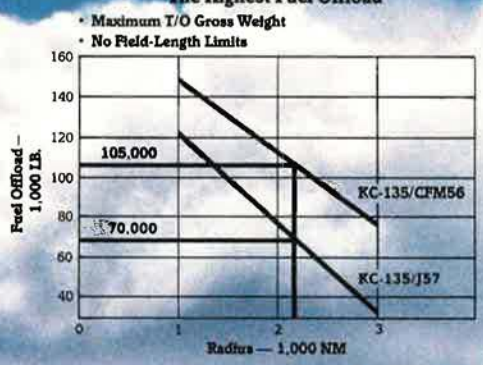


THE ELECTRONIC AIR FORCE

The Air Force can now cut th and increase fuel delivery u

By re-engining the existing Boeing KC-135As, the productivity of this tanker fleet goes sky-high. Two re-engined KC-135R tankers, for example, are now equal to three KC-135A aircraft. In addition, the Air Force will save over 150 million gallons of fuel a year once re-engining of the fleet is complete.

The KC-135R's General Electric/SNECMA CFM56 engines are the primary reason.



Higher productivity and a higher state of mission readiness

Re-engining with the CFM56 gives the KC-135R vastly superior advantages over the current tanker. It's an engine that's perfectly suited to the high-speed, high-altitude refueling of strategic bombers, fighters and airlift aircraft.

Fuel offload is up to 150% higher, or an average 50% better than the current KC-135 fleet. Thanks to a 25% reduction in fuel consumption. And thanks to a greater maximum takeoff gross weight (over 322,000 pounds) from fields that are up to 40% shorter. An increase made possible by the CFM56's 60% higher thrust.

What's more, the KC-135R will be ready to fly whenever it's needed. The reason? The experience gained from over 2 million commercial flight hours on the CFM56-2 engine by the time the first KC-135R squadron is operational. Experience that will translate into proven reliability and low maintenance requirements.

All of which means the CFM56-powered KC-135R will deliver more fuel more efficiently, more economically, more often. Well into the 21st Century.

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Overall, there's a dramatic 58% reduction in maintenance costs over the current KC-135A engine.

Why? There are no scheduled engine overhauls or component replacements. LRU replacements on-wing are faster because of fan-mounted accessories. Commer

anker's fuel usage over 25% o 150%. And for good reasons.

perience shows that mean time tween maintenance is very low, d engine operating costs are also v — thanks to lower fuel and intenance costs.

e right engine for other y transport aircraft, too

Already, the CFM56 has been ected for the French Air Force's -8 and the U.S. Navy's Boeing . In fact, it's the only engine that can handle the E-6's tough mission requirements: extended time on station, short-field operation, plus high bank-angle orbits. In addition, it meets or exceeds the strictest noise and emission standards.

A leading candidate in several other programs around the world, the CFM56 is a perfect match for large military transport and tanker platforms. For the U.S. Air Force's AWACS, for example, it means a 2 to 3.4 hour increase in time on station — depending on takeoff conditions.

Re-engined with the 56, the French Air Force's will have the greatest ating range of any commercially ed aircraft.

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That's what the CFM56 is doing for the KC-135R. And what other GE engines — like the F404, F101, T700 and F110 — are doing for aircraft as diverse as the F/A-18, the B-1B, the Black Hawk and (in flight tests) the F-16 and F-14.

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JULY 1984
VOLUME 67, NUMBER 7

AIR FORCE MAGAZINE

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About the cover: The electronic warfare environment is home to USAF's EF-111A Tactical Jamming System. A special section reflecting the extensive interface among ESD, ASD, and the combatant commands begins on p. 42.

Special Section: The Electronic Air Force

Features

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AN EDITORIAL

An Ambush of National Consensus

By Russell E. Dougherty, EDITOR IN CHIEF AND PUBLISHER

GENERAL Eisenhower once offered a sage admonition: "We must not make our mistakes in a hurry!" Would that he were here today to repeat it, for we appear to be on the threshold of making one helluva mistake in one helluva hurry. This nation is close to letting the tenacious and cancerous campaign against the MX vitiate, in pell-mell fashion, a central recommendation of the most significant consensus on defense issues in this decade: The 1983 report of the President's Commission on Strategic Forces, the so-called Scowcroft Report.

The House of Representatives voted on May 31 to require the President to submit a determination as to Soviet intent regarding strategic arms limitations after April 1, 1985. At some unspecified time thereafter, both houses of Congress must pass a joint resolution before any of the MX production funds may be obligated.

This makes a mockery of efficient production and deployment of a necessary, central weapon system for our strategic arsenal. It just won't wash to explain this bizarre switch in production decisions from the Administration to Congress by saying it was necessary to avoid certain defeat of the MX. This course of action destroys the trenchant logic of the consensus achieved in the Scowcroft Report in explaining the "essential dual task of statecraft"—maintaining an effective deterrent while pursuing effective arms-control measures. We are jeopardizing both tasks. While no single weapon system can ensure an effective deterrent, MX is the keystone of a modern strategic weapons mix.

It is bad enough to have well-intentioned individuals rushing into the various movements, protestations, and pressure groups, all demanding that we resume an arms-control dialogue with the Soviets, notwithstanding the costs and concessions. But it is incredible to find ourselves on the threshold of having Congress declare itself as the judge, jury, trial attorneys, and *witnesses* in making the case for the presence of good-faith Soviet bargaining on arms control. It is even more incredible to have the fate of strategic force modernization dependent on the outcome of this bizarre game of Russian roulette.

No wonder our public is confused.

An authoritative poll shows that an overwhelming number of Americans believe overall defense spending to be three to four times what it is; yet this majority still supports an even higher level of defense expenditures. Citizens believe, mistakenly, that spending on nuclear forces is at least twice what it really is. They think there has been a substantial increase in both numbers and total destructiveness of our US nuclear weapons. In reality, there has been a substantial decline in both. A clear majority of those polled believe that America's military position vis-à-vis the Soviet Union's has stayed even over the past few years and that the threat of nuclear war is the same or diminished. A sad commentary on the lack of accurate, reliable public information.

The thoughtfully constructed strategic logic and the force posture recommendations of the Scowcroft Report are becoming lost in public apathy, lack of accurate information, and the congressional fog count—to our detriment at home and our discredit abroad.

It is a mistake for our legislators to withhold support for strategic modernization on the grounds that such support would detract from conventional force upgrading. We need both—badly—but for two different reasons. They are *interdependent* and both vitally important; there can be no "either/or."

We need better and more conventional strength and depth to reduce our reliance on an early resort to nuclear weapons in the face of a major attack. We need conventional improvements to raise *our* nuclear threshold—not to raise *the* nuclear threshold. We can't control *the* nuclear threshold in a conflict with a nuclear-equipped enemy; the decision is not solely ours to make. Because we can neither control the nuclear threshold nor be sure of the time, weight, nature, and place of attack, we cannot afford a simple choice of conventional or nuclear modernization. We cannot restrict our arsenal to single weapon systems in single categories.

In the 1985 authorization requests—and the even more difficult 1985 appropriations process that will follow—we are, in large measure, defining the weapon systems, the support, and the postures we will achieve well into the future—mostly through the 1990s. What we rely on as operational today stems from key decisions in the late 1960s and 1970s. What we will have—or not have—in the year 2000 depends to a very great extent on the decisions taken by the US Congress this year and next. ■

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Military Retirement . . .

Lt. Lance Charnes's outlook of the military retirement system is appropriate for a young man who hasn't tasted family separation in the name of preserving Air Force needs, remote tours in forbidding lands in the name of freedom, a different community family life every two or three years in the name of the needs of the nation, fear in combat in the name of world peace, monthly pay under $200 in the name of budgetary constraints, the Vietnam-era look of disgust by your own community because you're proud to wear the fighting man's uniform, and the promotion and pay freezes. *(See Lieutenant Charnes's letter in "Airmail," p. 9, February '84 issue, and readers' responses in subsequent issues.)*

Also, it's acutely obvious that this Lieutenant is too shallow to understand the big picture painted by our senior leaders. He has but to look at his own unit's senior leadership to realize his misperception. When I look back at how little I understood decisions made at command levels, I think that I would have probably agreed with the Lieutenant about our military leadership. But when I put on my third stripe and turned twenty-one, I got my own first real taste of leadership. In the fourteen years that have passed since then, my appetite for responsibility and leadership has been matched by the military's eagerness to trust me with responsible decision-making authority.

His attack on the retirement system shows his poor understanding of the real world. Sure, you can retire after only twenty years of low pay, frequent relocation, tough promotions, deteriorating benefits, and queasy feelings every time the world situation gets shaky. Then you take your fat retirement check and immediately search for a new job so that you can enjoy all the luxuries of middle-income America. You *try* to convince the bank that you really can afford your first house.

If Lieutenant Charnes hears people jump to defend the retirement system, it's because they and I feel justifiably defensive. Why? Because, in the years we came in, the military was the only job that offered such attractive fringe benefits as combat pay, free doctors to patch you up or diagnose your condition as too much stress, and travel to such garden spots as Turkey, Guam, Iceland, or Vietnam.

I'd like to share with this Lieutenant what a decade and a half in this overpaid, underled hierarchy of confusion, double standards, and rampant waste has done for me. It's taught me to be versatile, tough, fair, mature, patient, understanding, respectful, disciplined, and compassionate. I've learned the meaning of true friendship, the love of patriotism, the respect and admiration for authority, an appreciation for liberty, the reality of my enemies, the unity of my family, and the responsibility of command.

I hope that Lieutenant Charnes will someday remove his mental blinders and see today's military for what it really is—a professional and dedicated force that the enemies of freedom have recently seen as too dedicated in its beliefs to be dealt with in combat. Until then, he may very well continue to view us from his isolated cocoon.

Thank God the Soviets don't share his misperceptions.

Capt. Darryl Rice, USAF
Albuquerque, N. M.

. . . And the Party Line

When I entered Air Force ROTC in 1971, I was a rarity: A four-year, non-scholarship, crosstown-agreement cadet. In the era of the draft, and with a number of 276, I was a greater rarity: I stayed in AFROTC because I believe in service to my country.

At that time (1971–75), the "party line" about pay and benefits was, "Sure, the pay is lower than what you'll start with in industry, but look at the benefits." Well, since 1975, a significant portion of those benefits are gone or are under attack.

- BXs can no longer sell large appliances, such as refrigerators or individual stereo components, in most areas of the US. Strident lobbying by local merchants about "unfair competition" brought down this benefit.
- CHAMPUS (for obvious fiscal reasons) has replaced "free dependent medical care."
- Basic Allowance for Quarters for military couples is under attack.
- Join-spouse assignments are getting tougher to work. I fully understand the reason—more and more military couples—but our recent nine-month separation to get a join-spouse assignment together was no picnic, especially being separated by an ocean.
- Military pay is under fire continually: "The military's getting too much pay," etc. We're not keeping up with inflation. Hopes of reasonable pay raises are raised each year, only to be dashed by a cut in the amount of the increase or a delay in the effective date.

The issue that concerns me most, however, is that of military retirement. I took a pay cut of nearly $500 per month in 1976 to enter active duty as a second lieutenant. I am only now, nearly eight years later, catching up. The 1971–75 "party line" was that a portion of what would normally be seen in active-duty pay was deferred to finance the retirement system: "Sure the pay is low now, but where else can you retire at twenty years and start a second career?" Funny how that reasoning has disappeared, never to be mentioned again!

I will put up with a lot, because I believe in serving my country. I have put up with a lot because I could at

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Editor in Chief and Publisher
Russell E. Dougherty

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Advertising Director
Charles E. Cruze
1750 Pennsylvania Ave., N.W.
Washington, D.C. 20006
Tel: 202/637-3330

Director of Marketing Services
Patricia Teevan—202/637-3331

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UK, Benelux, France, and Scandinavia
Richard A. Ewin
Overseas Publicity Ltd.
91-101 Oxford Street
London W1R 1RA, England
Tel: 1-439-9263

Italy and Switzerland
Dr. Vittorio F. Negrone, Ediconsult Internationale S.A.S. Piazzo Fontane Marose 3
16123 Genova, Italy
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Germany and Austria
Fritz Thimm
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least tentatively plan for the future. The future now holds doubts—doubts about join-spouse assignments, doubts about pay, doubts about benefits, and doubts about retirement. Until and unless a definitive policy on "grandfathering"—spelling out at what point a person will be considered "grandfathered" under each benefit—is issued and approved by Congress (how many ways can you spell "fat chance"?), the doubts will remain.

I am free to "vote with my feet" and walk out, and there have been some attractive offers to do so, but I remain out of a sense of loyalty to the Air Force and this nation. The equation of doubts vs. loyalty is still weighted to the loyalty side, but the equation is approaching equilibrium in my personal calculations. When the equation begins to tilt toward the doubts side, I will have to make a tough decision.

I just hope that the unknown "They" recognize that I am not alone in facing this decision and that "They" move to act accordingly—and do it soon.

Capt. Bruce E. Lewis, Jr., USAF
Wright-Patterson AFB, Ohio

Almanac Issue

I applaud you once again for another exceptional May Almanac issue.

I was particularly happy to see the inclusion of the Civil Air Patrol in the Air University report. CAP and the Air Force did a lot together this past year, with many CAP wings performing Military Training Route Surveys for both TAC and SAC. CAP aircraft and aircrew resources were used quite often by SAC for shuttling FB-111 parts between Plattsburgh AFB, N. Y., and Pease AFB, N. H. Also quite noteworthy was CAP's participation with both NORAD and SAC in Exercise Night Train earlier this year. Our search and rescue record with MAC and the Aerospace Rescue and Recovery Service speaks for itself.

We all are proud of the relationship between our two organizations, and hope for many more years like 1983 in the future. Keep up the good work!

C/Capt. Matt Johnson, CAP
Salt Lake City, Utah

In the report on the Air Force Commissary Service on p. 131 of the May issue, the article states that "Air Force commissaries sell goods at cost, plus a five percent surcharge required by law to pay for equipment, supplies, and construction."

Does this mean what it says? Does the Air Force buy foods and other commodities to be sold in the commissaries and sell them at "cost," and then add the five percent surcharge? Or does the Air Force apply a percentage markup to everything sold in a commissary to the actual cost of the article or commodity, and then add in the five percent surcharge?

Your advice would be appreciated.

Russell E. Sullivan
Pensacola, Fla.

• *Yes, the sentence means what it says. Goods in Air Force commissaries are sold for a price that equals cost plus the required five percent.*—THE EDITORS

Corrections Roundup

While browsing through the May '84 issue, I could not help but notice a small error.

The caption to the picture on p. 110 purports that the airmen are preparing laser-guided bombs for loading. As a twenty-one-year veteran of the "bomb-loading" field, I believe I can safely say that the bomb is in fact an Mk 84 2,000-lb "Slick." There is no laser guidance unit installed on the nose, and the tail does not have the large boxy fins found on LGBs. The load crew member in the foreground is setting an M-904 nose fuze, which is used on "Slicks" but not on laser-guided bombs.

I have seen numerous photos depicting different phases of the weapons field in the five years that I have received the magazine, and this is the first mistake that I have noticed.

I don't remember seeing any articles in the magazine that dealt with the weapons field and the bomb loaders in depth. The weapons field is a very large field. Unfortunately, not very much notice is taken of it until we weapons crews are needed—when the shooting starts.

MSgt. James L. Long, USAF (Ret.)
Phoenix, Ariz.

• *Reader Long is right—partially. The bomb is not laser-guided, but it isn't an Mk 84 either. According to the Air Force (which supplied us the erroneous caption), the bomb pictured is an Mk 82 500-lb general-purpose bomb. The airman in the foreground is indeed inspecting an M-904 fuze. And though it doesn't focus specifically on bomb loaders, we'd like to draw Sergeant Long's attention to the article "Spirit and Surge" on p. 94 of this issue.*—THE EDITORS

I just received my May 1984 issue of AIR FORCE Magazine and was amazed to see that you have repeated an error that you made last year in your "Gal-

lery of USAF Weapons." On the right side of p. 165 you show a picture of a C-135B painted for use as a special airlift aircraft but that you label as a C-137.

I hope that this error can be corrected in future issues. I also hope that the people from "Jane's All the World's Aircraft" know the difference as this would really impact on their credibility as an authority on aircraft.

Jim Stevens
Enon, Ohio

• *Reader Stevens is correct. The people at "Jane's" certainly know the difference between a C-135 and a C-137; in this case, it is their American cousins here at* AIR FORCE *Magazine who are responsible for the mistake.*—THE EDITORS

Almanac Aces

On pages 188 and 189 of the 1984 Air Force Almanac, you list the aces of various wars. These, of course, only include AAF and USAF pilots.

I am sure that everyone would be interested to see where the Navy and Marine aces would rank in this tally. . . .

Fred S. Fiedler
Los Angeles, Calif.

• *We are often asked why we do not list all American aces. The main reason is that we have limitations of space. It is impossible now to feature all the information on USAF that we would like in our Air Force Almanac issue; we cannot really spare the room for a complete list of American aces. Those looking for more on aces should consult the book* Fighter Aces *by Raymond Toliver and Trevor Constable or any of the other many fine publications on this topic.*—THE EDITORS

Emotional Rhetoric?

One letter on p. 12 of the May '84 issue "Airmail" cries out for response.

Frank Schnekser's contention that the peace movement is orchestrated by the Soviets is the type of emotional rhetoric that continues to foster mistrust between the public and the military. Any sane, logical person wants peace. In a society where suicide is seen as the ultimate insanity, nuclear confrontation *must* be avoided.

America's defense has long stood on fear. Other governments were made to fear for their existence if they attacked us. The actual number of warheads becomes irrelevant. If each side had 100 warheads, the mutual fear of destruction would still provide our needed deterrence. Perceptions of readiness are what prevents war,

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and weakening of these perceptions is what threatens peace.

The American public would like nothing better than to live and let live, without the threat of nuclear war. However, when the threat is no longer mutually dangerous to both sides, the event moves closer to actuality. Threatening the Soviets with outdated weapons of questionable reliability moves us much closer to war than any unilateral disarmament. Modernization of our forces must continue. Dialogue must continue.

Mr. Schnekser's comment that the American public is being manipulated by the Soviets only pushes us farther apart. The public doesn't understand, apparently, why we must threaten the Soviets. The military is perceived as pushing the nation closer to national suicide. Therefore, as most people are generally sane, they protest for peace. This is not necessarily manipulation. . . .

All I would like is to see a little more rational thought and a great deal less emotional accusation and name-calling. Working to educate everyone on our policies, maintaining a meaningful dialogue, and striving to keep tensions low are what is needed. . . .

Let us remember that the military's profession is to maintain the peace, not to override public rights in a huge buildup. Everyone wants peace; the issue is how to preserve it. I, for one, would much rather work with public sentiment behind me rather than against me. Let's work together to protect deterrence, not suppress rights.

Lt. Donald Logston, USAF
Norton AFB, Calif.

Oversize OSD?

I was interested to see in your April 1984 issue the commentary on General Krulak's study of the birth and growth of the Office of the Secretary of Defense *(see "Questioning the Superstructure" by Gen. T. R. Milton on p. 32).* I welcome an informed debate on how we can improve management throughout the Department.

Unfortunately, your author repeated a substantial error apparently made by General Krulak in giving OSD a staff that exceeds our actual strength by more than 86,000 people. Today, OSD has 1,768 people, about the same as in 1982, and nowhere near the more than 87,800 reported. That larger figure would include all of the Defense Agencies, which provide common support to the military services in such areas as military supplies, communications, intelligence, and logistics.

Claire Freeman
Deputy Assistant Secretary of Defense/Civilian Personnel Policy and Requirements
Washington, D. C.

General Milton's comments and conclusions in his article "Questioning the Superstructure" in the April issue are right on target, as usual. The number of more than 87,700 people for the Office of the Secretary of Defense is almost unbelievable. No wonder Congress doesn't want to approve the DoD budget. It might be that if DoD would cut in half the superstructure of OSD and some of the top staff of the military services, then we could buy a substantial number of the additional strategic weapons so badly needed.

A further benefit would be additional decentralization of authority. As a matter of grand strategy, I am sure that, even with our inadequate existing strategic offensive and defensive weapons, our deterrent would be tremendously more effective if the Soviets were sure of an almost automatic retaliation to any surprise nuclear attack instead of the high-level strategic and political discussions that would likely emanate from the top-heavy superstaffs. In fact, if the Soviets were to hit us hard enough by surprise, they might anticipate that, with so little strategic power left, we might sue for peace and thereby negate the Mutual Assured Destruction (MAD) strategy.

Civilian grand strategist Henry Kissinger, in presenting the MAD strategy, said just about that more than two decades ago. Today there is a strategy called Launch Under Attack (LUA) that would make MAD effective. Not many people in Washington want to listen to an LUA strategy these days, but that doesn't make it wrong or impractical.

The President's antiballistic-missile Strategic Defense Initiative plan is excellent, but even if Congress approves it promptly, it could not be fully operational for many years. The LUA strategy is the only answer to our strategic nuclear defense needs for now and the immediate future. Moreover, Congress doesn't have to approve it, and it can be implemented overnight by Presidential announcement.

Col. Robert H. Arnold,
USAR (Ret.)
Greeneville, Tenn.

Perceptions

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The Independent Infusion

Your article "The Independent Infusion" in the April 1984 issue of AIR FORCE Magazine accurately described an important element of our nation's technological leadership. When one thinks about the many areas of independent research and development (IR&D), it is reasonable to expect that some of industry's research should address technology with a potential to counter future threat capability, based on classified projections of the future threat.

Ideally, the Air Force should have a provision to share classified information with a contractor for IR&D projects if the contractor can demonstrate a valid "need to know." However, in the absence of a funded contract, the Air Force does not provide classified information to a contractor. Because IR&D is unfunded, there is no mechanism for a contractor to access classified data from the Air Force that would help to improve the IR&D effort.

The US Army, on the other hand, has a policy (AR 70-35, Advanced Planning Information for Research and Development) that permits its support of unfunded study efforts if the Army determines that the product will be mutually beneficial. This policy includes sharing of classified information, based on a valid need to know. To implement the policy, a contract is developed that describes what the contractor and the Army will provide to each other. This program results in benefit to both the Army and industry.

Perhaps the Air Force should adopt a policy, similar to the Army's, that would increase the value and validity of the "independent infusion" by enabling the contractor to be knowledgeable of classified data that has an important impact on IR&D work.

Thomas B. Barnes
Marietta, Ga.

Windshield Clarification

The "Aerospace World" column in the April '84 issue, p. 44, reported that Lucas Aerospace of Luton, England, has developed a new acrylic and polycarbonate material capable of defeating a bird at 610 mph.

The acrylic-faced polycarbonate laminate was initially developed by Sierracin Corp. of Sylmar, Calif., and was licensed to Lucas Aerospace for upgrading windshield impact resistance for British aircraft. These high-impact laminates have been in production for more than five years. Variations of them are used as windshields for the USAF F-111, F-16, AT-37, and B-1B aircraft.

As a result of Sierracin's efforts, bird-impact protection (up to 600 knots) has been achieved that was never before thought possible.

Lee R. Marshall
Sierracin/Sylmar
Sylmar, Calif.

Douglas C-47

I am looking for any information that I can obtain on a particular Douglas C-47, s/n 4423, USAAC serial 41-18385.

She was the first aircraft owned by my company, Cathay Pacific Airways of Hong Kong, which is now one of the most successful airlines based here in the Far East. The airline was founded by a retired USAF pilot, Roy C. Farrell, who purchased this surplus C-47 from the Reconstruction Finance Corp. at Bush Field, Ga., on October 8, 1945. Mr. Farrell subse-

Air Force Association Balance Sheets

Assets	December 31, 1983 General Fund	December 31, 1983 Life Membership Fund	December 31, 1983 Total	December 31, 1982 General Fund	December 31, 1982 Life Membership Fund	December 31, 1982 Total
Current Assets						
Cash plus marketable securities at cost	$6,029,080	$2,075,236	$8,104,316	$6,098,081	$1,092,217	$7,190,298
Receivables, inventories, and prepaid expenses	2,000,805	693,577	2,694,382	1,505,047	472,735	1,977,782
Other Assets (including fixed assets, funds on deposit, etc.)	4,433,227		4,433,227	1,489,814		1,489,814
Total Assets	$12,463,112	$2,768,813	$15,231,925	$9,092,942	$1,564,952	$10,657,894
Liabilities and Fund Balances						
Current Liabilities (including payables, accrued expenses, etc.)	$2,667,394		$2,667,394	$2,403,441		$2,403,441
Deferred Revenue (including advance membership dues and magazine subscriptions)	1,487,181		1,487,181	1,281,125		1,281,125
Long-Term Debt	2,007,000		2,007,000			
Fund Balance	6,301,537	$2,768,813	9,070,350	5,408,376	$1,564,952	6,973,328
Total Liabilities and Fund Balance	$12,463,112	$2,768,813	$15,231,925	$9,092,942	$1,564,952	$10,657,894

Air Force Association Statements of Revenues and Expenses

General Fund	Year Ended December 31 1983	1982
Revenues		
Membership	$2,178,483	$1,829,920
Patronship	182,579	155,928
Magazine	2,387,748	2,167,661
Industrial Associates Program	96,790	86,968
Data Processing Services	114,683	118,432
Insurance Programs—Administration	1,628,731	1,465,833
Annual Convention	346,147	293,915
Aerospace Development Briefings	848,050	600,793
Other Income	106,814	116,202
Total Revenues	7,890,025	6,835,652
Expenses		
Membership	2,846,551	2,379,655
Patronship	206,241	175,795
Magazine	2,075,758	1,914,337
Industrial Associates Program	102,483	94,410
Data Processing Services	308,438	310,254
Insurance Programs—Administration	2,301,424	2,060,655
Annual Convention	399,597	381,530
Aerospace Development Briefings	421,769	352,047
Total Expenses	8,662,261	7,668,683
Net (Loss) from Operations	(772,236)	(833,031)
Non-Operating Revenues		
Investment Income	727,903	875,939
Insurance Programs—experience credits and interest on reserves	933,394	585,420
Net Income—General Fund	$889,061	$628,328

Expenses include chapter commissions, state commissions, and other direct support for field units totaling $522,223 in 1983 and $556,752 in 1982.

Life Membership Fund		
Revenues from Investments	$148,225	$90,398
Less: Transfer to General Fund for annual dues	126,864	65,376
Net Income—Life Membership Fund	$21,361	$25,022

Treasurer's Note: The figures reflected herein have been extracted from audited financial statements submitted previously to the Board of Directors of the Air Force Association.

quently put the aircraft on the US civil register as NC 58093, and then, after much patient work, he succeeded in gaining authority to ferry her to the Far East, where he commenced charter operations out of Shanghai.

These charter operations were quite successful, but in order to take advantage of further opportunities, he moved his base to Hong Kong. Together with a partner, Syd de Kantzow, and by now with a second DC-3, he formed Cathay Pacific Airways in September 1946. The rest of the story has become a legend of airline success, and we now operate a fleet of Boeing 747s and Lockheed L-1011s throughout Asia, eastward to Vancouver, British Columbia, and westward to London.

Some two and a half years ago, I discovered that this very first aircraft of ours was remarkably still flying for an airline down in Australia, all of our other former DC-3/C-47 aircraft having long since been written off or scrapped by owners. I suggested that, as a successful airline, we should reacquire our first aircraft and preserve her in an airworthy condition.

After many months of hard work toward this end, my suggestion was accepted by our management, the aircraft was repurchased, and, on September, 23, 1983, she flew back into Hong Kong. She had been beautifully restored in her original Cathay livery and looked very much as she must have in 1946. She is now destined to be the prime exhibit in the as-yet-unbuilt Hong Kong Museum of Science and Technology.

As a final tribute to this remarkable aircraft, I have decided to write her

history. I would like to hear from any readers who knew her during World War II. I have established that she was delivered from Long Beach, Calif., to the USAAC at Mobile, Ala., on June 4, 1942. She was earmarked as part of the force buildup for "Bolero," the allied invasion of North Africa. . . . In January 1943, she was assigned to the 53d Troop Carrier Squadron, but was still in the US when that unit moved overseas in May 1943. She apparently left the US in August 1943, and I suspect that she went either to the Middle East or Far East for transport duties. She returned to the US on November 15, 1944, and went to various air transport units before finally going to Bush Field, Ga.

I would like to hear from any readers who know anything about this aircraft. Any material or photos sent will be most carefully looked after and returned if requested.

Martin J. Willing
Box 342, Flight Operations
Cathay Pacific Airways
Kai Tak Airport
Hong Kong

Looking for . . .

I am trying to locate Frank W. Long and Jonie O'Connor Wortley. They were good friends of my father, George Adamson, during World War II. They both served in Borneo and were attached to the 307th Bomb Group, 424th Bomb Squadron. My father served in the Australian armed forces.

The only address I have for Jonie Wortley is in San Francisco, Calif., and the last address I have for Frank Long is in Bakersfield, Calif.

I am now living in the United States and would like to establish contact with these friends. Anyone who can furnish any information on these two men should contact me at the address below.

Norm Adamson
205 Island Blvd.
Fox Island, Wash. 98333

I am trying to locate Jim Scotty, who was stationed at Wiesbaden, Germany, in 1956. He was married to Ingeborg Cremer while stationed at Wiesbaden. I believe that they lived in the Hainerberg Military Housing.

I would greatly appreciate any information as to past duty locations, present address, or unit of assignment.

SSgt. John Monaccio, USAF
P. O. Box 813
APO New York 09104

I am looking for any American airmen who befriended my late father when they were stationed at the air base at Villacoublay in France during World War II. My father was only a child at the time. In particular, I am seeking men from the engineering section of the 644th Bomb Squadron

Anyone who knew my father is asked to contact me at the address below.

Didier Mansuy
"Les Marronniers"
77 410 - Montjay La Tour
France

I would like to locate crew members of Crew #61 of our B-24 *Slick Chick*, which flew with the 489th Bomb Group, 846th Bomb Squadron, 95th Bomb Wing, Eighth Air Force, out of Halesworth in England in 1944. We would like to hold a crew reunion.

Please contact the address below.

R. Wyatt Porterfield
105 St. George Dr.
P. O. Box 1028
Athens, Ga. 30603
Phone: (404) 548-5983

Collectors' Corner

I am an Air Force veteran of Vietnam. I collect World War II uniforms and insignia. However, my collection lacks items from the Army Air Corps.

I am particularly interested in obtaining some flight coveralls, A-2 jackets, and any other flight crew equipment.

Anyone who can help or who wishes to donate items to my collection is asked to contact me at the address below.

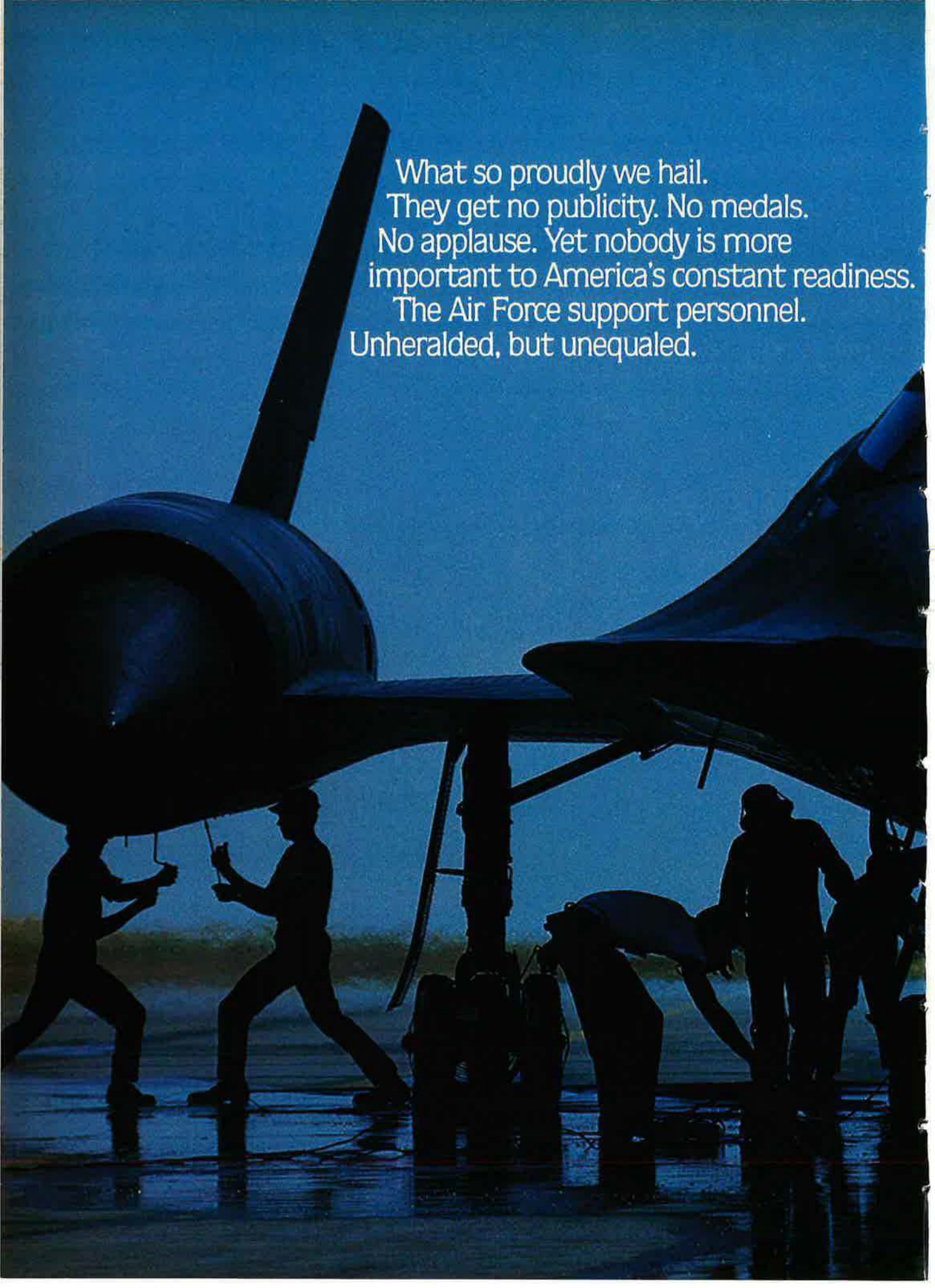
Jerome J. Steber
500 West Diamond Ave.
Hazleton, Pa. 18201

I am looking to collect all or as many as possible of the AIR FORCE Magazines issued from January 1971 to December 1974. I was in the Air Force during this period and spent a lot of time overseas as a munitions loader for the F-4 Phantom. I am especially interested in issues with articles about aces and MiG killers during this time period.

Anyone who wishes to sell, donate, or knows where I can obtain these issues, please contact me at the address below.

Greg Lindquist
4594 Fraser Way
Denver, Colo. 80239
Phone: (303) 371-1181

AIRMAIL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They get no publicity. No medals.
No applause. Yet nobody is more
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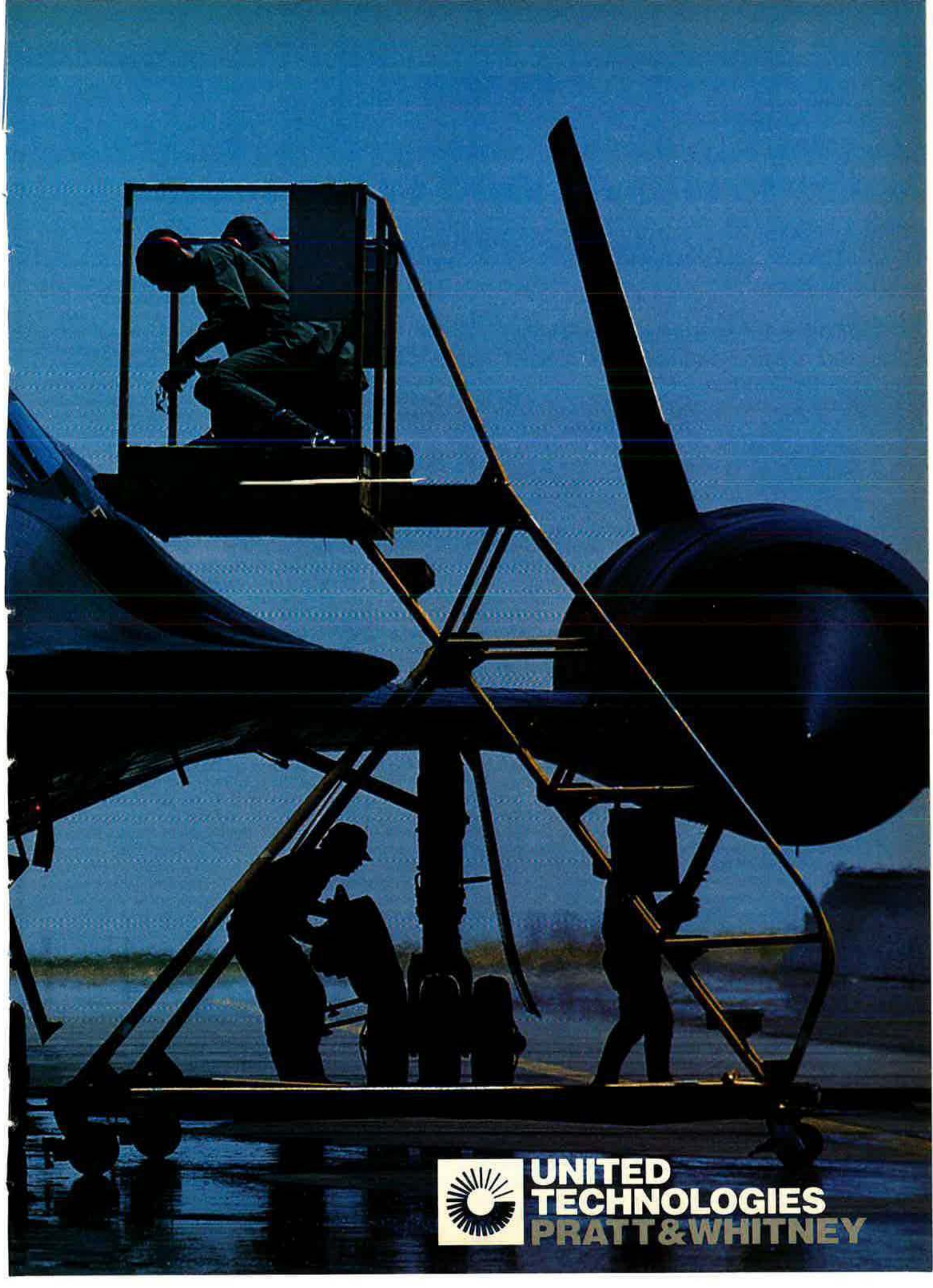
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IN FOCUS...

The Airland Agreement

By Edgar Ulsamer, SENIOR EDITOR (POLICY & TECHNOLOGY)

A new Air Force-Army Memorandum of Agreement points toward role and mission changes and greater cooperation in combat.

Washington, D. C., June 1

The Chiefs of Staff of the Army and Air Force announced on May 22 the signing of a landmark Memorandum of Agreement (MOA) that points the way toward a significant revamping of the roles and missions of the two services, especially in the area of airland combat operations. As Gen. John A. Wickham, Jr., USA, and Gen. Charles A. Gabriel, USAF, explained at a joint Pentagon press conference, the agreement encompasses thirty-one "initiatives" that "will maximize our joint combat capability to execute airland combat operations."

The fundamental tenet of the agreement, the two service chiefs averred with conviction, is the recognition that "if we go to war, we are going to go jointly," and that, by extension, it follows that "there has to be an element of trust" between the services.

The Memorandum of Agreement is the culmination of a six-month joint study by the two services—launched and carried out internally—of comprehensive approaches to greater "jointness" in terms of planning, designing, acquiring, and operating weapon systems relating to airland combat. The Secretary of Defense, his principal staff, the Joint Chiefs of Staff, the commanders in chief of the unified and specified commands, and the heads of the major combat commands of the two services subsequently reviewed and endorsed the details of the agreement.

Premised on the precept that "we are not four different services charging off in four different directions," General Gabriel explained that the new agreement focuses on "how we can do the job together" in the best way rather than on turf questions involving "roles and missions." He announced that similar agreements will be tried with the US Navy and the Marine Corps.

Both service chiefs expressed confidence that the MOA will "significantly enhance the country's military posture and have a major positive impact on the way future combat operations are conducted." Further, the two services view the agreement "as the initial step in the establishment of a long-term, dynamic process whose objective will continue to be the fielding of the most affordable and effective airland combat forces."

As part of this joint effort to strengthen the warfighting capabilities of the two services, the Army and the Air Force "will annually exchange a formal priority list of those sister-service programs essential to the support of their conduct of successful airland combat operations, without duplication. The services will resolve joint or complementary systems differences prior to program development."

The individual initiatives of the agreement commit the services to realignments and greater "jointness" in a host of mission areas that extend from area air defense to intra-theater airlift. In the case of area air defense operations, USAF will participate in the requirement and development process for follow-on area surface-to-air missile (SAM) systems. Also, the Air Force will kick off a joint analysis to determine what represents the most cost-effective mix of area SAMs and air defense fighters. The Army, on the other hand, will lead a joint study of whether or not area SAMs should be transferred from the Army to the Air Force. As General Wickham pointed out with regard to high-altitude air defense, the Army's Patriot SAM fires into the regime of USAF's air defense fighters. Both types of weapons serve the same purpose. Yet one is an Air Force responsibility, while the other one belongs to the Army: "Perhaps it makes sense for one service to manage both of these programs in high-altitude air defense."

In the area of point air defense (PAD), the two services pledged a joint approach, with the Air Force providing the Army with an updated list of worldwide requirements that will be reviewed annually. In addition, rear-area point air defense systems will be developed jointly, with the Air Force participating in the Army's reviews of air defense requirements at the corps level and above.

The two services agreed also on joint approaches to counter the heliborne assault threat, with the Army undertaking a joint assessment of that threat and both services subsequently developing and fielding the capabilities for detecting and countering it. In similar fashion, the two services will go jointly after the tactical missile threat. The objective here is a joint "Anti-Tactical Missile Program," aimed in the main at the ability to attack these weapons—nuclear and conventionally armed—before the enemy can launch them. The possibility of intercepting these weapons after launch by a variety of means, including advanced technology approaches, will also be probed.

The MOA stresses the importance of joint approaches to IFF (Identification, Friend or Foe) systems as well as to air base ground defense. In the latter case, a joint agreement is to be formulated. The Army is to provide ground defense outside the base perimeter, but under the operational control of the pertinent air commander. In that context, the Air Force announced termination of the mobile weapon system program—an armored vehicle carrying Stinger SAMs and 30-mm antiaircraft guns that would have cost at least $3 million each. Also, the Air Force abandoned plans to "acquire something like 440 platoons of . . . Air Force infantry" and instead will rely on the Army for air base defense and rear area security, according to General Wickham. There are ancillary accords that call for the transfer of reserve manpower slots from USAF to the Army, if the air base defense requirements exceed the Army's capabilities, as well as for a shared approach to on-site security flights and rear area close air support.

The MOA folds the services' individual programs for ground-based electronic defense against enemy air attacks into the Air Defense Electronic Warfare System (ADEWS), thus abandoning Electronic Security Command's "Comfy Challenge" program tailored toward the same mission. Conversely, the Army agreed to terminate its Airborne Radar Jamming System and, instead, will rely on the Air Force to provide this type of support.

The MOA spells out how the Air Force's Precision Location Strike System (PLSS) and its associated platform, the TR-1, will be modified to accommodate Army requirements. The purpose is to broadcast PLSS target information to designated Army units in real time. The system guides attacks against fixed targets deep behind the forward line of troops (FLOT) by standoff and other weapons. In this context, the agreement commits the Air Force and the Army to modifications of the current TR-1 program "to enhance its wartime survivability and effectiveness, within the bounds of affordability." This entails buying additional TR-1s, to allow for attrition, as well as development of mobile ground stations.

Significant changes appear to be in store for Military Airlift Command's Search and Rescue (SAR) and Special Operations Forces (SOF) under the MOA. While the Air Force will remain as what the agreement calls the "proponent" of these two missions, it will reexamine SAR objectives in "relation to depths on the battlefield defined by capability." This means, the agreement explained, that the Air Force will develop tactics, techniques, and procedures for the conduct of SAR in Air Force zones. For SAR operations beyond Air Force zones, the two services will rely on the special operations forces.

Helicopter support for the special operations forces will be transferred from the Air Force to the Army. But this transition won't take place "until we are sure that they [the US Army] have the same capability [in terms of helicopter equipment] that we have to do that job," General Gabriel pointed out. He added that the proposed transfer of the SOF rotary wing aircraft to the Army does not denote a lessening of Air Force interest in the SOF mission: "The Army has 7,000-plus helicopters and the Air Force has about 100. Certainly they have the experience and knowledge and capability to take their own 'A-Team' special forces and drop them behind the lines as well as we do." MAC's SOF will concentrate on fixed-wing operations, involving mainly the MC-130 Combat Talon aircraft.

The agreement presages major changes for the interlinked Joint Tactical Missile System (JTACMS) and the Joint Surveillance and Target Attack Radar System (Joint STARS) programs. In the case of JTACMS, the two services will go their separate ways, except for some "black"—thus presumably unmanned—stealthy weapon systems that General Wickham said might be continued on a joint basis. As the agreement points out, the Army "will refocus its current development efforts on a shorter-range ground-launched" missile while the Air Force "will develop an air-launched system." The latter will probably be an advanced cruise missile smaller than any of the current family of cruise missiles. Rocket-propelled designs, however, have not been ruled out categorically.

Common sense drove the decision to restructure JTACMS, according to General Wickham. Both services were working toward the same missile with the same range and the same target capabilities. The only major difference was that one was to be ground-launched and the other air-launched. The approach taken in the MOA lets each service go after the target sets and arrays on the battlefield that it is best equipped to attack. If the Army, for instance, concentrates on close-in targets—roughly within a range out to seventy kilometers—while the Air Force's tactical missile system goes beyond that distance, a degree of synergism would be gained that makes sense, General Wickham suggested.

The agreement between the two services did not, for the time being, change the assignment of the Pershing IIs to the Army and that of the ground-launched cruise missiles to the Air Force. It did, however, leave the door open to mission realignments in the future, after what is circumspectly referred to as "optimum service proponencies" for such INF systems are determined.

The new agreement appears to put on ice indefinitely the "Assault Breaker" high-tech standoff scheme for interdicting the Warsaw Pact's second echelon. As an Air Force expert put it, the exorbitant costs associated with the Assault Breaker approach rendered the program unaffordable "over the next five years." Joint Army-Air Force analyses found, for instance, that it would take about 2,000 conventionally armed missiles a week to cover just a single corps front in a war with the Soviet Union. That kind of consumption would cost about $8 billion—obviously an unacceptable amount, he pointed out.

In the case of Joint STARS, the new agreement spells out that both services "will support the C-18 as the single . . . platform" and will work on procedures to provide needed support of ground commanders. The C-18 is a refurbished Boeing 707 jetliner. The Army and Air Force will also work out jointly the number of C-18s required to perform the Joint STARS mission for both services.

Originally, the Army had planned to put Joint STARS on forty-four OV-1s, while the Air Force expected to deploy the system on fifteen C-18s. The number of C-18s required to accommodate both services will presumably exceed fif-

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SPERRY

teen aircraft. Air Force as well as Army personnel will be manning the Joint STARS C-18s. General Wickham explained that the Army agreed to this arrangement to avoid duplication in the collection of moving target intelligence: "What we are doing is relying on the other service to do it for us" rather than insist that each service operate essentially the same radar in different aerial platforms, even if that means "killing" one type of platform. One service, he added, should do the bulk of the job and the "ground user should regard the [provider] of that information in a transparent way."

The two services will go their separate ways on JTACMS, for the most part. The Army will focus on a short-range, ground-launched system while the Air Force pursues a smaller, air-launched cruise missile with greater range. Cooperation may continue on stealthy systems.

The "shoulder-to-shoulder" character of the MOA came through loud and clear in the case of munitions research, development, test, and evaluation (RDT&E): "The Army and Air Force will develop procedures for a joint and recurring review of munitions technical base programs keyed to the budget/POM [the five-year Program Objectives Memorandum] cycle. This review will use the Joint Logistics Commanders structure and include Army and Air Staff participation."

Night combat requirements will also be tackled jointly, with the Air Force setting up liaison with the Army's Night Vision and Electro-Optics Laboratory. Similar arrangements will be made with regard to battlefield air interdiction. The two services are to formulate interdiction procedures that "can be tailored to theater-specific requirements [in order to] synchronize [such] interdiction with maneuver." These procedures are to be field-tested before they are put into effect and will be tied to automated battlefield coordination.

Elsewhere, the MOA calls on the Army and Air Force to conduct joint target assessments with an eye toward standardizing attack on surface targets and to cooperate in joint development and acquisition of munitions. Further, the two services will deal with theater interdiction on a joint basis. In a given theater, the air component commander will be responsible for the execution of the interdiction campaign. The Air Force will lead a joint study with the Army to pinpoint joint requirements for interdiction systems and to define the future conventional interdiction requirements.

There is no change planned at this time in terms of close air support operations, with the Air Force continuing to provide such support to the Army. But the arrangements covering Air Liaison Officers (ALOs) and Forward Air Controllers (FACs) are in for significant adjustments. Both services will step up the training of air liaison officers and forward air controllers in maneuver-unit operations and coordinate forward-air-controller operations closely with those of the tactical air control party structure. In turn, this will boost the maneuver unit's ability to call in air support, including Army helicopter support, as well as enable FACs to execute their function while operating from organic maneuver-unit vehicles. Also, Air Force officers who are nonrated will be able to perform the FAC mission while assigned to maneuver battalions. USAF's Tactical Air Command and the Army's Training and Doctrine Command will review the effectiveness of these new approaches before they are cleared for field-testing.

The two services also agreed to coordinate the requirement for relevant new combat aircraft before such programs are initiated. Included here are manned tactical reconnaissance systems. The two services will spell out jointly the requirements for common platforms to meet "follow-on needs." Whenever possible, joint service requirements of this type will be met by means of single-service platforms operated by the service that developed the system. In such instances, the lead service will see to it that the other service's requirements are met fully, both in terms of operating procedures as well as in the number of platforms needed to do the job.

Concerning intratheater airlift requirements, the MOA provides for the establishment of a joint Army/Air Force organization to determine the scope and nature of these needs, which range from medical/noncombatant evacuation to resupply by airland/airdrop to redeployment of forces, equipment, munitions, and war reserves.

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Grumman Aerospace Corporation, Bethpage, New York 11714.

IN FOCUS...

The capstone of the Memorandum of Agreement is the commitment by the two services to participate in each other's POM development process. This commitment includes the exchange of formal priority lists of those "sister-service programs essential to the joint conduct of airland combat operations."

A new Soviet ICBM, now in testing, exceeds SALT II limitations by a wide margin. US sources peg its weight at 260,000 pounds, compared to 190,000 pounds for the SS-19. Its throw-weight exceeds that of the SS-19 by fifteen to twenty percent and totals between 10,000 and 11,000 pounds.

Washington Observations

★ The Soviet Union has started ground tests of a new solid-propellant ICBM that is larger and that has greater throw-weight than is permitted under the terms of SALT II. Tests of the rocket motor of the new weapon, which has not yet been given a name by US intelligence, are taking place at the Pavlograd ICBM facility. The new missile's launch assist device, essentially a canister/ejector system, is also undergoing test at that site. New silos, apparently meant for the new missile, have been built at Plesetsk. They appear to be larger than the silos of the new SS-X-24, an ICBM comparable to the MX, but slightly smaller than those housing SS-19 ICBMs. Full-up flight-testing of the new missile is expected to take place in 1986. Tentative assessments by US intelligence peg the weight of the new missile at about 260,000 pounds, compared to about 190,000 pounds for the SS-19.

The throw-weight of the new missile appears to be fifteen to twenty percent greater than that of the SS-19 and totals between 10,000 and 11,000 pounds. The throw-weight of the SS-19 is about 9,000 pounds. SALT II rules out development and deployment of new missiles—by either signatory—that exceed the SS-19 in size or throw-weight. That accord, which both countries are pledged to honor, also prohibits development of more than one new ICBM. The Soviets have informed the US in the Standing Consultative Commission (SCC, the special body meant to clarify questions concerning compliance) that the SS-X-24 is the one new missile allowed them by the treaty. Since then, they have started flight-testing a new, smaller ICBM, the SS-X-25, which is roughly the size of the US Minuteman ICBM and is meant for mobile deployment.

Both the SS-X-25 and the as-yet-unnamed large ICBM constitute violations of the SALT accord. The latter runs afoul of SALT II because it is an unauthorized new missile, because it exceeds the size and throw-weight limits set by the treaty, and because it is a solid-propellant design meant to replace a liquid-fueled missile, which is also prohibited by the SALT II accord.

★ The Defense Department recently released a report, entitled "Improvements in US Warfighting Capability, FY 1980–84," that concludes that the Armed Forces are far more capable now than they were four years ago. Specifically, the report—which was prepared at the behest of Congress—found that there are more and better trained people on duty of substantially higher quality than was the case in 1980; that the Armed Forces are equipped with more modern and more effective weapon systems to defend against a numerically superior potential adversary whose strength continues to grow in numbers as well as in quality; and that US combat forces have better support today than they did in 1980. In the latter category, the report claimed that there is more strategic air- and sealift available to transport the combat forces to the theaters where they might be called upon to fight. Also, there are more war reserve munitions and spare parts to sustain these forces in combat once they get there.

In the case of the Air Force, the report finds that "we added two Air Force wing-equivalents since FY '80 and will be adding still another wing-equivalent when all the aircraft from FY '84 and prior appropriations are delivered." With the acquisition of almost 720 F-15s and F-16s during the period covered by the report, the inventory of these weapons will be 150 percent above what it was in 1980.

★ Soviet jamming of US telemetry systems is escalating. In addition to the Soviet interference with the Cobra Judy, Cobra Dane, and Cobra Ball monitoring systems that was reported earlier in this space, the Soviets are now jamming two critically important satellite systems. Included are the hush-hush Rhyolite and Argus systems. ■

CAPITOL HILL

By Kathleen G. McAuliffe, AFA DIRECTOR OF LEGISLATIVE RESEARCH

Washington, D. C., May 29

Reducing MX Buy

The Senate Armed Services Committee cut the FY '85 MX request from forty to twenty-one missiles, the same number funded last year. The House approved just fifteen missiles. Defense Secretary Caspar Weinberger wants Congress to apply the savings from the lower MX buy to readiness and sustainability, specifically training, ammunition, and spare parts.

Unlike the House, the Senate panel recommended buying the MX without any strings attached. The Committee, viewing MX as essential to arms-control negotiations, refused to "adopt restrictive language providing the Soviets with veto power over such an important US program." A total of $2.6 billion was included by the Senate Committee for the twenty-one missiles and related procurement. An additional $2.4 billion was approved for R&D of the ICBM modernization program, including the small, single-warhead missile, hard-mobile and deep basing, and silo hardening.

The MX barely survived in the House, where a compromise forged by Rep. Les Aspin (D-Wis.) authorized fifteen missiles, contingent on arms-control negotiations. According to House provisions, funds for the fifteen MX ICBMs may not be obligated until April 1, 1985—a six-month delay. Funds for basing, which make up about two-thirds of the procurement money, may be obligated, however. The funds for missile acquisition would be released on April 1 if the Soviets have not returned to arms-control negotiations or if the President certifies that the USSR is not acting "in a manner indicating that it is willing to take actions to further the control and limitation of types of strategic nuclear weapon systems similar to the MX. . . ." This allows the Administration some flexibility in determining whether or not the Soviets are bargaining in good faith should they return to the Geneva talks. A mere return to the table by the Soviets, with no bona fide intention of compromising on arms reductions, would not keep MX funds from being spent.

The House and Senate will reconcile differences on MX in conference on the FY '85 Defense Authorization.

Defense Authorization

The Senate Armed Services Committee recommended authorization of $299 billion for defense in FY '85, a level consistent with the Senate-approved and Administration-blessed budget resolution. The Committee cut $14.4 billion from the President's original request for $313 billion, which represented thirteen percent real growth. The after-inflation increase is now about 7.5 percent over last year, compared with about six percent in the House version.

The Senate bill authorizes funds for all major initiatives except Administration plans to begin production of binary chemical munitions. The Committee, which approved such funds in past years, bowed to the political pressures of an election year but encouraged the President to resubmit the chemical-weapons request in FY '86. Strategic programs were funded, albeit some at levels below the request. The Advanced Technology Bomber and the Advanced Cruise Missile, both of which are to have "Stealth" characteristics, were authorized for full funding despite being cut in the House. The B-1B program went unscathed, as did R&D for the C-17 airlifter. Two C-5Bs were slipped to FY '87, mirroring House action and DoD recommendations.

A total of $4 billion was cut from the Administration's tactical program request, but production rates of most major systems were maintained. F-16 production was kept at 150 and F-15 production was cut to forty-two.

Active-duty end-strength growth was reduced by 10,600. The five-percent pay-hike request was reduced to four percent, slightly higher than the 3.5 percent recommended by the House.

ASAT Moratorium

The House approved legislation banning antisatellite (ASAT) testing. The effect of the moratorium is to continue the limitations that were imposed last year by the Tsongas amendment.

The measure does not limit funding for development of the system but prohibits testing ASAT against a target in space unless the President certifies to Congress that the Soviets have resumed testing of their ASAT system. The Soviets have an operational ASAT system that can put at risk US reconnaissance satellites and other space-based assets in low orbit.

Opponents of ASAT testing hope the moratorium will induce US and Soviet leaders to negotiate an agreement controlling deployment of space weapons. However, the Administration said in a report to Congress that such negotiations are not in the national interest at this time and cited extensive verification problems inherent in an ASAT treaty.

Meanwhile, the Senate Armed Services Committee is recommending a more flexible approach to ASAT testing. The Senate panel would require Presidential certification that continued ASAT testing is essential to efforts to negotiate an ASAT arms-control agreement that is verifiable and consistent with US interests.

The Air Force planned to test its ASAT system late this year in the first in a series of ASAT tests against objects in space.

Air Base Defense

The House questioned USAF priorities in funding the new F-15E dual-role fighter for deep interdiction while neglecting point air defense of air bases in Europe. The House is concerned that without some point air base defense USAF air bases could not remain operational long enough for the F-15E capability to be utilized. It was recommended that further funding of the F-15E be contingent on DoD submission of a comprehensive master plan for US air base defense in Europe. Funding of the plan is to be at a level at least equal to that of the F-15E in the next budget.

The House authorized $350 million to continue air defense of US air bases in West Germany and to begin air defense of some air bases in Italy and Turkey. ■

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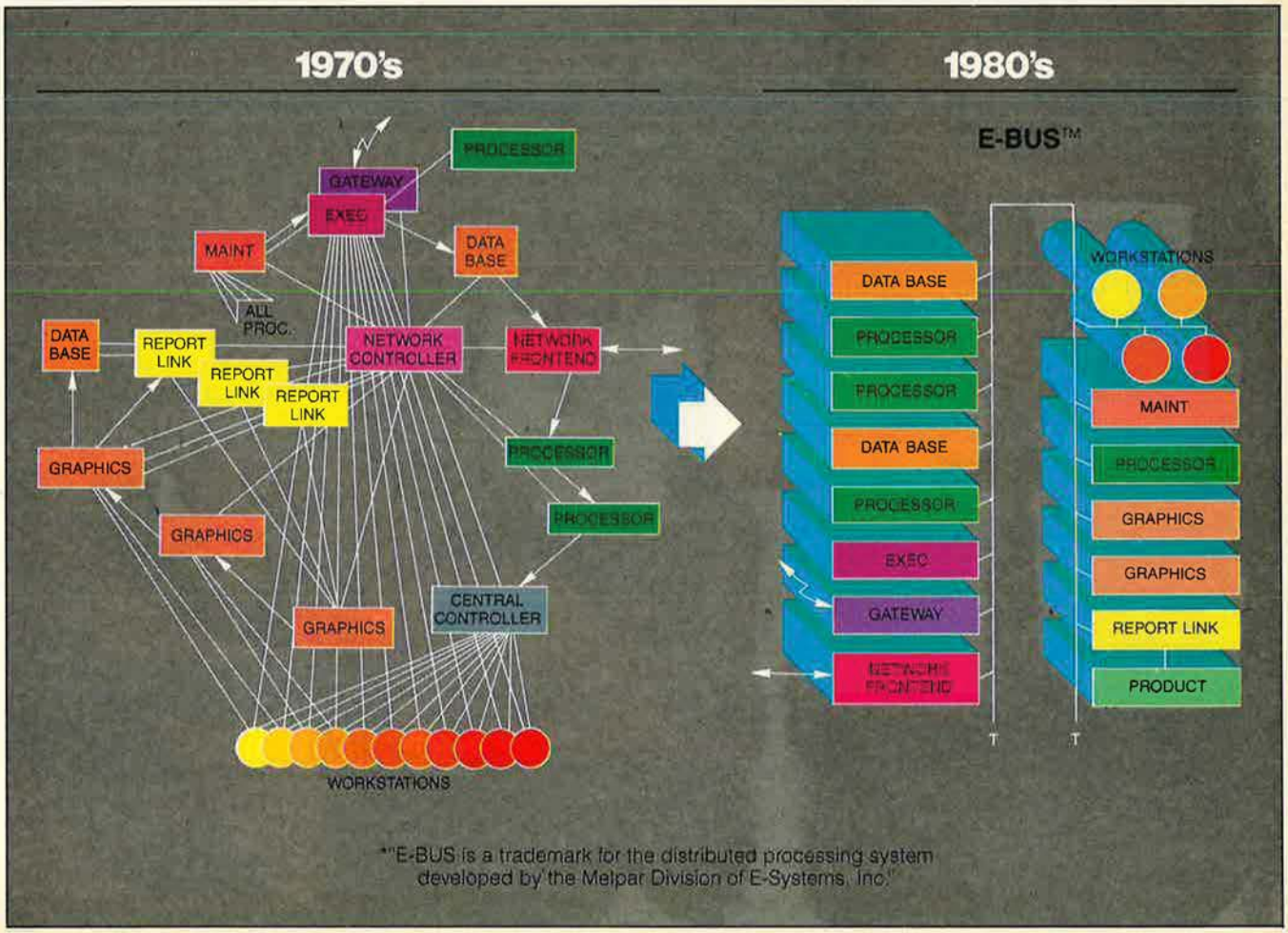

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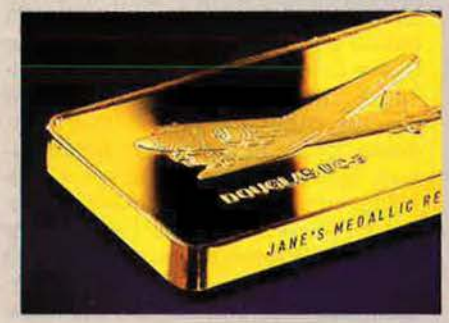

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VIEWPOINT

Talking Real Money

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

The SDI effort may prove to be our salvation down the road, but in the meantime more mundane matters shouldn't be neglected for the glamor of space.

New ideas make people nervous, and never more so than when the ideas have to do with warfare. We have no record of the staff meetings before the battle of Crécy, but to the extent His Majesty allowed discussion, there were doubtless grave misgivings about Edward III's plan to rely on longbows rather than on traditional knightly tactics. Chivalry died at Crécy, but the English carried the day. That, after all, is the objective of combat.

The most secret of World War II endeavors, the Manhattan Project, might have foundered had it been subjected to the kind of media and congressional attention that is routine today. As it was, not even Harry Truman was aware of the project until President Roosevelt died and he, as President Truman, had to make one of history's most shattering decisions.

Now it is 1984, an election year besides, and a major new project is under way, the Strategic Defense Initiative (SDI). Unlike the Manhattan Project, everyone and his uncle knows about this one. The SDI boss, Lt. Gen. James A. Abrahamson, must envy the privacy that insulated Lt. Gen. Leslie Groves as he directed the development of the bomb. Everyone not only knows of General Abrahamson's organization, almost everyone has an opinion about it, including our NATO allies, who see it as a divisive step.

Star Wars was fun as a Hollywood fantasy, but the real article tends to be unsettling. Until now, space has been a sort of romantic playground: weightless astronauts, space walks, blastoffs and reentries, even—when relations were not so cold—a nice little space rendezvous with Soviet cosmonauts.

The Strategic Defense Initiative is definitely not playfully inclined. Despite the alarm of arms controllers and the scoffing of opposition scientists, the SDI is looking for ways to destroy ICBMs in space. Since there is good reason to believe the Soviets are on the same track, common prudence would suggest we get to work. Even if ICBMs on an untested polar trajectory should not approach their east-west test accuracies—a theory of some eminent physicists—these things would still inflict terrible damage. If some way can be devised to destroy a substantial number of them before they could reach us, then maybe ICBMs could be negotiated away, or at least diminished as a strategic factor.

Whatever comes of the Strategic Defense Initiative, space will be increasingly important in our—and the Soviets'—military schemes. The Consolidated Space Operations Center is now under construction a few miles east of Colorado Springs. When finished, it will have cost more than $1 billion and will serve as the focus for Space Command's activities: controlling Shuttles, military satellites, and various other objects in the man-made galaxy. In the not so distant future, fighter-bombers and even individual infantrymen will know their exact position thanks to the Navstar Global Positioning System, which will provide triangulation fixes from eighteen satellites. Submarines will know within fifty feet of where they are. Their missiles will thus have land-based accuracy—unless, of course, the enemy knocks out the satellites.

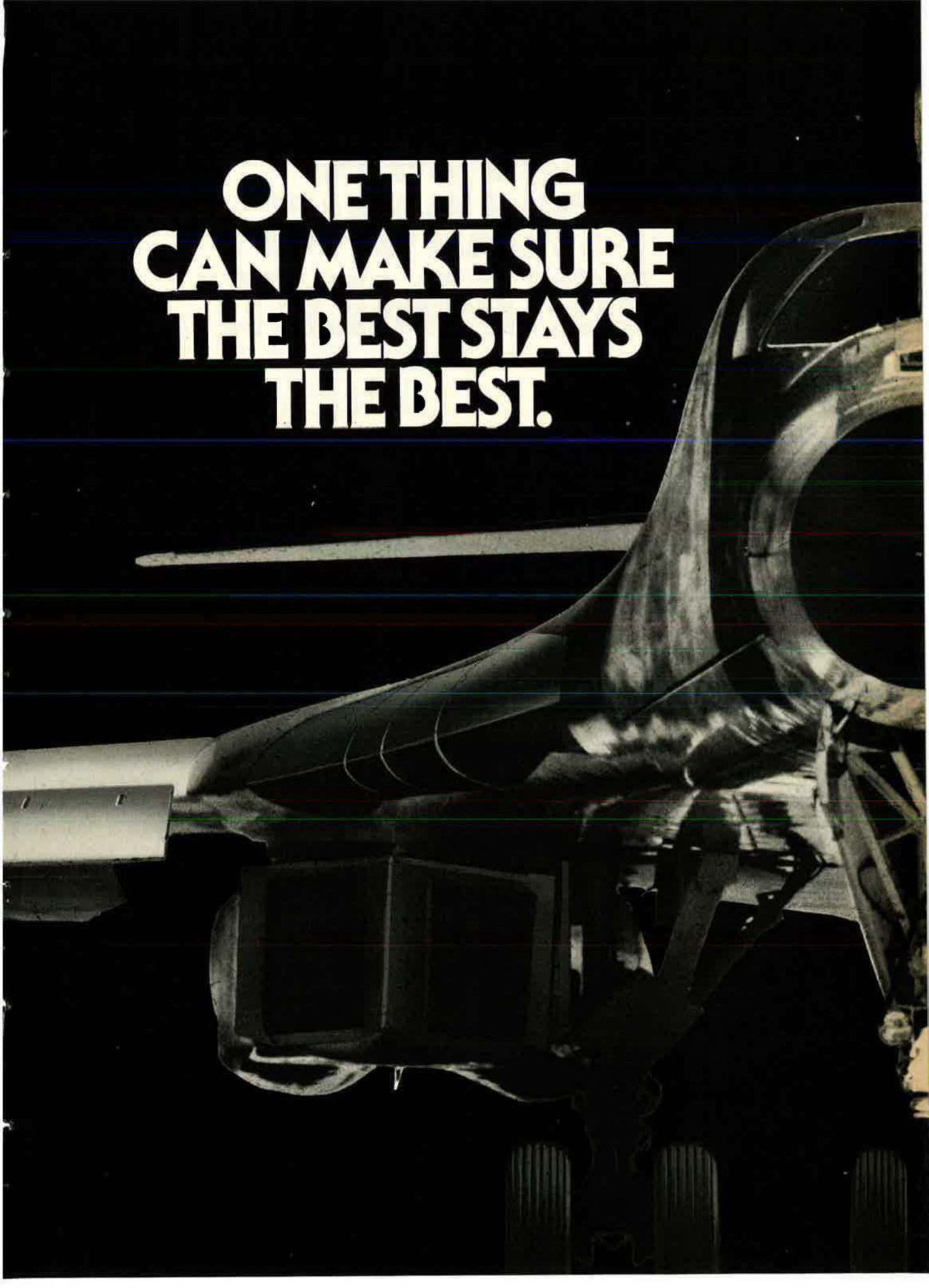
All of which is very exciting except for the disquieting thought that it may come about at the expense of more mundane activities. No matter how defense-minded an administration may be, there is always, in the end, just so much money. If you want this, you can't have that. The SDI is going to be expensive no matter in which direction it goes, whether toward space-based lasers, charged particle-beam guns, or the ingenious notions of High Frontier. Even without a missile-defense program, military space budgets have risen from $2 billion in 1974 to $10 billion projected for 1985, with the end nowhere in sight. Add the SDI's forthcoming demands to that and, pretty soon, in the late Sen. Everett Dirksen's words, you are talking real money.

Former President Nixon has said in his book *Real Peace* that the US and the USSR cannot afford to go to war against each other under any circumstances: "The cost to both sides of a full-scale conventional or nuclear war would far exceed any conceivable benefits." He is, of course, right, but the trick is to keep the other side convinced of that logic. If such a war does happen, it will be because our side has become an irresistible target for an international mugging.

All things remaining even approximately equal in the way of nuclear offenses and defenses, the likelihood of a nuclear war will remain small. Still, it would take a supreme and unworldly optimist to believe wars below the level of a nuclear exchange will not continue to happen.

In spite of the glamor of space, it can still be pretty exciting here on earth. There are a lot of countries in this world who do not wish us well, and they have assembled some very considerable military formations whose ultimate purpose is to do us in, given the right circumstances. We have already taken a dangerous step toward vulnerability by excusing the citizenry at large from responsibility for national defense. The All-Volunteer Force thus forms a thin line. To be effective, they must be truly superior, a condition that requires training, adequate reserve stocks, the best equipment, and, it goes without saying, first-class people. In other words, plenty of money.

Space is glamorous and—who knows?—it may be the key to our salvation somewhere down the road. But, in the meantime, it would be foolhardy to take space research out of the conventional forces' hide. ■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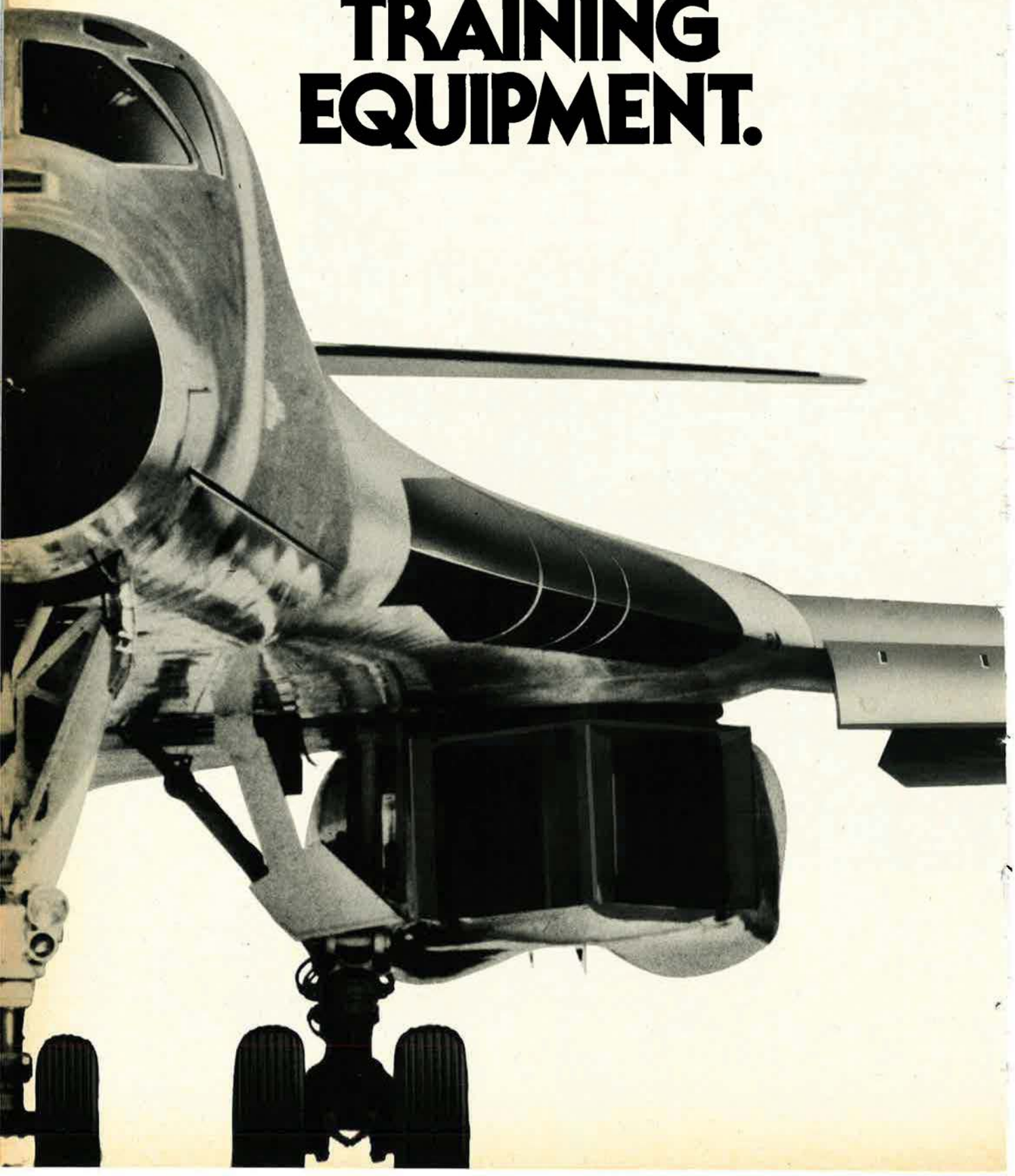

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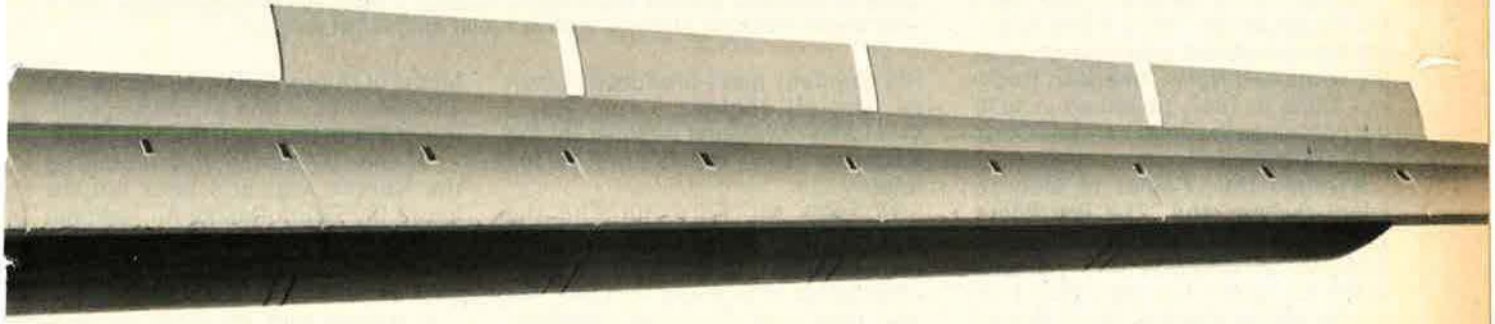


AEROSPACE WORLD
News, Views & Comments

By William P. Schlitz, SENIOR EDITOR

Washington, D. C., June 6

★ In July, four aerospace pioneers were to be enshrined in the National Aviation Hall of Fame, Dayton, Ohio. The four:

• Known as "The Dean of Aerospace," John Leland "Lee" Atwood boasts a career that spans the years from the transatlantic Lindbergh flight to the Space Age. An engineer with the Army Air Corps in 1928, Mr. Atwood subsequently joined Douglas Aircraft Co., where he made vital design contributions to the DC-1, DC-2, and the world-famous DC-3 commercial transport. With North American Aviation Co. from 1934 onward, he was integral in the design and development of aircraft beginning with the AT-6 Texan and running through the B-25, P-51, F-86, and F-100. Mr. Atwood went on to the Space Age with his work on the X-15, the Apollo Command and Service Modules, rocket propulsion systems, and guidance and control systems for air, surface, and submarine vehicles.

Mr. Atwood's contributions have continued on into the B-1 and Space Shuttle programs. The first chief of the combined North American Rockwell Corp. in 1967, he retired in 1970 but continues to serve Rockwell Corp. as a consultant.

• Called the "Father of Modern Flight Testing" and "The Test Pilot's Test Pilot," Maj. Gen. Albert Boyd, USAF, is considered to have been one of the Air Force's top test pilots. During his career, General Boyd logged 23,000 hours in 723 different aircraft. He received worldwide recognition for his technical and scientific abilities and achievements in aviation and for the new philosophy of flight-testing he developed.

After retiring from the Air Force, General Boyd began a second career as an aerospace industry executive while continuing as an engineering test pilot. He died in 1976.

• Automotive manufacturing genius Henry Ford became involved in aviation in 1909, only six years after the Wright brothers' first powered flight, when he built a primitive monoplane powered by a Model T engine.

Hughes Helicopters, Inc.'s Higher Harmonic Control (HHC) aircraft undergoes flight-testing of its computerized vibration-control system at the company's Mesa, Ariz., facility. Demonstrated has been a reduction of eighty percent or more in fuselage vibrations at cruise speeds and during selected maneuvers. This should provide a boost for sensitive avionics and weapon systems, a reduction in maintenance, and a more stable weapons platform. HHC is a joint Army/NASA program.

His company mass-produced "Liberty" aircraft engines during World War I and developed engines for the Kettering "Bug," the US's first guided missile.

In 1925, Mr. Ford initiated the world's first regularly scheduled commercial airline devoted to the business needs of a single company. He also built Ford Airport at Dearborn, Mich.—the first modern airport in the world.

Later, the airline carried the first airmail on regularly scheduled routes between Detroit, Chicago, and Cleveland. In that era, Ford engines powered the 4-AT Trimotor while his new Airplane Manufacturing Division became the world's largest manufacturer of commercial aircraft.

During World War II, Ford built thousands of Pratt & Whitney engines and B-24 bombers. Mr. Ford died in 1947.

• USMC's Maj. Joe Foss shot down twenty-six enemy aircraft during World War II and was awarded the Medal of Honor. Following the war, he entered politics and served as governor of South Dakota in the mid-1950s.

He served again in uniform during the Korean War and later helped found the South Dakota Air National Guard. An early AFA leader, he was elected National President in September 1961 for a year's term.

In league with the enshrinement ceremonies, The Ninety-Nines, America's premier women's aviation organization, was to be awarded the Hall of Fame's Spirit of Flight Award.

The international group of licensed women pilots was formed in response to a query by aviatrix Amelia Earhart. Today, more than 5,000 members engage in educational, charitable, and scientific activities to promote aeronautical science. Members include professional businesswomen, mothers, and housewives.

★ Agreements have been signed regarding the production and delivery of more than $1 billion in machine

tools essential to defense production during national security emergencies, according to the Federal Emergency Management Agency (FEMA).

FEMA, based in Washington, D. C., has overall responsibility for the Machine Tool Order Program, initiated in mid-1982.

Other agencies involved include the Departments of Defense and Energy, which identify emergency mobilization needs; the Department of Commerce, which tags specific products and contractors to meet those needs; and the General Services Administration, which oversees the production contracts.

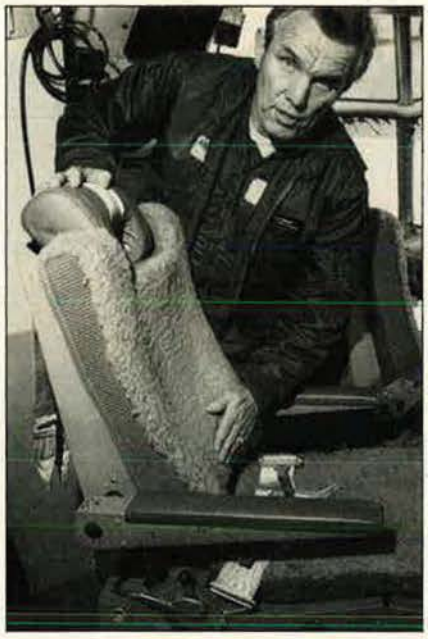
Machine tool builders from fourteen states have currently signed up for the program, with the majority in the Midwest and New England states.

★ Northrop Corp. is pressing hard to establish markets for its F-20 Tigershark, the US's newest tactical fighter.

One such initiative is unprecedented in military aircraft history, according to company officials: Northrop plans a commitment to provide all the spare parts for the aircraft at a fixed-price per flying hour.

"We can now eliminate the uncertainty about spare-parts costs that has plagued military services all over the world," commented David J. Deering, a company vice president. "The F-20 was developed to provide a very high level of combat capability, and at the same time provide unsurpassed reliability and maintainability. The commitment to fixed-price parts support will provide the F-20 user with predictable, low costs."

Northrop, which is also offering the aircraft at a fixed price, said its commitment to provide the spares will extend through the life of the program. The US government has agreed to communicate the program's details to foreign governments, to which Northrop hopes to sell the F-20.



Lockheed-Georgia Co. test pilot Bernie Dvorscak points out the natural sheepskin cover of a new, orthopedically designed crew seat. Such seats are now being installed on USAF's C-130 Hercules transports.

Three F-20s, built by the company and its 519 suppliers in twenty-nine states, have logged about 600 flights at Edwards AFB, Calif.

★ USAF has accepted the first Joint Tactical Information Distribution System (JTIDS) Class 2 terminal. The terminals are designed to make vital battle data immediately available to Air Force fighter aircraft and Army air defense units.

Air Force Systems Command's Electronic Systems Division developed the terminal under a combined Air Force and Army program.

Consisting of two containers the size of breadboxes, the system is part of ESD's JTIDS program to develop jam-resistant means to exchange information rapidly during combat.

"This terminal is the first of forty we'll get by early 1985," noted program manager Lt. Col. Curtis Newill. "These development models will be put into F-15 aircraft and Army air defense systems. A joint service test program at Eglin AFB, Fla., from April 1985 to March 1986 will check their performance in an operational setting."

JTIDS Class 1 terminals, considerably larger than Class 2, are already installed in US and NATO E-3A airborne warning and control systems. Plans call for their installation in ground sites later this year.

According to Colonel Newill, "We have many sensors out there collecting information of great value to our tactical commanders and fighting units. These terminals will pass that current data along despite enemy attempts at jamming. The information is put on aircraft cockpit displays and into computers of Army ground weapon systems. This will greatly increase our air/land tactical units' effectiveness and survivability."

Singer Co.'s Kearfott Division, Little Falls, N. J., is producing the forty Class 2 terminals under an $85 million fixed-price contract. The services are to make a production decision in 1986 following completion of the joint tests.

The third Northrop F-20 Tigershark made its first flight at Edwards AFB, Calif., on schedule this spring. Northrop Corp. is seeking to establish markets for the US's newest tactical fighter. See item.

AEROSPACE WORLD

A significant feature of the contract was the requirement that Rockwell International's Collins Government Avionics Division, Cedar Rapids, Iowa, serve as a second production source. Collins is sharing design and manufacturing responsibilities and is expected to deliver five of the terminals.

Both companies are also participants in ESD's GET PRICE (Productivity Realized through Incentivizing Contractor Efficiency) program with industry to produce quality equipment at reduced prices.

★ Jetliner pilots will soon be able to "fly" into crowded airports while under the direction of an air traffic controller and to deal with other approaching aircraft, extreme weather conditions, and even mechanical failures—all from the safety of the ground.

"These ground-based studies of pilot responses, controller commands, and air traffic operations—plus evaluation of new procedures and systems—will further improve" the safety of airliners, NASA officials recently announced.

NASA's unique new Man-Vehicle Systems Research Facility (MVSRF) at Ames Research Center in California is dedicated entirely to the study of human factors in aviation, including pilot fatigue and stress and complex operations.

MVSRF will make possible the study of interaction among flight crews, the aircraft, air traffic control, and as many as thirty-six other aircraft.

Prior to MVSRF, simulators were used primarily for developing and testing aircraft hardware and software systems and for crew training rather than for human-factors research.

According to statistics, human error plays a part in sixty to eighty percent of all aviation accidents. The new facility will allow scientists to study how errors are made as well as how automation and advanced instrumentation affect human performance.

Simulation of complete flights will be possible, with observer stations provided in the MVSRF's two transport aircraft cockpits and also at remote locations. From these, such problems as turbulence, traffic, fog, or mechanical failure can be introduced or scenarios modified.

One of two simulators—the Advanced Concepts Flight Simulator—represents technology projected to be flying by 1995. It is equipped with desk-top flight controls and displays instead of the conventional steering wheel and column. Included also are cathode-ray tubes with touch-sensitive panels for pilot interaction.

The other simulator is a replica of a Boeing 727 Series 200 cockpit.

The French Ministry of Defense has authorized the production of the Atlantic 2, of which forty-two will be acquired by the French Navy. While the airframe and engines are identical to those of the predecessor Atlantic 1, the equipment for antisubmarine and antisurface warfare is entirely new. The Atlantic 1 was selected by NATO in 1958 as its maritime aircraft and was designed specifically for that mission.

A milestone was passed recently at Beale AFB, Calif., when for the first time in more than twenty years three pilots soloed on the same day in the U-2/TR-1. The three soloists are, from left, Maj. Robert Uebelacker and Capts. Clifford Napolitano and James Perkins. (USAF photo by A1C John Q. Adams)

★ Four US aerospace companies have each been awarded a $5 million Air Force contract for the design of a hard-mobile launcher for the new small intercontinental ballistic missile.

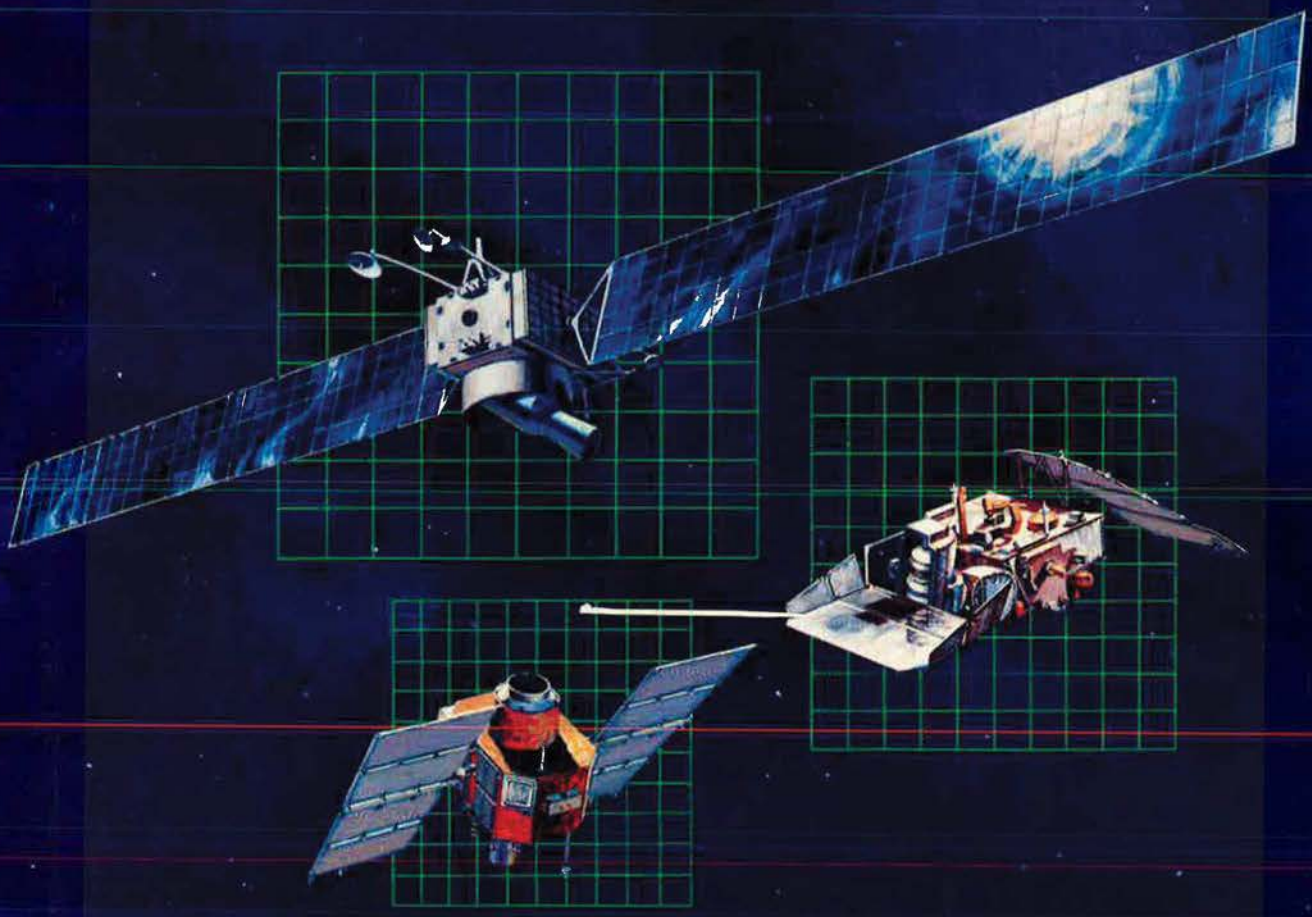
Boeing Co., Martin-Marietta, General Dynamics/Convair, and Bell/Textron are to develop concepts for a vehicle that would protect, transport, and launch the small ICBM—a weapon being developed for initial deployment in the early 1990s.

The missile, less than one-sixth the weight of the Peacekeeper ICBM, is to be integral to the strategic modernization program recommended by the Presidential Commission on Strategic Forces (the Scowcroft Commission) and approved by Congress in 1983.

★ In Navy news, the USS *Iowa* has followed the *New Jersey* as the second battleship to be modernized and recommissioned.

The *Iowa* has been equipped with eight armored box launchers for thir-

Tracking the Surveillance Leader



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- **First space-qualified infrared mosaic focal plane for detecting air vehicles from space (Teal Ruby).**
- **First Mercury-Cadmium-Telluride detectors for an operational space program.**

Through these accomplishments and many more, we've laid the groundwork necessary for the next generation of strategic space based surveillance programs. We recognize their importance, and we've been preparing for some time the approaches that will make them the space success stories of tomorrow.

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ty-two Tomahawk cruise missiles; four quadruple cannister launchers for sixteen Harpoon cruise missiles for antiair and antimissile defense; modern communications, air and surface search radars, and electronic countermeasures systems; and an operating station for a helicopter and hangar space for an additional three.

All this, of course, supplements *Iowa's* original weaponry of nine sixteen- and twelve five-inch guns.

The ship's primary mission is to serve as the predominant unit of a Surface Ship Action Group guarding carriers or as an independent force, Navy officials noted.

It was also announced that Everett, Wash., is to be home port for a carrier battle group in Puget Sound, with the first of about fifteen combatant ships to be stationed there—following a construction program—in late 1988.

AEROSPACE WORLD

★ AFSC's Aeronautical Systems Division, Wright-Patterson AFB, Ohio, is acquiring from 1,500 to 1,600 lightweight decontamination systems. The first batch of systems is currently being delivered to US bases abroad.

The new systems are more flexible, lighter in weight, and have a larger capacity than units currently in use. Variable water pressure and temperature will allow the new decontaminators to remove contaminants from aircraft, vehicles, other equipment, and people.

Engineered Air Systems, St. Louis, Mo., is producing the new systems as US licensee for the Norwegian-designed system. Besides the bases overseas, CONUS mobility units will also be reequipped.

The systems consist basically of a gasoline engine and pump. They heat water to 248 degrees Fahrenheit and pressurize it up to 100 pounds per square inch and can utilize water from any source, including ponds and streams.

Weighing only 360 pounds, a system has a fully transistorized electrical control system and can be carried by a team of four. The system can be supplemented with a 1,580-gallon-capacity, collapsible, fabric tank.

Adaptable for all weather, it can also be a source for drinking water, showers, kitchens, laundries, and autoclaves.

A new, lightweight decontamination system, shown here during a recent chemical defense exercise at Lambert Field in St. Louis, Mo., is currently being distributed to US bases overseas. AFSC's Aeronautical Systems Division will acquire 1,500 to 1,600 of the systems for eventual use at CONUS bases. In the foreground is the system's 1,580-gallon-capacity, collapsible, fabric tank. See item.

★ The Air Force plans to automate the weather stations at its bases in the first major upgrade in military forecasting in about thirty years. The modernization will allow forecasters to plot and interpret weather nearly nine times faster.

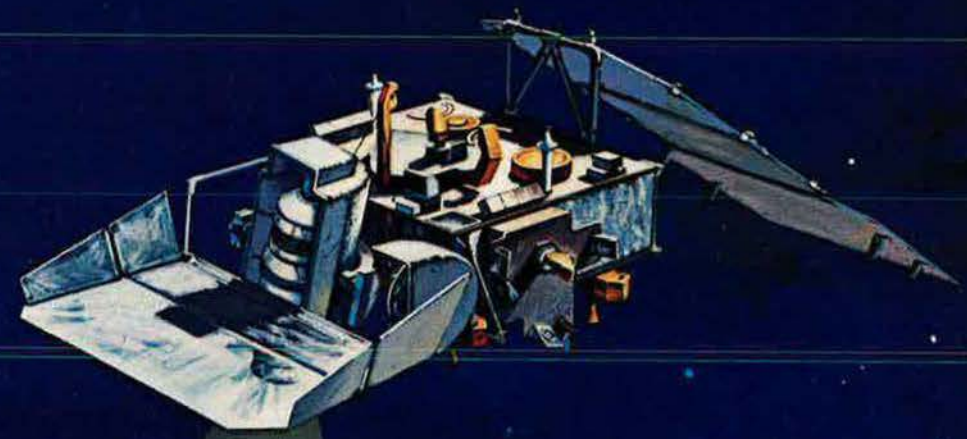
AFSC's Electronic Systems Division, Hanscom AFB, Mass., is to develop the advanced electronics for the Air Weather Service. As currently visualized, plans call for producing and deploying 166 fixed-base and twenty transportable versions to support worldwide Air Force and Army flying operations.

The automation will enable Air Force meteorologists to complete forecasts in just five minutes compared to the three-quarters of an hour it now takes, according to Donald E. Turner, program manager. "It's the first innovative move in military forecasting since weather map machines appeared in the later 1950s," he noted. "We'll get more accurate profiles of weather fronts and impending storms and lots of numbers to characterize their intensity."

This will be possible due to the vari-

(Continued on p. 39)

Tracking the Sensor Innovator



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AEROSPACE WORLD

Sponsors are sought for a monument, based on this miniature, to honor World War I Overseas Flyers. Sponsors should contact Ira M. Jones, 1037 N. Astor St., Milwaukee, Wis. 53202. Phone (414) 276-4210.

The Annapolis Connection Continues

Upon graduation from the Naval Academy in May, four midshipmen were sworn in as Air Force officers.

Officiating at the Academy was Maj. Gen. Ralph H. Jacobson, Director of Special Projects, Office of the Secretary of the Air Force, assigned to Space Division in Los Angeles, Calif. General Jacobson is himself an Annapolis graduate, Class of 1956.

(For more on the tradition of Naval Academy graduates accepting Air Force commissions and subsequently rising to positions of blue-suit leadership, see the article "The Annapolis Connection," by former middle Maj. Gen. Robert A. Rosenberg, USAF, in the February '84 issue.)

Among the four midshipmen in the Class of 1984 opting for service in the Air Force is General Jacobson's son, Matthew, who has been slated for undergraduate pilot training at Williams AFB, Ariz.

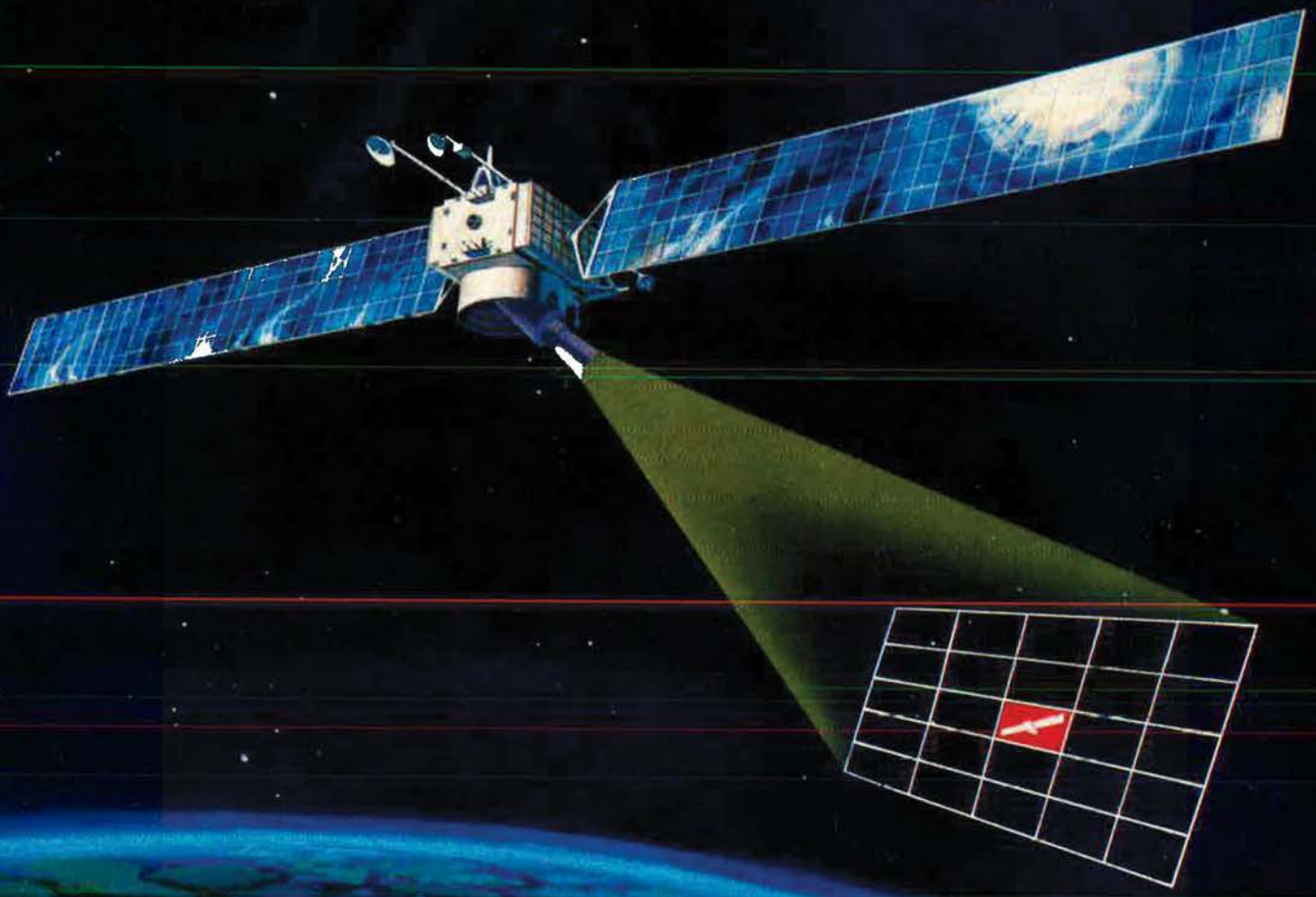
Of the others, 2d Lt. Jeffery Amerine, son of Lt. Col. Ernest Amerine, USAF (Ret.), is to report to Vandenberg AFB, Calif., to attend Missile Launch Officers School. The son of USAF's SMSgt. Lindberg Andrews, 2d Lt. Tae Wan Andrews, has been assigned to Signals Intelligence at Lowry AFB, Colo. And 2d Lt. Stephen Shepherd, son of Col. Thomas Shepherd, USAF (Ret.), is to attend undergraduate pilot training at Reese AFB, Tex.

Donning a different shade of blue suit is not a one-way street. In June, several graduates of the Air Force Academy's Class of 1984 accepted commissions as Navy ensigns.

***BELOW:** Jagdbombergeschwader 38, based in Jever, Friesland, is the German Air Force's first operational Tornado unit. Crews for the unit's twenty aircraft were trained at the Tri-National Tornado Training Establishment at RAF Cottesmore, UK.*

Standing in the Naval Academy's Memorial Hall, which is dedicated to all alumni who have lost their lives in battle, is the latest crop of graduates to accept Air Force commissions. Maj. Gen. Ralph H. Jacobson, USAF, center, officiated at the swearing-in ceremony. The new blue-suiters are, from left, 2d Lt. Stephen Shepherd; 2d Lt. Tae Wan Andrews; General Jacobson's son, 2d Lt. Matthew Jacobson; and 2d Lt. Jeffery Amerine. See adjacent box.

Tracking the System Developer



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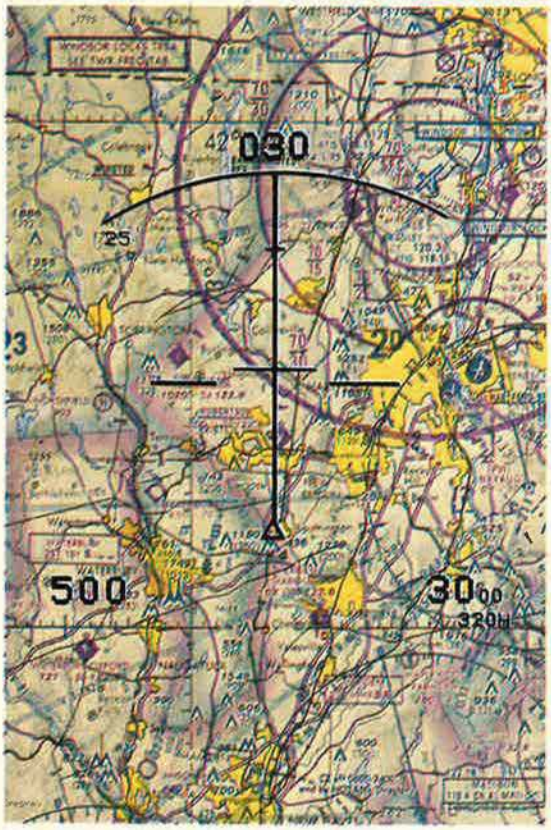

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UNITED TECHNOLOGIES
HAMILTON STANDARD

(Continued from p. 34)
ety of computer graphics and the greater amounts of digitized data that will be immediately available to meteorologists. Weather personnel will edit data by keyboard and be able to correct the computer displays instantly. The screen will show forecast information similar to that appearing on television weather programs.

The new system will do away with the need for teletypes, weather advisory printouts, and weather map data that presently has to be traced or transcribed by hand.

Worldwide weather data originates from two principal centers—Offutt AFB, Neb., and Carswell AFB, Tex. It is distributed to US bases via telephone lines and to overseas locations by either satellite or international cable.

AEROSPACE WORLD

★ **NEWS NOTES—Federal Express**—the overnight aerial parcel delivery service—has agreed to commit three of its wide-body DC-10-30 **aircraft to the international routes of the Civil Reserve Air Fleet.** They'll join the CRAF fleet of about 390 aircraft volunteered by US carriers and earmarked for MAC to support DoD airlift requirements in national emergencies. *(For more on CRAF, see the article "Partners in Airlift" in the February '84 issue.)*

In June, **Judith A. Resnik,** who holds a doctorate in electrical engineering from the University of Maryland, was to have become the **second American woman in space** during the maiden voyage of the Space Shuttle *Discovery.* Her primary duty among the six-astronaut crew was the deployment and retraction of an experimental 102-foot solar panel. She was also to assist in the operation of the first production model of a pharmaceutical factory in space.

Died: Gordon Sinclair, Canadian newsman, whose 1973 broadcast entitled "The Americans" castigated the world for its lack of appreciation of the US's humanitarian contributions and which was recorded on a forty-five-rpm disc and distributed as a memento at the 1974 AFA National Convention, of a heart ailment in Toronto, Canada, in May. The journalist was eighty-three. ■

INDEX TO ADVERTISERS

Gary Gelt Joins Air Force Magazine

Gary Gelt has been appointed Air Force Magazine's Advertising Sales Manager for the West Coast.

A graduate of the State University of New York, Mr. Gelt has extensive advertising sales experience, having worked for the Los Angeles *Times* for the last eight years. Prior to that, he was with the Los Angeles *Herald-Examiner.*

Mr. Gelt can be reached at the new Los Angeles sales office at 5200 Century Blvd., Los Angeles, Calif. 90045. The telephone number is (213) 641-7970.

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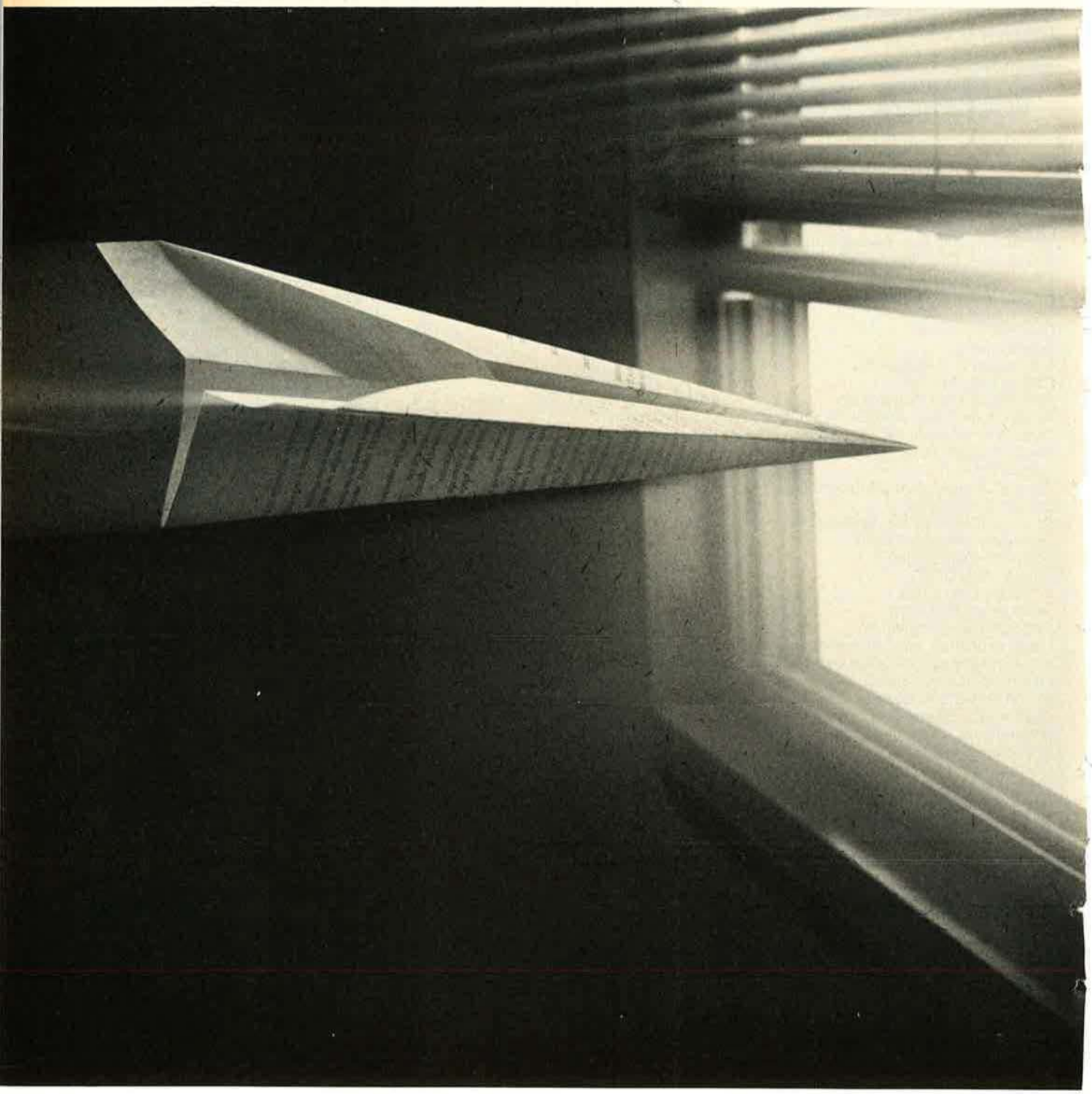

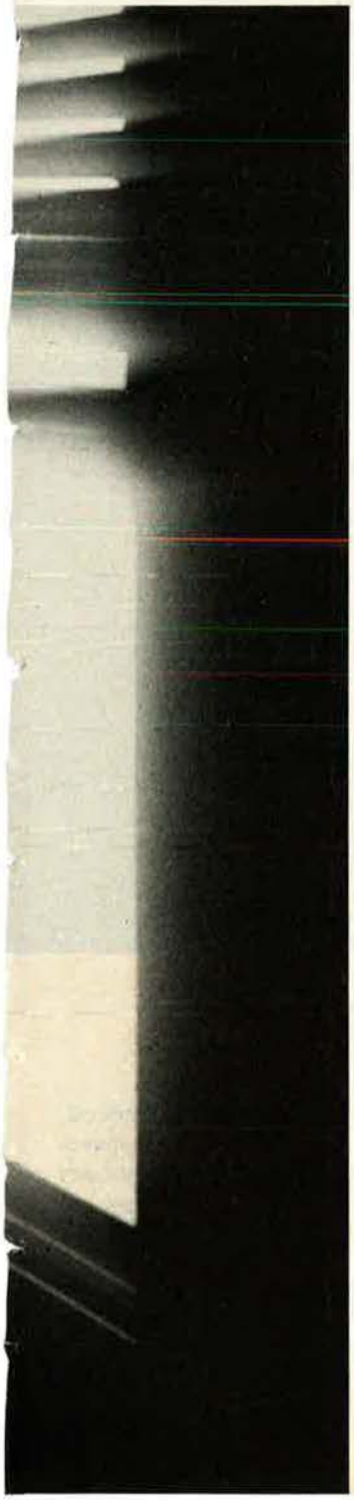

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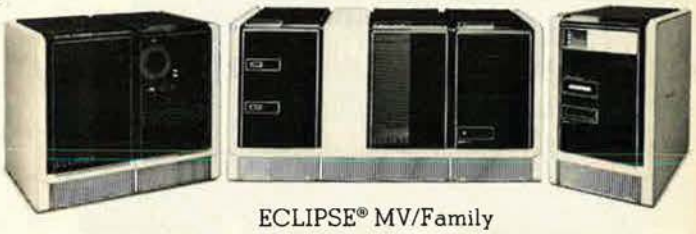

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a Generation ahead.

All across the defense spectrum, C³I is gaining attention and getting better—and the demands on it are growing accordingly.

Fast Track For C³I

BY JAMES W. CANAN
SENIOR EDITOR

THIS nation's command control communications and intelligence (C³I) is coming on strong from its also-ran status of the 1970s. It no longer takes a back seat to weapons, which need C³I as never before.

As the top-priority beneficiaries of the Reagan Administration's long-range Strategic Modernization Program, strategic C³I systems are being upgraded, hardened, and dispersed more widely. They are also becoming more numerous and more mobile.

Consequently, such systems are shaping up as much better able to survive a nuclear strike, and to keep on operating, than they were even at the beginning of this decade—when they were vulnerable indeed.

Tactical C³I also shows improvement, thanks in large part to greater C³I teamwork—in programs and in applications—among the military services.

On both the strategic and tactical fronts, C³I has a long way to go, however, before military and civilian command authorities can take

total comfort in its potential for making winners out of US forces and weapons in wartime.

There are many problems, and solving them is very tricky and expensive. C³I innovations and improvements account for nearly $36 billion in the FY '85 Defense budget. Congress has been kind to the Pentagon's C³I funding requests in recent years. Given the current defense budget crunch, however, the lawmakers' largesse may be coming to an end.

Progress and Problems

Defense-wide progress and problems in C³I were made abundantly clear at the April 26–27 Air Force Association National Symposium on "Electronics and the Air Force—C³I Developments and Their Impact on Military Plans and Operations," held at Wakefield, Mass.

Even though the Symposium's military and civilian speakers ranged widely and variously among C³I and other topics, one common theme emerged.

It was this: For all the recent progress, C³I is becoming ever tougher to put into shape. In the strategic and tactical arenas, the demands on US C³I are growing so fast that improvements are hard-pressed to keep pace.

For example, strategic C³I is now being called upon not only to ensure that the US can deter and detect a nuclear strike, and retaliate with sustained effectiveness over several months of warfare, but also to become the central nervous system of an emerging and highly demanding nonnuclear defensive strategic posture as well.

As a result, C³I planners and designers have come smack up against an additional, unprecedented, enormously difficult task. They must devise the C³I architecture for the multitiered defense against ballistic missiles that is the goal of the Administration's Strategic Defense Initiative (SDI) program. And that's not all.

The Defense Department is putting together another program called Strategic Defense Architecture (SDA) 2000. Its ambitious goal is to integrate space defense, ballistic missile defense, and air defense. Such a broad integration will utterly depend on C³I and will demand a great deal of it and from it.

At the AFA Symposium, Dr. Donald C. Latham, Deputy Under Secretary of Defense for C³I, explained the rationale for the SDA 2000 program:

"It makes no sense to try and build some sort of ballistic missile defense [but] leave yourself wide open without any air defense against Soviet attack by cruise missiles and/or bombers."

Ditto for Soviet attack by antisatellite (ASAT) weapons in space.

Dr. Latham's topic at the AFA Symposium, which attracted an audience of several hundred, was "C³I Progress to Date: Prospects for the Future."

The Symposium also featured several other speakers who dealt with tactical C³I ramifications that are germane not just to USAF but to all the services.

Harold Kitson, Deputy Assistant Secretary of the Navy for C³I, discussed "Navy C³I," with special emphasis on progress and problems in Navy-Air Force interaction and interoperability.

Casting "a jaundiced eye at our C³I equipment," Army Lt. Gen. Robert C. Kingston, Commander in Chief, US Central Command, told of his unique and demanding C³I requirements when he spoke on the "Genesis of the US Central Command: Protecting US Interests in an Arc of Crisis."

USAF Lt. Gen. James R. Brickel, Deputy Commander in Chief of US Readiness Command and Vice Director of the US Joint Deployment Agency (JDA), discussed "Joint Deployment Systems: Joint C³I Systems" in the context of REDCOM's and JDA's wartime mobilization mission.

Staggering Complexity, Little Time

Dr. Latham described the prospective C³I battle-management role in SDI as embodying "a very complex set of functions" that would have to be done in a twinkling.

"We are trying to look," he said, "at how we would activate a defense that is going to have to be almost automatic, in a very dynamic situation . . . with thousands of objects in the air at any one time. We'd somehow have to do a tactical assessment over very long ranges against very complex threats. We would have to have the capability to modify our tactics in real time.

"Kill assessment is going to be difficult; you have to know what all your subsystems are doing—and [you have to] be able to stand the system down. Those are just a few of the key things."

The Deputy Under Secretary called the IFF (Identification, Friend or Foe) problem inherent in an SDI system "really staggering." Dr. Latham described the difficulty of the C³I tactical warning assessment problem with regard to missile launches, even now, as follows:

"Typically, there are 500 missile launches a year [by] the Soviet Union, ourselves, and others that we have to observe and assess." Moreover, "Just very recently, the Soviets launched a large number of ICBMs and SLBMs in a very short period out of operational silos, so our assessment problem is very real."

In the complicating context of SDI, Dr. Latham continued, "If you're going to do boost-phase kill, it's got to be activated within two to three minutes after the boosters leave the ground, and you'd better make sure it isn't a friendly launch. So you've got to have high-capacity communications and ADP [automated data processing] in space that will operate under very stressful conditions."

Dr. Latham described the exercising and testing of an SDI system as "an enormous challenge—a one-on-one test is going to be meaningless; how do we conduct a many-on-many test?"

He depicted the major battle-management functions of a multitiered defense against ballistic missiles as involving:

- A system battle manager to consolidate the attack and kill-assessment information and intelligence, provide the overall defense strategy, exercise the doctrine of weapons release, monitor all the subsystems, keep track of the battle situation, and reconfigure the system as necessary.
- A boost-phase defense battle manager to watch the attack as it develops in that phase, coordinate and conduct the engagement of defensive weapons, and pass on battle

information for the next phase.

- A midcourse-phase defense battle manager to assess the attack, receive and disseminate "launch and engagement authority," conduct "the midcourse battle," and pass on battle information for the next phase.
- A terminal-phase battle manager to assess the attack, receive and disseminate "sensor-activate and engagement authority," conduct the terminal battle against RVs plummeting into the atmosphere, and pass information to the system battle manager.

DoD has budgeted $99 million for work on missile-defense battle-management C^3 and systems analysis in FY '85, Dr. Latham said, adding, "We are looking at such things as 'smart' algorithms, fault-tolerant computers, communications networks that we haven't ever invented before, and some way to build a test facility to evaluate some of these things."

The "Must" List

In the systems analysis area, the SDI C^3I planners are "looking at responses to threats" and "trying to develop an overarching system and operational concept for integrating all of this—and that will go on for years and years," the Deputy Under Secretary declared.

Dr. Latham continued: "What we need is a system that could have five to ten years of operation without maintenance, hardened memories and logic, 100-MIPS processors in space, and large construction sets that are essentially failure-free." He also ticked off such additional "SDI needs" as totally dependable software programs, millimeter-wave and laser space communications, multinode space, air, and terrestrial communications networks, and completely reliable interfaces between human operators and space-based weapons.

All this, DoD's top man for C^3I emphasized, adds up to "a tremendous technology challenge, and then, on top of that, it's an incredible systems challenge."

Dr. Latham also made the point that nearly all proven C^3 technology and demonstrated systems capability ("demonstrated, or at least worked on heavily") for ballistic missile defense now lie almost solely in the singular arena of terminal defense.

"We've got some reasonably well-developed systems concepts for terminal defense," he said. "We know how to do things a la the [once-planned] Safeguard [ABM system], if we wanted to do it again."

Otherwise, Dr. Latham made clear, the Pentagon is starting from scratch on C^3I for SDI. "Very little has been done on midcourse, and certainly nothing on boost-phase," he said.

This is why the development of C^3I technologies for boost-phase and midcourse target surveillance, acquisition, tracking, and kill assessment (SATKA) is attracting major attention in the $26 billion, five-year SDI program.

"First of all," said Dr. Latham, "we need a threat data base. For example, what does a Russian post-boost vehicle look like? So we're going to have to work at post-boost imaging, with a multispectral approach. We're going to have to develop IR [infrared] sensors with millions of detectors in them, and coolers to cool them."

Also on the SDI C^3I technologists' lengthy lists of "must" projects are, for example, IR detectors for midcourse defense and airborne optical and radar imagers for terminal defense, the Deputy Under Secretary said.

In the development of a multilayered defense against ballistic missiles, C^3I—not weapons—will set the pace. "The C^3I battle-management systems analysis area is probably going to dominate how the [SDI] weapons and all of that come out, and we're going to try to drive the program from the top down with C^3I and battle-management work," Dr. Latham declared.

The Soviet Challenge

The backdrop for the Deputy Under Secretary's discourse on the tough technological and systems challenges of the SDI program was his sobering assessment of the Soviet threat that the program is being designed to meet. In general, he said, the Soviets "are outspending us and outproducing us, and will continue to do so" in terms of military systems and forces. Dr. Latham was joined in this assessment at the AFA Symposium by USAF Col. Donald "Desi" Arnaiz, Tactical Air Command's Deputy Chief of Staff for Intelligence.

Both agreed that the Soviet Union clearly has an established and growing first-strike capability. Dr. Latham emphasized, in that vein, that US C^3I is under the "very heavy burden" of making sure that the National Command Authorities (NCA) recognize a legitimate threat warning and a first strike when they see one, can assess its magnitude and damage, have the sustained means of ordering and orchestrating retaliation, and can carry on a nuclear engagement for some time following initial launch. Thus it is "very important" that the NCA "maintain contact with our strategic reserves," such as nuclear submarines, Dr. Latham said.

Above all, he declared, the US strategic C^3 system "must ensure that the NCA can stay connected not only to the forces but to the civil structure" and "must be perceived to be convincingly capable of responding to enemy aggression."

The US seems to be playing catch-up in C^3I. "The Soviets," Dr. Latham said, "have gone to a great deal of trouble to provide a survivable and endurable C^3I. They exercise their system all the time. They jam themselves, with realistic jamming, at the tactical and strategic levels."

Moreover, he said, the Soviets "have retained manual Morse and HF [high frequency] as their backbone communications. The Soviet Union is littered with varied antennas and with above-ground HF antennas. It is clearly their way to communicate if all else fails.

"They are doing a very good job in communications and operational security, and they are very good at what I call electronic combat."

Strategic C^3 Requirements

The Defense Department's C^3I chief summed up his "personal view" of US strategic C^3I requirements:

- "Absolute control of nuclear weapons, from storage sites to whatever systems the nuclear weapons are going to be deployed on, under all conditions."
- Making sure that "there's no way anyone can come in and decapi-

tate the NCA; that is, disconnect the NCA from the force commanders so that we couldn't launch the force or [so that] it would be severely degraded."

- "No cheap shots succeed—high-altitude EMP [electromagnetic pulse] or a few cruise missiles coming in, hitting a few command centers, and disconnecting the system."
- "We want to be sure that the system is perceived to underwrite deterrence, and that it is sufficiently complicated [so] that he [the would-be attacker] can't think through his campaign and win the war, in some way, in his own mind."
- "Six months' worth of endurance. We have under way a very extensive set of work—in its third year now—called the Nuclear Weapons Master Plan that is addressing all these issues."

Improvements of the C³I system since 1981 have indeed been impressive. As Gen. Bennie L. Davis, Commander in Chief of Strategic Air Command, told AIR FORCE Magazine early this year, "We have made more progress over the last three years in C³ than we have in the last twenty-five years—but we have not yet arrived." Concurring, Dr. Latham claims that DoD and the services now "have a firm analytical grasp of the relationship between the doctrine and policies necessary for strategic deterrence and the C³I capabilities to carry these out." Moreover, he says, "We are making good progress in developing and upgrading our C³I systems."

Progress in C³

As examples of such progress, Dr. Latham recounted the following in his AFA Symposium address:

- A good start on the very-low-frequency (VLF) Ground Wave Emergency Network (GWEN) system as "an overlay to the US telephone system" for linking the NCA with NORAD, SAC, all strategic bomber and ICBM wings, and the PAVE PAWS coastal radars that watch for incoming submarine-launched ballistic missiles.

Sixty GWEN towers have been installed, with many yet to come. DoD plans to deploy 200 to 300 GWEN nodes, and may wind up with even more.

At the AFA Symposium, Dr. Latham was asked whether the fixed-position GWEN sites would be able to survive Soviet ICBM targeting. He responded that "the whole idea is to proliferate enough nodes so that the Soviets would have to use several hundred warheads to take them out. GWEN is a packet-switch network, so if a node is taken out between two points, you can route around that destroyed or damaged node to some other set of nodes. . . .

"Typically, the GWEN sites are going to be in remote areas. [An attacker] either would have to have a sabotage team go to each of these nodes, or target each one of them with an RV. And I don't think that the Soviets, even with the number of warheads they have, would waste RVs on every GWEN node.

"We've done calculations on how many nodes they'd have to take out in order to cut the network—cut it, for example, north to south, so that we'd be denied communications [across the cut] from, say, the Washington area to, say, SAC. And it's a lot of RVs. . . .

"We will probably put GWEN up into Canada and probably out into the Alaska area so that we can connect up to our air defense forces."

- In the "command and decision" area of C³I, fixed command centers have been upgraded by such means as better power systems and hardening against EMP. Four E-4 airborne command post aircraft also have been hardened. And a mobile command center program is under way for SAC and other nuclear commanders.
- VLF receivers are being installed on bombers and airborne tankers.
- Methods of communicating with ballistic missile submarines are being upgraded and expanded. The Navy is intent on developing a long-range, long-loitering aircraft to supplant its C-130 Take Charge and Move Out (TACAMO) platform now used for this purpose. An extremely-low-frequency (ELF) antenna grid is under construction in upper Michigan as an expansion, in effect, of such a grid already emplaced in Wisconsin for ELF testing.

"Test receivers have been deployed [on submarines], and the tests have been very successful," Dr. Latham told the Symposium audience. "We expect IOC in 1985 and full operational capability in 1987 on all submarines, including the SSNs [nuclear-powered attack submarines]."

In the surrealistic setting of a magnetic silencing facility, the ballistic missile submarine USS Ohio undergoes a change in the giveaway "signature" it had acquired from the earth's magnetic field. A major requirement of US strategic C³ is keeping the National Command Authorities constantly in touch with such nuclear-retaliation SSBNs.

• The Ballistic Missile Early Warning System (BMEWS) is being sharpened up with digital technology and by other means, and the computers and networks of the World-Wide Military Command and Control System (WWMCCS) are being made more capable and more secure.

• For C^3 reconstitution or augmentation under duress, DoD is considering such innovations as "barrage balloons or quickly erectable towers" for LF and VLF communications, Dr. Latham said.

• Submarine-launched ballistic-missile-coverage gaps to the southeast and southwest of the US will be closed by additional PAVE PAWS phased-array radars and over-the-horizon backscatter (OTH-B) radars to warn of attack from the east, west, and south. PAVE PAWS radars on the east and west coasts now keep watch over the more northerly approaches to the North American mainland.

• Improvements of the satellite early warning systems are afoot to increase performance and survivability. Nuclear-detection sensors are being integrated into the Navstar Global Positioning System (GPS) navigation satellites. This Integrated Operational Nuclear Detection System (IONDS) will be fully operational—with eighteen GPS satellites in orbit—in 1988.

Early Warning and Communications

Moreover, the Pentagon is in the process of procuring four new Defense Support Program (DSP) early warning satellites. The focal-plane, scanning infrared sensors of these satellites will utilize 6,000 detectors. The satellites will be "additionally hardened" against attack, and will have "crosslink capability," Dr. Latham told his attentive AFA Symposium audience.

The Deputy Under Secretary also said that six mobile ground terminals will be purchased "for readouts of the information" from the new DSP satellites, "so if our fixed sites go away in wartime, we would still have DSP data." Such mobile vans "will be based in the southwest part of the United States," Dr. Latham said.

DoD is also working up a new advanced-warning satellite concept "to replace DSP someday," Dr. Latham said, adding: "It is being viewed as part of the tactical warning attack assessment system and the Strategic Defense Initiative system." DoD requests for industry proposals of such a concept are expected to be issued in relatively short order.

• As to space communications, the first of the third-generation super-high-frequency (SHF) Defense Satellite Communications System (DSCS III) satellites is now operational, along with three precursorial DSCS II satellites. Four other DSCS II satellites are orbiting as spares. The second DSCS III satellite and another DSCS II satellite are scheduled for launching this year.

• In the ultrahigh-frequency (UHF) regime, four Fleet Satellite Communications (FLTSATCOM) satellites are operational, and four new LEASAT satellites are in store for additional UHF coverage. The first of the LEASATs is scheduled for launching this month (July).

"I see us as having UHF forever," Dr. Latham said. "It's relatively inexpensive. But we will transition strategic users off UHF to Milstar when it comes into the force in the 1990s. So the strategic UHF AFSATCOM [Air Force Satellite Communications] channels on FLTSATCOM and other [satellite] hosts will gradually go away as we turn to Milstar."

Milstar

In the extremely-high-frequency (EHF) Milstar (Military Strategic and Tactical Relay) system, DoD is "trying to build a very survivable, very capable satellite system like we've never had before, with adequate bandwidths so we can get high jam-resistance," Dr. Latham said.

By placing Milstar terminals on a wide variety and great numbers of mobile platforms, such as submarines and land vehicles, and by "taking a number of initiatives to make [the satellites] very survivable," the system "will be here even under the worst set of circumstances, we believe," Dr. Latham said.

"We are building Milstar with a mobile operational capability so that we can do all the telemetry and command and control and all the network configuring of the satellites from fully mobile platforms, be they aircraft, ships, or ground-mobile command centers," the Deputy Under Secretary explained.

Consisting of a constellation of satellites in circular orbits at low and high inclinations, the Milstar system is being planned for full operational deployment in the late 1980s. The system will feature crosslinks, frequency hopping, time shuffling, and other techniques and will be hardened against nuclear and laser attack. It is designed to provide highly survivable, two-way, secure voice and data communica-

A US armored vehicle commander uses a Navstar receiving unit to establish his ground position. Navstar Global Positioning System (GPS) satellites play a vital role in US command control and communications.

tions, but is often referred to, in Pentagon circles, as much more than that—as a "multipurpose" system of extremely high classification. Dr. Latham has referred to it as "a technological bearcat."

In fact, Milstar's capability will be tested long before the system's deployment. At the AFA Symposium, Dr. Latham said that two upcoming FLTSATCOM satellites will embody "the first sets of a Milstar-capable system," thus "allowing us to do end-to-end testing with the small packages on those two satellites as early as 1986."

For USAF, Milstar means that its bombers, airborne command posts, tankers, and early warning aircraft will be assured of staying constantly in touch with each other and with ground and sea command centers anywhere in the world in wartime. All Milstar circuits will also be hardened and shielded against EMP that would ensue from nuclear detonations.

Elaborating on his exceptionally well-received presentation at the AFA Symposium, Dr. Latham later harked back to the C³I situation as it existed when the Administration undertook its Strategic Modernization Program in 1981:

"We found C³I systems in place that were intended to control strategic weapons but [that] were more vulnerable—less survivable and enduring—than we deemed is absolutely required.

"In addition, many of our tactical systems simply could not be depended upon to operate in the face of enemy electronic countermeasures, or even, in some cases, through the dense electronic environment caused by friendly systems.

"To compound the problem, we were giving the enemy's C³I capability a free ride by not investing sufficient resources in our own ECM systems or in C³ countermeasures. Each of these areas has been addressed as a matter of priority—as have some of the underlying management issues."

Protecting the Sea Lines

In Harold Kitson's AFA Symposium presentation, the Deputy Assistant Secretary of the Navy for C³I described how the fast-growing Soviet threat to US sea lines of communication—much of it from long-range Soviet Naval Aviation (SNA) Backfire bombers armed with standoff cruise missiles—has necessitated shoulder-to-shoulder Air Force-Navy operations in protection of those sea lines.

The latest in a series of joint-service Memoranda of Agreement in this regard was signed by Gen. Charles A. Gabriel, Chief of Staff of the Air Force, and Adm. James D. Watkins, Chief of Naval Operations, on September 9, 1982. Titled "Joint USN/USAF Efforts to Enhance USAF Contribution to Maritime Operations," it sets forth the following specific initiatives:

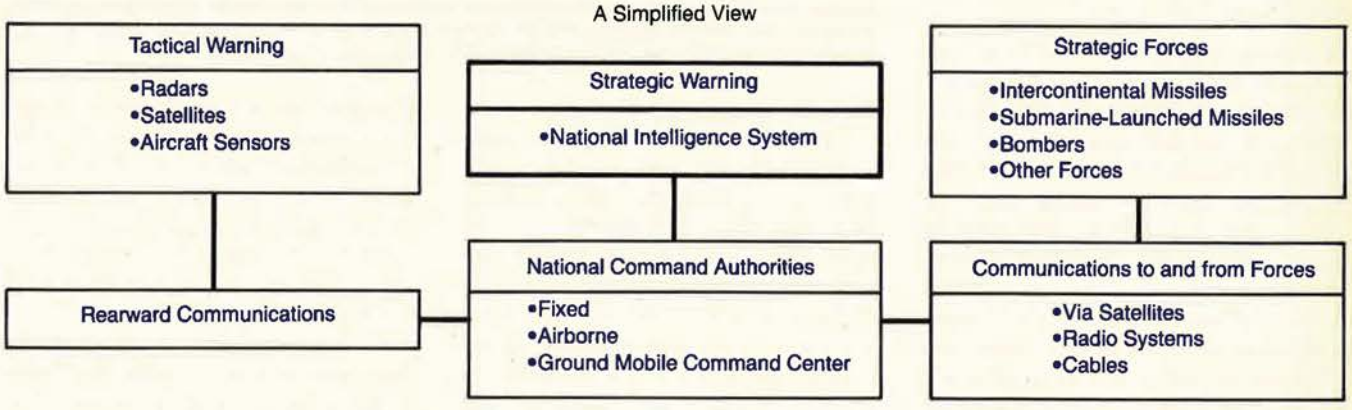
- Increased integration of Air Force and Naval forces in tactical training exercises, including maneuvers sponsored by the Joint Chiefs of Staff.
- Heightened cooperation in interoperable command control and communications equipment and procedures.
- Greater cooperation in improving tactical weapons effectiveness, which depends in large measure on the ability of both services' interceptor, attack, and airborne warning and control aircraft to communicate with one another.

In his annual report to Congress this year, Navy Secretary John F. Lehman, Jr., reported: "We are particularly proud of the progress that has been made in the last three years in integrating the Air Force, Navy, and Marine Corps forces in joint exercises."

Secretary Lehman continued, "Air Force AWACS, fighter, attack, and tanker participation in Naval exercises is now routine and extremely effective. Similarly, Navy and Marine air support of the land battle is proving of unique value and flexibility in every theater."

At the AFA Symposium, Mr. Kitson repeated Secretary Lehman's comment and expressed his agreement. He noted, however, that joint-service maritime exercises have had some major problems and that much needs to be done by way of attaining satisfactory C³ interoperability.

Describing the geographical range of a typical Navy interception of approaching bombers, Mr. Kit-



Even the simplest elements of the US strategic command control and communications network are complex and intricately interwoven. Charged with detecting, countering, and withstanding—and thus helping to deter—a nuclear strike, strategic C³ has shown much improvement in the past few years. But the job is broadening and becoming tougher.

son said that the F-14 Tomcats would range out and fan out from their aircraft carriers so far as to cover an area that is the equivalent of one-third of the continental US.

"The Air Force cannot just pop over the horizon and play in this type of a scenario," Mr. Kitson asserted. "They need to train with us."

Two joint exercises—Northern Wedding '82 and FLEETEX 1-83—provided the retrospective settings for Mr. Kitson's discussion of the value and problems of USAF-USN joint operations.

Northern Wedding '82 was a large-scale North Atlantic exercise in defense of Norway. It included strike operations, antisubmarine warfare (ASW), antiair warfare (AAW), and amphibious operations.

"The major C³ lesson from this exercise was that the AWACS aircraft could successfully participate in a joint maritime warfare scenario," Mr. Kitson said. He also said, however, that "the first use of AWACS in a maritime exercise of this magnitude served to point out some areas which needed to be addressed, such as providing common AAW reporting procedures, training requirements, and a Navy liaison officer to the E-3A [AWACS] aircrew."

FLEETEX 1-83 was a Northern Pacific operation for integrating Air Force units into Naval battle-force theater-level operations. In it, Navy E-2C Hawkeyes practiced at controlling USAF F-15 Combat Air Patrols (CAPs), and AWACS aircraft did the same with the Navy's F-14 CAPs. A heavy cruiser also controlled Air Force CAP and vectoring intercepts.

The results were heartening but far from perfect. "The exercise pointed out the value and the added dimension that the E-3A provides in our outer air-defensive zones," Mr. Kitson said. But it also showed "the need for better training of both Navy and Air Force personnel in joint carrier battle-force operations," he added.

Mr. Kitson said that most C³I problems encountered in joint exercises have to do with Air Force unfamiliarity with standard Navy operating procedures. This, he said, can be resolved through better planning and liaison and by more exercises.

The Pentagon is counting on its highly advanced, extremely-high-frequency (EHF) Milstar satellites as the mainstays of all military C³I in the 1990s. Much before then, however, the Milstar system will be tested aboard such Fleet Satellite Communications (FLTSATCOM) satellites as the one in this artist's rendering.

The Compatibility Problem

"What cannot be resolved, however," he said, "are hardware and software incompatibilities—systems developed independently of each other and without a common systems-engineered architecture.

"This is where we need to take a hard look. It makes no sense for one service to develop, for example, a multimillion-dollar antijam [AJ] voice link that is incompatible with the existing AJ voice system being developed by the other service. Unique service requirements notwithstanding, we just can't satisfy everybody's pet rock. The future must—by necessity—rest with interoperable systems, and we . . . need to view the real-world operational requirements beyond our parochial interests."

In this vein, Mr. Kitson alluded to the controversy between the Navy and the Air Force over the Joint Tactical Information Distribution System (JTIDS) for antijam, interoperable data and voice communi-

cations. Because of fundamental differences in their tactical combat requirements, Air Force fighters rely heavily on voice communications for dogfighting and offensive scenarios; Navy fighters, on data communications for quick vectoring and long-range weapons release—in a very intensive jamming environment—against bombers coming in over the oceans.

Consequently, the communications links of the Air Force JTIDS is oriented to voice; that of the Navy JTIDS, to data. The Air Force now proposes to go beyond JTIDS in developing the Enhanced JTIDS, called EJS, that will emphasize voice communications even more. USAF is also resisting the incorporation of the message standard called TADIL-J (Tactical Data Information Link-Joint) that the Navy insists upon for JTIDS.

At the AFA Symposium, Mr. Kitson pressed the Navy's point. The incorporation of TADIL-J, he said, will be necessary for the Navy "to fully capitalize on JTIDS." Without TADIL-J, "we lose a significant portion of the inherent capability of JTIDS."

He continued, "In order for our JTIDS terminals to be interoperable with Air Force JTIDS terminals, we must both communicate on a common message standard. TADIL-J is the agreed-to common standard. Since the Air Force and NATO have deployed JTIDS before TADIL-J has been developed, they have been forced to use an interim JTIDS message standard [IJMS]."

Mr. Kitson's unrelenting bottom line: "Until both Navy and Air Force terminals are converted to TADIL-J, we will not be interoperable with the Air Force AWACS terminals, nor with NATO AWACS. This problem needs to be worked by the Office of the Secretary of Defense and the JCS. We, the Navy, are firmly committed to proceeding with TADIL-J."

USAF Cool to JTIDS

The Air Force clearly has misgivings not only about a distributive communications link that would favor data but also about JTIDS with or without such a link.

Gen. W. L. Creech, Commander in Chief of USAF's Tactical Air Command, claims that JTIDS just does not meet USAF needs for high antijam voice communications near the forward edge of the battle area.

DoD is irritated with the Air Force for having cooled on JTIDS and for giving much higher priority to the EJS antijam voice radio system that, despite its nomenclature, would not be compatible with JTIDS.

As a result, DoD directed USAF to modify its EJS design to make it interoperable with JTIDS. In this, DoD also hopes to influence the Air Force to step up its deployment of JTIDS terminals, which up to now have been programmed for installation in only two wings of F-15s and in no F-16s at all.

In his AFA Symposium address, Mr. Kitson also cautioned the Air Force and the Navy against developing incompatible IFF systems and techniques. He said that his admonition also applies to NATO air forces. IFF interoperablity, he said, "is essential if we are to operate in the same areas without shooting each other down."

There is also the danger, Mr. Kitson pointed out, that Air Force and Navy will diverge in their developments of new electronic countermeasures. "Our electronic warfare approaches must be coordinated so that we do not jam each other's receivers," he declared.

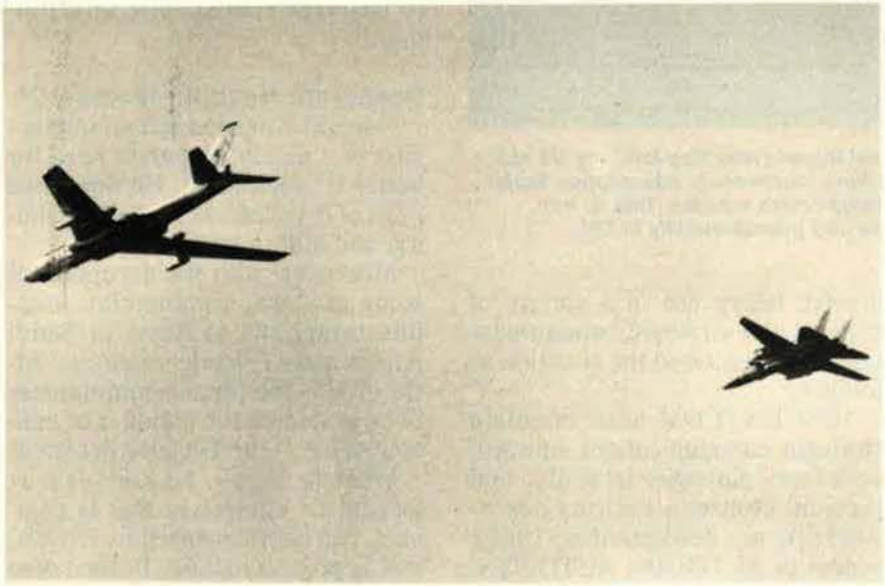
In developing a new, highly automated communications link for its EA-6B Prowler EW aircraft, the Navy expects to "learn a great deal from the Air Force Compass Call experience, which should make our planning much easier," Mr. Kitson said. Moreover, he said, the Navy is benefiting from USAF's over-the-horizon radar program in developing its own lower-powered, relocatable version, called ROTHR.

"While the prime purpose of the ROTHR is to provide information to our battle forces, some of this same data will be of use to the Air Force," he said. "We are, therefore, working closely with them to ensure that data that we obtain can be communicated to Air Force sites, and tied into the data that they receive from their OTH-Rs."

Finally, Mr. Kitson referred to the Space Based Radar (SBR) program that is "to provide badly needed, wide-area surveillance for the [Navy] battle force as well as warning data for the Air Force" as a victim of funding cuts "which are as much due to the lack of the Air Force and the Navy being able to agree on program management as to anything else." Because it is "a costly program in any of its versions," it will go nowhere unless it is "well supported" by both of the services, Mr. Kitson declared.

The Challenge for Central Command

At the AFA Symposium, US Central Command's General Kingston described the C³I and logistics enor-



An F-14 Tomcat from the US aircraft carrier **Enterprise** *keeps close watch on a Soviet Tu-16 Badger reconnaissance aircraft during FLEETEX 1-83, a US-Canadian naval exercise in the Northern Pacific that also involved USAF fighter and AWACS aircraft.*

mities inherent in the execution of USCENTCOM's combined-arms mission.

For example, the General said, his command's area of responsibility—primarily Southwest Asia—is larger than the continental US, and "the distances present considerable obstacles to both movement and communications."

From north to south, USCENTCOM's territory stretches a distance equivalent to that between Tehran and London. From the US East Coast to the Persian Gulf, the distance is 7,000 miles—a fourteen-hour flight on an air-refueled, nonstop C-5 airlifter. The sea line of communication through the Mediterranean and the Suez Canal is 8,100 nautical miles; around the Cape of Good Hope, 12,000 nautical miles.

Defending carrier battle groups and other naval forces protecting far-flung US sea lines of communication now entails Air Force-Navy teamwork in intercepting Soviet bombers before they can launch standoff antiship cruise missiles. This, in turn, requires consummate joint-service cooperation and interoperability in C³I.

Moreover, General Kingston noted, the region "is characterized by isolated surface lines of communications and limited terminals for air and sea movement," and has "just two-thirds of the paved road mileage found in Florida," where—at MacDill AFB—USCENTCOM is headquartered.

General Kingston drew comparisons with the US European and Pacific Commands. Both, he noted, have substantial US forces and C³ systems in place. Both also have "extensive logistics infrastructures" and support agreements with their host nations and treaty partners. On all such counts, asserted General Kingston, USCENTCOM "has none."

"In short," he added, "if we had to send a combat force into the Central Command area, we would start from almost zero in terms of combat power and support structure in the region. So my challenge is to be capable of moving a sizable force to the region quickly; to access, process, use, and disseminate information from national strategic and tactical sources; to exercise effective command and control over these forces as they bed down across a large geographical area; and to sustain the force logistically."

All this, the General said, would involve heavy use of a variety of tactical and strategic communications. He described the situation as follows:

"USCENTCOM must maintain strategic communications upward, necessary linkages laterally, and tactical communications downward. At my headquarters, I have access to AUTODIN, AUTOVON, AUTOSEVOCOM, WWMCCS intercomputer network, command telephone, mobile radio, PAGES networks, VHF satellite, and point-to-point ring-down communications to my components.

"In transit to the region, I have UHF satellite capability aboard my EC-135Y command and control aircraft, which provides secure voice capability [with] AUTOSEVOCOM interface capabilities through my command center.

"Current communications capabilities in the area of responsibility are limited to VHF satellite, embassy record communications, and embassy telephone communications."

Once his headquarters is deployed, General Kingston said, it would be completely dependent on space assets for its strategic communications. "Strategic service in the area is extremely limited," he declared. "The Defense Communications System (DCS) backbone [of my strategic communications] cannot be directly accessed except by satellite."

Once it is set up on the ground in its combat arena, USCENTCOM's headquarters would require multichannel access to a DCS super-high-frequency satellite, to a UHF satellite for secure intratheater voice communications, to HF radio nets for secure record traffic, and to AUTOVON access via DCS.

Compounding his C³ problem, said General Kingston: "The limited HF links must transmit beyond optimum distances to reach DCS entry points. HF communications are easily jammed, and are subject to frequent atmospheric interruption."

Desperate Need for Modern C³

General Kingston left an impression of a nearly desperate need for better C³ equipment. He described most of it as "old, of limited reliability, and still in short supply."

Moreover, with the exception of some modern, commercial, long-line telephone systems in Saudi Arabia and a few other nations, "little of the telephone communications system in the region is of military value," the General declared.

What he needs, he said, is new tactical C³ equipment that is compact, can be transported by C-130s, and is ground-mobile. It must also be able to stand up under extreme conditions of heat, unstable power sources, and continuous penetra-

tion by dirt, dust, and sand. Such equipment must be versatile, the USCENTCOM Commander made clear. It must process a high volume of voice and data. It must also transfer—quickly and reliably—high-quality imagery, map overlays, and digital data from reconnaissance sensors, he said, adding, "This will require circuits for computers to talk to computers, and for high-quality, secure voice to pass urgent traffic on a nearly real-time basis."

And then General Kingston sounded an alarm.

"I am concerned," the General declared, "that our old equipment just won't stand the test. USCENTCOM's goal is a responsive, interoperable system or network of systems that works from the ground up. New C³I developments must be able to contribute to the overall mission of commanding and controlling my forces."

Conveying pride in the quality, training, and leadership of the combined-arms units at his disposal, General Kingston expressed optimism that his command "will soon have the [C³I] equipment that we require," providing "there is sufficient budgetary support from the Congress."

There had better be such support, he made plain, because the Soviets—given their military buildup, including "a large and capable Navy"—"can dominate the Eurasian landmass today, endanger our vital lines of communications, and threaten our national interests if they so choose," General Kingston warned.

The Joint Deployment System

Far-flung, complex C³ is also the hallmark of the US Readiness Command and the US Joint Deployment Agency, both of which—like USCENTCOM—are headquartered at MacDill AFB, Fla. Their progress and vicissitudes were described at the AFA Symposium by USAF Lt. Gen. James R. Brickel, Vice Commander in Chief of USREDCOM and Vice Director of JDA.

As an arm of the Joint Staff at the Pentagon, JDA was created in 1979 to integrate DoD's three Transportation Operating Agencies (TOAs)—Military Airlift Command, Military Sealift Command, and Military Traffic Management Command—into a single transportation system called the Joint Deployment System (JDS).

The need for JDS was an urgent one. In 1978, Nifty Nugget, a DoD command-post mobilization exercise for war in Europe, had demonstrated beyond all doubt that the US was simply incapable of such mobilization. There wasn't anywhere near enough airlift or sealift, and what there was didn't get to Europe with the warfighting wherewithal in time. C³ confusion characterized the whole affair.

Now, as General Brickel made clear, things look better. The JDA has a grip on its mission of "planning, coordinating, and monitoring deployments, redeployments, and movements of mobilized forces and materiel necessary to meet military objectives.

"We are in reasonable shape," the General told his audience. "We are very well satisfied with where we are at the moment, but we still face big challenges. . . . We are now moving into the operational phase [of mobilization deployment], dealing with such things as training."

As a result of improvements in C³ software in the WWMCCS system for CINCs worldwide and in the increasing comprehensiveness and accuracy of the WWMCCS data base, the JDA is now confident of its ability to plan crisply for quick deployments of Stateside troops and materiel to wherever they are initially needed, General Brickel said.

Changing such plans in midstream, in keeping with fluctuations of combat requirements within or among theaters of operation, is quite another matter, he said.

"What we can't do well is alter the flows once they've begun," the General declared. Major reasons for this, he added, are the lingering shortfalls of airlift and sealift capacities, together with C³ inadequacies that are being addressed.

"In the deployment world, the two biggest problems are availability of lift and C³," he asserted. In keeping with this, he added, "We are a strong supporter of the C-17 program for the Military Airlift Command."

Among many mobilization-C³ innovations that JDA has introduced in the last five years, a highly important one is its Rapid Deployment Modeling Capability. As General Brickel explained it:

"We are dealing with multiple divisions, and we must be able to sustain them in the Arctic, in jungles, or deserts, and plan for it quickly. If they are going to Southwest Asia, a critical need would be water, so they would need water-drilling and pipeline equipment. They would not need [that] if they were going to Europe.

"So we must have a standardized way of interchanging plans for deployments, and we must be able to alter those plans very rapidly—in a crisis-action process. What we do is change [computerized] deployment models, using our standardized, interchangeable force modules."

Moreover, the USREDCOM-JDA apparatus comes up against such rapid-deployment questions as, said General Brickel, "Do you plan for air defense or air assault first? How much water will you need? What are your initial and final arrival dates? The whole purpose is to be able to look at all the 'what ifs,' " he said. "In the past, this has not been done."

From Push to Pull

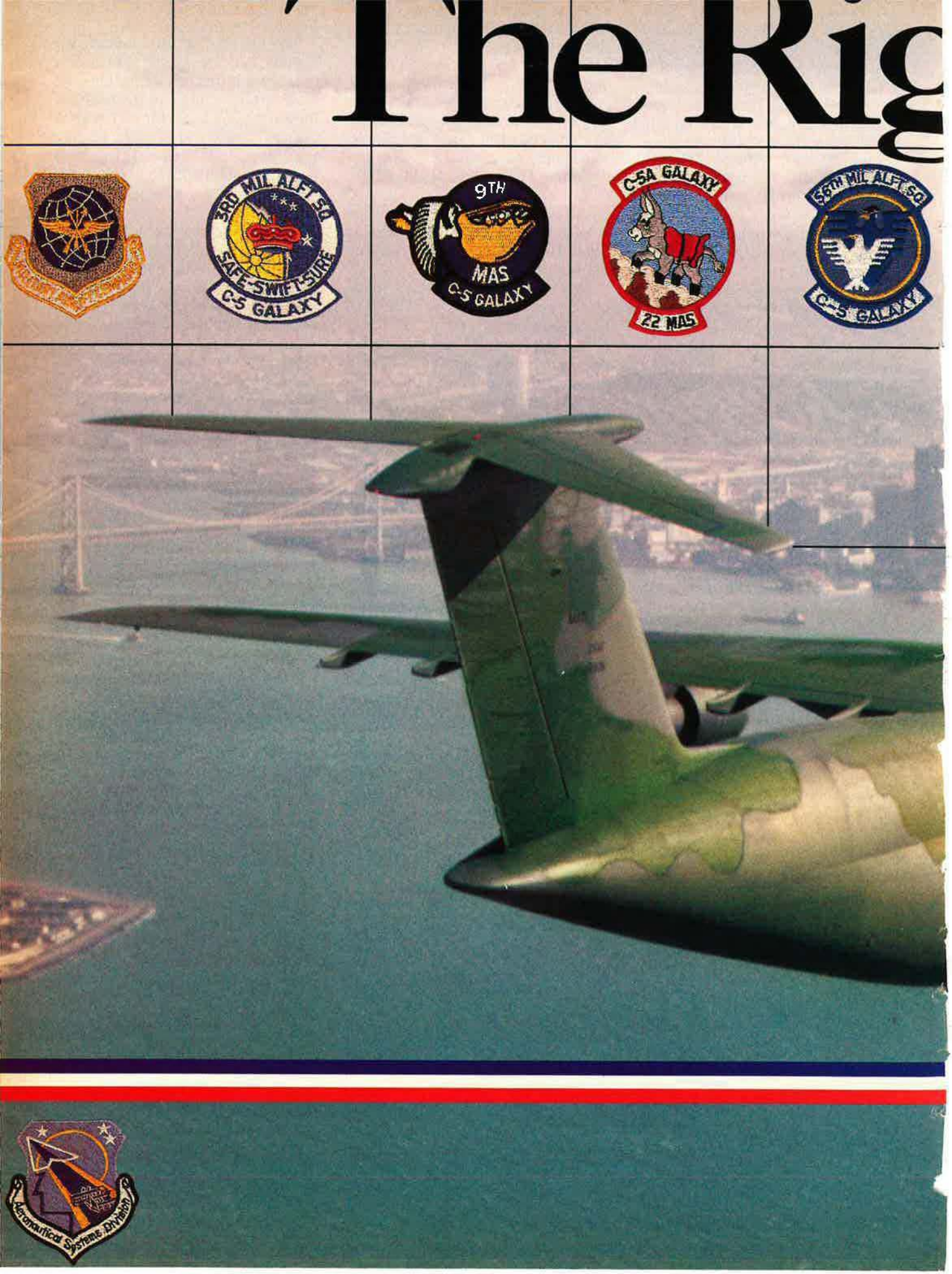
General Brickel was asked whether the JDA can stop a large-scale deployment once it has begun.

"Yes," he replied, "we have done so in command-post exercises when another part of the world takes priority. We can stop the lift flow, but it's difficult. It's like taking a freight train, slowing it down, and starting it in another direction."

The process of sustaining airlift and sealift raises the problem of transition, at some point, from "push to pull," General Brickel said. At the beginning of a deployment, airlift and sealift to a given overseas commander are predicated on what the JDA has already programmed for him to get. But after combat has begun, they must be "iteratively" adjusted to the commander's changing needs as he sees them, the General explained.

Precisely planned and executed deployments have "tremendous payoff in terms of high weapons effectiveness and reliability," General Brickel declared. "They allow the combat commanders to carry out their jobs with many fewer tons of munitions." ■

The Rig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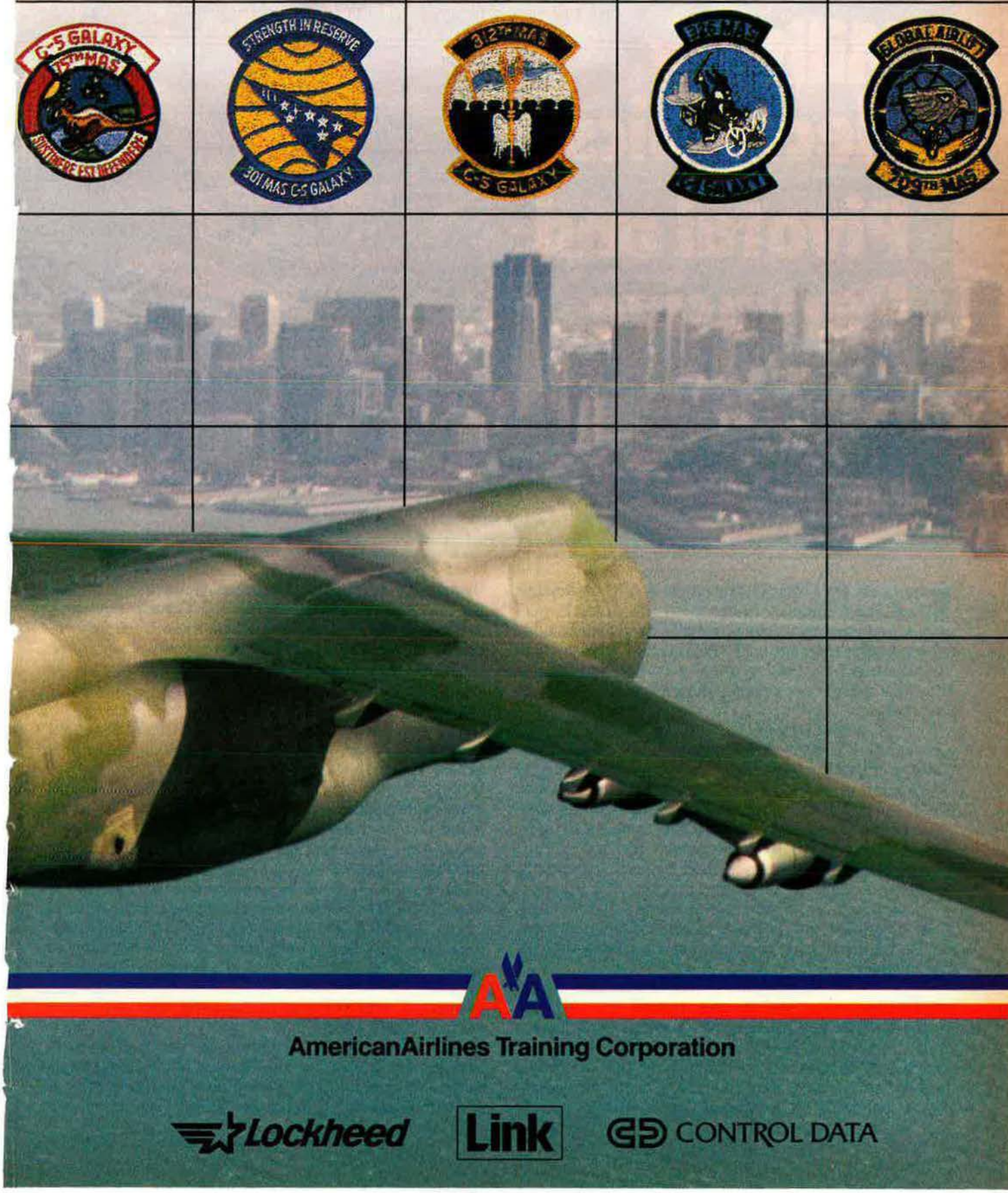


AmericanAirlines Training Corporation

Lockheed Link CONTROL DATA

From space-based warning to battlefield reconnaissance, the role of C³I systems is expanding at a rapid rate.

Military Electronics: Pivotal and Pervasive

BY EDGAR ULSAMER
SENIOR EDITOR (POLICY & TECHNOLOGY)

THE latest Five-Year Defense Plan and its associated Defense Guidance underscore the pivotal, pervasive, and growing role of command control communications and intelligence (C³I). This catchall term takes in a multitude of functions, systems, software, and components that encompass virtually the entire field of military electronics.

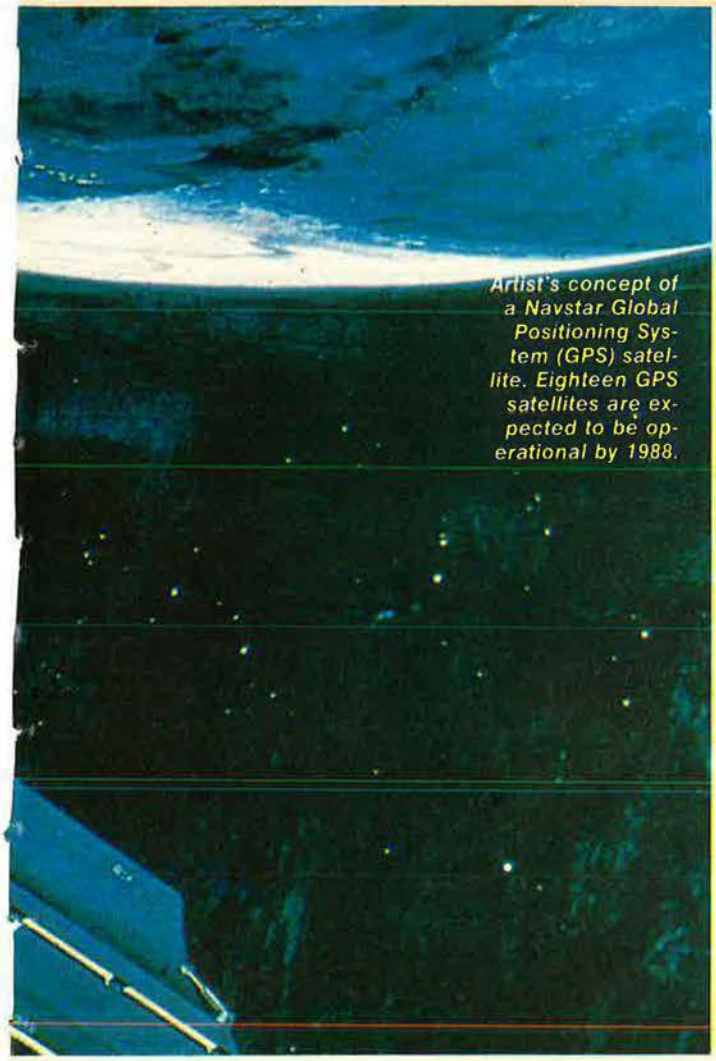
As Secretary of Defense Caspar Weinberger told Congress in the FY '85 Defense Report, C³I systems assist decision-makers in gathering and evaluating intelligence information on enemy forces, enable commanders to assess the status and disposition of friendly forces, provide communications links over which orders and information can be transmitted, and give civilian and military leaders a means of redirecting their forces in response to changing conditions. C³I systems serve five principal mission areas, he pointed out: nuclear force management, defense-wide information and communications, electronic warfare, C³ countermeasures, and defense intelligence.

The Air Force Association's National Symposium entitled "Electronics and the Air Force—C³I Developments and Their Impact on Military Plans and Operations," held April 26–27 near Hanscom AFB, Mass., provided a comprehensive analysis of the status and prospects of military electronics. The event was held in concert with Air Force Systems Command's Electronic Systems Division, the organization charged with designing and acquiring most of the Air Force's electronic systems. This article and the article "Fast Track for C³I" beginning on page 42 of this issue are based largely on information garnered from this Symposium.

C³I Is Big Business

The FY '85 Defense budget request includes about $36 billion for C³I programs. At the apex of these programs stand those that serve strategic deterrence through nuclear force management. In the main, this means surveillance and warning, connectivity, and command and control. As the current Defense Guidance points out, the task assigned to strategic C³I as the enabling element of the US strategic forces is tough and unambiguous: It must be convincingly capable of executing US responses to enemy aggression at any level of conflict and under any set of conditions and of bringing conflict to an early termination on terms favorable to the US and its allies. By logical extension, this means the ability to function on a protracted basis and to stay connected with residual forces even after a massive nuclear attack on the US.

The Defense Support Program, consisting of the early warning satellites, is the key element of the US strategic defensive posture. These satellites, operating in geosynchronous orbit, provide the National Command Au-



Artist's concept of a Navstar Global Positioning System (GPS) satellite. Eighteen GPS satellites are expected to be operational by 1988.

thorities (NCA), the North American Aerospace Defense Command, and Strategic Air Command with initial information concerning a strategic nuclear attack on this country. New DSP satellites are being procured, the first of which—number 14—is to be delivered in 1986. DSP satellites 15 through 17 will be delivered after 1986. All these spacecraft incorporate a higher degree of hardening against nuclear effects than the presently deployed systems, as well as improved infrared scanning arrays. The new designs also include communications cross-links to boost their reliability.

Enhancements of DSP on the ground include the addition of mobile ground terminals that will be deployed in the southwestern states. The idea here is to ensure access to the information from the DSP satellites even if the normal ground terminals are destroyed. Six mobile ground terminals (MGTs) are being acquired, with delivery to be completed by the end of next year. Operational testing and evaluation of the MGTs will get under way at that time. Their specific function is to receive, process, and disseminate warning data on hostile ICBM and SLBM launches.

A follow-on system to DSP, known as the Boost-Phase Detection and Tracking System, is in concept formulation. Meant to serve as a key component of the Strategic Defense Initiative, dubbed "Star Wars" by the media, the DSP follow-on system will use millions of detectors cooled by special cryogenic coolers in its focal plane as compared to the 6,000 detectors used by the latest DSP spacecraft.

While funding levels of the DSP program and its follow-on effort have not been made public, the two are thought to absorb a significant portion of the $4.138 billion the Defense Department plans to spend on strategic surveillance and warning and related programs over the next two years.

NDS and GPS

Another important space-based element of the nation's tactical warning and attack assessment capability is the Nuclear Detection System (NDS) that is expected to reach operational status in 1988. The NDS system, also called the Integrated Operational Nuclear Detection System, or IONDS, will boost the Pentagon's ability to detect, locate, and report nuclear detonations worldwide. These highly survivable NDS sensors will ride in "piggyback" fashion on the eighteen satellites of the Navstar Global Positioning System (GPS) and will provide virtually instantaneous information on the scale and location of above-ground nuclear detonations in any part of the world. As such, they will contribute to nuclear test-ban monitoring in peacetime and would provide damage and strike assessment information to US command posts in the event of a nuclear attack.

The principal function of the Nuclear Detection System is to enable the National Command Authorities and others to make real-time assessments during the transattack and postattack phases of a nuclear war. In turn, this makes possible better management of the strategic forces by providing a running inventory of those resources—friendly as well as enemy—that have been destroyed and those that remain, thus aiding in the recovery and reconstitution of residual capabilities. The current budget calls for continued development of NDS's user terminals and procurement of the operational GPS/NDS satellites.

GPS, although not designed for the strategic nuclear mission, is one of the key space-based systems that will provide a common navigation grid for land, sea, and air operations. By providing users with three-dimensional position and velocity information accurate to within fifty feet, GPS will help in target acquisition, low-level navigation to and from the target, flexible routing, and precise weapons delivery. To date, eight GPS satellites have been launched. Five of them are operational, two are rated as marginal by Space Command, and one has failed. The five operational satellites form an R&D constellation that assists in mapping operations as well as in missile and avionics integration testing. Six GPS satellites are to be acquired in FY '85 under a multiyear procurement arrangement.

The Milstar System

The single most important trait of strategic C^3 systems, whether based in space or elsewhere, is their ability to continue to function "while they are being shot at," Brig. Gen. John Paul Hyde, USAF, Space Command's Deputy Chief of Staff for Communications-Electronics, told the AFA Symposium. Current systems don't meet this requirement fully. More than seventy percent of all long-haul military communications are

handled by satellites, but these space links can be disrupted by the blackout and scintillation induced by nuclear events. While some of the current crop of satellites have an antijam capability, this advantage is gained at the cost of diminished capacity. Finally, the present generation of strategic C^3 satellites is heavily dependent on highly vulnerable ground stations for global data relay.

The Soviets, on the other hand, have a "solid ground-based electronic warfare system, and the doctrine and organization to use it," according to General Hyde. Soviet antisatellite systems (ASATs) also pose a significant threat to US C^3 space assets.

One of the most significant "milestones" in the C^3 field, Lt. Gen. Robert T. Herres, USAF, Director of Command Control and Communications Systems in the Office of the Joint Chiefs of Staff, told the Symposium, was a memorandum sent by President Reagan to the Pentagon in March of last year designating the Military Strategic and Tactical Relay (Milstar) satellite communications system as a "program of the highest national priority." Lt. Gen. James W. Stansberry, USAF, Commander of Electronic Systems Division, termed Milstar a "magnificent capability, the cornerstone of the Administration's C^3 upgrade program." The Air Force, the ESD Commander reported, is using a double-track approach in the current development phase by "keeping an additional contractor aboard until the design is firm enough to get production prices in competition."

Currently in full-scale development and slated for deployment in the late 1980s and early 1990s, Milstar will serve as a survivable, jam-resistant, global communications system for the NCA and the strategic and tactical forces of all the services. The system will capitalize on extremely high frequencies (EHF), cross-links, frequency hopping, time shuffling, nuclear and laser hardening, and other advanced techniques to attain levels of survivability that guarantee essential communications capabilities under protracted nuclear war conditions. The system will consist of satellites in twenty-four-hour circular orbits at low and high inclinations; terminals at fixed and mobile command centers, on aircraft, ships, and submarines, and at missile launch control centers and similar installations; and proliferated system control equipment on survivable platforms. The Air Force acts as the Defense Department's executive agent in the development and acquisition of the system and, as such, is specifically responsible for developing the satellites along with the system control equipment and all associated airborne terminals. The Army and the Navy are developing ground- and sea-based terminals, respectively.

The system operates in the EHF regime because communications in that bandwidth are relatively impervious to electronic warfare and can recover very quickly from degradations caused by high-altitude nuclear detonations. Space Command will be the operational manager of Milstar, with responsibility for spacecraft operations, control, and protection.

In order to reap the benefits of the Milstar system as early as possible, the Air Force Satellite Communications (AFSATCOM) system's terminals are to be upgraded for compatibility with the new satellite system. As a result, almost all AFSATCOM terminals will be capable of using Milstar's ultra-high-frequency channels following the first Milstar launch. The modifications also will enhance terminal operation in the presence of jamming and improve performance during ionospheric disturbances. Milstar is meant to replace the relatively soft AFSATCOM system. Milstar's functions and configuration can be controlled from such mobile platforms as aircraft and ships at sea.

The Ground Wave Emergency Network

As a complement to Milstar, the Air Force is developing the Ground Wave Emergency Network (GWEN), which is meant to provide a survivable and enduring ground-based communications capability between the NCA and key strategic installations, such as major command facilities, missile warning locations, and US-based nuclear forces. The system consists of a network of radio relay stations and user terminals that link these installations.

GWEN's primary function is to maintain robust communications links with the bomber and ICBM forces. Completely independent of the vulnerable civilian communications network, GWEN uses EMP-hardened relay nodes and packet-switching techniques to achieve a high degree of survivability. The packet-switching approach enables GWEN to work around destroyed or inoperative relay nodes by picking alternate paths. GWEN operates in the low-frequency band to resist the electromagnetic pulse (EMP) induced by nuclear detonations. Low frequency translates into a low data rate and the requirement to confine transmissions over this network to essential data. Each GWEN node consists of transmitters and receivers installed on a radio tower with its own power supply.

The GWEN program consists of three phases: concept development, full-scale development, and production. Full-scale development began in February 1983 and will continue through early 1986. The prototype GWEN network includes relay stations, input and output ground and airborne terminals, and receive-only terminals. Following test of this prototype network, the Air Force expects to make a production decision on the full-up GWEN network in 1986. Full operational capability is to be reached in FY '89. The prototype system will help in providing SAC's bomber forces with timely warning of impending attack.

In the final phase of the GWEN program, the number of relay nodes will be increased substantially to bolster the system's survivability and to provide an alternate communications link with the ICBM force during and after an attack. Initially, GWEN is likely to be held to between 200 and 300 nodes located in remote areas, including possibly Alaska and Canada. As the threat increases, the number of nodes might be increased to 500 or more. While it would obviously be possible for the Soviets to take out most of the system by attacking each node with one or more nuclear warheads, the force drawdown involved would be disadvantageous and therefore would discourage such an attack in the first place.

Emergency Rocket Communications System

As systems such as Milstar and GWEN come into being, there is all the more reason to upgrade one of the

most essential enabling strategic C^3 systems, the aging Emergency Rocket Communications System (ERCS). Using certain Minuteman ICBMs—numbers and location are classified—ERCS would, in case of a nuclear war, put communications packages on a special trajectory to transmit the "go code," meaning the nuclear weapons release authority, to certain nuclear forces and to such specialized C^3 systems as the TACAMO aircraft, which are modified EC-130s that serve as strategic communications relays to the ballistic missile submarines at sea. Even though deemed urgent and essential by C^3 experts, no concrete plans to modernize ERCS exist at this time. The key reason why there are no such plans is apparently the high cost associated with such upgrade proposals. Air Force C^3 experts point out that an "affordable" way to modernize ERCS—without the "bells and whistles" that have made these proposals prohibitively expensive—must be found because of this system's unique importance and enormous contributions to the credibility of the US strategic deterrent forces.

In order to extend EMP protection provided by GWEN to emergency action communications equipment, the Air Force initiated the Aircraft Alerting Communications EMP (AACE) upgrade program. AACE will provide shielded enclosures for critical equipment at SAC's main operating bases in the continental US. The system will also protect communications equipment used to relay critical action messages from the command posts to bomber crews in alert facilities or in the cockpit. Development test and evaluation of a prototype AACE system will start next year and could lead to the purchase of twenty-three production units in FY '85.

The ASAT Requirement

The new Air Force budget allocates $143 million for continued development of ASAT, a space interceptor that will be able to negate Soviet space weapons when they threaten US and allied sea, land, and aerospace forces. The US ASAT system consists of a two-stage booster composed of a modified short-range attack missile (SRAM) and Altair rockets, upon which would be mounted a miniature vehicle (MV). The nonnuclear MV warhead would be capable of attacking satellites in low orbit, meaning a few hundred miles above the earth's surface. The booster and MV would be carried aloft by modified F-15 aircraft. These ASAT-launching F-15s are to be stationed at Langley AFB, Va., and McChord AFB, Wash.

Space Command, General Hyde told the AFA Symposium, has in place the basic doctrine on how ASAT would work: "We would inform the National Command Authorities of a threatening satellite and, if they make the decision to intercept [such a hostile satellite], we would compute in the SPADOC [Space Defense Operations Center] an engagement profile from orbital parameters. The ASAT Mission Control Center in the Cheyenne Mountain [Complex] would produce a profile tape to be put in [an] F-15, along with a supercooled missile. The F-15 would take off and follow the profile to a launch box. At the programmed time and altitude in the box, the ASAT is launched and makes the negation."

Because of a congressional edict, the first test of ASAT in space earlier this year had to be flown against a "point in space" rather than a real target. The Defense Department considers it essential, however, to demonstrate an actual intercept and kill capability on the part of ASAT, both for reasons of deterrence and arms-control leverage. As the House Armed Services Committee pointed out in its report on the FY '85 Defense Authorization, the Soviets have had an operational ASAT system for more than a decade. The Committee asserted that "contrary to arguments heard recently concerning the US ASAT, [that] program and the reasons for its existence are not new developments originating within the current Administration. . . . The US ASAT program and the general US arms-control policy with regard to ASATs [have] not changed since 1977."

The Committee's report added, "What has changed, however, is the advance of Soviet technology. Advances in technology have introduced numerous possibilities for Soviet antisatellite activity that compound the verification problems existing in 1977 and, therefore, make the possibility of reaching mutual and verifiable arms-control agreements in this area much more difficult—and perhaps impossible, if only national technical means can be used for verification."

The Committee gleefully called attention to the fact that one of the nation's most vocal arms-control lobbyists, Paul C. Warnke, recommended the rationale for the US ASAT program to Congress in March 1978 when he served as the Carter Administration's Director of the US Arms Control and Disarmament Agency. At that time Mr. Warnke testified that the US ASAT program provides a hedge against Soviet use, or threatened use, of their ASAT. At the same time he told Congress that development of a US ASAT would demonstrate this country's determination to deny the Soviet Union a monopoly in ASAT weapons, would provide a hedge against Soviet development of advanced ASAT systems, and might encourage the Soviets to enter into ASAT negotiations with this country on an equitable basis. He also testified that ASAT would enhance stability because the incentive for a Soviet attack on US satellites would be reduced if this country possessed an operational ASAT. Mr. Warnke also conceded that the US ASAT program is consistent with all arms-control agreements to which the US is a party. Mr. Warnke serves at present as point man in a campaign to kill the ASAT program.

Toward a Unified Space Command

The Joint Chiefs of Staff—including the Chief of Naval Operations—announced that they favor formation of a unified space command. Recent statements by Secretary of the Navy John Lehman and other senior Navy officials indicated opposition by that service to the concept of a unified space command. General Herres told the AFA Symposium that the issue is not if, "but when." He added that a joint planning staff for space, headed by Maj. Gen. Thomas C. Brandt, USAF, has just been formed within the Joint Staff.

This new element of the Joint Staff, "as I see it, will do what the J-5 of a Unified Space Command would do, if we had a Unified Space Command. The work the [joint planning staff for space] will do over the next year will point all of us in the right direction in the Defense Department in terms of how the Chiefs and the individ-

ual [services] ought to plan for, control, and direct [military] space activities," General Herres said. He went on to predict that the need for a Unified Space Command would become "self-evident after that staff is well established," functioning smoothly, and helping the Chiefs exert an influential role on space operations. That, the General said, "is what I believe the Navy is waiting for."

Ground-based Warning and Attack Assessment

Ballistic missile attack warning and assessment is not confined to space-based systems. Ground-based components include three Ballistic Missile Early Warning System (BMEWS) sites; the Perimeter Acquisition Radar Attack Characterization System (PARCS) radar near Grand Forks AFB in North Dakota; the AN/FPS-85 radar at Eglin AFB in Florida; the AN/FSS-7 SLBM at MacDill AFB in Florida; and two PAVE PAWS SLBM phased-array warning and detection radars—one at Otis ANGB, Mass., and the other at Beale AFB, Calif. Also included in this network are command center processing systems in the NORAD Cheyenne Mountain Complex in Colorado; the SAC Command Post in Omaha, Neb.; the National Military Command Center in Washington, D. C.; and the Alternate Military Command Center near Fort Ritchie, Md.

Several of these systems are being modernized and expanded. To complement the space-based warning systems and to provide redundant surveillance of Soviet missile launch areas, the Ballistic Missile Early Warning System (BMEWS)—designed to warn of ICBM attacks—and PAVE PAWS—an SLBM warning system—are being upgraded. Two additional PAVE PAWS radars are being deployed—one at Robins AFB, Ga., and the other at Goodfellow AFB, Tex. These deployments, combined with the PARCS radar and the two existing PAVE PAWS sites, will complete the planned five-site network, will close gaps in coverage, and will make it possible to phase out the older, less capable AN/FPS-85 and AN/FSS-7 SLBM radars in Florida. In FY '86 and '87, three of the PAVE PAWS radars will be modified to boost their ability to track satellites, thus enhancing their warning capability.

In the case of BMEWS, the existing twenty-year-old conventional radars at the site at Thule, Greenland, are being replaced with a new solid-state phased-array radar. This step will reduce the danger of the system becoming saturated and will increase its ability to assess raids more rapidly. Also, the aging missile impact predictor computers are being replaced at three BMEWS sites. The FY '85 Defense budget provides for replacement of major computers at NORAD's Cheyenne Mountain Complex as a way to increase the reliability of the national missile warning systems.

C^3 Systems for Atmospheric Defense

Atmospheric defense of North America is a cooperative US and Canadian effort meant primarily to provide timely, credible tactical warning and defense against enemy bombers, air-to-surface missiles, and cruise missiles. Most of the existing systems for this mission date back to the 1950s and have been reduced in numbers over the years. Moreover, the ability of most of these systems to cope with today's low-altitude bomber threat is limited since they were designed against medium- to high-altitude penetrators. Also, most are limited in range and lack survivability. As part of the Administration's strategic modernization program, the Defense Department developed an air defense master plan in 1982 that stressed the importance and urgency of over-the-horizon backscatter (OTH-B) radars and replacement of existing Distant Early Warning (DEW) Line radars.

OTH-B, which provides all-altitude coverage and early warning of air-breathing intruders out to a distance of about 1,800 miles, is being expanded to cover eastern, western, and southern approaches by the end of the decade. The FY '85 budget request includes funds to complete procurement of the OTH-B radars for the East Coast segment of the network and to buy the first of three radars that will be installed on the West Coast. The new budget also calls for research on alternative surveillance systems to detect cruise missiles.

OTH-B's ability to "look north" can be affected by the aurora borealis (northern lights). This circumstance makes it necessary to maintain and upgrade the DEW Line, also called the North Warning System. The Air Force, therefore, plans to phase out the thirty-one existing DEW Line radars that are old and difficult to maintain and to replace them with a total of fifty-two new radars: thirteen minimally attended long-range radars and thirty-nine unattended short-range radars. In FY '85, the acquisition of the long-range radars is to be completed while development testing of the short-range radars continues. Both the OTH-B and improved DEW Line radars will be able to detect and track long-range cruise missiles; these warning systems are, however, not intended to survive a nuclear attack. The upgrading program will improve radar performance and low-altitude coverage as well as reduce operating costs.

In planning such modern atmospheric surveillance and warning systems as OTH-B, the Defense Department is allowing for the emerging challenge of "stealthy" penetrators. General Herres stressed that the Pentagon is working on a "comprehensive approach" to this problem. General Stansberry told the AFA Symposium that "we are looking for ways to deal with 'stealth' by adding power, changing frequencies, and other techniques." He added, "We are allowing for this in OTH-B to cover targets as they get smaller and smaller" in terms of radar cross section.

Key organizations pursuing technologies that could lead to high-confidence warning, discrimination, and tracking capabilities against low-altitude, low-observable penetration threats include the Defense Advanced Research Projects Agency (DARPA), the Air Force's Rome Air Development Center (RADC), and MIT's Lincoln Laboratory. Promising avenues of technology center on multispectral approaches and internetting of systems using radio frequency signals of opportunity, such as broadcast networks and multispectral automatic-track file generation and reporting. Air Force System Command's Low Observable Interface Management Group is moving toward producing by FY '87 advanced development models of sensors that could be effective against stealthy cruise missiles. In the same year, current R&D efforts are expected to provide options to upgrade the E-3A AWACS as well as ground surveillance networks in terms of detection of stealthy objects

by means of passive, noncooperative surveillance options.

Holding Down Costs

Electronic Systems Division, which develops and buys C³I and Electronic Warfare systems to the tune of $4 billion a year and which manages about 120 programs, has one key problem, according to General Stansberry: "The equipment we buy in general costs too much." There are many reasons for this, he told the AFA meeting, but overriding is the fact that "we have yet to capitalize on the benefits of competition . . . in the production of defense goods. Practically everything we do in R&D is competitive, but it is extremely difficult" to buy weapon systems in that manner. One approach that ESD is exploring involves keeping two competitors involved in the design phase long enough so that they can bid production prices on a competitive basis. Leader/follower arrangements also show promise, he said. ESD plans to test the feasibility of isolating the design work from production and to "go for competitive production contracts" in certain cases, he said.

Another fundamental reason why production costs tend to be too steep is program instability. Virtually no major program has remained stable recently, General Stansberry pointed out. Multiyear procurement arrangements can help in this regard.

A third reason that militates against economic production buys is that production contracts are negotiated, and industry profits are set, on the basis of a complex system of weighted guidelines and cost estimates based on past experience. The basic flaw of the process is that the total dollar value of individual contracts is used to establish profit, with the latter simply showing up as a straight percentage of the former. If the contractor lowers costs by whatever means in follow-on contracts—usually negotiated annually—the base on which his profit is calculated goes down, and so, of course, does his profit. Rather than having an incentive to invest in robotics, automated assemblies, or other labor- and cost-saving capital equipment, contractors, in fact, are encouraged not to lower prices and not to modernize their plants.

GET PRICE and Warranties

Three years ago, ESD, as part of its "war on cost" effort, pioneered a concept known as GET PRICE, for "Productivity Realized through Incentivizing Contractor Efficiency." Simple in concept but difficult in practice, GET PRICE is predicated on the idea that if industry makes an investment that brings down the price of products the government buys, then the government should allow industry to keep part of the savings. The percentage of the savings that the contractor pockets should be sufficient to enable industry to earn a fair rate of return on its investment, General Stansberry told the AFA meeting. He added that in the case of the first GET PRICE arrangement, involving ESD and Westinghouse Electric Corp., "We will over the next ten years save the Air Force, the Navy, and the Army close to $1 billion. And that is just the tip of the iceberg." Other GET PRICE arrangements have either been entered into or are being negotiated by ESD with General Electric, Rockwell, Hazeltine, Singer Kearfott, E-Systems, Sonicraft, Magnavox, Hughes Aircraft, and Litton Data Systems. GET PRICE, General Stansberry stressed, "is not an evolutionary step forward; it's a revolution in the way we do business."

In one area of its war on costs, ESD clearly is scoring decisive victories: In the aggregate, cost overruns have been reduced to the one-percent level, according to the ESD Commander. The reason for this improvement is better cost-estimating, he stressed. Nevertheless, cost-estimating remains a problem that the Division is working on hard.

A technician checks a Joint Tactical Information Distribution System (JTIDS) terminal aboard a NATO E-3A aircraft. An Enhanced JTIDS System (EJS) is now under development.

Congress has recently attached considerable importance to—and mandated in a categoric, almost procrustean manner—the incorporation of manufacturers' product performance warranties into all production contracts. While General Stansberry acknowledges that "we don't use warranties enough," he warns that the present law that says "we shall have warranties on all major weapon systems and major components is unworkable." Suggesting, for instance, that it is somewhat difficult for a manufacturer to repair a satellite in orbit that has developed a problem, the ESD Commander recently warned the Senate Armed Services Committee that "if we set up a blanket requirement for contractors to accept all of the risks" associated with committing a brand-new design from the outset to a host of "specifically delineated performance requirements," industry will be deterred from using technological innovation and state-of-the-art technology in military products.

He told the Senate committee that "we need the latitude to make informed judgments about whether a warranty is appropriate, what type of agreement is best suited to operational needs, and whether the warranty should be applied at the system, subsystem, or component level, or at some combination of levels." Mandating "both the type of warranty and the extent of application provides unnecessary restrictions and may not achieve the result, [*i.e.*,] systems that are affordable and work as promised."

High AJ Voice, High AJ Voice, and High AJ Voice

The central importance of strategic C³I, and as amplified by the Administration's focus on strategic force

modernization, General Stansberry pointed out, has led to stable, firm support of this field over the past few years. On the other hand, it has proved far more difficult to get and maintain such support for tactical C^3 programs. The tactical field, he said, lags behind its strategic counterpart in funding stability and basic support. Nevertheless, C^3 is just as vital for successful tactical operations as it is for strategic deterrence.

The central deficiency of the Air Force's tactical C^3 systems is their vulnerability to enemy jamming. Magnifying this vulnerability is the fact that the basic tenet of Soviet radioelectronic combat (REC) calls for the systematic disruption of the opponent's C^3 by using appropriate lethal and nonlethal means as the situation warrants. The Soviet doctrine is simple and clear. They plan to jam about one-third of US electronic warfare capabilities, they will kill another third by physical destruction, and they expect that the remaining third will collapse.

As proven time and time again in Mideast combat operations over the past decade and reconfirmed in Air Force and NATO exercises, jam-resistant air-to-air and air-to-surface ultra-high-frequency and very-high-frequency voice communications are essential in tactical air operations. Jammed communications mean that combat performance will be degraded in a significant, measurable manner, causing major—possibly decisive—losses of men and aircraft. That is why General Stansberry says the three most important things "we are doing here at ESD are high AJ [antijam] voice, high AJ voice, and high AJ voice."

In a chronological sense, the first step toward coping with the AJ voice communications challenge is a program called HAVE QUICK. This program provides ECCM (electronic counter-countermeasures) protection for the Air Force's primary UHF C^3 equipment, in the main ARC-164 radios used for air-to-air and air-to-ground communications. HAVE QUICK originally was seen merely as a quick-fix measure, to be replaced by a more sophisticated, more survivable system. This is no longer the Air Force perception. HAVE QUICK, therefore, is already undergoing an evolutionary enhancement known as HAVE QUICK II, which bolsters the system's jam resistance. Installation of the first HAVE QUICK II radios will get under way in FY '85.

It was clear from the inception of HAVE QUICK that Soviet REC capabilities eventually would be able to negate that system and that, therefore, an advanced technology, ultra-high-frequency system would be needed. Two programs, first SEEK TALK and then HAVE CLEAR, were formulated but failed to get congressional support. HAVE CLEAR differed from SEEK TALK in that it relied on computer-driven "frequency hopping" and thus did away with SEEK TALK's adaptive antenna array techniques to "null" enemy jammers. The latter approach required "that we punch holes in our aircraft, which is an expensive way of doing business," according to General Stansberry.

Enhanced JTIDS

At the root of the problem, especially in terms of Congress, are differences in requirements of the Air Force and the US Navy, with the latter generally operating in a less dense jamming environment than the former. As a result, the Navy prefers data to control its aircraft, while the Air Force relies on voice communications. Even though DoD's Defense Systems Acquisition Review Council (DSARC) approved go-ahead of HAVE CLEAR early in 1983, the Defense Department redirected the program a few months later toward an Enhanced JTIDS (joint tactical information distribution system), known as EJS. JTIDS provides jam-resistant, secure communications by means of high-volume, high-speed digital data links. Operated by tactical air, land, and naval forces, this survivable system provides not only tactical data and some limited voice communications but also furnishes relative navigation and limited cooperative identification information to individual terminals within the JTIDS net.

The system uses a technique called time division multiple access (TDMA)—or, in the case of the Navy, DTDMA, for distributed time division multiple access—to create jam-resistant networks that can handle vast amounts of digital data. JTIDS "frequency hops" across a wide spectrum and transmits encoded pulses of digital data in a way that is jam-resistant and secure. In the case of the Air Force, the standard JTIDS will be used to create digital data links among AWACS aircraft, ground command and control centers, and some fighters. The system will be interoperable with the other services.

EJS will use JTIDS-like signal structures and waveforms but will employ increased power. EJS, General Stansberry told the AFA Symposium, will be a highly capable system and an adequate replacement for SEEK TALK, "if we ever get to build it. We are now supposed to field it in the late 1980s, but at the rate we are going, it will be a lot later. Every time we get a head of steam up, somebody tells us to redesign [the system]. Congress sort of feels it is being asked to vote [on such technical nuances as] waveforms and alternate bandwidths. The key requirement is to get on with the job." Originally, the Air Force expected to have high AJ voice systems in operation by 1985. The prospects are now that this might slip to the early 1990s, according to the ESD Commander. The FY '85 Defense budget provides for continued full-scale development of the EJS system.

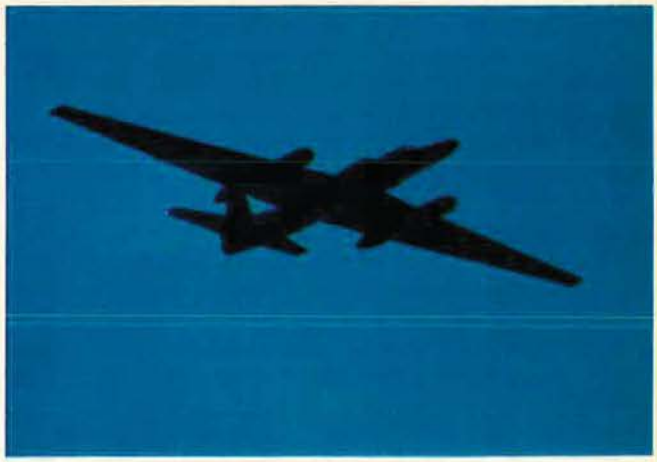
The Travails of Joint STARS

Another ESD program that has had rough sledding in Congress is the Joint Surveillance and Target Attack Radar System (Joint STARS). Under development by ESD for use by both the Army and the Air Force, Joint STARS uses moving target indicator (MTI) and fixed target indicator (FTI) radars to provide for integrated real-time detection and attack of second-echelon targets. When combined with advanced weapon systems, Joint STARS will see and strike deep into enemy territory.

Joint STARS's principal challenge—typical of joint service systems—is to reconcile and accommodate different requirements of the two services. The Army, for instance, needs to look only about twenty to thirty kilometers beyond the forward line of troops (FLOT), while the Air Force needs a radar range of about 200 kilometers. The Army needs an operational capability sooner than the Air Force. The Air Force wants to be able to look through weather and to do so from higher altitudes than does the Army. Obviously, the Air Force

must be able to detect second-echelon armor even when it is standing still. This would have to be done over considerable distances using synthetic aperture radars. The Army is only after moving targets and can get by with processing target information in its nearby ground stations. The Air Force needs on-board data processing and airborne platforms that can work in concert with forces that are rapidly deployable on a worldwide basis.

At this writing, an accommodation of the two services' divergent requirements appears to be at hand. Both services apparently are willing to operate from one platform, a modified Boeing 707 bearing the military designation C-18. Personnel from both services would be aboard these Joint STARS aircraft and would transmit the data to their individual users. Congressional



ABOVE: An OV-10 pilot switches his HAVE QUICK radio to a jam-resistant mode before take-off. HAVE QUICK provides electronic counter-countermeasures protection for USAF's primary UHF C³ equipment. RIGHT: Although USAF feels differently, Congress prefers the TR-1 as the platform for the Joint Surveillance and Target Attack Radar System.

reaction to such an approach may be chilly, since influential staff experts contend that the C-18 is unduly vulnerable to hostile action. The Air Force believes the evidence is to the contrary.

The House Armed Services Committee recently "zeroed" the funding request for Joint STARS. Although "strongly convinced of the requirement for a Joint STARS system," the committee recommended that the "Air Force program be terminated and that the full authorization request of $108.168 million be provided to the Army. The radar developed by the Army could be integrated into the TR-1 should the Air Force require this capability." Congress has shown a marked preference for the TR-1, a U-2 derivative, as the Joint STARS platform. The Air Force has expressed concern that the TR-1 has neither the range nor the ability to operate independently of ground stations.

General Stansberry expressed disappointment over the congressional action, saying that it could have the "effect of wrecking well over a year of significant progress toward achieving an extremely capable system." Technological progress, he said, has narrowed the gap between what the two services want to get out of Joint STARS: "It is quite possible to build modular radars and achieve the benefits of the commonality of individual components." The need for long-range operations can be met "with higher power, different antennas, and [more] transmitters in one version that sits in a big platform that flies far behind the lines." Another version, he said, could be used by the Army aboard a different platform. The approach to Joint STARS, he urged, should be common-core designs but "certainly not identical radars," if more than one platform is used to accommodate divergent requirements by the services.

Expressing confidence that Congress will restore funding for the program, General Stansberry said the contention that the Air Force and the Army are not treating Joint STARS as a joint program is "100 percent wrong. We have made terrific progress . . . in getting complete agreement on [systems specifications] to the point where we just released [a request for proposal] to industry." He added, "I believe our resolve is being tested" by the bias of influential elements of OSD and Congress toward the TR-1 and against the C-18 as the system's platform.

The Joint Electronic Warfare Center

The use of electronic warfare and C³ countermeasures (C³CM) is fast becoming an integral part of force management and weapon systems design specifications. The lessons learned from the Falkland Islands conflict and the Israeli-Syrian encounters in the Bekaa Valley have heightened the Defense Department's interest in C³CM. Command control and communications countermeasures are comprised of tactics, techniques, and procedures as well as specific weapon systems that seek to use electronics as both a shield and a sword. Its broad purposes are offensive action against the electronic por-

tion of the enemy's combat forces and systems by exploiting, jamming, deceiving, or destroying them, and the protection of friendly forces. Within the Air Force, the C³CM function is primarily the responsibility of the operational commands supported by Electronic Security Command.

The head of that command, Maj. Gen. John B. Marks, USAF, also serves as the Director of the Joint Electronic Warfare Center (JEWC), and, in that capacity, works directly with the Joint Staff and the commanders in chief (CINCs) of the unified and specified commands. The task of the Joint Electronic Warfare Center is to help the Joint Staff and the CINCs develop joint tactics, techniques, and procedures (JTTP) for C³CM in future conflicts. The objective underlying the development of joint C³CM and EW tactics is to improve the ability of the military services to fight as an integrated whole, cohesively and effectively. For that purpose, JEWC performs detailed analyses of the EW capabilities of the US in comparison with those of potential adversaries. As General Marks points out, all aspects of radioelectronic combat are being treated as high-priority issues by the Soviet Armed Forces and are "getting about as much of a push" as these efforts can absorb.

With a staff of about 170 officers and enlisted personnel from all services, JEWC, located at Kelly AFB, Tex., is concerned with all equipment involved in EW and C³CM, without regard as to which service operates individual systems, according to General Marks. In line with the current emphasis on joint doctrine and joint operations, the four-year-old organization is getting increased attention that recently resulted in direct, detailed briefings for the Chairman and the members of the Joint Chiefs of Staff. In its work of drafting the JTTP, the Center avoids telling the individual services how to do their job but does emphasize the need to work together, according to General Marks.

The basic tools used by JEWC in drafting joint C³CM tactics and procedures are lessons learned from such joint exercises as the recent Team Spirit 84 and such high-level seminars as one held earlier this year at Hq. ESC, entitled "C³CM in Joint Operations." That seminar involved eighteen flag-rank officers and some seventy high-level civilian experts from government and industry.

ESC itself, General Marks explained, performs two basic functions: "We are an intelligence command, and we are an operational command." ESC supports "the intelligence world with programs that enhance our C³CM operations" on a global scale. As an operational command, General Marks said, "we try to enhance both training and operational capabilities in support of electronic combat operations." In part, this means the Command procures for the strategic, tactical, and airlift forces equipment needed for C³CM and EW operations. Most of the programs involved are classified.

"Excedrin Headache Number Two"

"Using the electromagnetic spectrum according to his plans, while denying its use to any adversary, is the crux of the electronic battlefield commander's job. It's a job that grows more difficult every year. When to listen, when to jam, when to broadcast, and finally, when to strike—they all make for an 'Excedrin headache number two' that won't quit." Providing the systems that give this kind of headache to the other side is the job of AFSC's Aeronautical Systems Division, its Commander, Lt. Gen. Thomas H. McMullen, USAF, told the AFA Symposium.

In a chronological sense, EW's first job is to find the enemy. ASD has a number of programs under way to do just that. These include the TR-1, a tactical variant of the high-flying U-2 that provides "continuously available, day-and-night, all-weather, standoff surveillance." Ten of these aircraft have been delivered so far, with production expected to extend into the late 1990s, General McMullen said. Accommodating a variety of sensors in its "quick-change nose," fuselage bays, and wing pods, "it's a truck" for carrying different information-gathering payloads.

Possibly the most impressive of these payloads is the Tactical Reconnaissance System (TRS), an advanced synthetic aperture radar system, or ASARS, that provides "radar images of remarkable fidelity at long standoff ranges and [that] makes available either wide-path or high-resolution spot coverage." TRS makes it possible to verify and identify ground targets near the FLOT as well as to spot targets in the second echelon without the TR-1 having to overfly these areas. "The combined increase in range, resolution, and area coverage, combined with real-time control of where it looks, represents a quantum jump over currently operational systems," General McMullen pointed out. Raw data from the airborne TRS will be downlinked, processed, and transmitted to US and allied users within minutes of initial collection. The airborne elements of the system are in production, and fielding of the ground stations will start next year.

Another key task of the TR-1 is to carry the sensors for the precision location strike system (PLSS). A triad of PLSS-equipped TR-1s will carry highly sensitive receivers that can detect enemy radars over a broad frequency range, pinpoint their location with great accuracy, and, at the same time, classify them by type. Capable of dealing with high-tech emitters in a dense electromagnetic environment regardless of time of day or weather conditions, PLSS essentially does for the ground electronic war what AWACS does in terms of air war. PLSS is in flight test and "we are pressing on with preproduction activity," the ASD Commander told the AFA meeting.

Reconnaissance and Defense Suppression

While the Air Force is upgrading the RF-4C reconnaissance aircraft with a more capable side-looking ground surveillance radar, there is also the recognition that the system has been in the inventory for about twenty years. ASD selected the two-seat F-16D as the replacement aircraft and eventually expects to field a force comparable in size to the current one, General McMullen said.

The F-4G "Wild Weasel" also requires modernization to be able to cope with the threats projected for the 1990s. ASD, therefore, is instituting a two-phased upgrade program. Phase I will increase the system's processing power by "almost an order of magnitude" and at the same time boost its supportability. The increased processing capacity is needed to make the F-4G com-

patible with HARM, the high-speed antiradiation missile. The Phase I upgrade will start entering the inventory in 1986. The hardware improvements of Phase II, involving mainly an extension of the system's frequency capabilities, is to get under way by 1988.

Modification of forty-two F-111As to EF-111A Tactical Jamming Systems, General McMullen said, is in full swing, with nineteen units delivered to the 366th Tactical Fighter Wing at Mountain Home AFB, Idaho, and one aircraft to the 42d Electronic Combat Squadron at RAF Upper Heyford, UK. The EF-111 shields friendly attack aircraft from hostile surveillance radars in

The EF-111A Tactical Jamming System is designed to shield friendly attack aircraft against hostile radars. Twenty EF-111As are now in service with USAF units.

three different ways: in a barrier standoff role, where the aircraft orbits over friendly airspace to prevent enemy radars from acquiring and tracking the attack force as it forms and heads toward the enemy; in a penetration escort role, where the EF-111A accompanies the attack force to confuse the enemy in the target area; and, finally, in a close air support role, where the system operates near the area of combat to deny surveillance radar support to the enemy. Modifications to the basic F-111 are about sixty percent electromechanical—meaning cooling, power, signal amplification, and beam steering—and forty percent electronic—in the main, signal receiving and processing and generation of the jammer signal.

In an effort to stay ahead of projected growth of the threat, ASD is initiating an upgrade program that is meant to counter advanced Soviet air defense radars and that will maintain the EF-111A's effectiveness throughout the 1990s. The present program limit of forty-two aircraft (thirty-six combat-coded units) represents a "thin line indeed" in terms of what is required, according to General McMullen. "We would like more but we haven't been successful as yet," he emphasized.

Self-Protection Systems

In order to provide fighter aircraft with on-board protection, ASD is deploying the ALQ-131 pod and developing jointly with the Navy the airborne self-protection jamming (ASPJ) system. More than 500 ALQ-131 pods have been acquired since 1979. A like number of these pods is to enter the inventory in the near future, but may involve upgraded versions, the ASD Commander said. The ASPJ is scheduled to enter the inventory within a few years. Mated to the F-15 and F/A-18, this system will improve the survivability of these aircraft because of its advanced capability and the fact that ASPJ does not require an external stores station.

ASD also is exploiting the electro-optical, infrared, and millimeter-wave areas for defensive purposes, General McMullen announced. "We are working on systems to warn our pilots when they are being illuminated by laser or millimeter-wave systems. For protection from IR trackers, we are developing a variety of improved IR flares and better ways to dispense them just when they are really needed," the ASD Commander added. Work is under way also on an IR search and track (IRST) system that makes it possible to detect and track enemy aircraft passively. Demonstration and flight test of such an IRST prototype is scheduled for 1985.

In a step toward thwarting the enemy's electronic countermeasures, ASD is working on approaches that let fighter pilots talk to each other in the face of jamming and that reduce the detectability of airborne voice and data link transmissions. These efforts involve the use of extremely wideband spread-spectrum techniques as well as sophisticated laser communications that the adversary can neither detect nor jam.

A "Golden Age" of C³I?

Very-high-speed integrated circuits (VHSIC), improved displays, and higher-order computer language applications should make the tasks associated with flying and fighting much more manageable than is currently the case, the Air Force's Principal Deputy Assistant Secretary for Research, Development and Logistics, Martin F. Chen, told the AFA Symposium: "We are not far from the time when pilots may literally be presented pictures of recommended flight paths through enemy territories. . . . The day is near when pilots may change radio channels and bring up desired cockpit displays by voice command." Mr. Chen predicted that eventually "we will see artificial intelligence employed to help the pilot make decisions in the cockpit. In this way, we will augment a pilot's experience based on computer analyses of previous data from similar missions using sophisticated software [that is] capable of learning."

In terms of battlefield commanders, Mr. Chen envisioned a "golden age" of information handling and processing, based on advanced sensor concepts in the areas of improved antennas, millimeter wave, improved signal processing, and radiation hardening. The payoff could be the ability to gather information in hostile environments without appreciable constraints. Other C³I improvements, such as packet switching and fiber optics, can be counted on to enhance tomorrow's distribution and processing of battlefield data, while VHSIC "can shrink and make more mobile the immense computer facilities needed to digest, store, correlate, and display huge volumes of real-time battlefield information." Lastly, artificial intelligence will help automate the decision processes necessary to make timely use of that information, according to Mr. Chen.

AFA's next national symposium on electronics is scheduled to be held on April 25–26, 1985, again at Hilton at Colonial in Wakefield, Mass. ■

What's Happening in Electronics at ESD

A CHECKLIST OF MAJOR ELECTRONICS PROJECTS

(As of May 8, 1984)

NAME AND MISSION	STATUS	CONTRACTOR
Deputy for Acquisition Logistics and Technical Operations (AL)		
Computer Resource Management Technology The goal of this program is to develop and transfer into active use the technology, tools, and techniques needed to cope with the explosive growth in Air Force systems using computer resources. Toward this end, this program (a) provides for the transition of computer systems development in laboratories, industry, and academia to active Air Force systems; (b) develops and applies software acquisition techniques to reduce life-cycle costs; (c) provides improved software design tools; (d) serves as the research and development area of the Air Force for computer security; and (e) develops an information network that links existing and planned logistics engineering systems into an integrated Logistics Information Management Support System (LIMSS) architecture. In addition, this program has been designated by the Under Secretary of Defense for Research and Evaluation (USDRE) Office as a special-interest program to provide Ada computer program development.	Engineering Development	University of Texas; DIGICOMP; Massachusetts Computer Ass'n; Computer Corp. of America; General Dynamics; Denver Research Institute; Input-Output Computer Services
GET PRICE A program to reduce the production cost of Air Force electronic command control and communications systems by encouraging contractor capital investment in modern technology. Increased productivity and improved product quality are key objectives. Contractor direct and indirect manufacturing areas are analyzed; specific, required manufacturing technologies are demonstrated; and capital investment incentives for new technology acquisition are negotiated.	Continuing	Hazeltine; Rockwell Collins; Singer Kearfott; Westinghouse Electric Co., Defense & Electronic Systems Center; General Electric Co., Electronic Systems Div.
Deputy Commander for International Programs (FA)		
Japan Base Air Defense Ground Environment System Systems engineering and program management assistance to the Japan Air Self-Defense Force in upgrading the current BADGE (Base Air Defense Ground Environment) Systems.	Ongoing Engineering Assistance	None
Royal Saudi Air Force Alternate Command Operations Center (ACOC) Acquisition of a Royal Saudi Air Force Alternate Command Operations Center. The Center will use commercially available equipment and software.	Installation and Checkout	Hughes Aircraft Co.
Royal Saudi Air Force C^3 System Acquisition of a ground command control and communications system for the Royal Saudi Air Force. The system will provide for the interface of existing tactical radars, the Saudi E-3A AWACS, and elements of other Saudi military organizations.	Acquisition	None
Deputy Commander for Intelligence, Countermeasures, and Support Systems (OC)		
Air Force SAFE Program Procurement and deployment of DoD BISS program-developed and commercially available physical security equipment to approximately seventy USAF bases and 210 sites worldwide. These systems will protect such mission-critical/high-value resources as stored weapons, strategic/tactical alert aircraft, open- and closed-sheltered alert aircraft, special mission aircraft located on parking areas, specified command posts, and other specifically identified strategic resources.	Procurement/Deployment	RACON
Air Staff Information Management Systems State-of-the-art technology will be used to increase the efficiency of handling management information. It will increase the productivity and efficiency of the USAF Air Staff with the latest automation systems, techniques, and networking.	Development	Booz-Allen & Hamilton
Automated Graphics System The Automated Graphics System develops and provides interactive tools for standardized viewgraph production in-house by SPO clerical personnel. Extended capabilities include viewgraph transfer to high-quality typesetting equipment and development of an enhanced graphics design station for use by audiovisual center graphics artists.	Operational	Booz-Allen & Hamilton
Automated Weather Distribution System (AWDS) AWDS will enhance Air Weather Service's meteorological support for the Army and the Air Force. The system will reduce labor-intensive tasks using advanced computer technology, color graphic displays, and sophisticated meteorological and graphic presentation software. A total of 163 automated Base Weather Stations worldwide and twenty tactical versions will interface with two communication networks for distribution of global alphanumeric and graphic meteorological data.	Development	MacDonald Dettwiler and Associates Ltd.
C^3 Countermeasures Advanced Development Definition of systems that provide a capability to conduct C^3 countermeasures activities.	Concept Definition	None
C^3 Countermeasures Joint Test and Evaluation Field tests to assess friendly C^3CM capabilities and to determine the impact of C^3CM on enemy operations.	Development	None
C^3 Countermeasures Planning Includes planning and coordination activities for systems development in support of an overall Air Force C^3CM capability.	Continuing	None
COBRA JUDY X-Band COBRA JUDY is a USAF shipborne phased-array radar system to collect data on foreign strategic ballistic missile tests. This modification will extend the capabilities of the basic system to allow it to gather and provide data vital to the development of other systems.	Production	Raytheon Co.
COMFY FOX A mobile, self-contained signal security assessment capability system that will collect and analyze friendly signals, determine vulnerability, and report the results for correction.	Concept Definition	None

NAME AND MISSION	STATUS	CONTRACTOR
COMFY SHIRE A C³CM Support Data Base under construction to support Compass Call. The data base will also be used for studies and simulation. It will be made generally available to DoD users involved with electronic combat.	Continuing	PRC; ISN Corp.; BETAC Corp.
COMFY SWORD A ground-based jamming and deception system for training friendly aircrews to operate in a hostile electronic environment.	Production	Flight Systems, Inc.
Critical Node Targeting Development of a system to locate and identify C³ nodes for targeting in a timely manner.	Concept Definition	None
DoD Base and Installation Security Systems (BISS) An evolutionary RDT&E program to provide a DoD-standard electronic exterior physical security system for protecting DoD resources worldwide. The system's components include detection, assessment, entry control, and command and control equipments. The system concept emphasizes maximum commonality of major items and a variety of supporting subsystems. It offers a flexible choice of equipment (USAF developed/commercially available) that must be tailored to the unique physical characteristics of the location and to the threat.	Development	Teledyne; ASEC; Canadian Commercial Corp.
Information Resources Management (IRM) Program This program will employ state-of-the-art technology to automate management information handling and to increase the productivity and efficiency of professionals through automation, and to minimize overhead development costs through use of off-the-shelf equipment. The IRM program is a development effort to implement within AFSC the Paperwork Reduction Act of 1980.	Development	Booz-Allen & Hamilton; Bedford Research Associates
Intelligence Analysis Center (IAC) Automated assistance to the Marine Air/Ground Task Force Intelligence organizations to store data, correlate information with a master file, perform analyses on collected information, and prepare and disseminate intelligence reports to appropriate organizations. The IAC segment is to be contained in standard 8' × 8' × 20' mobile shelters capable of worldwide deployment.	Production	ADCOR
Logistics C³I System Capstone of the Logistics Force Structure Management System will develop an architecture and provide an improved operational capability to support logistics command and control activities in both peacetime and wartime. Scope includes Hq. AFLC, each Air Logistics Center (ALC), the Aerospace Guidance and Metrology Center (AGMC), and the Military Aircraft Storage and Disposition Center (MASDC).	Conceptual	Booz-Allen & Hamilton
Logistics Information Management Support System (LIMSS) This program will provide a logistics command control and communications system to network logistics information at all required logistic levels.	Validation	None
MAC C² Upgrade Three programs to upgrade the MAC C² system. The elements to be acquired are MAC UHF SATCOM Terminals (MUST), Improved Data Sets (IDS) for Digital Entry and Receipt, and the Information Processing System (IPS) consisting of hardware and software. These will significantly improve MAC's command and control of aircraft in peace and wartime.	Development and Acquisition	None
Manual Radar Reconnaissance Exploitation System (MARRES) This program is the exploitation element of the AN/UPD-8 Side-Looking Airborne Radar System. The AN/UPD-8 ground system consists of several elements with split management responsibility: antenna control, data link, and correlator/processor (ASD); exploitation equipment and communications (ESD). MARRES uses equipment similar to the Imagery Interpretation System to provide automated aids to the radar imagery interpreter to help perform target identification and location.	Production/Deployment	Texas Instruments
Military Air Traffic Control Systems (MILTRACS) MILTRACS develops and acquires Air Force ground facilities and equipment and associated avionics to provide safe, orderly, and efficient movement of aircraft throughout the world in peacetime and under wartime conditions. NAVAIDS, Air Traffic Control Radar Equipment, Precision Landing Systems, and Air Traffic Control Training Devices are among the systems being acquired, often with the other services and the FAA.	Continuing Development and Acquisition	Many
MPN-XX Radar Approach Control System The MPN-XX, to replace the AN/MPN-14, will be an improved, low-capacity, easily deployable Ground Control Approach (GCA) radar that will be resistant to Electronic Countermeasures (ECM), CW, Antiradiation Missiles (ARM), and Electromagnetic Pulse (EMP). It will be designed for forward-area tactical operations in a hostile environment and consist of an Airport Surveillance Radar (ASR), a Precision Approach Radar (PAR), an Operations Center (OPS), and an Expansion OPS.	Predevelopment	None
Operations System Network (OPSNET) OPSNET is a proposed multilevel secure information management system for Hq. USAF, DCS/Plans and Operations. It will consist of a network of automated systems and equipment that will link the entire DCS together and provide for easier information flow and access. The purpose of the system will be to increase the productivity of, and reduce the work load on, action officers.	Development	Booz-Allen & Hamilton
PACER Acquire Provides for the acquisition and implementation of selected Logistics Force Structure Management Systems (LFSMS) that support AFLC. Present systems under definition and development include the AFLC Local Area Network (LAN) and the Enhanced Transportation Automated Data System (ETADS).	Validation	None
Public Information Processing and Printing System (PIPPS) Hq. USAF-directed program to develop and implement a state-of-the-art electronic Air Force-wide system to create, publish, distribute, and maintain standard USAF publications and forms. Includes electronic data base, computer terminal access, and high-speed print on demand.	Development	Booz-Allen & Hamilton
Security Police Communications System (SCOPE SHIELD) SCOPE SHIELD addresses requirements to replace radios currently used by the USAF Security Police Forces in the mission areas of Air Base Defense, Weapon System Security, and Law Enforcement. These areas utilize fixed-base station, vehicular, and hand-held radios. SCOPE SHIELD will effect their replacement through implementation of a combined state-of-the-art acquisition/preplanned product improvement approach.	Development/Production	None
SEEK SCORE To develop and produce a radar bomb-scoring system for SAC for training and evaluation of aircrews in a realistic operational environment.	Development	Sierra Research

NAME AND MISSION	STATUS	CONTRACTOR
Sentinel Aspen This program will provide a General Imagery Intelligence Training System (GIITS) to Air Training Command. This generic trainer incorporates computer-aided instruction to prepare imagery analysts for operational hardcopy and softcopy exploitation systems.	Development	None
Sentinel Bright Design, develop, and acquire a generic Voice Processing Training System (VPTS) and its system-specific Tactical SIGINT System Simulator (TSSTS). These systems will provide training support for linguists, communications analysts, and other cryptologic specialists for modern operational systems.	Development and Acquisition	Logicon Inc.
Shelter Management Office (SMO) USAF focal point for tactical shelters. Includes overall management for USAF research and development and initial acquisition of new and modified tactical shelters (includes shelter systems for F-15, F-16, F-111, A-10, *et al.*). Provides technical support to all Air Force major commands and program offices procuring systems that employ tactical mobile shelters.	Development and Acquisition	None
Tactical LORAN Digital Avionics Systems Development and acquisition of the AN/ARN-101(V) Navigation, Weapons Delivery and Reconnaissance Systems for RF-4C and F-4E aircraft. This digital modular avionics system combines LORAN/Inertial information and integrates radar, optical, infrared, and laser sensors to satisfy requirements for precision weapons delivery during the 1980s.	Installation, Operations	Lear Siegler, Inc.
Unified Local Area Network Architecture (ULANA) This program will develop Air Force Local Area Network (LAN) standards and apply them to LANs being developed within ESD as an initial stage. The program will ultimately encompass all Air Force LANs under the same standard, with eventual transition of the finished products, as well as the SPO itself, to AFCC.	Development	Booz-Allen & Hamilton
Warrior Preparation Center (WPC) This program will enhance our tactical warfighting capability through better training of our battle commanders.	Validation	Computer Engineering Associates
Deputy Commander for Strategic Systems (SC)		
Aircraft Alerting Communications EMP (AACE) Upgrade Program AACE Upgrade Program is to provide assured, electromagnetic pulse (EMP) hardened, end-to-end communications from the Commander in Chief of Strategic Air Command (CINCSAC) to his alert aircraft forces. It will also provide CINCSAC and the SAC Main Operating Base (MOB) Commanders with indications of an EMP event so that appropriate actions may be taken.	Full-Scale Development	None
Air Force Satellite Communications Systems Phase I, a UHF SATCOM system, is in the field serving the SIOP forces. Phase II, an enhancement of the UHF and SHF airborne/ground terminal to provide more reliable, jam-resistant, survivable satellite communications to the strategic forces, is being developed. Now in planning is Phase III, a new communications system operating at UHF and EHF with a common transmission format for maximum interoperability among all services.	Deployment, Development, Conceptual	Rockwell Collins; Linkabit Corp.
Air Force Support to MEECN Upgrades the Air Force and Army Survivable Low Frequency Communications Systems (SLFCS) as part of the Minimum Essential Emergency Communications Network (MEECN). Major developments include airborne LF/VLF transmitters, new receive antennas for transverse electric mode reception, incorporation of the Navy MEECN Message Processing Mode (MMPM), and mini-LF/VLF receive terminals for bomber aircraft. This program is designed to meet the requirements of the Joint Chiefs of Staff, CINCSAC, and Theater CINCs.	Definition, Development, Production/Deployment	Rockwell Collins; Sonicraft; ASEC
Berlin Radar System This program will modernize the Berlin Air Route Traffic Control System by consolidating Air Traffic Control Operations at Tempelhof Central Airport, replacing the current long-range radar system with a modern 3-D AN/FPS-117 radar, and automating the associated operations center.	Acquisition	Sanders Associates
BMEWS Modernization Program Upgrade of the three operational sites (Greenland, Alaska, England) operated by Space Command and the Royal Air Force. The Missile Impact Predictor is being upgraded by replacing the aging computers now in use with off-the-shelf computers and by translating software assembly language into a higher-order language. Radar improvements (Greenland and England) are planned that will meet the 1980s' threat and give the system an attack assessment capability to meet the need of the National Command Authorities.	Acquisition	ITT, Federal Electric Corp.; Raytheon Co.
Communications System Segment—Replacement Improvement of the reliability, capacity, maintainability, and flexibility of the NORAD Cheyenne Mountain Complex communications processing function by replacement of the Communications System Segment (CSS) acquired through Program 427M. The CSS handles message processing, formatting, technical control, line code conversion, and routing of internal and external messages.	Definition Phase	Ford Aerospace; Martin Marietta Aerospace
CONUS Over-the-Horizon Backscatter Radar The CONUS OTH-B Radar System will provide NORAD with a capability for long-range tactical early warning and surveillance of aircraft and air-to-surface missiles approaching North America.	Full-Scale Engineering Development/Production	General Electric Co.; SRI
E-4 Airborne Command Post Provides the National Command Authorities and the Commander in Chief of Strategic Air Command with a survivable airborne command and control system that will operate during the pre-, trans-, and postattack phases of a nuclear war. As a survivable emergency extension of NMCS and SAC ground command and control centers, the E-4 Airborne Command Post provides high confidence in US ability to execute and control SIOP forces in a nuclear environment.	Development, Production/Deployment	Boeing Aircraft Co.
Ground-Based Electro-Optical Deep Space Surveillance System (GEODSS) The GEODSS system will extend Space Command's spacetrack capabilities for detecting and cataloging space objects out to the 3,000–20,000-nautical-mile range. This will be a global network of five sites to detect optically, track, and identify satellites in earth orbit. Three sites are operational; two sites are being deployed.	Acquisition	TRW Inc.

NAME AND MISSION	STATUS	CONTRACTOR
Ground Wave Emergency Network (GWEN) GWEN will provide US strategic forces with the ability to maintain critical CONUS long-range command and control communications connectivity despite atmospheric disturbances present in both the trans- and postattack phases. Survivability for this system is provided primarily by proliferated relay nodes, using unmanned, ground wave radio equipment collocated where possible with existing commercial/government broadcast towers. Strategic forces units, equipped with compatible radio equipment, will interface with nearby nodes for participation in the overall network.	Conceptual/Development	RCA; R&D Associates
Joint Surveillance System (JSS) The JSS program was established to acquire and deploy a peacetime air surveillance and control system to replace the Semi-Automatic Ground Environment (SAGE) and Back-Up Interceptor Control (BUIC) systems for the CONUS and Canada and the manual ground environment systems in Alaska and Hawaii. The primary mission of JSS is peacetime air sovereignty and airspace surveillance, with limited air defense functions. For Canada, the mission includes support of wartime air defense functions; in Alaska, the mission includes performance of tactical air control. Eight Region Operations Control Centers (ROCCs) are approved.	Production/Implementation	Hughes Aircraft Co.
MILSTAR Reliable, jam-resistant, survivable satellite communications for the three services' tactical and strategic users is being developed. A common transmission format will be employed to provide for interoperability among services. The new system will operate at EHF. ESD is responsible for developing communications terminals for airborne platforms. As part of this development, the current AFSATCOM system is being upgraded to provide a transition for the SIOP forces from UHF to the EHF frequencies of MILSTAR.	Full-Scale Development	Raytheon Co.; Hughes Aircraft Co.
North Atlantic Air Defense System An automated command and control system and associated sensors in the North Atlantic. It will provide the capability to control air defense operations through a real-time command and control system. Interfaces will be provided to US and international agencies.	Conceptual	None
North Warning The North Warning Program will replace the current DEW Line with a combination of long- and short-range radars for contiguous coverage from the northern slopes of Alaska across Canada and down the west coast of Greenland. Thirteen long-range radars and thirty-nine unattended gapfiller radars will be required. A new communications network will link the North Warning sensors with the Canadian and Alaskan JSS ROCCs.	Full-Scale Engineering Development	None
PAVE PAWS Primary mission of PAVE PAWS is credible warning and attack characterization of sea-launched ballistic missiles penetrating the PAVE PAWS coverage. The warning and attack characterization data include estimations of launch and impact points and times. Radars are operational at Otis ANGB, Mass., and Beale AFB, Calif. Others are planned for the southeast and southwest United States.	Operational/Full-Scale Engineering Development	Raytheon Co.
SEEK IGLOO Replacement of all thirteen Air Force long-range radar sites in Alaska with solid-state, highly reliable radars that provide range, azimuth, height, and beacon data on all detected targets. Implements a Minimally Attended Radar concept: maintenance by not more than three medium-skill radar technicians and no on-site radar operators. A major objective is a large-scale reduction in the life-cycle cost of Alaskan radar surveillance systems.	Production	General Electric Co.
Space Defense Operations Center (SPADOC) SPADOC, to be located in the NORAD Cheyenne Mountain Complex, is the central command control communications and intelligence element of the Space Defense Command and Control System. It will consist of new ADPE, displays, interface equipment, and communications upgrades. It will act as the focal point for higher-echelon command and control and disseminate space-related information to other US commands. SPADOC will collect and disseminate real-time information on space status, warning, and operations direction.	Development	Ford Aerospace
Strategic Air Command Digital Network (SACDIN) A program to modernize Strategic Air Command's Control and Communications Systems from both the operational and maintenance standpoints. SACDIN will provide two-way, direct, secure data communications with enhanced survivability from the National Command Authorities to the nuclear strike forces through the Commander in Chief, SAC. It will replace parts of the SAC Automated Command and Control System.	Development	ITT, Defense Communications Div.
SAC Command Post Upgrade Alternatives for both near-term and long-term corrections to Hq. SAC Command Post C^3 performance deficiencies will be developed and presented to SAC. Technical analyses, system engineering, and contract interfacing to support near-term, low-cost corrections and their implementation will be provided.	Conceptual/Development	TRW Inc.
WWMCCS Information System (WIS) This total information system planned for the post-1985 time frame will replace, modernize, and enhance the current WWMCCS Automatic Data Processing. WIS encompasses the information collection, processing, and display system that includes WWMCCS ADP and related software systems, procedures, and supporting telecommunications. The modernization focus is on the backbone of standard WWMCCS ADP, which supports command and control functions on Honeywell H6000-based systems.	Acquisition/Development	GTE
Deputy Commander for Tactical Systems (TC)		
AF Joint Interoperability of Tactical Command and Control Systems (JINTACCS) JINTACCS is a JCS-directed joint program to improve the operational effectiveness of the services' tactical C^2 systems used in support of joint tactical operations through the 1980s. JINTACCS will develop and test an interoperable system architecture and standardize message structure, message language, and operating procedures. The intent of the Air Force program is to support the joint program and to ensure that USAF requirements are reflected in the developed and tested standards.	Development	None
Combat Identification System A triservice program to develop and deploy a worldwide, NATO-compatible system to provide accurate and timely target identification information to battle commanders and weapons controllers. The system concept includes the development of automated correlation and fusion of information from multiple sources and the development of electronic support measures (ESM) as an additional source of aircraft identification information.	Prototype Development	Watkins Johnson Co.; General Dynamics

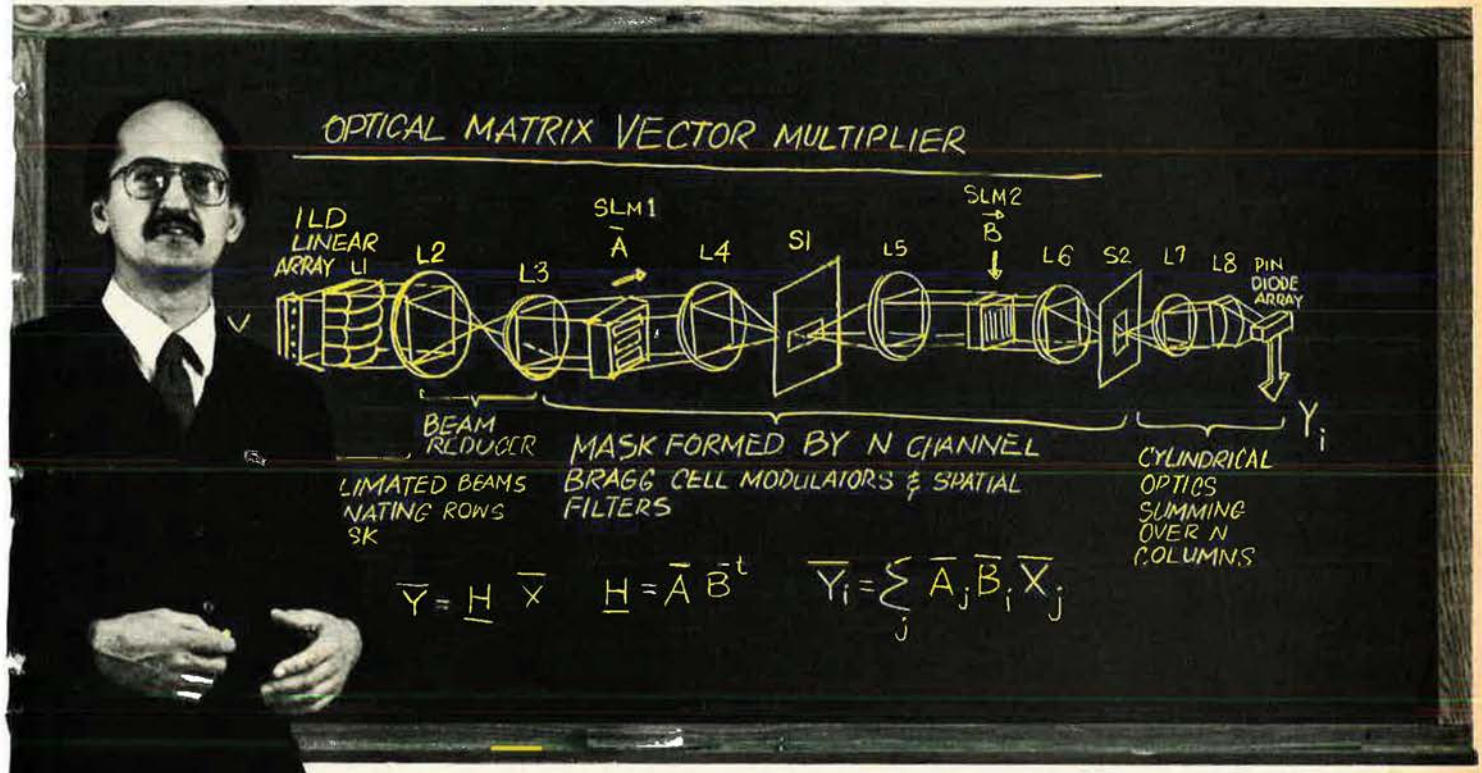
NAME AND MISSION	STATUS	CONTRACTOR
Combat Theater Communications Acquisition of tactical digital communications equipment for the multiservice area under the auspices of the DoD Joint Tactical Communications (TRI-TAC) Program. This includes all trunking, access, and switching equipment for mobile and transportable tactical multichannel systems, associated systems control and technical control facilities, local distribution equipment, and voice, record, data, and ancillary terminal and COMSEC devices.	Definition, Acquisition, and Production	Martin Marietta; Raytheon Co.; Systems and Applied Sciences; ASEC; General Atronics
Commando Torii Acquisition of command control communications and intelligence (C^3I) systems to be implemented in USAF facilities in Japan to optimize the command and control of in-country resources.	Definition/Planning	None
Digital European Backbone Incremental upgrade of portions of the European Defense Communications System (DCS) from a frequency-division multiplex (FDM) analog system to a time-division multiplex (TDM) digital system with higher reliability components. This will provide a modern, wideband, digital, bulk-encrypted capability with increased capacity between Defense Satellite Communications System earth terminals and major commands.	Acquisition and Deployment	None
EIFEL (Follow-on) This new EIFEL effort is a bilateral US-German program that will provide functional commonality for the planning, tasking, and status reporting in support of offensive tactical air operations in the NATO Central Region. ESD will develop automated assists for the wings and squadrons through the use of a development test-bed at Spangdahlem AB, Germany. The local workstations will be interconnected through a local area network. The Germans will develop a set of Host Standard Software that will perform common system functions at the force-management and unit levels.	Definition	None
Enhanced JTIDS System (EJS) Provides the Tactical Air Forces with a high antijam voice air-air and air-ground-air communications capability through application of a combination of techniques, *e.g.*, pseudo noise spread spectrum modulation, fast frequency hopping, pulsed JTIDS-like waveform, and high transmit power level. Other features include multiple user conferencing, high net capacity, and rapid signal acquisition time. Preplanned Product Improvements for limited data capability. Slated for integration into twenty-one different aircraft and ground platforms.	Development	Hazeltine Corp.
Ground Mobile Forces Satellite Communications (GMFSC) Terminal Program The GMFSC program provides the Tactical Air Forces with highly mobile satellite communications terminals. The program will also provide equipment to Air Force Communications Command for support of the Rapid Deployment Forces and Air Force contingency missions. The GMF program is multiservice, with the Army as lead service. The GMFSC terminals operate through the Defense Satellite Communications System (DSCS) satellites located in synchronous orbits for continuous worldwide coverage.	Development, Acquisition, and Production	RCA; Lincoln Laboratories; Raytheon Co.
HAVE QUICK Provides an improved near-term air-air and air-ground-air jam-resistant UHF voice communications capability that will allow TAF mission accomplishment against the current threat.	Development and Production	Magnavox; Rockwell Collins
Intra-Theater Imagery Transmission System (IITS) A hard-copy imagery-dissemination system utilizing the Tactical Digital Facsimile equipment being developed by ESD under the TRI-TAC Program. The IITS program will give the Tactical Air Forces the capability to transmit photographs and other intelligence information rapidly to high-priority users via electronic means.	Development, Production	None
Joint Surveillance Target Attack Radar System (Joint STARS) Joint STARS is an Air Force/Army program to acquire an electronic scan, multimode, synthetic aperture radar that will satisfy the services' needs to detect, track, and direct weapons against stationary and slow-moving ground and airborne targets. The system will consist of Air Force and Army airborne radars, ground stations, and weapon interface units and will interface into the existing C^3I network to support operations in any worldwide location.	Development	None
Joint Tactical Communications (TRI-TAC) Acquisition of ground-based tactical digital communications equipment for the multiservice area under the auspices of the DoD Joint Tactical Communications (TRI-TAC) program. This includes all trunking, access transmission and switching equipment for mobile and transportable tactical multichannel systems, associated systems control and technical control facilities, local distribution equipment, and voice, record, data, and ancillary terminal and COMSEC devices.	Definition, Acquisition, Production, and Deployment	Martin Marietta; Raytheon Co; General Atronics
Joint Tactical Information Distribution System (JTIDS) A program to develop a high-capacity, reliable, jam-protected, secure, digital information distribution system that will provide a high degree of interoperability among data collection elements, combat elements, and command and control centers within a military theater of operations.	Full-Scale Development/Production	Hughes Aircraft Co.; Singer Kearfott; IBM, Federal Systems Div.
NATO Air Base SATCOM (NABS) Terminal Program The NABS terminals will enhance the survivability of critical wartime communications between and among NATO Air Operations Centers (AOCs) and allied airfields where USAF elements will deploy in their NATO wartime role.	Acquisition and Production	None
SINCGARS Develop and acquire airborne and ground SINCGARS systems to provide jam-resistant, secure, voice tactical VHF/FM communications that will interoperate with the US Army-developed equipment.	Development	ITT, Aerospace Optical Div.
Spanish Systems Assistance to the Spanish Air Force for maintenance and operation of Spain's air defense system. Provides modifications and improvements to the network, including weapon and command and control improvements, increased radar coverage, and augmentation and upgrade of communications links.	Acquisition	Hughes Aircraft Co.
Speakeasy Secure Voice Terminal Secure voice terminals for triservice use over normal AUTOVON. These terminals provide good-sounding voice quality and can be used in the normal office environment. The terminals will be delivered to AFCC for deployment. The terminals will expand the number of users having access to the existing defense automatic secure voice system and will provide secure voice to selected C^2 and other high-priority triservice agencies with need for secure voice that have not had this service in the past.	Production	Harris Corp.
Tactical Air Control System Improvements This program will increase Air Control System capabilities for combat command and control of tactical aerospace operations. Improvements consist of mobile communications and electronic systems capable of worldwide deployment that are interoperable with Army, Navy, and Marine Corps tactical data systems. Project includes MCE, ULSA, STEM, CAFMS, Arm Alarm, Arm Decoy, and SALTY NET.	Definition, Development, Production	GTE Sylvania; Westinghouse; Sanders Associates; Litton

NAME AND MISSION	STATUS	CONTRACTOR
Deputy for Development Plans (XR)		
Adaptive Planning Concepts for Strategic Force Management Identify a set of critical force-management functions/tasks that would be enhanced in terms of timeliness, accuracy, uniformity, and simplicity through application of automated decision aids. Priority will be given to adaptive planning concepts for weapons allocation problems and multiple weapon-targets assignments/reassignments. Analyses will be conducted to support an advocacy position for an orderly program to provide strategic planners with adaptive planning capabilities and automated decision aids.	Planning	MITRE Corp.
Advanced Air Traffic Control Concepts Definition of concepts to support survivable military air traffic control landing systems for the pre-, trans-, and postattack periods. Specifically, mission requirements and related peacetime/wartime threats for theater-deployed systems will be established and current and planned program deficiencies will be identified. Concepts for a new, survivable ATC system, including proposed technical alternatives and long-lead-time development, will be recommended.	Development	MITRE Corp.
AFCC Base Support Communications Planning Development of a comprehensive architectural plan for base communications beyond 1990. This plan will address full integration and interoperability between support communications and essential command control communications and intelligence elements. It will form the basis for Hq. AFCC decisions to upgrade base communications to a coherent, mission-effective system.	Development	MITRE Corp.
Air Force World-Wide Military Command and Control System (AFWWMCCS) Involves systems planning and engineering for Air Force elements of the World-Wide Military Command and Control System. Activities will focus on intersystem engineering of selected AFWWMCCS existing and planned assets.	Conceptual/Validation/Development	MITRE Corp.
Assured Information Flow "Capping" Architecture This study provides a first-cut assessment of the concepts and activities necessary for the evolutionary achievement of survivable communications capabilities required to support the TACS of the post-2000 era. It includes an examination of the technical means of communications that are available, the distances and data rates these communications must support, and the various physical configurations these communications can take. The study will identify those promising technical issues that require further study in the information flow area.	Ongoing	MITRE Corp.
Atmospheric Defense Planning This study effort evaluates alternative technical approaches for CONUS atmospheric surveillance and warning of evolving cruise-missile and low-observable technology threats in terms of capability, military utility, cost, and schedule.	Conceptual	MITRE Corp.
C^3 Measures of Effectiveness This project is an initial effort toward developing conceptual and measurable links between strategic C^3 systems and force effectiveness measures (FEMs) of weapon systems. An integrated MOE should result from this quantification of C^3 systems. Work being done at present involves an analysis of the Emergency Rocket Communications System (ERCS) as one such system. The development of a Vanguard-compatible FEM algorithm is envisioned as the next stage, with an expected capability to rank all strategic C^3 systems.	Planning	MITRE Corp.
C^3 for the Small Missile This is a joint project with the Ballistic Missile Office. The purpose is to develop a C^3 Systems Architecture. Our effort will provide the initial analyses of the C^3 environment to determine where interoperability problems are likely to occur and to assess the capabilities of current, programmed, and planned higher-authority systems to meet the interface requirements for the postulated small missile basing modes. The output is to serve as the framework for subsequent C^3 definition at the system and subsystem level.	Planning	MITRE Corp.
CINCUSAFE C^2 Master Plan (C^2MP) The objective of this effort is to define C^2 functional requirements, assess the capability of current C^2 elements to meet those requirements, describe planned improvements, and identify deficiencies not addressed in current planning activity. The C^2MP provides a basis to rank USAFE C^2 needs that support CINCUSAFE and subordinate units, USCINCEUR, and the NCA. This plan will be a component command input to the 1984 USCINCEUR C^2MP.	Ongoing	MITRE Corp.
Command and Control Concept Evaluation Capability (C^2CONCAP) C^2CONCAP is a development planner's tool to assist in structuring viable Air Force C^2 concepts and acquisition strategies. Projected military scenarios, *e.g.*, EOB, friendly force status, threats, can be simulated to define promising C^2 concepts. Critical parts of C^2 systems (functions, information flow, structure, man/machine interface) can be modeled to evaluate sensitivities to such characteristics as target types, weapons, and geography. As specific user-oriented simulation tools are developed, the basic capability expands for future applications. The object is to provide the capability to the development planning community to assist in defining viable concepts and investment strategies.	Conceptual	MITRE Corp.
Future TACS Program Support Hq. AFSC in the conceptual design of a distributed, deployable Tactical Air Control System. The objective is to ensure that the future TACS (1990 and beyond) will be successful and survivable. Future effort provides for timely and efficient program implementation of advanced C^2 systems called for by Vanguard and the TAFIIS Master Plan. This includes development of system design concepts to counter future threats and to satisfy stated needs. Emphasis on detailed systems solutions will ensure identification of critical needs and provide focus and guidance for technology and acquisition projects. After consideration of new designs and evaluation of alternative approaches, it will provide for integration of existing and planned technology into TAC C^2.	Planning	MITRE Corp.
Ground Attack Control Capability (GACC) Will improve the Air Force's capability to attack time-sensitive ground targets. GACC will use near-real-time sensor and attack systems to perform decentralized execution of air attacks against selected, time-sensitive ground targets. Further program direction received in FY '84, with funding expected in FY '85. Will use the Modular Control Equipment (MCE) as host hardware.	Ongoing	MITRE Corp.
HAVE VIEW The program is a proof-of-concept demonstration to assess the ability to locate and track airborne/cruise-missile targets passively on a near-real-time basis.	Conceptual	MITRE Corp.
MAC C^2 System and Interoperability Planning An analytical approach to resolve interoperability deficiencies between two or more planned, programmed, or existing MAC command and control (C^2) systems. The program also addresses the missions, C^2 functions, resources, and requirements of MAC forces not previously identified in the original MAC C^2 architecture.	Ongoing	MITRE Corp.

NAME AND MISSION	STATUS	CONTRACTOR
Military Satellite Communications (MILSATCOM) Architecture A broad systems-level evaluation of all MILSATCOM systems, including such constellations as MILSTAR, FLTSAT, SDS, and DSCS, emphasizing the terminal segment and associated user requirements compilation and analysis. This in-depth examination analyzes MILSATCOM deficiencies and offers recommendations to assist Air Force managers with both near-term and far-term MILSATCOM decisions. Results of this architectural effort are spelled out in a MILSATCOM architecture document addressing current, planned, and proposed MILSATCOM system developments.	Ongoing	MITRE Corp.; ASEC; Massachusetts Institute of Technology
Operational Intelligence Systems Concepts Planning (OPS/INTEL) OPS/INTEL plans for and evaluates concepts of intelligence systems for Air Force mission requirements. Systematically analyzes, assesses, and integrates the roles and requirements of intelligence systems that support military forces' command and control. Analyzes current capabilities and deficiencies, projects requirements and enemy threats, *e.g.*, for tactical theaters—USAFE and PACAF, and the RDJTF. Development and acquisition activities now being structured include Tactical Exploitation of National Capabilities (TENCAP), Advanced Deployable Digital Imagery Support System (ADDISS), the Imagery Architecture Plan (IAP), and Mobile Intelligence—2000. As appropriate, limited demonstrations are planned and conducted to evaluate or prove concepts. Effort includes architecture analyses, mission-area analyses, and concept development and concept exploration with emphasis on an investment strategy for processing, exploitation, and dissemination systems to support force commanders.	Planning	MITRE Corp.
Precision Location Strike System C^3 Interoperability Identify information exchanges and communications interfaces required for the Precision Location Strike System (PLSS) to interoperate with command control communications and intelligence (C^3I) systems and operational facilities in Europe in the 1985–90 time period. This effort involves: (1) describing the baseline communications capability for PLSS initial operational capability; (2) identifying the growth and flexibility considerations the PLSS Program Office should take into account when processing an Engineering Change Proposal (ECP) to upgrade the PLSS Central Processing Communications (CPCOM); and (3) describing direction, funding, and program actions needed for other systems and facilities to implement the interoperability requirements stated above.	Conceptual	MITRE Corp.
Reconstitution Post-Attack Interoperable Radio Network (REPAIRNET) REPAIRNET is a concept for the reconstitution of C^3 assets during the postattack period. It will be used for polling survivors to establish a higher capability network necessary for force reconstitution. The system will utilize small microprocessor-equipped radios of any frequency. The philosophy of REPAIRNET is survivability of the system, proliferation of communications, and mobility.	Conceptual	MITRE Corp.
Secure Conferencing Project (SCP) This project will provide a secure conferencing capability for the major CINCs in the Air Force, Army, and Navy by 1990. This multiservice program, run mainly by the DCA and the Navy, will acquire digital conference directors, voice and graphics terminals, COMSEC equipment, and related interface devices to achieve this capability.	Development	MITRE Corp.
Space C^3 Intersystem Planning This project identifies and analyzes long-range C^3 concepts, technologies, and capabilities for possible space combat and the combat-support mission. Included is battle management and C^3I support to the Strategic Defense Initiative, various system definition analyses, and space systems C^3I architecture planning.	Planning	MITRE Corp.; Aerodyne Research
Surveillance/Identification "Capping" Architecture This study provides a first-cut assessment of the TACS air surveillance functions in the post-2000 era. It includes an examination of active and passive surveillance systems and considers issues of internetting, automatic detection and tracking, communications, and correlation. The study will identify those promising technical issues that require further study in the Surveillance/Identification area.	Ongoing	MITRE Corp.
Survivable C^3 for Strategic Forces The project provides intersystems engineering and analysis support for SAC and ADCOM strategic C^3 improvement efforts. Emphasis is directed toward timely preattack alerting functions and survivable C^3 capabilities for force recovery and management in trans- and postattack nuclear environments. Relationships and interdependencies between surviving strategic force C^3 capabilities and other civilian/military reconstituted communications will be defined and expedited for mutual advantage.	Planning	MITRE Corp.
Tactical Warning and Attack Assessment Vanguard Analysis This includes the Atmospheric Surveillance and Warning and Ballistic Missile/Surveillance and Warning Vanguard Plans. Analysis will include current capabilities assessments and will identify deficiencies, develop and evaluate a baseline plan, and prioritize development goals in accordance with current Air Force direction on plan content and format.	Planning	MITRE Corp.; IBM
Technology Guidance Planning (Tech Plans) Tech Plans efforts are designed to develop technology investment strategy guidance for Air Force and DoD laboratories, research centers, and contractors who support ESD C^3I systems acquisition. Primary objective is to translate ESD planning activities (Vanguard, Architectures, Mission Area Analyses, SONs, Concepts) into Technology Planning Guidance for the C^3I technology base community. Assists in formulating technology base investment strategy by identifying technology areas that could yield high payoff in the orderly development of future capabilities. The ESD/Development Plans role includes periodic canvassing of ESD mission deputies to generate comprehensive statements of technology need (TN), evaluation of TNs generated, development of broad-based guidance for the technology-based community, and advocacy of emerging technology opportunities (*e.g.*, fiber optics, VHSIC, signal processing, local area net connectivity). Results are published in the annual ESD Technology Planning Guide (TPG).	Planning	MITRE Corp.
Deputy Commander for Airborne Warning and Control Systems (YW)		
E-3 Airborne Warning and Control System (AWACS) Provides survivable airborne air surveillance capability and command control and communications functions. Its distinguishing technical feature is the capability to detect and track aircraft operating at high and low altitudes over both land and water. Used by Tactical Air Command with Tinker AFB, Okla., as the main operating base; aircraft may deploy throughout the United States and overseas to provide surveillance, warning, and control in a variety of peacetime and wartime situations.	Acquisition and Operational	Boeing; Westinghouse
NATO E-3A Acquisition of E-3A Sentry aircraft for the North Atlantic Treaty Organization (NATO) with special modifications to meet NATO requirements.	Acquisition and Operational	Boeing; Westinghouse
Saudi Arabia E-3A/Tanker Development and acquisition of five modified E-3As and eight derivative tankers to fulfill United States government commitments to the Saudi Arabian government.	Development and Acquisition	Boeing; Westinghouse

Optical Signal Technology on the move.

Andy Tarasevich on high speed processing to cancel sidelobe jamming.



"To make a quantum jump in radar signal processing, you must consider optical methods. Optical signal processing systems offer promising potential for needed high speed calculations since data can be processed in parallel," according to Andy Tarasevich, Engineering Supervisor at Lockheed Electronics.

"We have a particular interest in phased array antennas, primarily because of their ability to function in hostile electromagnetic environments. To do this, a phased array must be able to adapt to a pulsed jammer in times on the order of 1 to 10 microseconds.

"To solve this problem, it is necessary to consider the transient response of the processor. Specifically, we must be able to deal with a non-stationary noise field. This calls not only for a high rate of convergence of the algorithm but an optical mask which can be updated in a few microseconds. Currently available two dimensional optical masks have frame rates of milliseconds, far too slow for this application.

"At Lockheed Electronics, proof of concept is under way to demonstrate an approach where high speed, acousto-optical, single dimension modulators are utilized to represent any matrix which is the outer product of two vectors. This optical approach appears to have distinct advantages in speed, power consumption and cost over proposed digital techniques." Lockheed Electronics, Plainfield, New Jersey 07061.

Engineers interested in contributing to advanced electronic systems are invited to write Employment Manager at LEC, Plainfield, New Jersey 07061.

Lockheed Electronics

Leadership in Technology

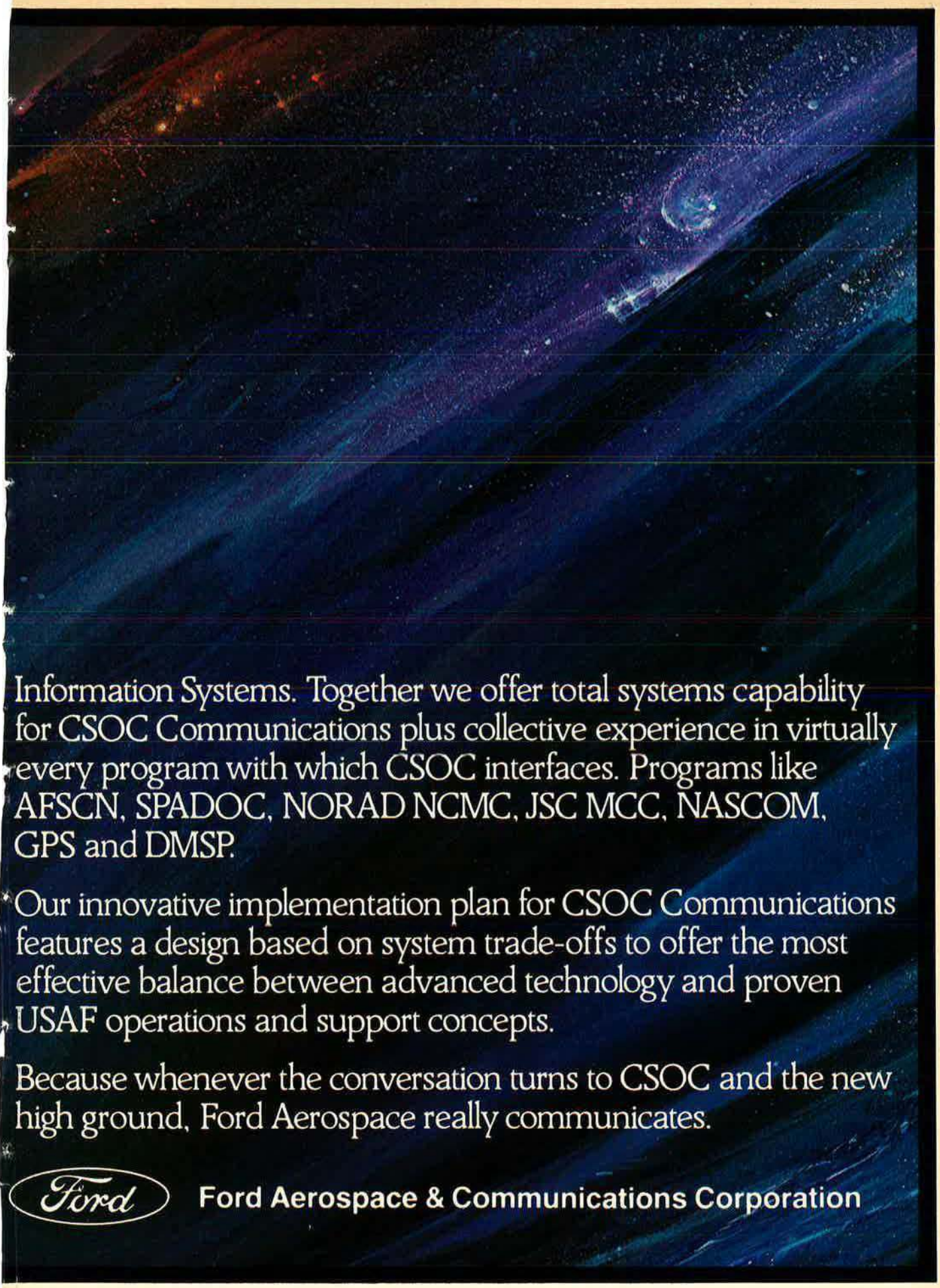
New High Ground: Space Communications

We speak the language.

At Ford Aerospace, we've been involved in high ground communications for over a quarter-century. Involved successfully with the people and the systems that helped bring space communication operations down to earth.

Today, we're applying our capabilities and legacy of experience t a new space mission support challenge: The Consolidated Space Operations Center [CSOC] Communications Program. Communications for the command and control of DoD space shuttle and satellite missions and integration of military and NASA space operations.

To reinforce our commitment to CSOC Communications, we've teamed with the Harris Corporation, ORI, and CONTEL


Information Systems. Together we offer total systems capability for CSOC Communications plus collective experience in virtually every program with which CSOC interfaces. Programs like AFSCN, SPADOC, NORAD NCMC, JSC MCC, NASCOM, GPS and DMSP.
Our innovative implementation plan for CSOC Communications features a design based on system trade-offs to offer the most effective balance between advanced technology and proven USAF operations and support concepts.
Because whenever the conversation turns to CSOC and the new high ground, Ford Aerospace really communicates.
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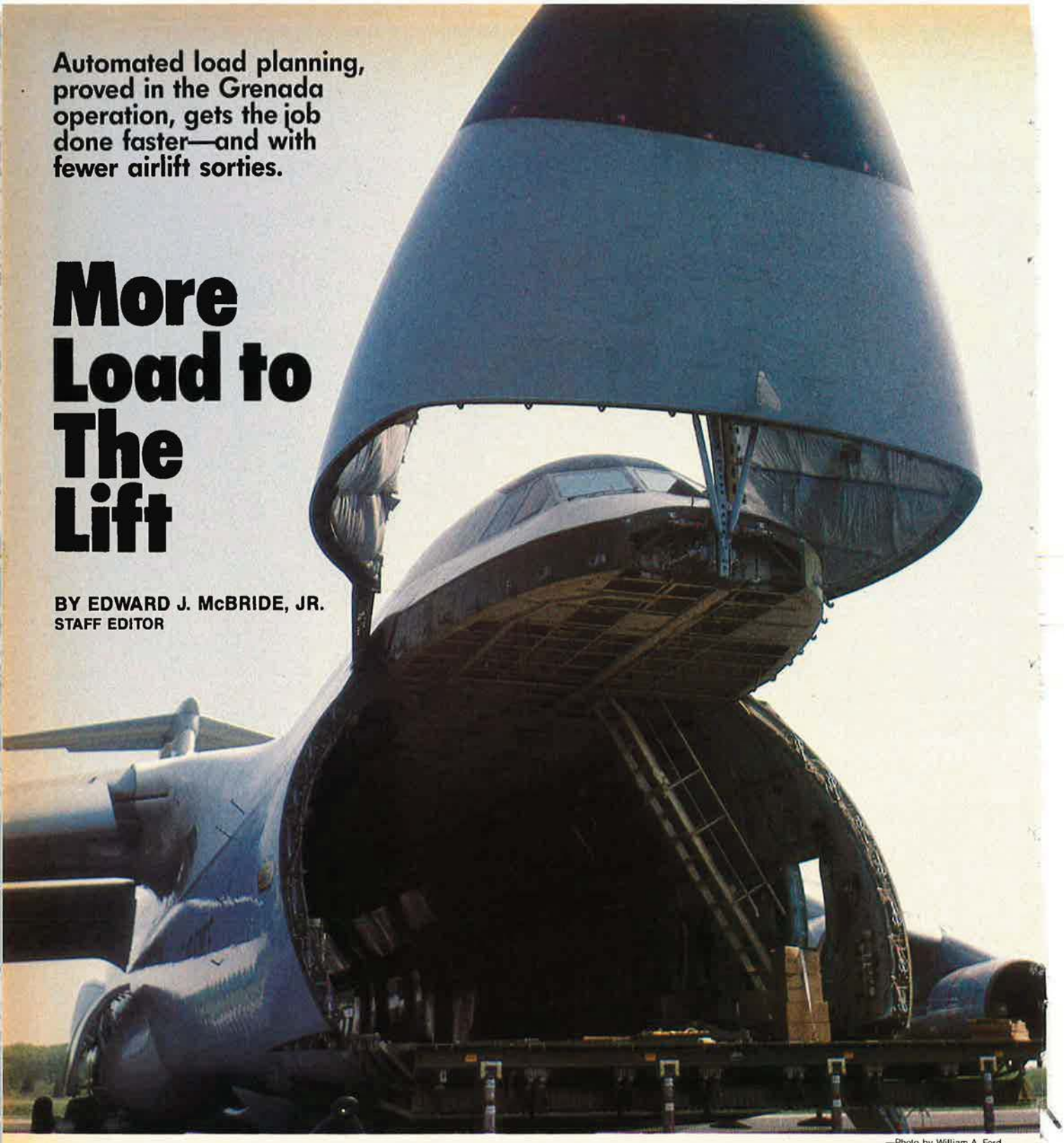
Ford Aerospace & Communications Corporation

Automated load planning, proved in the Grenada operation, gets the job done faster—and with fewer airlift sorties.

More Load to The Lift

BY EDWARD J. McBRIDE, JR.
STAFF EDITOR



—Photo by William A. Ford

ONE of the least publicized yet most important tasks in airlift operations is load planning—determining how to move the required cargo in the correct sequence in the fewest number of airplanes.

Load planners currently use scale models of aircraft floors and plastic templates representing cargo to help determine how many items can be loaded onto a particular aircraft and where each item will be placed. In addition to ensuring that the required cargo will fit, the load planner must also consider various constraints, including the physical characteristics of the aircraft, the weights and dimensions of the individual pieces of cargo, the special requirements for handling hazardous cargo, the ease of on- and offloading, and the placement of passengers and baggage.

Performing the complex calculations necessary to balance these constraints is a frustrating and often error-prone process requiring plenty of time, much patience, and many pencils and erasers. Even if the load plan is correct, last-minute changes

in tasking, arrivals and departures, and airlift availability frequently necessitate the complete reworking of a plan. During a contingency, such last-minute changes are common and can overwhelm a load planner since manual methods simply do not allow enough time to rework plans and retain control of the operation. Inefficient utilization of airlift resources and delays in the delivery of troops and cargo can result, seriously impairing the effectiveness of a mobility operation.

The solution to these and other shortcomings of the manual load-planning process may be on the way in the form of the Deployable Mobility Execution System (DMES), a prototype, microcomputer-based aircraft load-planning and manifesting system developed by personnel at the Air Force Logistics Management Center, Gunter AFS, Ala. DMES has been designed to free the load planner from the time-consuming task of performing complex calculations to allow him to use his expertise in deciding how best to move the required cargo.

The benefits of the system were amply demonstrated during last year's Grenada rescue operation. DMES enabled planners to move cargo and troops into and out of the battle area more quickly and in fewer sorties than would have been possible if manual methods had been used. Data compiled by MAC headquarters indicate that, during the initial deployment from Pope AFB, N. C., to Barbados, DMES saved more than twenty C-141 sorties, with a saving in flying-hour cost of $1 million.

Planning Loads with DMES

The current DMES program is stored on floppy diskettes and runs on the Hewlett-Packard 9816 and 9836 microcomputers. AFLMC personnel are evaluating the program to determine if it will run on the Zenith Z-100 recently selected as USAF's standard microcomputer. DMES can plan loads for C-130E, C-141B, and C-5A aircraft. Work is in progress at the Logistics Management Center to add the capability to plan loads for the KC-10A. In addition, the system can accommodate any equipment that is certified for air transport.

DMES allows the user to build a deployment file first, consisting of a list of the items to be transported, and then to load each aircraft one at a time.

The deployment file software can accommodate a number of characteristics for each item: the physical dimensions and center of balance; an indication of whether the item is a pallet, Container Delivery System (CDS) bundle, or airdrop platform; and, if the item is rolling stock or a tracked vehicle, the number and location of the axles. The file can be built by manually keyboarding the required information from a hard-copy list of items.

The load-planning software basically replicates the sequence used to prepare load plans manually. After inputting the type of aircraft to be loaded and the allowable cabin load (ACL) of that aircraft type, the planner then "pulls" from the larger deployment file a subset of items to be considered for that particular load. From there, it is simply a matter of placing cargo on the aircraft one item at a time.

Like the load-planning software, the DMES graphics also replicate manual methods. The aircraft floor is represented on the computer screen as a large rectangle, similar to the diagram that load planners currently use. Details of the image include aircraft station numbers and the location of vents and passenger seating areas. Each item of cargo is represented as a smaller rectangle—in a sense, a computer version of the plastic templates now in use. Thus, loading the aircraft is a process of filling a large rectangle with a number of smaller ones. The planner can use DMES as a "spread sheet" to place items on the aircraft one by one or can instruct DMES to generate its own plan. In building its own plan, DMES follows standard load-planning guidelines, such as always placing rolling stock forward of pallets. DMES completes a "first-cut" load plan instantaneously.

After the aircraft has been filled, the planner can fine-tune the load by moving cargo within the aircraft, adding or deleting items, switching the positions of two items, or changing the orientation of an item. The planner can also use DMES to add passengers and baggage to the load. After each alteration, DMES continuously updates all of the statistics and alerts the operator when any of the aircraft or cargo constraints have been violated. Once the plan is complete, the computer can print a MAC-approved cargo manifest to correct scale.

A Management Tool

In addition to providing a faster, more efficient method of planning loads, DMES is also expected to improve the overall management of mobility operations.

One of its most useful features in this context is the ability to save and retrieve load plans and deployment files. Up to 500 items or 180 load plans can be stored on each diskette, and there is no limit to the number of diskettes that can be used. The benefits of this capability are enhanced by the fact that DMES updates the deployment file after each plan has been completed. The result is that each item in the file is "tagged" to indicate the specific aircraft on which it was loaded. These saved load plans and files constitute an exact record of the airlift operation. This record could be used in developing plans for various scenarios since complete and detailed summaries of movements are available with DMES.

Because the data is stored in electronic form, it could be transmitted to higher levels for reporting or to the redeployment site for accountability. Also, diskettes containing deployment load plans and files can easily be transported for use at the redeployment site. Of course, the diskettes are useless without the computer. Since DMES runs on a compact, transportable microcomputer, it is a truly deployable system.

Origins of the System

The idea of using computers in load planning is not a new one. One of the earliest attempts at automating the load-planning process was a computerized system developed in the late 1970s by Capt. Walter F. Huebner and other members of the New Mexico ANG's 150th Tactical Fighter Group. The unit gave several briefings and successfully demonstrated their concepts in the Bright Star 81 exercise held in Egypt in late 1980. In March 1981, the Logistics Management Center

was tasked to evaluate the system.

The AFLMC was called on because its mission is to work toward innovative solutions to unit- and base-level logistics problems and because load planning, according to Air Force regulations, is a unit-level responsibility.

The AFLMC, though connected to Air University for administrative support, reports directly to the Director of Logistics Plans and Programs at Air Force headquarters. A fourteen-member Board of Advisors also provides program guidance.

The evaluation of the New Mexico ANG system conducted by Center personnel showed that, although the system did not totally satisfy the requirement, it did demonstrate the feasibility of using computers to plan loads. Concurrently, the Air Force Data Systems Design Office, also located at Gunter AFS, began work on a batch-mode automated load-planning system for use on large, on-base computers.

To support these efforts, the AFLMC was asked to develop a prototype load-planning software program for use on the Honeywell 6060 computer system. Both the Honeywell program and the Design Center's batch-mode system were demonstrated at the Air Force Logistics Planners Conference in October 1981. At that time, it was decided to modify the Honeywell program to run on a microcomputer in order to satisfy the need for a deployable system that would not be tied to base-level computers.

After determining that modern microcomputers had the capability to run software as complex as a load-planning program, AFLMC personnel developed a demonstration program, which loaded pallets on a C-130, on an Apple II microcomputer. This demo and the final briefing on the prototype Honeywell program were presented to the Board of Advisors in January 1982. At that time, the Board directed the project team to develop a prototype, deployable load-planning system in one year.

Initial Development

Throughout the preliminary stages of the program, the project team consulted such load-planning experts as MAC Airlift Control Element (ALCE) personnel. The input from ALCE personnel and from others involved in load planning on a day-to-day basis enabled the team to see the process from the planners' perspective and thus to design the system to their needs.

After determining the capabilities required to meet those needs, the team began its investigation of target hardware. To save time, the team decided to choose hardware based on the prototype software that had been developed for use on the Honeywell computer.

In reviewing the Honeywell program, several deficiencies were identified, the most serious of which was the lack of direct user control. With the Honeywell program, the user could make corrections to a plan only by redefining the cargo. Recognizing that automated systems negate the benefits of computerization if they force the user to go back to the start to modify initial input, the project team determined that DMES would have to be an interactive system with extensive overrides—a computer-assisted rather than automated system.

Once this initial system definition was completed, the team decided in February 1982 that the Hewlett-Packard 9836 was the lowest-cost microcomputer that would satisfy the memory and graphics requirements of the DMES program.

During the spring of 1982, the prototype program was further revised following consultation with MAC loadmasters. After the Hewlett-Packard computer was delivered in July 1982, the DMES team began writing test programs.

The test programs evolved into a demonstration program that was used for briefings while DMES was under development. An added benefit of the demonstration program was that it generated many suggestions for improvements and new capabilities.

The most difficult aspect of the software development effort was the design of the human interface. Rather than start with a fixed, unchanging description of how the computer would interact with the user, the DMES team followed an evolutionary design method. After a design had been proposed and a temporary procedure developed, team members would evaluate the procedure. After it was evaluated, the procedure was usually redesigned, or at least modified.

A major reason for the success of the design effort was the people on the project team who had specialized knowledge of various aspects of mobility operations. Logistics planning expertise was provided by Lt. Col. Cecil J. Smith, CMSgt. Otis L. Hankins, and project managers Maj. Douglas D. Cochard and Capt. Jeffrey A. Cameron. The bulk of the actual programming was done by Capt. Kirk A. Yost. The other members of the team were Ron Hare, Maj. Susan Alten, and Capt. Michael R. Ackley.

By November 1982, DMES had progressed to the point where it could be considered a working system. The working system was tested by personnel from AFLMC, MAC, and SAC. Several bugs were found and corrected and the final briefing was given, on schedule, to the Board of Advisors in January 1983.

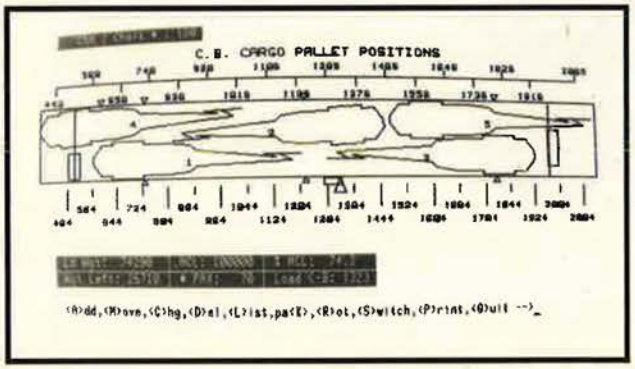
Testing in the Field

By that time several software limitations had been identified: The data base was too Air Force-oriented, there was no capability to store and retrieve load plans, and the program could not plan for airdrop platforms and Cargo Delivery System bundles.

Fixes for these and other known problems were developed during DMES's first field test during the Team Spirit exercise in February 1983. As part of the exercise, DMES was used to produce plans for a strategic deployment of a Marine air defense wing from Japan to South Korea.

The load plans that were actually flown were prepared manually by Marine embarkation officers; DMES was used to load-plan the same missions. This arrangement enabled the team to experiment with the system and modify it. In fact, more than thirty changes and enhancements were identified and most of the solutions were developed and tested during the deployment. Also, the parallel arrangement permitted comparison of the DMES-planned missions with those planned manually. The comparison revealed some striking numbers.

Using manual methods, the Ma-



ABOVE: A US Army AH-1 Cobra helicopter is offloaded from a C-5A. LEFT: A C-5A load plan on the Deployable Mobility Execution System (DMES) computer screen. If a plan must be revised, DMES will automatically update the weights and center of balance (C-B).

rines planned out the deployment in 200 man-hours using twenty-one C-141 and forty-seven C-130 sorties. MAC loadmasters, who had about one day's training with DMES, planned the same movement in 8.5 man-hours using only eighteen C-141 and thirty-seven C-130 sorties.

The numbers, however, were not the most significant outcome of the test. More important was the fact that the basic "user-friendly" design of the software had proven successful.

In April 1983 the system was tested during an Army tactical deployment that was part of the Laser Mace exercise. During the test, the DMES loads were actually flown. Because it was a tactical deployment, the sequencing of the deployment took priority over aircraft utilization, meaning that there were restrictions on the switching of cargo from one load to another. Despite these restrictions, DMES showed a significant improvement. The flexibility of the system enabled MAC loadmasters, who had been trained in minimal time, to react quickly to the changing mission priorities.

The final field test of the system took place in June 1983 during the joint Army-Air Force exercise Universal Trek. During this test, DMES was used to plan the redeployment of an F-16 wing, ALCE personnel, combat communications equipment, and several Army units from Roosevelt Roads, Puerto Rico. Once again, DMES performed up to expectations.

These field tests demonstrated that DMES was a reliable system, was easy to learn, could be used by all services, and could support all types of cargo configurations and delivery methods in a variety of scenarios. Also, the DMES project team was able to gather useful ideas from the wide range of personnel who came in contact with the system during the tests.

Throughout both the development and the testing phases of the program, more than ninety-five percent of the suggested improvements were added to the system. This willingness to implement changes resulted in a system that, in essence, was designed by load planners.

"The key in the development of the system," according to AFLMC Commander Col. Keith E. Burres, "was the willingness of the people here to go out and listen to load planners, learn how to load-plan, produce an interim software package, go out in the field and have load planners critique the system, and then use these critiques to modify the program. Through this approach, DMES is really a system for load planners—an aid."

The Real Test

DMES underwent its most important and rigorous test during last year's Grenada rescue operation. The system was used to plan loads at Pope AFB, N. C., Grantley Adams International Airport on Barbados, and Point Salines Airfield on Grenada. DMES was also used by McChord AFB, Wash., Airlift Control Element personnel to plan the deployment of the US Army Rangers from Fort Hunter.

Conditions at Pope AFB, Barbados, and Grenada were typical of contingency operations: ever-changing missions requirements, interruptions in aircraft flow, and severe time restrictions.

The challenge, according to Major Cochard, one of three AFLMC personnel who took part in the Grenada operation (the other two were Captain Ackley and then-Lieutenant Yost), "was to provide highly efficient and safe load plans in a very timely manner, and to respond to the numerous changing missions requirements."

DMES helped load planners to meet this challenge and then some. McChord AFB ALCE personnel estimate that the total time required to deploy the Rangers from Fort Hunter was reduced by eight hours. MAC headquarters estimates that, during the entire Grenada operation, fifteen to twenty percent fewer sorties were required as a result of DMES.

Although the savings in time and cost are substantial, DMES's most important payoff is increased combat capability. DMES is "one of the great enhancements that has been produced and is being fielded that will improve our ability to deploy more forces and deploy them faster into a combat environment," comments Colonel Burres.

The final testimony to the success of the project is that DMES has been selected as USAF's standard load-planning system. The system is expected to be fielded next year. ■

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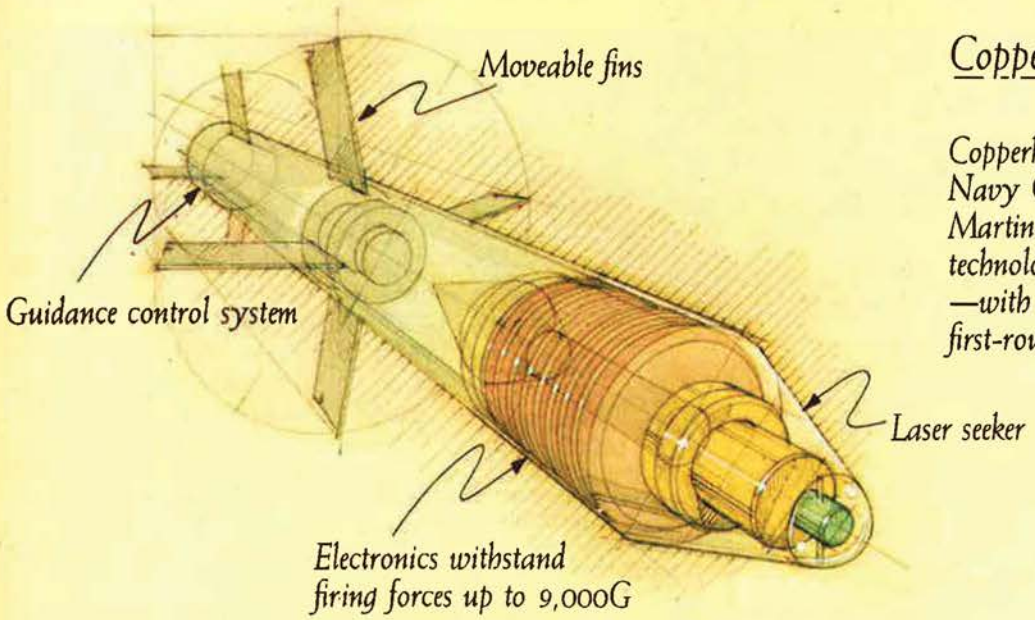

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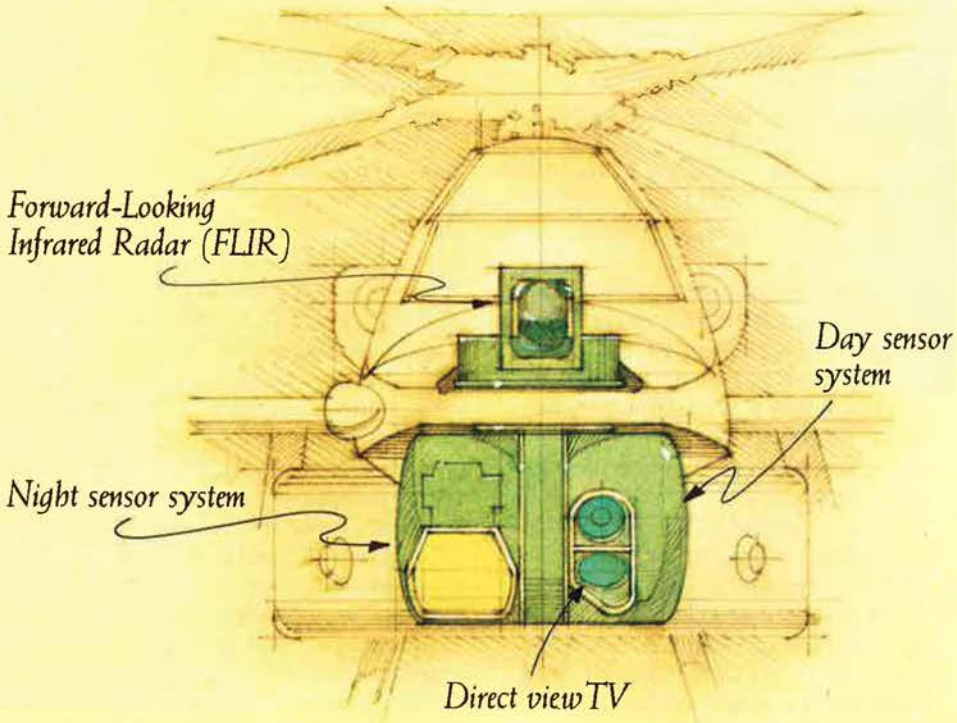

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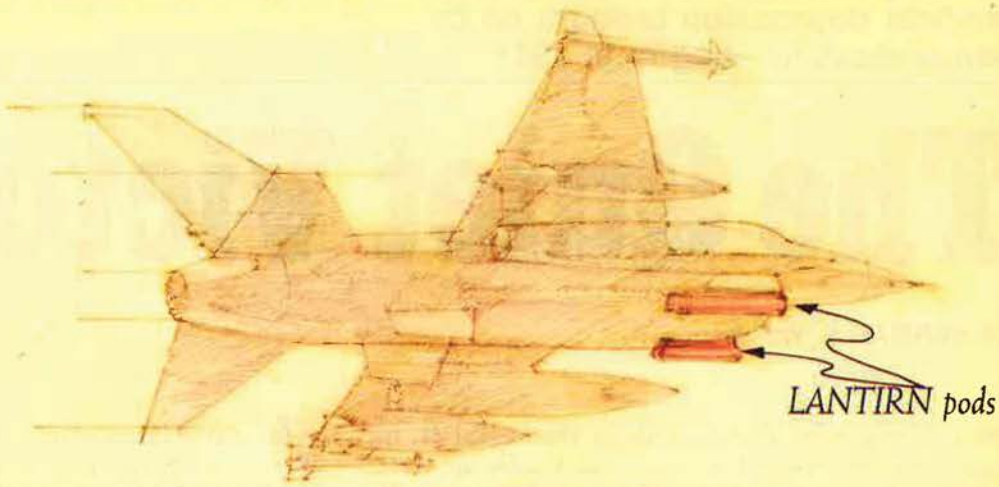

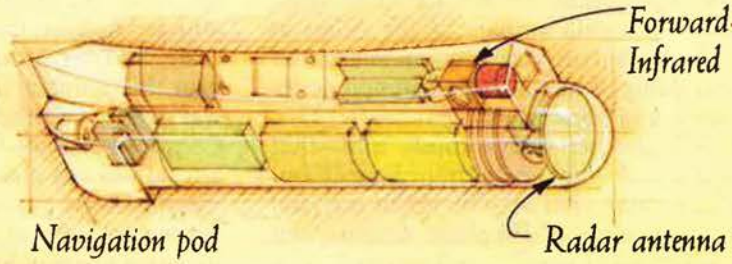

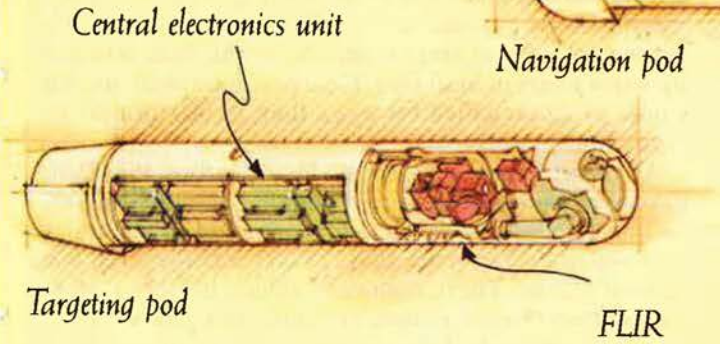

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Planning for postwar conversion of industry—and avoidance of a postwar depression brought on by demobilization—began in 1943.

The Quiet Victory

BY HERMAN S. WOLK

IN THE enormous literature about World War II, including that on the European and Pacific air wars, writers have usually emphasized operational exploits. Planning, organization, doctrine, strategy, and dramatically crucial battles have caught the attention and imagination of millions. The uphill struggle of the Allies in World War II, battles fought on a tremendous scale, and the subsequent unfolding of the ultimate triumph never fail to excite interest and admiration.

There is, however, another story—rarely told—that although far less dramatic remains extraordinarily important, holding as it does vital lessons about war and peace. That story is the story of the plans, actions, and events that ended the global conflict and ushered in an era of postwar prosperity. It is a story played out on a large canvas, involving large-scale wartime planning, production, and logistics.

Most observers are aware of the enormous contribution to victory made by the tremendous productive capacity of American industry. Much less discernible, and appreciated, are the planning and events that took place during and after the war that probably prevented a recession or even a depression. With rare foresight, the United States government, including the military—and especially the Army Air Forces (AAF)—anticipated the end of the war and made plans for war contract termination and disposition of materials and equipment. These plans were formulated long before the war was over. Ultimately, they were carried out efficiently and with dispatch.

This, then, is the story of the shutting down of the great war-production engines of American industry in order that they might be rapidly converted to production of peacetime commodities. Despite its scale, when compared to the drama of great battles it is a quiet story.

The Challenge From Roosevelt

In May 1940, with Nazi Germany on the march, France just weeks from falling, and the Battle of Britain not far off, President Franklin D. Roosevelt made a dramatic call for production of 50,000 military aircraft. Although the President's pronouncement caught the imagination of the country, it confronted military planners with a tremendously difficult task. They had to convert a target figure into a procurement program.

The startling fact was that the United States had not yet terminated all contracts from World War I. And yet, as far as procurement objectives were concerned, World War II was already starting. President Roosevelt's 50,000-aircraft figure included both the Army and Navy. The Army Air Corps part of the target was 36,500, after the Navy's total had been subtracted. In the Fiscal 1941 military budget, the War Department called for 166 aircraft, and the House of Representatives was about to trim this number to fifty-seven planes. However, with war raging in Europe, and energized by Roosevelt's call, Congress provided 1,900 additional aircraft. With the aircraft as yet undelivered from Fiscal 1939 and 1940, the Air Corps counted some 7,700 planes in active programs. As subsequently approved by the President and by Army Chief of Staff Gen. George C. Marshall, the Air Corps program called for more than 18,000 aircraft by April 1942.

After the Japanese attack on Pearl Harbor, President Roosevelt asked for increased output. He wanted 60,000 aircraft in 1942 (45,000 tactical planes and 15,000 trainers), and in 1943 he requested 125,000, including 100,000 tactical planes. These figures, it should be noted, were greater than those forwarded by military planners. Roosevelt, it seems, had simply raised the military's numbers. When his advisor, Harry Hopkins, protested, the President allegedly said: "Oh, the production people can do it if they really try." Robert Sherwood, who wrote a book about Roosevelt and Hopkins, observed that the President "was never afraid of big round numbers."

The goal of 125,000 aircraft, however, was unrealistic. Although Lt. Gen. Henry H. (Hap) Arnold, Commanding General, AAF, wanted 133,000, he ultimately settled for a 1943 goal of 107,000. Assistant Secretary of War for Air Robert A. Lovett actually thought that 88,000 would be a much more realistic goal.

This difference of opinion about production goals resulted in a confrontation between Lovett and Arnold. Lovett considered Arnold's 133,000 figure ridiculous, way outside the bounds of realism. Lovett described Arnold's goal this way: "It is a little bit like asking a hen to lay an ostrich egg; it is unlikely that you will get the egg, and the hen will never look the same." Nonetheless, General Arnold insisted. He agreed that it was like asking a "peacetime hen" for a wartime ostrich egg, but "if we can induce her to lay it, I for one feel that we must accept the wear and tear on the hen." Arnold never liked negative thinking. He believed in driving toward objec-

tives without compromise. However, Lovett's judgment proved correct. In 1943, acceptances of military aircraft totaled 84,433.

Gearing Up for War

The tremendous aircraft production record of American industry in World War II can be traced to prewar planning and expansion of productive capacity in 1940 and 1941. The key factor here was the demand for planes by England and France in 1939 and 1940 that financed expansion of the American aircraft industry. At first, most of these planes were trainers and obsolescent P-36As, B-10Bs, and P-35s. Later, the English and French ordered the A-20 and P-40, and subsequently even more advanced planes. Secretary of War Henry L. Stimson observed in early 1941 that were it not "for the early British orders, and the French orders which were subsequently taken over by the British, we would have at this time only a small fraction of the existing aircraft plants and productive facilities."

Among the companies that significantly expanded their capacity during this period were Boeing, Lockheed, Douglas, Martin, Consolidated, North American, and Curtiss. Pratt & Whitney and Wright Aeronautical had substantially enlarged their engine plants between 1938 and 1940.

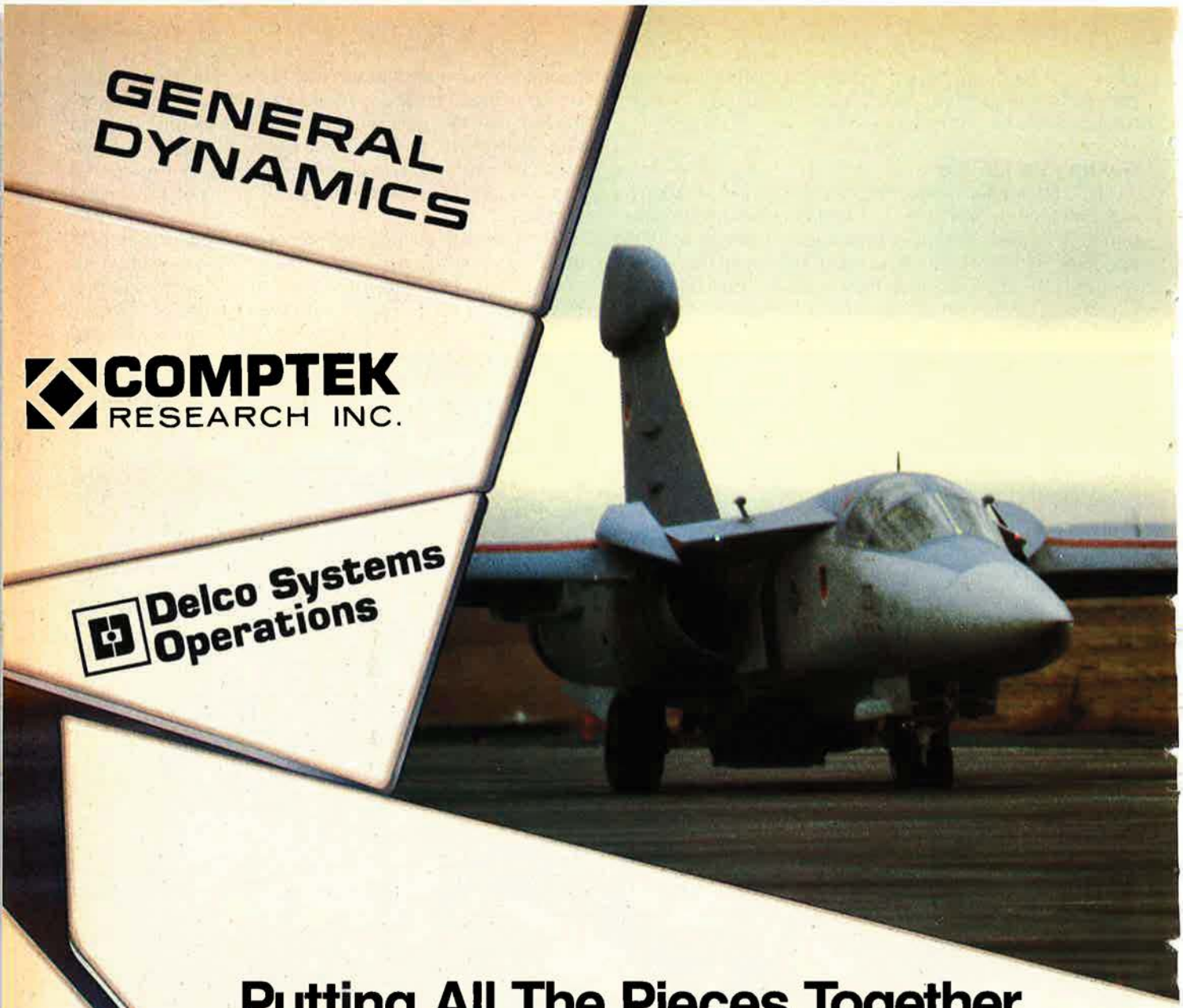
However, the aircraft industry could not have done it alone. The giant automotive industry converted to production of aircraft and aircraft parts. The tremendous cost involved in this conversion was met, almost ninety percent, by the government. It should be emphasized that, in 1939–41, the Army Air Corps was in an especially sound position in regard to knowledge of industrial capacity. This was due in no small measure to General Arnold.

Even prior to becoming Chief of the Air Corps in 1938 upon the death of Maj. Gen. Oscar Westover in an air crash, Arnold had nurtured his contacts with industry. His personal relationships with the captains of industry and his knowledge of potential industrial capacity proved a large bonus to the Air Corps, and later the Army Air Forces.

Urged on by Lt. Gen. William S. "Bunky" Knudsen (former President of General Motors) of the National Defense Advisory Commission (NDAC) and the NDAC's Aeronautical Section, the aircraft industry and the converted automotive industry mushroomed. Under Secretary of War Robert P. Patterson, subsequently to become Secretary of War, played an important part in putting this expansion into effect.

Among Air Corps officers taking part in this program were Brig. Gen. Oliver P. Echols, Chief of the Materiel Division at Wright Field; Lt. Col. Kenneth B. Wolfe, Chief, Production Engineering Section, Materiel Division; and Col. Edwin W. Rawlings, who, after playing a key role in budgeting for the early expansion, subse-

Pell-mell production of B-25 bombers exemplified US industry's "tremendous" gearing-up for World War II. Industry's reconversion to peacetime production was, however, an equally notable feat.



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Lt. Gen. William S. Knudsen, left, a World War II US production chief, joins up with Boeing's J. E. Schaefer and AAF's Brig. Gen. K. B. Wolfe.

quently was named Chief, Production Resources Section, Production Division of the AAF Materiel Center at Wright Field. Rawlings, adept at finance and with a keen sense of the critical details of aircraft production, would later hold a number of critical positions with the Air Technical Service Command. In 1945–46, Rawlings, as a brigadier general and Chief of the Readjustment Division, AAF Materiel Command, and then as Chief of the Procurement Division, ATSC, was instrumental in directing termination of wartime contracts.

The expansion of aircraft production necessitated a complex system of administration. An Aircraft Division was established under the War Production Board, and it opened an office at Wright Field. This division listed priorities to meet schedules set by the Joint Chiefs of Staff. An Aircraft Scheduling Unit was headed by Col. Edward M. Powers and included hundreds of temporary officers (lawyers, accountants, and businessmen) and civilians. Beginning in October 1943, Colonel Rawlings was the administrator of the Aircraft Scheduling Unit.

The Production Miracle

The aircraft production record of the United States in World War II was a stunning achievement. Incredibly, by the time of the Japanese attack on Pearl Harbor in December 1941, America had already become the world's top producer of military aircraft. This was achieved despite the export of materials and equipment to allies that would have been important to the production of American aircraft. Between July 1940 and the end of August 1945, this nation produced almost 300,000 military aircraft, more than 802,000 aircraft engines, and a total airframe weight, including spare parts, of 2,859,098,000 pounds. The cost of this program totaled almost $45 billion—24.5 percent of the total munitions output of $183 billion.

In the process, aircraft manufacturing changed from handwork to mass production. In 1940, the aircraft industry produced about 13,000 planes, fewer than half of them military. In 1944, more than 96,000 military planes came off the assembly lines. In airframe weight, production during 1944 exceeded the total for the rest of the world.

The breakdown of the total of almost 300,000 military aircraft is as follows: bombers, 97,810; fighters, 99,950; reconnaissance, 3,918; transport, 23,929; trainers, 57,623; communications, 13,643; and special purpose, 2,420. Heavy bombers—B-29, B-24, B-17—although totaling less than twelve percent of production by number, constituted more than thirty-five percent of total airframe weight.

LEFT: Women workers mass-assemble fuselage sections on a monorail conveyor. ABOVE: Male counterparts prepare ball turrets for B-24s.

The leading manufacturers prior to America's entry into the war retained their position during the conflict. These companies delivered more than seventy percent of planes accepted between July 1940 and the end of August 1945: North American, Consolidated Vultee, Douglas, Curtiss, Lockheed, Boeing, Grumman, Republic, Bell, Martin, and Chance Vought. Pratt & Whitney and Wright and their licensees delivered a majority of the hundreds of thousands of engines. These figures, reflecting a revolution in the production of military planes, illustrate the enormous reconversion task that confronted the United States once the war was over.

This country had learned a lesson from the disorganized, messy demobilization following World War I. As mentioned, when the United States entered World War II, it still had not terminated contracts from the previous world war. But when Japan surrendered in 1945, the Army Air Forces was ready to take action to shut down aircraft production and the flow of materials and yet still keep developmental work going. AAF leaders had to be careful to allow for continued research and development as an investment in the future.

Planning for War's End

The Army Air Forces started planning for reconversion long before the close of the war. This farsighted planning began in 1943 and accelerated during 1944. General Arnold directed the Air Staff to draw up complete plans in 1944. In April 1945, Arnold told Lt. Gen. Ira C. Eaker, Deputy Commander, AAF, and Chief of the Air Staff (and just returned from his Mediterranean command), to accelerate final planning for termination of war contracts, disposition of materials, and reconversion of production facilities.

In June and July 1945, the Air Staff and the Air Technical Service Command joined in preparation of detailed plans and scheduling. These plans proceeded on the assumption that Japan would collapse by the end of August 1945. Plans were completed in July, disseminated in the Air Staff, and forwarded to the commands and government agencies outside the War Department. Revisions were requested. Plans were to be completed by August 10 so that the AAF could promulgate directives immediately to put the plans into effect. Instructions to be carried out by all concerned agencies and groups were contained in a publication, "AAF Materiel Demobilization Plan for V-J-Day." Readjustment from wartime to peacetime would start with the flash of a single order: "Put the Plan into effect."

On August 14, 1945, after President Harry Truman announced that Japan had accepted the Potsdam surrender terms, the above AAF order was issued. Immediately, delivery overseas of thousands of aircraft halted. Movement of aircraft at ports of embarkation stopped. Aircraft in transit were rerouted. Shipments of materiel stopped. Cargoes at dockside were examined to determine what should proceed to destination. Ships at sea were turned around. Officers of the Army Air Forces, working with the Transportation Corps, provided instructions about AAF materiel in transit. All instructions and revised orders were completed by August 16.

Beginning on V-J Day, termination notices were promulgated. Within twenty-four hours of Truman's announcement, notices went out to more than 3,000 contractors, involving approximately 10,500 contracts and purchase orders. This was possible because the AAF had discussed cutbacks with major prime contractors well in advance. About $8.5 billion in contracts were canceled in this twenty-four-hour period. Approximately 33,000 planes were eliminated from scheduled production in postwar 1945 and 1946. Between V-E Day and V-J Day, about 44,000 planes had been scratched from production. After Japan's surrender, the only aircraft continued in production—on reduced schedule and in limited quantity—were B-29s, P-80s, P-61s, and long-range models of P-51s and P-47s. Production of B-17s, B-24s, and B-25s was eliminated entirely.

The Nucleus Amid the Surplus

As noted, simultaneously with cancellation of contracts, the Army Air Forces took action to review and to revise aircraft requirements in order to sustain developmental work. These adjustments, approved by the Office of War Mobilization and Reconversion, were in accordance with the War Mobilization Act of 1944 and with a letter of August 8, 1945, from Truman to Under Secretary of War Robert P. Patterson. According to this letter: "It is vital to the welfare of our people that this nation maintain developmental work and the nucleus of a producing aircraft industry capable of rapid expansion to keep the peace and meet any emergency."

Secretary of War Robert Patterson testifies in Congress in 1946 on the need for a one-year extension of the draft, then due to expire.

In this regard, the AAF had already made provision to hold tools in standby for future airframe and engine production. Under the Contract Termination Law, the AAF and contractors agreed to retain and to store AAF-owned tools. Additional machine tools were disposed of by the Reconstruction Finance Corporation.

Prior to the end of the war, AAF leaders were keenly aware of the great importance of keeping alive a growing aircraft industry. Arnold and Lovett set the pace, building support for both research and production. Secretary Lovett believed that an intergovernmental group was required to coordinate and to develop policies affecting the aviation industry. Lovett gained the backing of Assistant Secretary of the Navy Artemus Gates, and in March 1945 an interdepartmental memorandum established the Air Coordinating Committee. This group played an important postwar role in framing governmental aviation policy. Moreover, Lovett's successor, Stuart Symington—subsequently the first Secretary of the Air Force—made the military aircraft industry a top priority. This concern became a centerpiece of the President's Air Policy Commission (Finletter Commission) report of January 1948.

After Japan's defeat, the AAF declared to the Reconstruction Finance Corporation more than 35,000 planes as surplus. By the end of June 1946, an additional 33,000 were declared surplus. This total of about 68,000 planes included approximately 21,000 bombers, 10,000 fighters, 5,600 medium and heavy transports, and 31,000 trainers and other small aircraft.

Statistics provide some idea of the magnitude of difficulty involved in the demobilization of the aircraft industry. During the war it had expanded to the largest single industry in the world, using about 250,000,000 square feet for production of planes and parts. This expansion was financed almost totally by the government, as three-quarters of this expansion reflected AAF

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projects, including machinery and tools. In early 1946, a survey conducted by the Aircraft Industries Association indicated that only twenty airframe plants would be retained for postwar military and commercial production, for a total area of about 24,000,000 square feet. Addition of production facilities for engines, propellers, and other parts brought the total area to about 35,000,000 square feet, about fourteen percent of peak wartime although three times the prewar area.

The complexity of the termination job that faced the Army Air Forces was, of course, heightened by the fact that it had to be done almost instantaneously. For example, when it came to contract termination, some planes had already been produced, others were almost completed, and some had barely gone into production. Considerable materials were en route to contractors. Also, there were subcontractors and subsubcontractors to consider.

The Contract Settlement Act

The keys to the success of the termination process were the planning and events that began as early as 1943. In the summer of 1943, the AAF recommended to Congress adoption of what became the Contract Settlement Act of 1944. Passed by Congress, this legislation made possible negotiated settlements with government contractors. It was strongly opposed by the General Accounting Office, which had failed after World War I to settle all contracts expeditiously. The AAF's suggestions in 1943 and 1944 made a significant contribution to establishment of War Department policies and procedures for settlement of terminated contracts, financing of termination claims, and disposition of termination inventories.

In early 1944, Gen. Brehon B. Somervell, Chief, Army Service Forces, convened a conference in Washington for industry leaders from the New England states. This was one of the earliest efforts to discuss termination and surplus disposal problems. At the same time, regional conferences were held to train personnel in termination procedures. In July 1944, the AAF staged two contractor conferences on the West Coast. A crucial element of the entire program was to familiarize subcontractors with the War Department's termination planning. Unless subcontractors presented claims promptly, prime contractors could not forward their final claims to the government.

Training of officers in termination procedures was crucial. In June 1944, the War Department reactivated the Army Industrial College in Washington, D. C., to train personnel as members of settlement teams. The basic course lasted three to four weeks. Beginning in July 1944, the Industrial College inaugurated a two-month termination course for AAF officers. The Army Air Forces Termination Officers' Training School, Vandalia, Ohio, trained almost 800 officers and civilians in termination and procurement. More than 1,200 AAF auditing personnel took termination accounting courses at the Budget and Fiscal Office, Wright Field. Several hundred AAF officers also received termination training at the Harvard Graduate School of Business Administration. All of this training—in line with the basic philosophy of the Contract Settlement Act—emphasized that termination should be "fair, fast, and final."

Collaborating with the Readjustment Division, Army Service Forces, and the Navy, the AAF was instrumental in formulation of the Army-Navy Joint Termination Regulation of November 1944. This regulation established uniform readjustment procedures and policies for contractors doing business with the War and Navy Departments.

Time of Transition

The summer of 1944 proved to be a vital time of transition in the AAF's concerted planning for contract termination. With the invasion of the European continent a success, on July 1, 1944, Maj. Gen. Charles E. Branshaw, Commanding General, AAF Materiel Command, directed that the Readjustment Division be activated at Wright Field under the AAF Materiel Command. An amalgam of the Termination Section of the Procurement Division and the Property Disposal Staff of the Production Division, the new Chief of the Readjustment Division was Col. Edwin W. Rawlings.

As noted, Rawlings was a budget and production control specialist with an extensive background in the redistribution of surplus property, including aircraft components and hardware. Previously with the Aircraft Scheduling Unit, he had been at the center of production control and redistribution involving hundreds of AAF contractors.

The Readjustment Division consisted of four sections: Termination, Property Disposal, Training, and Administrative. The Training Section operated and sponsored schools for readjustment officers and men at Vandalia, Ohio, the Army Industrial College, and at Harvard University.

As Chief of the Readjustment Division, Rawlings directed termination of contracts; negotiated contractor settlements that involved termination; cleared plants of government-owned machinery, equipment, and materials; and directed storage and disposal of surplus property. In 1944–45, this work laid the foundation for massive reconversion of industry from wartime to peacetime footing.

These evolving reconversion plans and reorganizations were not without their critics. Lovett in 1944 believed that this activity hurt the war effort. He was not opposed to it, but held that it was being overdone. The war was far from over, and Lovett argued that sensitivity to readjustment caused delays and even cutbacks of requirements because of fear of having excess equipment should the conflict suddenly end. Lovett wondered how "we can be expected to fight a cashier's campaign in which the last American bullet kills the last German soldier on the day before payday." He was against fine-tuning, and argued that "we ought to be shot if we do not have more than we can deploy in the Pacific and not try to balance the thing out to the last penny."

Meanwhile, one of the most important AAF activities involved termination of cost-plus-fixed-fee contracts. This resulted in surplus parts, materials, and scrap—all government property. Termination settlement stipulated that the government would take over surplus parts and materials. Under AAF sponsorship, the government had supplied most of the machine tools and equipment used in manufacturing AAF materiel. Termination of these kinds of contracts usually involved much negotiation.

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As directed by Rawlings, the key to contract settlements involving billions of dollars was the "termination team." This group comprised a contracting officer, negotiators, a property disposal officer, an administrative officer, a legal officer, and an accounting officer. All were trained to accomplish a specific task, working directly with the contractor. The contracting officer was the "captain" of this team. He signed settlement documents. With the legal officer, he directed interim financing and settlement of subcontractor claims. The property disposal officer inspected the site and set procedures for property to be retained by the contractor and subcontractor or to be returned to the supplier.

Settlements negotiated by these teams might be checked by a Settlement Review Board at Headquarters, Air Technical Service Command. Members of this board were named by the Chief of the Readjustment Division. If asked by the contracting officer, the board reviewed especially difficult termination proposals.

ABOVE: President Roosevelt confers in Sicily with Gen. Henry H. (Hap) Arnold, Chief of Army Air Forces (AAF) and a key figure in planning for postwar industrial reconversion. LEFT: USAF Lt. Gen. Edwin W. Rawlings. As an AAF colonel and brigadier general, he was instrumental in industrial expansion and subsequent reconversion.

Disposition of materials was one of the most tricky and potentially controversial decisions related to partially completed aircraft. With sufficient planes in the inventory, the question was whether to complete them off the production line or to cut them for scrap. Rawlings and his people determined that it was more economical to cut than to store these aircraft in the Arizona desert. Scrap dealers cut up the aircraft and engines and sold them as junk. Once this process started, Rawlings appeared continuously before congressional committees to explain the decision.

Liferafts Full of Goldfish

Fast and fair settlement of terminated contracts and disposition of materials and equipment by the Army Air Forces made an extraordinarily important contribution to reconversion to a peacetime economy. "This rapid conversion," General Rawlings observed, "no doubt prevented a recession." The War Department estimated it would take 5,000 AAF officers several years to finish reconversion. This job was essentially completed in considerably less time by only 2,500 men.

By mid-1946, most contracts were settled. In late 1946, about ninety percent of the dollar value of contracts scheduled for cancellation had been settled. By late 1947, the job was basically finished. Approximately $15 billion in contracts were terminated after the war. The total value of Army Air Forces' terminations was more than $22 billion. This prodigious amount of work was a tremendous accomplishment by a relatively small group of AAF officers and men.

An Air Force Logistics Command historian summarized reconversion this way: "The sleeping bags now contained happy honeymooners, the Mae Wests were suspended from the necks of nonamphibious Boy Scouts, the liferafts were full of goldfish in suburban backyards, and somebody had converted a surplus plane into a small greenhouse."

The massive reconversion succeeded because civilians at the uppermost levels of government and military officers decided before the end of the war that the mistakes of the post-World War I demobilization would not be repeated. Had the United States failed to heed those lessons, it was probable that a recession, and possibly a depression, would have ensued.

Under the Contract Settlement Act, General Arnold, General Eaker, the Air Staff, General Rawlings, and materiel officers at Wright Field triggered planning during the war that assured an organized, successful reconversion of the world's greatest production machine. These complex plans covered all aspects of the job—administration, training, inspection, negotiation, disposal, retention, settlement, accounting, and much more. Simultaneously, the plans were sensitive to developmental and production requirements to sustain the future force.

And so a few farsighted men guided an industrial transformation from war to peace, a reconversion of the giant American industrial machine. In a real sense, this global conflict ended where it began—on the production line. It was the quiet victory that made possible the postwar boom. ■

Herman S. Wolk is Chief, General Histories Branch, Office of Air Force History. He is the author of Planning and Organizing the Postwar Air Force, 1943–1947 *(Office of Air Force History, 1984);* Strategic Bombardment: The American Experience *(MA/AH Publishing, 1981); and contributing author to* Evolution of the American Military Establishment Since World War II *(George C. Marshall Research Foundation, 1978). Mr. Wolk has written many articles for* Air Force *Magazine, the most recent being "The Establishment of the United States Air Force," September '82 issue.*

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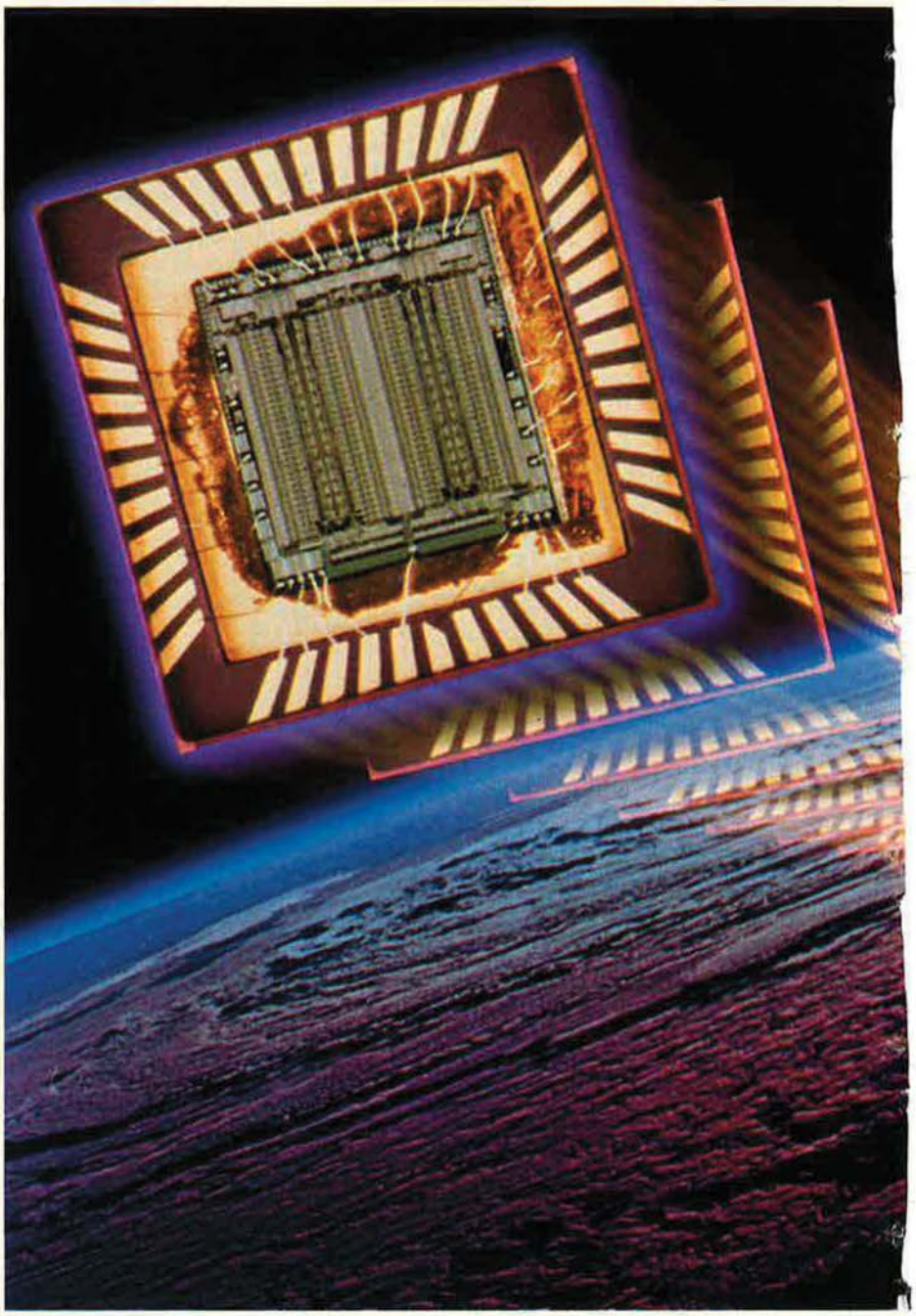

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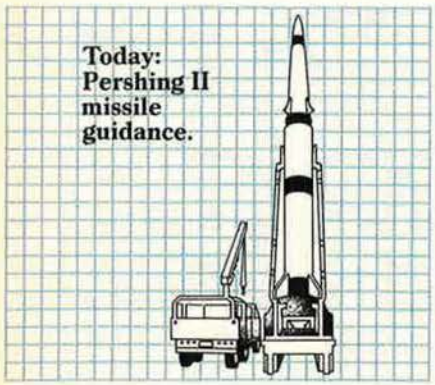

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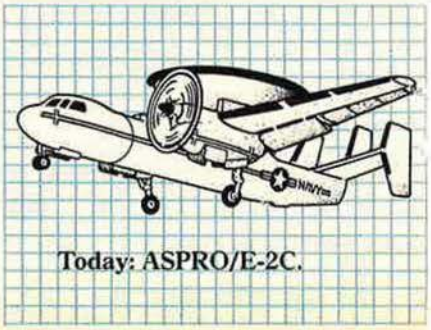

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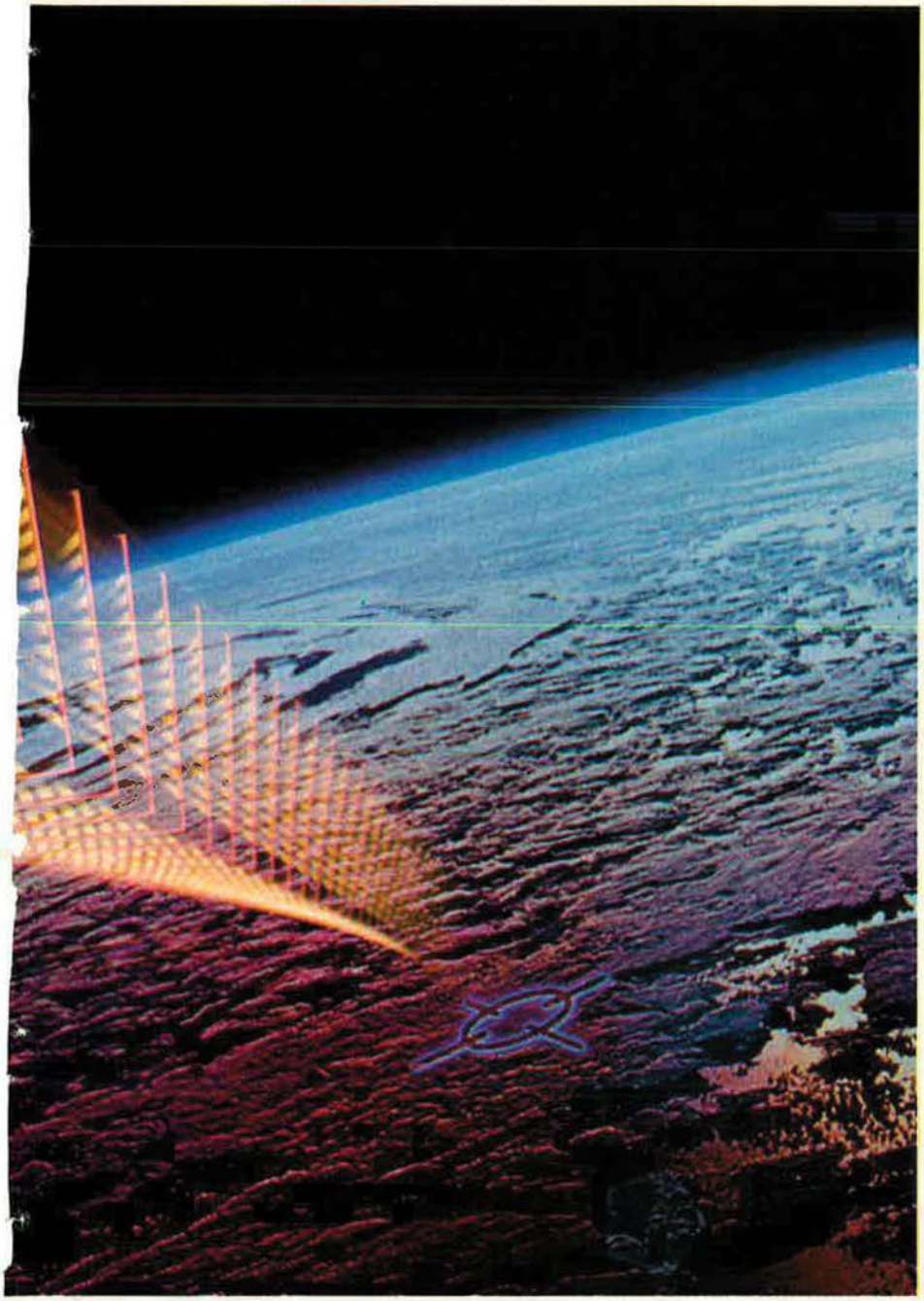

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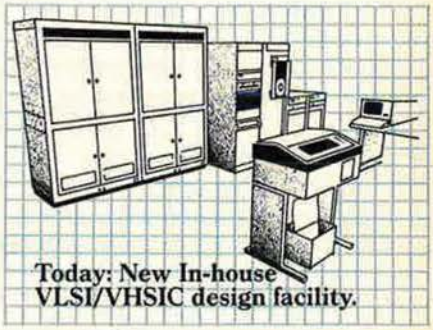

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GOODYEAR AEROSPACE

Speaking recently at the Air Force Academy, the first Secretary of the Air Force harked back to the earliest days of flying and gave some good advice for today.

Symington Remembers

BY THE HON. STUART SYMINGTON

My interest in aviation started many years ago when my Uncle Pete, a Naval officer, came back on leave to our hometown of Baltimore. He was mighty proud of his new Oldsmobile and one day asked if I would join him in a ride over to Halethorpe, Md., just outside of Washington, D. C., where a man was scheduled to take off in something called a "flying machine."

Needless to say, this eight-year-old boy was delighted to accept; and from nearby hills hundreds of us watched a Mr. Latham run his object along the ground, soar into the air, and actually disappear from sight.

When this pioneer returned in a few minutes from where he had started, those of us on the hills expressed approval by pumping hard on large rubber bulbs, at that time the horn on all automobiles.

Some thirty years later during the Battle of Britain, when from June 1940 to June 1941 that nation stood alone against Hitler and his allies, it was my privilege to be an observer from our government of the air war being conducted over England. Those were the days of those magnificent men whose immortality Winston Churchill nailed down forever with his famous remark: "Never in history have so many owed so much to so few."

I did not realize just how few until August 1946, when from our Embassy in London I watched a flyover of all that remained of the Royal Air Force: very fine, but very, very few.

This nation must never allow its own Air Force to be decimated as was the RAF just prior to the beginning of World War II. I can never forget Air Chief Marshal Sir John Slessor's telling of the time, not long before the start of the Battle of Britain, when Sir John Simon, Chancellor of the Exchequer, heavily reduced the size of the RAF. With stroke after stroke of his pen, Slessor said, the Chancellor cut out one group after another, admonishing: "What you gentlemen don't realize is that England's first line of defense is its economy."

The Struggle for a Separate Service

On January 31, 1946, President Harry S. Truman appointed me Assistant Secretary of War for Air, whereupon a friend whose place I was taking, that great statesman Robert Lovett, suggested I visit him in Florida. It was during this visit that I met Gen. Carl A. (Tooey) Spaatz, combat pilot of World War I, head of our Eighth Air Force in England during World War II, and later the first Chief of Staff of the newly created US Air Force.

That was a lucky day for me. Tooey Spaatz represented all that was best in an officer and a gentleman. We who knew him, all of us, respected him and were devoted to him.

To this day I do not believe Carl Spaatz has received the recognition he so richly deserves. Gen. Dwight D. Eisenhower once told me that, with the exception of Gen. H. H. (Hap) Arnold, Tooey Spaatz was without question the leading airman of the war.

Tooey was a quiet man, but full of humor. Two of his remarks remain with me. When talking to his generals about their impending appearance before Congress, he admonished: "Don't lie, but don't blab the truth."

Another one: I asked if he had talked to a certain person about one of our people. Stuttering a bit, as was his custom, Spaatz replied, "Yes, I did. He said he would think it over. You know he always thinks things over before he goes off half-cocked."

A separate service for air was the dream of Carl Spaatz. That dream came true.

Based on actual battle experience, Spaatz, along with many others—such as the flyer who to me is our greatest living airman, Lt. Gen. Jimmy Doolittle—returned from Europe and the Pacific convinced that airpower was indivisible. After listening to these "voices of experience," I too became convinced; and we all worked together for our separate service.

We had important help. Based on their knowledge of what occurred in World War II, President Truman, Secretary of War Robert Patterson, and then Army Chief of Staff General Eisenhower were strong for a separate Department of Air, and also for one true head of our Military Establishment, not just a coordinator but an actual administrator who would be the head of the services—ground, sea, and, hopefully, air.

Early in 1946, Secretary Patterson assigned to me the task of obtaining legislation that would give actual administrative control to the civilian head of the proposed new Military Establishment.

The Navy adamantly opposed any administrative control at the top of the new Department. In effect, their position was: "We do not care what the Army does with its air force, but we don't want anyone outside of the Navy to take control of Naval air."

Secretary Patterson and General Eisenhower thereupon assigned to me that able Air Force officer, Gen. Lauris Norstad, to help get a bill through Congress. Secretary of the Navy James Forrestal assigned an equally able officer, Adm. Arthur Radford, to steer opposition to any administrative control at the top. (Admiral Radford was later appointed Chairman of the Joint Chiefs of Staff and went out of his way to be especially fair with respect to the problems of the new Air Force.)

At a point in 1946, we realized we just could not obtain legislation that year, so we regrouped our forces and finally achieved our aim in the National Security Act of 1947. It was approved by the President and then sent to Congress. This bill, as sent up, gave the proposed new Secretary of Defense administrative control of all three services.

Congress thereupon approved the recommendation for a separate Air Force; but because of heavy lobbying, as expressed by resistance from powerful forces in and out of the government, the proposed bill was watered down to the point where the new head man, the Secretary of Defense, became only a coordinator instead of an actual administrator.

General Spaatz and the rest of us Air Force people felt this to be a sad and expensive mistake; but when we received authentic word from Congress that we could either accept this revised legislation or obtain nothing, we agreed to the revised bill and so recommended to the President. On September 18, 1947, the United States Air Force came into being.

New Structure, New Problems

From the beginning, General Spaatz and I also agreed as to how we were to function together. I was to work on establishing a more independent and efficient logistics setup. (In the past, the War Department—Army—had first to examine and then approve all major logistics requests of the Army Air Forces. This resulted in delay and costly duplication.)

As Secretary, I emphasized continually that the Chief of Staff and his staff would, as they did, make the military decisions.

Of course, we discussed all major matters, but the decision by Spaatz and his staff on military policy and actions was final. Thereupon, together, we all did our best to obtain approval of our unanimous recommendations to the Secretary of Defense and the President.

Promptly after we had commenced operations under the new legislation, failure to achieve administrative authority at the top resulted in disagreement, at times bitter, among the three services, primarily about who was to do what with respect to "mission" but also much about ground support and who had the range to be the first line of defense.

These differences were exacerbated in 1949. That year, the total amount of money finally allocated for all three services was less than $14 billion. Naturally, each service thereupon did its best to persuade both the Administration and Congress to give it a larger piece of the monetary pie.

Many of these differences came into the open at the time of the famous so-called B-36 hearings held by the House Armed Services Committee during much of the summer of 1949. Anyone interested in what went on during those days should read the record of those hearings.

Our new Air Force faced problems. As the art of flying developed, accelerated by the experiences of the recent war, we needed—and needed rapidly—new-type planes; at the same time we were being forced to reduce our personnel by hundreds of thousands.

Consider that from some 240 groups during World War II we were told to scale down to forty-eight. Needless to say, we objected vigorously all the way.

Then the Korean War started in June 1950. That changed everything. Almost immediately the Air Force received all that it had previously requested—and soon afterward a lot more.

Statute after statute gave increased authority over the services to the new Secretary of Defense; but especially from the standpoint of maximum security at minimum cost, the structure of the Joint Chiefs of Staff remained wrong. And it is wrong today.

The Need for Change

One of the most effective current advocates of proper change in this regard is that universally respected officer, Gen. David C. Jones, Chief of Staff of the Air Force and later Chairman of the Joint Chiefs. The eloquent testimony of General Jones and others before Congress has recently stirred renewed interest on this subject as our national debt soars over $1 trillion and our incredibly high annual federal deficit continues.

As but one illustration of unnecessary duplication: Some years ago the Senate Armed Services Committee found that in the Mediterranean Theater six different United States agencies were monitoring the same message from various other countries.

Let us hope that the sound thinking of people like Dave Jones with respect to the structure and functioning of the Joint Chiefs is soon recognized. The great and growing financial problems this country faces today can only remind us of that sign on General Motors Vice President Charley Kettering's wall: "The greatest incentive to sound thought is the sheriff."

However, of one past, present, and future military fact all of us can be certain: No nation can ever hope to win possible future combat unless that nation controls the airspace over both the battlefield and the area that surrounds it. ■

Stuart Symington became the first Secretary of the Air Force on September 18, 1947, when the Air Force became a separate service. He had previously served since 1946 as Assistant Secretary of War for Air. Born in Amherst, Mass., in 1901, Mr. Symington enlisted in the Army as a private in 1918 and was discharged in 1919 as a second lieutenant. Later that year he entered Yale University, from which he received a B.A. degree. Before entering government service in July 1945, Mr. Symington had been President and Board Chairman of the Emerson Electric Co., St. Louis, Mo. In 1952, Mr. Symington was elected to the US Senate from Missouri, and held his seat until his retirement in 1977. AFA has twice presented Mr. Symington its highest honor, the H. H. Arnold Award, in 1948 and 1956. Mr. Symington is presently Vice Chairman and a Director of First American Bankshares, Inc., of Washington, D. C.

The Clements Award

The accompanying article is from an address delivered by Mr. Symington during the presentation of the Clements Award at the US Air Force Academy on May 1, 1984. The award is named for former Deputy Secretary of Defense William P. Clements, Jr., and is presented annually to the outstanding military educator who has completed less than four years of teaching service at the Academy. This year's recipient was Capt. Barbara J. Kuennecke, USAF, Assistant Professor of German in the Academy's Department of Foreign Languages.

Mr. Symington's appearance at the Academy was especially fitting since it was he who conceived and first formulated a plan for a United States Air Force Academy while serving as the first Secretary of the Air Force.

They were short on people, parts, and experience, so they generated sorties for Linebacker II on grit and determination.

Spirit and Surge

BY MAJ. KARL J. ESCHMANN, USAF

Ground crew in Thailand works fast to get a 388th Tactical Fighter Wing F-4E ready for another sortie during Linebacker II.

In late October 1972, President Nixon halted all bombings north of the twentieth parallel in North Vietnam in anticipation of a negotiated cease-fire. For the next several weeks, many of us stationed in Southeast Asia felt that the end of the war was imminent. Apparently the manpower planners felt the same way, because our pipeline of replacement personnel was suddenly reduced to a trickle.

At the time, I was an F-4E flightline maintenance officer assigned to the 388th Tactical Fighter Wing at Korat, Thailand. We had no way of knowing that in less than two months we would be called upon—despite our personnel shortages—to generate great numbers of sorties around the clock for the Linebacker II air offensive against North Vietnam.

Through November, our maintenance organization lost experienced personnel at a rate far higher than normal. In addition to those leaving as their regular one-year tours ended, we were also losing people completing 180-day TDY tours. The TDY people had been sent to Southeast Asia the previous spring following a North Vietnamese invasion of the South, and now they were due back at their home stations. In light of the bombing-halt situation, there was outwardly no reason to retain the TDY people beyond their six-month commitments.

But by the end of November, the realization had struck that we would be left without adequate manpower to maintain the force unless the personnel pipeline were reopened. Finally, during the first part of December, we began receiving some relief in the form of new TDY personnel. Furthermore, some of our experienced men who were due to rotate just before Christmas were involuntarily extended until January or February. This was a highly unpopular action, as most of the extended troops had families expecting them home for the holidays, but it proved a fortunate action as things turned out.

The new men were soon performing well as assistant crew chiefs, and some of the fast burners were upgraded to primary crew chiefs. We were still far short of our normal manning, though.

In the meantime, the North Vietnamese were using the bombing halt to rebuild their military strength. On December 13, the North Vietnamese delegates walked out of the Paris Peace Talks. Two days later, the President ordered the execution of Linebacker II—the resumption of air strikes against North Vietnam.

Something Unusual

My first hint that something un-

usual was coming popped up on December 16 when I was told to go to my quarters to get some rest in preparation for a return to the night shift beginning the next evening. But before I left, I had to supervise a quick detail to transport dozens of empty centerline fuel tanks from the storage area to our aircraft revetments. Our oncoming night shift was tasked to load the tanks and to begin putting together all of our aircraft undergoing routine scheduled maintenance. Thai work crews went on overtime to assemble a large reserve of operational tanks (which arrived in kit form from the Stateside stocks).

The evidence pointed to an expected large expenditure of external tanks. It was standard procedure for our aircrews to punch off their external fuel tanks before entering North Vietnamese airspace, thereby lessening the drag on their Phantoms.

When I reported to work on the evening of December 17, I noticed immediately that every single aircraft status board in wing Maintenance Control was covered by curtains. My F-4 board controller lifted the curtain covering the status board for our section and, amazingly, almost all of our aircraft appeared as either operationally ready (OR) or well on the way to being so.

Normally, we maintained an OR rate of about eighty to eighty-five percent, but the board was showing an OR status of ninety-two percent, with twenty-three out of twenty-five F-4s available for service. Every aircraft was loaded in either an air-to-air configuration (AIM-7 Sparrow and AIM-9 Sidewinder missiles) or a hunter-killer configuration (cluster bomb units, or CBUs) with fully fueled centerline and wing tanks. This had to mean only one thing—our aircrews were going North.

The EB-66s were getting new electronic countermeasure (ECM) packages. All of the Wild Weasel F-105Gs were fully armed and loaded with AGM-45 Shrike and AGM-78 Standard ARM (antiradiation missiles used to home in on enemy acquisition radars). Almost everyone who had leave, a pass, or a rest and recreation trip scheduled was told to remain on base.

I was in a state of high anxiety. Some of our key maintenance personnel had already departed for Christmas leave. Among them was our Officer in Charge (OIC), on his way to the States. I kept hoping that he would be caught en route and asked to return, since I was only a second lieutenant with four months of flight-line maintenance experience and thus a novice. But this did not happen and I ended up as the acting OIC of the Fighter Branch throughout the Linebacker II campaign.

To make matters worse, I learned that my section would be tasked to support both day and night operations until further notice. Such a flying schedule usually called for a maximum effort, even when units were manned at full strength. Our section was still suffering from a shortage in manning. We had barely enough crew chiefs to handle the launching, recovery, and maintenance of fourteen aircraft within each twelve-hour shift. Yet we possessed twenty-five shark-mouthed F-4Es that December, and we would have to support them on a twenty-four-hour flying schedule.

Everyone *knew* that it required an entire twelve-hour night shift to generate enough F-4 airframes to support the next day's flying—and that was assuming the luxury of a permanent crew chief assigned to almost every aircraft. Now we were being told that we would launch and recover twice as many missions with half as many crew chiefs and with no appreciable maintenance standdown time. It seemed impossible, and I didn't even know the best parts yet.

A strange thing happened, though, when I relayed the word to the troops. I had expected complaints about the longer working hours and the loss of leave time at Christmas. Instead, they seemed to sense that what we were about to do was important and could help to end the war. Up to then, many of the extended people had been angry at being held in Southeast Asia over the holidays for no apparent reason other than to "baby-sit" our airplanes. When those same individuals started to talk about "almost missing out on the action," I knew that somehow we were going to come through this period successfully, or at least turn in a damned good effort.

The Bombers Go North

On the afternoon of December 18, we finally got the straight word on what our preparations had been about. Our B-52 bombers were to attack targets in the dense Hanoi-Haiphong defense zones.

F-105G Wild Weasel aircraft are made ready for missions in support of B-52 night bombing runs over North Vietnam. Wild Weasels had the high-risk job of suppressing SAMs around Hanoi and Haiphong.

The operation differed from previous air offensives in that it provided for continuous around-the-clock air attacks against the North Vietnamese homeland. The primary aim was to strangle the Communist war effort by shutting down the massive pipeline of equipment and supplies that gave Hanoi its capability to sustain a major ground offensive in the South. It was also meant to convince the North Vietnamese that it was in their best interest to return to the negotiating table.

In earlier air offensives against North Vietnam, our fighter-bombers had limited capabilities to attack pinpoint targets at night or in condi-

tions of poor visibility. Thus, the enemy had learned to adjust to our bombing schedules by hiding and storing their valuable supplies during our daylight attack periods and moving them at night when our air operations were not nearly as effective. The plan for Linebacker II was to maintain constant pressure on the North Vietnamese by intensive bombing of key targets by B-52s and F-111s at night, with continued pounding of the same areas by USAF and Navy fighter-bombers during the daylight hours.

radar and then would fire one or more of their locked-on antiradiation missiles into the detected signal. The missile would then home in on the signal and ride it down to the radar antenna. Once the site was marked, the accompanying F-4s—carrying cluster bombs—would destroy whatever remained of the site. The F-4s also carried two AIM-7 Sparrows in their aft fuselage launchers to protect the Wild Weasel team from MiG attacks.

Every night, USAF and Navy fighters preceded the B-52s, hitting airfields, gun batteries, and known or suspected SAM sites. The Wild Weasel teams were operating constantly along the planned ingress/egress routes. Although relatively few Weasels were available (six F-4Cs TDY from Okinawa and two Korat-based F-105G squadrons), they lived up to their motto—"First In, Last Out"—and made their presence felt.

The SAM site crews had long since learned to respect the capabilities of the Weasels. For our B-52 attack force, a radar turned off to

A 388th TFW F-4 touches down on Thailand's Korat AB flight line on August 15, 1973, having carried out the wing's final bombing mission over Cambodia. All USAF bombing of Cambodia from Thailand ended that day.

Throughout the afternoon and the night of December 18–19, aircraft were being launched from every base in Thailand to support the B-52s. The first night, more than 120 B-52s attacked targets in the Hanoi area in three separate waves. Our F-4E Phantoms were assigned essentially two primary missions throughout the operation: to provide a "MiG CAP" aerial protection and escort for the B-52s, and to serve as a component of the hunter-killer teams with the F-105G "Wild Weasels" in attacking surface-to-air missile (SAM) sites surrounding the Hanoi-Haiphong complexes.

The main purpose of the hunter-killer team mission was to "troll" the enemy skies looking for ground-launched threats. The Weasel F-105G crew would "listen" for any signals indicating a tracking SAM

The 388th TFW's maintenance crews worked around the clock during Linebacker II to keep the wing's aircraft ready for the around-the-clock flying. Spare parts ran short during this demanding operation.

Armed with two Shrike radar-suppression missiles, a USAF F-105G approaches a KC-135 tanker for a refueling rendezvous. Aerial refueling did its part in keeping the pressure on North Vietnam during Linebacker II.

avoid a Weasel attack was nearly as good as the destruction of a SAM site. Wary of attracting the Weasels, the North Vietnamese employed a tactic of firing their SAMs like skyrockets, without the benefit of good lock-ons by their acquisition radars. Thus, they had to rely primarily on aiming at a point in space in hopes of scoring hits with the missile's proximity fuzing system. Often, MiGs flew parallel courses with our bombers and radioed information to the SAM crews concerning B-52 altitudes and headings to assist the batteries in their aiming.

The point here is that our maintenance personnel fully understood and appreciated the implications of keeping mission-capable fighter aircraft available to protect the B-52 attack force. Our personnel shortage was such that each primary crew chief was maintaining and supporting up to three aircraft per shift. The men consistently volunteered to work beyond their normal twelve-hour shifts almost every day of the offensive. Additionally, many airmen and NCOs assigned to other areas of maintenance—such as in the phase docks, nonpowered aerospace ground-equipment sections, or the specialist maintenance squadrons—volunteered to work as crew chief assistants.

Although inexperienced in performing crew-chief functions, these volunteers learned quickly to accomplish such tasks as conducting end-of-runway quick-check inspections, depaneling aircraft to remove and replace defective equipment, towing, fuel servicing, uploading fuel tanks, and assisting with aircraft launches and recoveries. As it turned out, the inexperienced volunteers did quite well because they learned their new roles fast, and more important, because *they wanted to*. Everyone sensed that we were involved in a historic event, and all wanted to have an active part in it. In fact, most of the volunteers performed the flight-line functions in addition to their regular shift duties at their own work areas.

Straining the Logistics

Toward the end of the first week, the compressed requirements of day-and-night flying were already straining our local supply support capabilities. This was especially true for the F-4 Phantoms, since so many F-4 units were assigned in Thailand and many of the essential parts were short everywhere. I presumed that the entire Tactical Air Command was probably sacrificing mission readiness in other parts of the world to keep up the flow of parts to our theater.

The shortages left some of our aircraft ineffective in a number of mission capabilities. Some onboard F-4 avionics—those used for performing critical functions in the areas of radar, fire control, navigation, and communications—were quite vulnerable to the extremes of the Southeast Asian climate. Rarely did an aircraft return from a mission without an avionics problem.

In the initial days of Linebacker II, we had to make do with what was on hand in our local supply warehouses. This meant that, in some cases, individual aircraft awaiting parts on order could not fly certain missions because subsystems required for those missions were inoperative. That restricted our flexibility in assigning airframes where particular mission configurations were called for.

We ended by continuously tailoring aircraft for specific mission blocks by "cannibalizing" parts during the turnaround periods. As

an aircraft returned from a mission and was being serviced, we would have to borrow its parts or avionics gear and put them on another F-4 getting ready to launch immediately in the next sortie block. This doubled the effort required to turn around an aircraft for another mission. But it was a necessary thing in those cases where we had only a limited number of reliably calibrated or fully operational avionics units. Our pilots could not afford to fly up North with anything less than a fully operable weapon system. The stakes were too high.

On the first and second days of the offensive, we tried to support a formalized flying schedule as worked up by our Plans and Scheduling Staff. They had printed up a series of "frag sheets," or flight schedules, where specific tail-numbered aircraft were assigned to time-blocks for specific types of missions. But, because of the turnaround problems and constant changes in aircraft readiness factors, it became difficult for our schedulers to determine which tail numbers would have reasonable capability to perform which functions for the next day's missions.

Formal changes to the published schedules became too numerous after Day Two. Thereafter, we were given blank schedule forms with printed mission times and we filled them in with tail numbers as airframes became available on the flight line. Often, this would happen just minutes prior to the scheduled launch times while our aircrews waited patiently in the revetments for the word on which aircraft to climb aboard. More often than not, they had very little time to conduct a proper preflight of their aircraft since the other aircraft within their mission block had already started engines. Our aircrews' trust in us certainly strengthened our resolve to provide them with the best possible airframes we could. Any mistakes on our part could have meant the loss of an aircrew over North Vietnam.

Our pilots kept us well informed on the progress of the offensive. We were invited to intelligence briefings and we saw combat film footage that gave us an idea of the effect that Linebacker was having. I can't emphasize enough the value that these briefings had on morale. They sparked the weary maintenance personnel to press on.

Our real break came when the President halted the bombing for a thirty-six-hour period over Christmas. This happened just at a point when I was sure we would run out of enough mission-capable aircraft to fully support the next day's missions. The standdown period allowed a breathing spell for our people and a chance to perform some catch-up maintenance on our aircraft, which were also getting tired. We were able to work some of the more serious discrepancies and again bring our F-4s up to some measure of their full capabilities. The North Vietnamese used the temporary halt to rebuild some of their damaged areas and defensive sites, but I am convinced that the break was far more beneficial to our side since our effectiveness and ability to strike the North in force were largely restored.

The Big Payoff

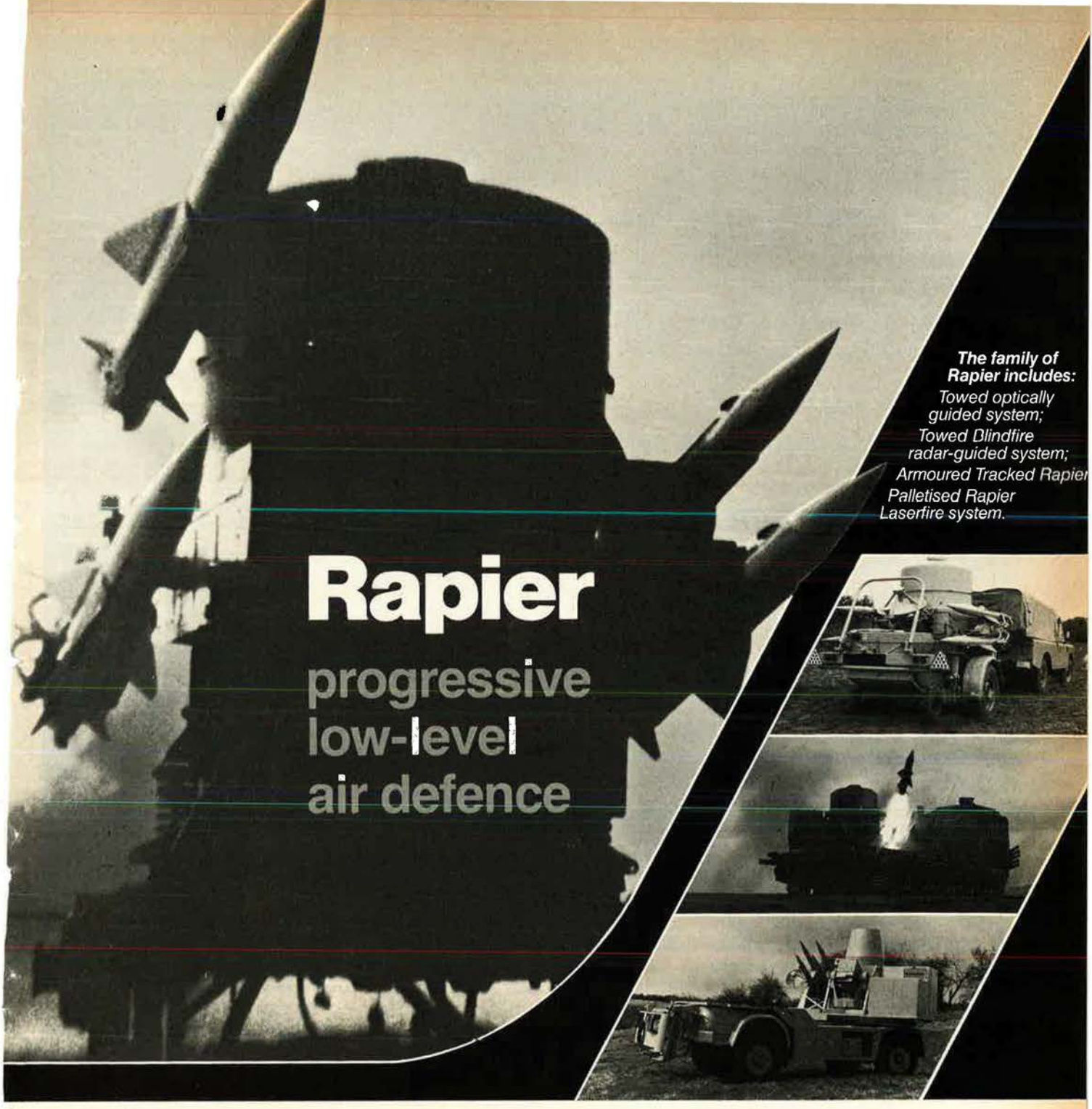
The final thrusts of Linebacker II after the Christmas break finally resulted in a North Vietnamese willingness to return to the peace table. Our own F-4E squadron had flown 199 sorties with only two countable aborts during the eleven-day operation. The Phantoms at Korat did not take a single loss, either from accidents or battle damage. Most units involved in the offensive reported similar experiences.

It proved that enthusiasm, dedication, and a real willingness to do the job by *all*—support personnel, aircrews, and commanders—can overcome shortages of spare parts, manpower, and experience. This was the "team effort" that is talked about frequently, but which is not seen that often in actual practice.

I think the Linebacker effort also showed the extent of the abilities of average American military people when they are asked to perform selflessly and to support efforts of national importance. It only requires the right reasons, a sense of dedication, and a "can do!" attitude. All were in good supply during Linebacker II. ■

The author served as a second lieutenant and "novice" F-4E maintenance officer with the 388th Tactical Fighter Wing in Thailand during Linebacker II.

Maj. Karl J. Eschmann, USAF, is the Chief Integration Engineer for the air-launched cruise missile system at Aeronautical Systems Division, Wright-Patterson AFB, Ohio. He holds a B.S. degree in Aerospace Engineering from Texas A&M University and a M.S. degree in Logistics Management from the Air Force Institute of Technology. During his Air Force career, he has served as an Aircraft Maintenance Officer on flight-line and staff positions in PACAF, TAC, and AFLC. In Southeast Asia, he served a tour as an F-4E Fighter Maintenance Officer during 1972–73. From 1979–80 he was an aide to the commander of the Oklahoma City Air Logistics Center. Major Eschmann is a graduate of Squadron Officer School, Air Command and Staff College, and a Distinguished Graduate of the Naval War College.



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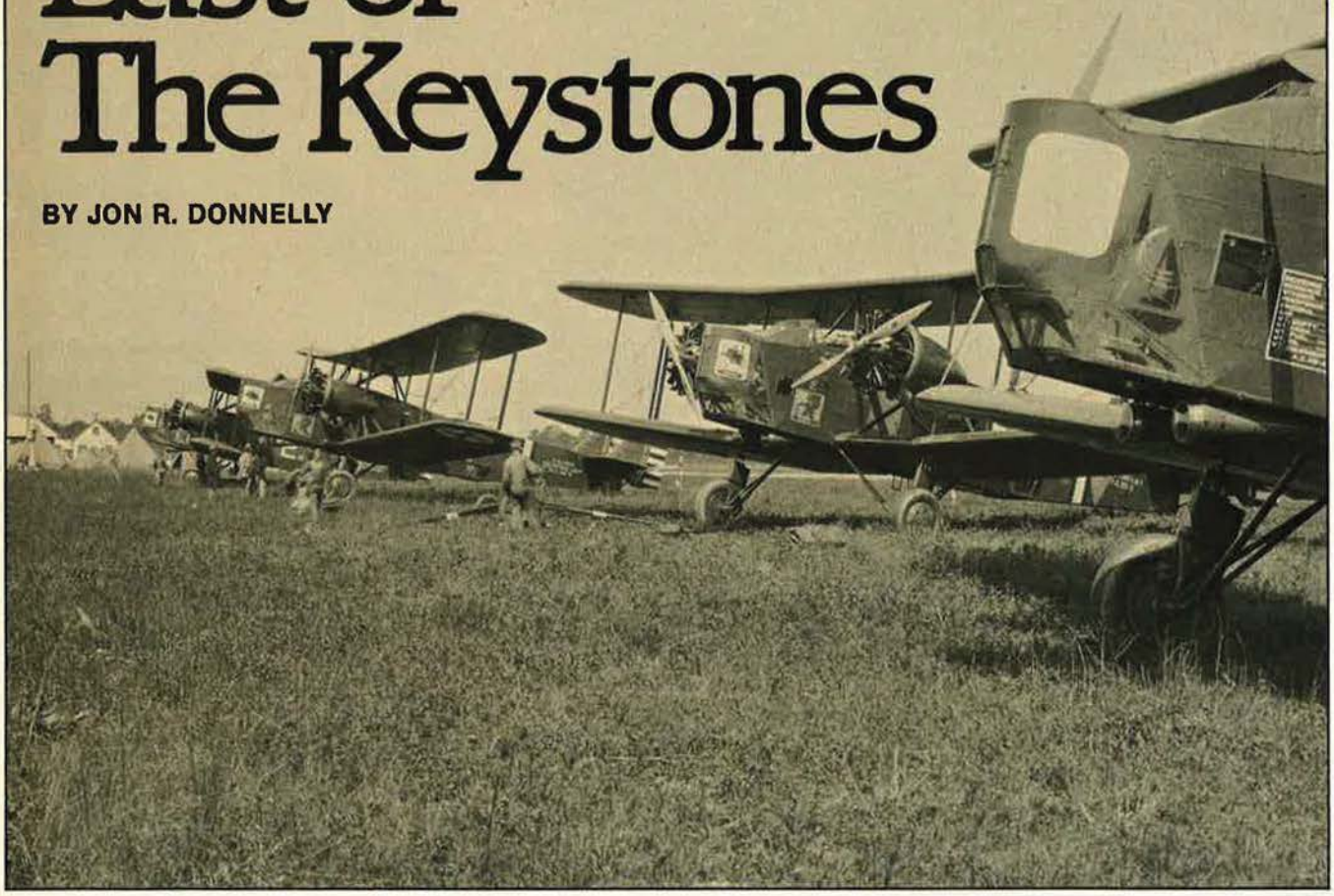
B-6A remnants found in Louisiana may lead to a reproduction of this extinct warbird from the strut-and-fabric days.

Last of The Keystones

BY JON R. DONNELLY



Keystone LB-7 bombers at Byrd Field in Richmond, Va., in 1930. (Photo by Anthony L. Dementi)

THEY lumbered across the sunny afternoon sky, these olive-brown biplane behemoths, before gently touching down on the sod runway and rolling to a stop near the hangar that marked the hub of Byrd Field, a civilian airport near Richmond, Va.

The year was 1930, and the new Keystone bombers sported the markings and colors of the US Army Air Corps's 20th Bomb Squadron of the 2d Bombardment Group from Langley Field over at Hampton, Va. Instead of the usual star wing markings, however, they carried Maltese crosses on white circles, apparently denoting their participation in Army war games.

The bombers, whose noses were decorated with the 20th Squadron's colorful cartoon of a pirate holding a bomb, would be around for a few days. Tents were erected near the hangar for the air and ground crews.

Before long, area airplane buffs arrived and began mingling with mechanics and pilots under the wings and radial engines. One of them, Richmond photographer Anthony L. Dementi, snapped several pictures of the twin-engine planes.

The Newest and Best

They were Keystone LB-7s, aircraft that marked the beginning of the end of the Army's fabric-covered, open-cockpit, biplane bombers.

At the time, they were the newest and best the United States could produce. The planes were a combination of metal framework, some of it stainless steel, and cloth. Each was armed with three .30-caliber machine guns.

Powered by two 525-hp Pratt & Whitney R-1690-3 Hornet radial engines, the LB-7 was about forty-eight feet long and had a wingspan of seventy-four feet. In addition to two pilots, the Keystone's crew consisted of a bombardier and front and rear gunners. The plane could carry 2,500 pounds of bombs at speeds of up to 120 mph over a maximum distance of 855 miles.

Before the end of the decade, their struts, wires, and fabric would be replaced by sleek, metal-skinned warplanes like the Martin B-10 and Boeing B-17. But during the late 1920s and early 1930s, spindly bombers like the Keystone LB-7s and their look-alike later models—the Keystone B-3As, B-4As, and B-6As—were the backbone of the nation's defense.

The planes with the 2d Group

based at Langley Field were regular visitors to Richmond's Byrd Field, which was a destination for Army pilots training for cross-country flights.

Relics Identified

Until recently, it was thought that little or nothing remained of any of the Keystone LB (light bomber) or B (bomber) series, of which some 230 models were built between 1926 and 1932.

Earlier this year, however, workers at Barksdale AFB in northwestern Louisiana who were preparing a site for construction found metallic remnants that were identified as pieces from four Keystones.

The site is a former bombing range, and Air Force records indicate that, in 1938, the then-obsolete Keystone bombers were flown to Barksdale from Langley Field. There they were stripped of useful parts like engines and instruments and the remains were towed to the bombing range to serve as ground targets.

While the remains have been damaged by time, weather, and explosives, officials at Barksdale say they are in good enough condition to be identified as parts of B-6As, which were produced in 1932 and were the last of the Keystone series.

They also hope the parts eventually can be used to build a reproduction of a Keystone, which the Air Corps called the "Panther." A complete set of blueprints from the now-defunct Keystone Aircraft Corp. (formerly Huff-Daland Airplaces, Inc.) is on file at Barksdale.

"We have found engine mounts, struts, exhaust pipes, steel bracing wires, and outboard portions of the right wing," said Air Force Capt. Dick Cole, base spokesman and director of the Eighth Air Force Museum there.

Also found was a piece of a plane's fabric covering with a portion of the 2d Bomb Group's markings. "It is in remarkably good condition and even has some of the original dope coating," Captain Cole said. The dope paint was used to keep the fabric taut over the metal framework.

Bound for Dayton

Those parts found this year, along with the framework of a complete

Before B-17s

Metal-skinned bombers were on the way, but in the 1930s the Keystones were our newest and best.

Some aviation historians have described the Keystone series of biplane bombers as the B-52s of the 1930s. In fact, by standards of the times, they were comparable to the best warplanes of other nations in size, construction, and performance.

But unlike the B-52 series, which has been an Air Force mainstay for nearly thirty years, the life span of the Keystones was relatively short—about five years. And, unlike the B-52, Keystones never saw combat.

The era of open-cockpit, fabric-covered biplanes was already nearing its end when the bombers began leaving the assembly line of the Keystone Aircraft Corp. in Bristol, Pa.

By the time the last version of the series, the B-6A, was in service with squadrons of the 2d Bombardment Group at Langley Field, more modern bombers like the sleek Boeing B-17, the German Dornier Do-17, and Japan's Mitsubishi G3M "Nell" were already on the drawing boards.

The Keystone series of twin-engine bombers evolved from the single-engine LB-1, ten of which were produced between 1923 and 1926 by Keystone's predecessor, Huff-Daland. A subsidiary of that firm, formed in 1924, was the forerunner of today's Delta Air Lines.

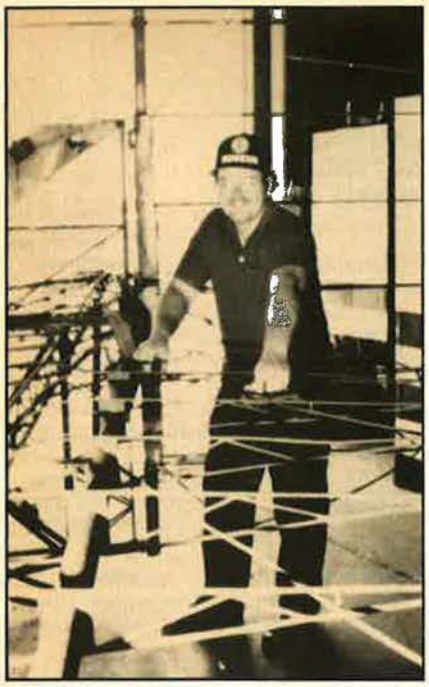
Several adaptations of the LB-1 resulted in the production of ten larger LB-5s, powered by twin 420-hp Liberty engines and carrying a five-member crew. The LB-5A, twenty-five of which were made, was a slightly modified model, as were the seventeen LB-6s that were produced.

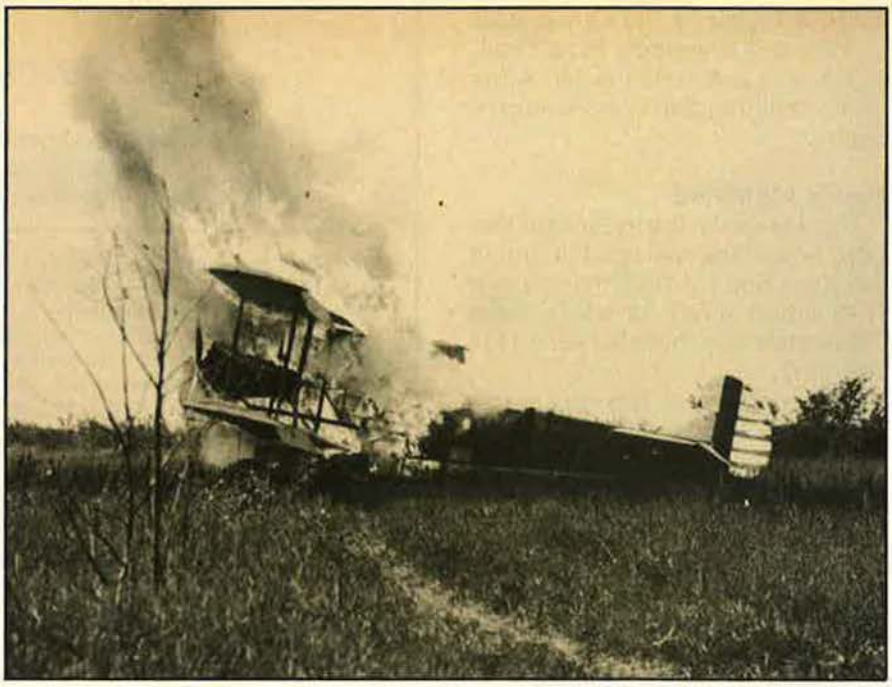
The major production models of the early Keystones were the LB-7, eighteen of which were built, and the LB-10A, sixty-three of which saw Air Corps service. They were identical except for the LB-7's twin tail vertical stabilizers. Single aircraft of several other models, and a total of ten of the LB-13s and LB-14s, were made before the Keystone LB series ended in 1930.

In the meantime, the Army decided to end the light bomber and heavy bomber designations in favor of the single "B" for all bombers. In the switch, for example, the LB-10A became the B-3A.

The last twenty-seven B-3As received Wright Cyclone engines instead of the standard Pratt & Whitney Hornet, and were designated B-5A. In 1932, the Keystone series ended with the production of two improved models. These were twenty-five B-4As (Hornet engines) and thirty-nine B-6As (Cyclone engines). It was the remains of four of these B-6As from Langley Field that were found at Barksdale.

The Keystone series of twin-engine bombers evolved from the single-engine LB-1, ten of which were produced between 1923 and 1926 by Huff-Daland Airplaces, Inc.





ABOVE: Eighth Air Force Museum curator Buck Rigg stands by B-6A tail section that was reassembled after excavation from the old bombing range at Barksdale AFB, La. TOP RIGHT: In 1938, the by-then-obsolete B-6As were flown from their home base at Langley Field, Va., to Barksdale and were used as bombing targets during the 1940s and early 1950s. RIGHT: Fabric-covered Keystone bombers, like this B-3A, formed the backbone of the nation's defense prior to the introduction of metal-skinned B-10s and B-17s.

tail section of a Keystone bomber found earlier at Barksdale, are being cataloged against the Keystone blueprints and prepared for shipment to the Air Force Museum at Dayton, Ohio, said Captain Cole.

A spokesman for the Museum said the Keystone reproduction project is feasible, depending on what parts have been found and their condition. He confirmed that no Keystone bombers are known to exist. "We don't know what eventually happened to the rest of them," the spokesman said of such other Keystone bombers as the LB-7s that visited Byrd Field.

"We think we've found all that we're going to find" of the four Langley planes known to have been at Barksdale, said Captain Cole. He said that the ordnance disposal teams and construction crews have orders to stop work if more items are found.

The site, which has not been used since the early 1950s, is on the east side of the 22,000-acre military base, which is located not far from Shreveport.

Site Is Littered

The searching isn't easy, Captain Cole said, since the site being cleared was littered with the remains of thirty years of target practice. He said ordnance found so far includes live bullets and unexploded practice bombs with 125-pound TNT charges. "We're pleased—and lucky—to have been able to recover what we have," he said.

The 20th Bomb Squadron, whose LB-7s were photographed by the late Anthony L. Dementi, still exists and is based at Carswell AFB, near Fort Worth, Tex.

Only one mystery remains. The reason for the modified Maltese cross underwing markings on the planes photographed by Mr. Dementi in 1930 is not known. Experts at the Eighth Air Force Museum at Barksdale and the National Air and Space Museum in Washington, D. C., speculate that the markings denoted the Keystone bombers' participation in war games that were staged along the East Coast at various times during the late 1920s and early 1930s. ■

Jon R. Donnelly is State Editor and aviation columnist for the Richmond News Leader, *Richmond, Va. Mr. Donnelly also serves AFA as a National Director. A journalist for twenty years, Mr. Donnelly has won numerous national, state, and local writing awards. His by-line last appeared in* Air Force *Magazine in October 1982 with the article "Guard's Up in Virginia."*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AFOSI Reserve Special Agents Lawrence Dempsey (left) and Larry Holtz practice firing technique with .45-caliber handguns during qualification training. (USAF photo by Mickey Sanborn)

Reservists as Blue-Suit Sleuths

Here, illustrating an application of the Total Force concept, is a rundown on how the Air Force Office of Special Investigations taps a special resource.

BY MAJ. STANLEY LEVINE, USAFR

FROM the Azores, information reached the Air Force Office of Special Investigations (AFOSI) that whale's teeth were being smuggled into the United States aboard military aircraft in violation of both US and international law. An expert undercover investigator with experience in smuggling cases was needed to crack the case.

At AFOSI Headquarters, Reserve Affairs Branch, Bolling AFB, D. C., exactly such an individual was identified: Special Agent (SA) Richard E. Hendrie, United States Customs Agent and a former pilot with 420 combat missions in Vietnam. Earlier in his career, Agent Hendrie had worked as a federal narcotics agent, with extensive undercover experience. More recently he was assigned to Vice President Bush's Special Narcotics Task Force operating in southern Florida.

An Elite Corps

He was the ideal man for a tough job. AFOSI was able to use his unique talents because he is one of 350 Reserve AFOSI special agents, an elite corps of hand-picked, specially trained military investigators.

On a cold winter evening at the Billeting Office at Malmstrom AFB, Mont., a robber suddenly appeared wearing a ski mask and brandishing a weapon. He stole $158 from the office. AFOSI Detachment 2006 was called in to investigate the crime, but the main suspect in the investigation had an alibi as to his whereabouts at the time of the crime. However, through the resources of Reserve Special Agent Bruce L. Hall, assigned to Detachment 2006, the suspect's alibi was disproved and the case was solved.

In civilian life, Agent Hall is a police lieutenant with the Police Department of Great Falls, Mont., and has served for the past twelve years in various investigative positions there. Through his many years of experience, he has developed his own network of sources, contacts, and informants to assist him in his civilian police work. One of these civilian sources provided critical information that completely disproved the subject's alibi, resulting in a confession and court-martial conviction.

Agent Hall's outstanding contributions have not gone unnoticed. He was named by the Reserve Officers Association as one of the AFOSI Mobilization Augmentees of the Year in both 1982 and 1983.

One might ask where AFOSI gets these and other experts. No, AFOSI doesn't contract for their services. They are among the 350 AFOSI Reservists who assist AFOSI in accomplishing its criminal and fraud investigative, coun-

terintelligence, antiterrorism, and protective-service missions.

Liaison a Bonus

AFOSI accrues an important advantage from its Reservists. The Reservists improve the liaison between AFOSI and the agencies in which they hold their civilian jobs. Because of the complexity of federal law, overlapping jurisdiction, and allocation of resources, AFOSI must work with many federal, state, and local agencies to get the job done. A lot of valuable time is saved when members of those agencies are AFOSI Reservists.

Not long ago, an Air Force NCO in Pennsylvania was accused of rape. The location was more than 200 miles from the nearest AFOSI office at McGuire AFB, N. J., which was using every available agent on another investigative operation. AFOSI District 4, at Andrews AFB, Md., contacted Reserve Special Agent James W. Grimes.

Agent Grimes is a federal investigator who lives in central Pennsylvania. He was on the scene in a matter of hours to investigate the alleged rape and report back to AFOSI. In situations such as this, the availability of trained and experienced AFOSI Reservists in remote locations not only provides immediate investigative support in out-of-the-way places but renders this assistance at great cost savings to the Air Force.

By the way, as a result of his work in the above-mentioned rape case and in many other investigations, Jim Grimes was recently promoted. In fact, officers in the AFOSI Reserve Program have enjoyed a ninety-five percent selection rate for promotion up to the rank of lieutenant colonel; AFOSI Reservists in the enlisted ranks have averaged a seventy percent selection rate for direct commissions under the Deserving Airman Commissioning Program.

Full Partners

Of course, it wasn't always this way. At one time, AFOSI Reservists were restricted in the type of activities and support they contributed to the mission. However, all this changed under the direction of Brig. Gen. Richard S. Beyea, Jr., the present AFOSI Commander, and his predecessors who made the Total Force a reality in AFOSI and made the AFOSI Reservists full partners with their active-duty counterparts.

About four years ago, SMSgt. Neal Ostroff, chief of AFOSI's Reserve Affairs Branch, with the help of Special Agent William T. Tucker, an AFOSI Reservist and computer expert, established a computerized data base and retrieval system to identify the unique skills, education, and civilian expertise of AFOSI's Reserve force, thereby enabling AFOSI to pick the best people for each particular mission.

The use of Reservists in AFOSI has expanded as mission requirements have increased in recent years. For example, increasing terrorist activity aimed at American military installations and people has severely taxed the available manpower in AFOSI's active-duty special-agent force. During 1982, twenty-five Reserve special agents trained in protective service operations were sent to Italy, West Germany, and Panama to help meet critical mission requirements.

Training and education requirements have also been revamped and upgraded. For example, all AFOSI Reserve special agents have been ordered to qualify quarterly with firearms rather than annually, which had been the policy for many years. Special weekend training seminars are offered at various AFOSI district headquarters and are run jointly by AFOSI Reserve and active-duty special agents. And with the increased training, new policies by AFOSI Headquarters permit Reservists to participate in all AFOSI missions and operations.

The System at Work

Another example of the system at work: When a fire at Eielson AFB, Alaska, completely destroyed an aircraft hangar at the base, AFOSI called upon the services of Special Agent Edward A. Lodwig, an AFOSI Reservist and the deputy fire marshal for the Anchorage Fire Department. His seventeen years of civilian expertise and experience as a fire inspector and arson investigator were needed. Agent Lodwig arrived the next day at the scene of the fire, sifted through ashes, analyzed the burn pattern, examined possible accelerants, and otherwise took charge of a complex arson investigation. On three separate occasions, Agent Lodwig traveled more than 500 miles to the crime scene in order to solve the case.

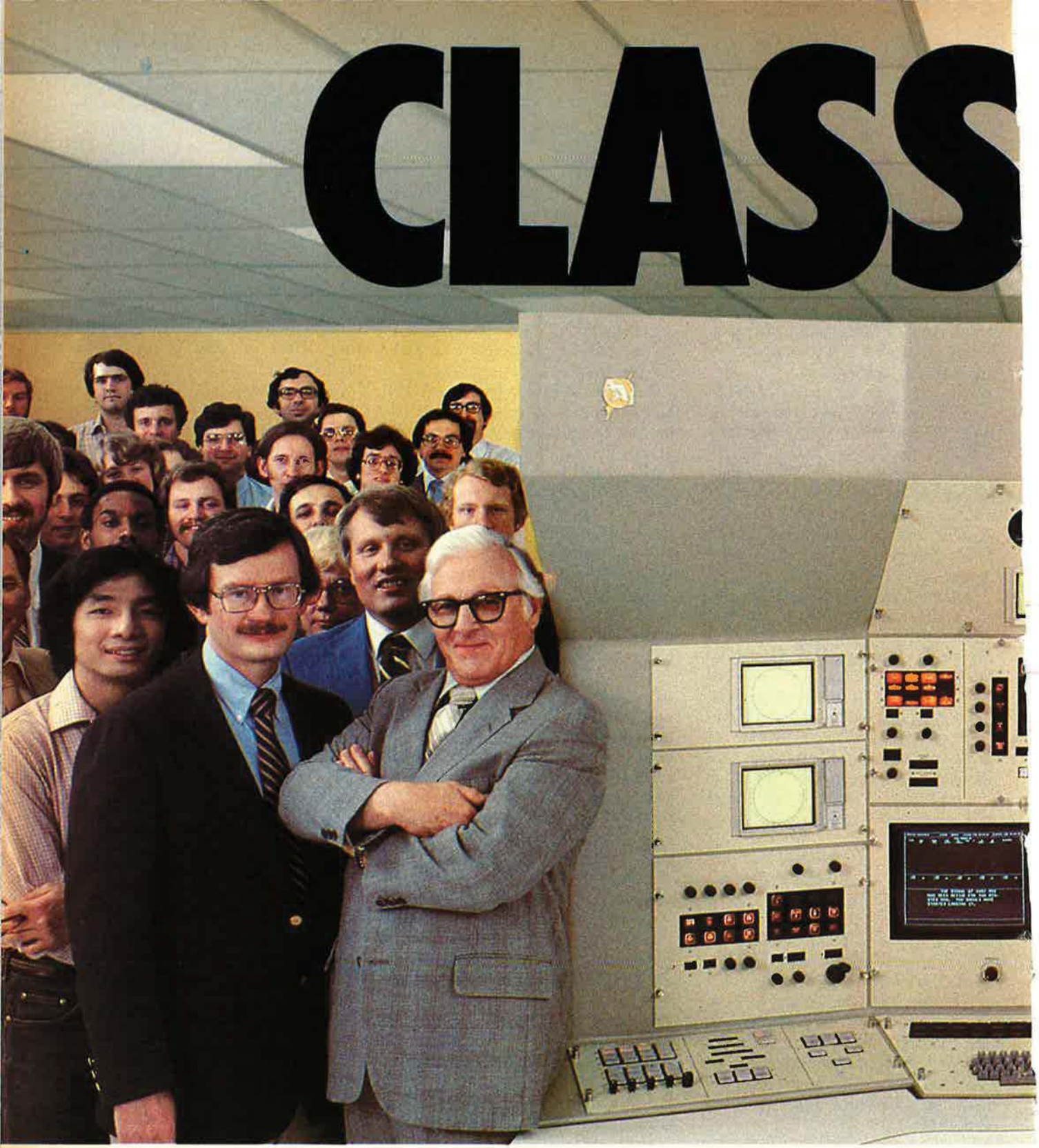
Similarly, when death threats and bomb scares were continuously telephoned to an Air Force Recruiting Office in New York, AFOSI called upon another of its Reserve special agents, an expert in this field. Special Agent Steve McDonald was asked to investigate the case because of his years of experience with the New York City Police Department. Agent McDonald is a police lieutenant and the commanding officer of the police department's Hoax Call Investigation Unit. He has investigated many telephone death threats to the mayor, governor, and even the President of the United States.

In California, another Reservist, Special Agent Paul Jubb, a certified public accountant, tax consultant, and computer consultant, was placed in charge of an extensive fraud investigation regarding defective work in the base housing at an Air Force base in California. As a result of his fraud investigation, almost $500,000 is being returned to the Air Force because of defective work by contractors.

And so it goes with AFOSI's dedicated Reservists. Selective recruitment, stringent training standards, and motivation for high levels of performance have made AFOSI's Reservists full partners with the active-duty force. In the face of the current world situation and ever-increasing mission requirements, the AFOSI Reservists stand together with the active-duty force as part of a team, fulfilling the promise of AFOSI's thirty-fifth anniversary motto: "1948—Thirty-five Years of Helping To Protect a Great Way of Life—1983." ■

Prior to joining the Office of Special Investigations as a Reservist in 1971, Maj. Stanley Levine served as an active-duty Air Force intelligence officer. He holds degrees from Brooklyn Law School and New York University. At present, Major Levine practices law privately and teaches business law in New York City. He has served as a Reservist at Hq. AFOSI in Washington, D. C., since 1974.

CLASS



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The Air Force Medical Service has good news to report on its thirty-fifth anniversary.

Medical Readiness Is Looking Up

BY MAJ. MICHAEL B. PERINI, USAF

TODAY'S Air Force Medical Service operates 120 hospitals and clinics and has more than 49,000 personnel, including physicians, dentists, nurses, and administrative, biomedical, and support people. All this requires an annual budget of $1.8 billion.

An Air Force survey of 78,000 patients in 110 medical facilities revealed that ninety-five percent were satisfied with the medical care they received in Air Force facilities.

To ensure that health care is the best, priorities have been established for the Air Force Medical Service by the Air Force's Surgeon General, Lt. Gen. Max Bralliar. These goals are reshaping the course of Air Force medicine.

This month, the Air Force Medical Service celebrates its thirty-fifth anniversary. AIR FORCE Magazine believes the time is right to review these priorities to find out what effect they have had on peacetime and wartime medical capabilities.

Sustained Medical Readiness

"Our most important priority is medical readiness," says General Bralliar. Yet, as recently as late 1981, the medical service was staffed, trained, and equipped to handle only a small percentage of the expected casualties of a European war.

General Bralliar says this fact has changed. "During the past two years our capability to treat battlefield casualties has increased dramatically."

There are several key reasons for the turnaround. Among them are the Four Echelons of Care System *(see* AIR FORCE *Magazine, October '83, p. 66)* and the establishment of such medical training programs as Self Aid and Buddy Care, Medical Red Flag, Battlefield Medicine and Battlefield Nursing Courses, revised Medical Disaster Training, and participation in the Triservice Combat Casualty Care Course.

Other actions will keep the momentum going. For example, expanded participation in major JCS training exercises, such as Reforger and Team Spirit, are now being planned.

Wartime casualties are expected to peak early in a war. This prospect, coupled with limited available airlift, has required an aggressive war reserve materiel (WRM) procurement program. "Medical resources must be in place where and when they are needed," General Bralliar says.

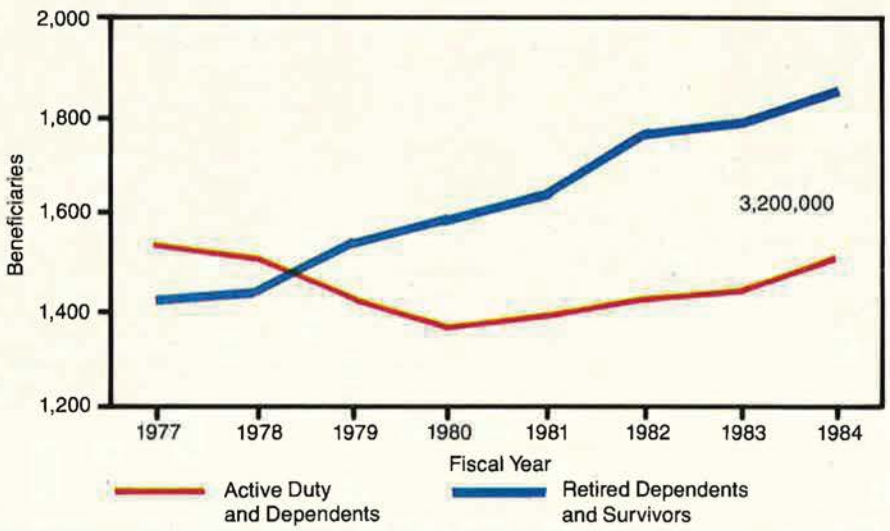
Four 500-bed hospitals are now being prepositioned in Europe: two for RAF Little Rissington, one at RAF Upwood, and one at Zweibrücken *Krankenhaus* (hospital).

This, however, is only the beginning. "We intend to have thirty-one 500-bed hospitals operating worldwide by the end of FY '91," General Bralliar notes.

Medical readiness is also measured by the number of physicians, nurses, and medical technicians. The Air Force Medical Service is currently authorized and staffed to fill sixty percent of wartime personnel requirements. Programmed manpower authorizations, if funded by Congress, will cover ninety percent of the estimated requirement by FY '89.

High Quality of Care

Medical care provided by the Air Force is at least "equal to or better than [that provided by] the civilian medical community," according to various Air Force and Department of Defense studies. This assessment is supported by the Joint Commission on Accreditation of Hospitals,



Continuing growth is projected in all categories of beneficiaries. This growth will necessitate ever-increasing direct-care and CHAMPUS budgets to meet the Air Force's legal responsibility for peacetime health care. Among the retired and survivor families will be increasing numbers of older patients who typically require more inpatient care, more intensive care, and longer periods of hospitalization than younger beneficiaries.

which is guided by national quality assessment standards.

Even so, effective Quality Assurance and Risk Management is an important priority. The Air Force Medical Service is now stressing more stringent quality force control and credentials based on performance. "We need to give more attention to eliminating bad performers," General Bralliar says.

Furthermore, each Air Force medical treatment facility currently has a quality assessment program designed to eliminate high-risk incidents, thereby improving total health-care service and patient safety.

These efforts are producing results. For instance, from FY '81 to FY '83 the number of medical malpractice claims declined from 287 to 262, medical Inspector General complaints decreased from 621 to 575, and medically related congressional inquiries dropped from 1,353 to only 1,175.

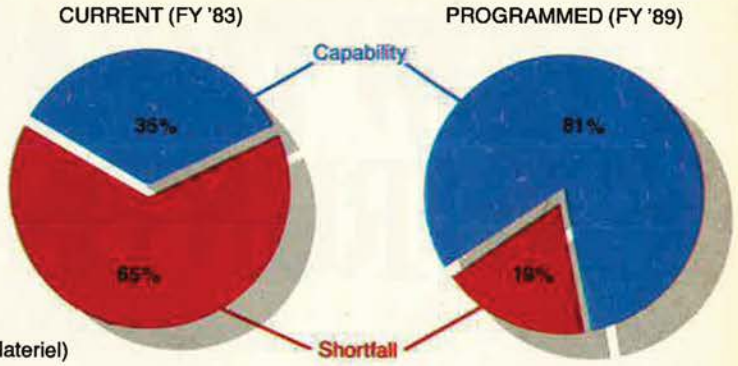
Increasing Accessibility and Expanding Services

Significant strides have been made in the past year to make more medical services available to more people than ever before. Twenty-one specialties at thirty-seven facilities were opened or reopened this past calendar year. These include openings in allergy, bone-marrow transplant, internal medicine, neurology, orthopedics, urology, and obstetrics and gynecology. Also, clinic operating hours have been extended and appointment systems enhanced at many facilities.

Air Force Medical Service officials note that general surgical services have been expanded at twenty-six locations. And where necessary, contracting of civilian physician specialists has been initiated to provide care for beneficiaries in many Air Force facilities.

An impediment to accessibility of care has been the size of facilities. In 1982, an amendment to Title 10 of the US Code was signed into law. "We can now size facilities based on the retiree and dependent population if we can prove that it will be cost-effective," General Bralliar says. Economic analyses are in progress or have been completed recently at Davis-Monthan AFB, Ariz., Malmstrom AFB, Mont., Patrick AFB, Fla., and Kirtland AFB, N. M.

Medical Readiness Capability



One measure of medical readiness is war reserve materiel (WRM) status. This chart depicts the WRM capability and shortfall for FY '83 and FY '89.

Upward Trends in Productivity

The work load is increasing in Air Force medical facilities. Births in 1983 were up by almost ten percent over 1982. Clinic visits were up by seven percent, and admissions increased by six percent. "We are setting realistic productivity goals and seeing results. I expect the trend to continue," General Bralliar says.

Productivity increases are partly due to efforts to reduce the amount of care that must be purchased from civilian providers by expanding clinical services. Referrals to CHAMPUS, for instance, have been reduced by twenty-seven percent.

Fortunately, medical staffing is at ninety-eight percent. Air Force Medical Service officials project physician staffing will be at 100 percent of authorizations by the end of October 1984. "We will, however, continue to experience problems in a mix of physician specialties, such as orthopedic surgery, general surgery, and anesthesiology," General Bralliar says.

Care With Compassion

The Air Force Medical Service provides care to 3,200,000 people—active duty, retirees, and dependents. More than seventy percent of Medical Service patients are dependents and retirees.

"We have the technology to do miraculous things. But there is one vital component that cannot be overlooked. That is delivery of compassionate care," General Bralliar emphasizes.

At some Air Force medical facilities, for example, there are groups that provide assistance to cancer patients and their families. The Oncology Support Group at March AFB, Calif., helps people cope with terminal illness and holds seminars concerning death and dying for hospital staff members to sensitize them to the needs of families and patients.

In summary, progress is being made in each of the priorities for the Air Force Medical Service. "We have made great strides in a relatively short time in providing the Air Force family with comprehensive, quality health care. True, there are those still out there who will joust with our health-care system, but we're prepared to defend our programs and priorities. The well-being of our people demands nothing less," General Bralliar says. ■

Maj. Michael B. Perini is Deputy Chief of the Operational Forces Branch in the Secretary of the Air Force's Office of Public Affairs. An Education With Industry officer with AIR FORCE *Magazine in 1982–83, Major Perini holds a bachelor's in social studies from Washington State University and a master's in social studies/education from the University of Southern Mississippi. He served as Chief of the Public Affairs Division of the 1st Tactical Fighter Wing at Langley AFB, Va., prior to his tour as an EWI student, and has also served as a public affairs officer at Hill AFB, Utah, and Keesler AFB, Miss. He joined the Air Force in 1972 after receiving his commission through the AFROTC program.*

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The criticism of military benefits and entitlements continues, but the outlook is less gloomy than it might seem.

In Prospect for People

BY BENJAMIN S. CATLIN
AFA ASSISTANT EXECUTIVE DIRECTOR FOR DEFENSE MANPOWER AND RESERVE AFFAIRS

MILITARY "people" programs have been under substantial assault for the past year, with calls for cutbacks being heard from critics of all varieties: elected, appointed, journalistic, and private.

The retirement system, commissaries, and medical care have been subject to intense criticism. For instance, there is still a proposal afloat to tax the Basic Allowance for Quarters (BAQ) to the extent that recipients apply it to tax-deductible interest on a home mortgage.

The fact that this is an election year is part of it, with the economy on the minds of both voters and candidates. Another factor is last year's report by the President's Private Sector Survey group—the Grace Commission. The report made grandiose claims for possible savings in the federal budget. Many of the proposals of that task force have since been refuted as unworkable, unwise, or just plain wrong-headed, but the report is still being quoted loudly and often along the banks of the Potomac.

A careful analysis of the situation on people programs, however, indicates a less gloomy outlook than the headlines might suggest. In fact, many of the trends actually look *good*.

There has been significant progress for Air Force people programs in the past five years. With a few more gains and some of the wilder proposals of the critics held in check, personnel programs will be in the best shape ever.

In 1979, military pay and compensation were completely out of line with the civilian sector. But military compensation has been raised by almost thirty percent since then and is now approaching comparability with the civilian sector.

Success in Recruiting and Retention

For the fourth straight year, the Air Force has achieved 100 percent of its prior-service and nonprior-service recruiting goals. The percentage of nonprior-service accessions with high-school diplomas increased from ninety-four percent in 1983 to ninety-eight percent last year; this high level has been maintained during the first quarter of 1984.

Officer recruiting has also been excellent. However, the Air Force expects that it will continue to experience shortages in such critical skill areas as pilots, navigators, electrical and aeronautical engineers, and physicians.

For the third consecutive year last year, Air Force retention rates improved across the board. First-term reenlistments were up nine percentage points to sixty-six percent (it was thirty-eight percent in 1979), and career reenlistments rose from ninety percent to ninety-two percent (this rate was only sixty percent in 1979). However, major shortages continue to exist in the noncommissioned (NCO) supervisory grades of E-5 through E-7, even though total manning is at authorized levels.

The continuation rate for pilots with six to eleven years of service was up to seventy-eight percent. For navigators this rate was up to seventy-six percent, and for nonrated officers it was up to sixty-three percent.

On the other hand, the Air Force can expect to see a decline in enlistment and reenlistment rates as the economy continues to recover and as competition increases for the declining number of high-school graduates in the private sector. The problem will become more acute in the future as the population of eighteen- to twenty-five-year-olds drops.

Pay and Bonuses

In 1972, military pay levels were comparable to those in the private sector, but by 1979 they were trailing by 7.8 percent. The Air Force experienced a major hemorrhage of talent during those years. FY '80 and FY '81 saw major increases in pay (11.7 percent and 14.3 percent, respectively), and recruiting picked up again. Military pay increases were limited to four percent in both 1983 and 1984. For FY '85, the Administration is asking for a 5.5 percent pay raise. The House Armed Services Committee (HASC) recommended 3.5 percent instead.

OUTLOOK: In a budget-crunch year such as this, a 3.5 percent pay raise is about all the military can expect. This should be regarded as something of a victory. A pay freeze was distinctly possible, considering the kind of year this is shaping up to be.

The Selective Reenlistment Bonus (SRB) is used to

increase the number of Air Force personnel in critical skills and to encourage others to cross-train into these skills. The Enlistment Bonus (EB) is an incentive given to those with high aptitude scores who enlist and to people entering difficult-to-recruit or hazardous-skill areas. It is also given to encourage members to complete the training required for these difficult or hazardous skills. The authority for these bonuses expires on September 30, 1984.

OUTLOOK: The HASC recommended the extension of these bonuses for five years. The Senate has not yet acted, but will probably agree to extend them, although perhaps not for five years.

Retirement

A major factor in the recruiting of high-quality personnel and in the retention of these personnel is the current retirement system, which provides for retirement after twenty years of service.

The fundamental purpose of the military retirement system is to ensure a ready force. It is *not* an "old age pension." It is designed to encourage the right people to remain in the service for a career. It also ensures that a large standing pool of skilled and experienced people will be available for recall to fill wartime requirements. In these respects, it is not comparable to a civilian pension system.

This retirement system provides the foundation, in part, to offset the extraordinary demands of a military career. Surveys of Air Force members consistently show that the retirement program is the *number-one factor* in the career decisions of both NCOs and officers. Unlike most civilian retirement systems, the military system does not provide for vesting or cash value short of retirement. A member must serve at least twenty years to receive any benefit from the system.

The Grace Commission recommended radical changes in the retirement system *(see "What the Task Force Forgot," December '83 issue).* The Department of Defense, drawing on options served up by the Fifth Quadrennial Review of Military Compensation (QRMC), came up with a less radical set of counterproposals. These latter recommendations were opposed unanimously by the Joint Chiefs of Staff, and the President sent the whole matter back to the Pentagon for further examination. He recommended no change to the military retirement system this year—but another DoD report is due to the White House by the end of the year.

Meanwhile, the critics—including some influential members of Congress—keep pinging away. Their major complaint is the option for military people to retire at twenty years. Examples are often cited of military members who receive retired pay for twice as long as they served on active duty. Some other countries also offer twenty-year retirement to their military forces, but the critics retort that most also have a minimum age requirement as well. For example, under many foreign retirement systems, a member can take twenty-year retirement only when he is fifty years old or older.

The services and the military associations, including AFA, have had the opportunity to present the other side of the story in congressional hearings, but the issue isn't settled yet.

OUTLOOK: While the House Armed Services Subcommittee on Military Personnel and Compensation has held hearings on this subject, it has not yet issued a report, and there were no recommendations for changes in the FY '85 DoD Authorization bill. The Senate Armed Services Committee (SASC) has not yet completed action on their Authorization bill. With the President's recommendation to maintain the present system unchanged, there will probably be no change in military retirement this year—but next year will bring major battles.

Delay for COLA

After a delay of almost six months, the Senate finally acted on the Fiscal 1984 Budget Reconciliation Act, which delays the Cost of Living Adjustment (COLA) from May 1, 1984, to January of 1985 and changes the period for which COLA is computed. The new COLA will be computed on the percentage change in the Consumer Price Index (CPI) between the third quarter of 1983 (July–September) and the same period in 1984. Military and Civil Service retirees under age sixty-two will continue to receive one-half the COLA, but the act does not make this change permanent.

Legislative Trends for People Programs

Pay Raise	+	Yes, between 3.5 and 5.5 percent
Retirement Changes	±	Next year—maybe
COLA	–	Half-COLA through FY '87
Health Care	+	Better physician retention
CHAMPUS	+	Emphasis on cost containment
Commissaries	+	Congressional support
Retention	+	Air Force doing well
Recruiting	+	Watch this upturn in economy
Air Force Families	+	Some setbacks but congressional support
Increased PCS Pay	–	Not this year
Temporary Lodging Expenses	–	Not this year
GI Bill	–	Perhaps next year
End Strength	–	Only 7,000–8,500 increase

The House Reconciliation bill, also passed this spring, addresses half-COLA as well. In that resolution there is a provision to extend half-COLA through 1987 for retirees under age sixty-two. Meanwhile, the Senate has remained silent on half-COLA in both their deficit-reduction package and their first Concurrent Budget Resolution. These provisions are still subject to full House and Senate reconciliation.

Half-COLA applies to both Civil Service and military retirees, but since nine out of ten federal annuitants under the age of sixty-two are military retirees, it is obvious where the brunt of the impact will fall.

OUTLOOK: Further changes this year are unlikely, but look next year for more attempts to make permanent

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The antenna on the AMRAAM missile slews to such high angles that it can track enemy aircraft attempting evasive maneuvers at high g forces. AMRAAM uses the launching aircraft's radar for initial guidance and midcourse reference. A small antenna mounted in the missile's tail section receives data and relays the information by cable to the inertial reference unit. The signals are processed and maneuvering commands are sent to four flight control fins. For terminal guidance, AMRAAM's own radar system takes over. The 4.5-inch gimballed microwave antenna in the nosecone transmits and receives signals as it closes in on the target. The Advanced Medium-Range Air-to-Air Missile is in full-scale engineering development at Hughes Aircraft Company for the U.S. Air Force and Navy.

To reduce contamination from airborne particles, and thus prevent problems with the sensitive gimbal assembly in the Infrared Maverick missile, Hughes has built an environmentally controlled production line in Tucson, Arizona. Laminar flow units were installed to filter air along the walls, floor, and ceiling—removing 99% of all particles as small as 0.5 microns in size. In addition, breathable vinyl-covered chairs replaced dust-generating fabric chairs; walls and ceilings were treated with vinyl; and wire storage racks were introduced to deter particles from settling. Since the new environment was created, particle counts dropped from 300 per cubic foot to 100 per cubic foot. Rework was reduced and reliability improved. Hughes builds IR Maverick for the U.S. Air Force.

An advanced military communications satellite network will let U.S. bombers and airborne command posts remain in continuous contact with designated ground and naval stations anywhere in the world. The new MILSTAR network will consist of satellites in various orbits and hundreds of terminals aboard aircraft, ships, submarines, and in ground units and command centers. Hughes is designing survivable, secure, and jam-resistant terminals for B-1 and B-52 bombers, E-3A Airborne Warning and Control System (AWACS) early-warning aircraft, E4 command post aircraft, VC-137 "Air Force 1," and other aircraft involved in the Air Force portion of the joint services network.

Extremely sensitive high-speed photodetectors, key components in microwave fiber-optic communications links, have been fabricated by Hughes research scientists. The devices are gallium arsenide Schottky barrier type photodetectors. They have demonstrated a flat frequency response to at least 20 GHz and have the potential to approach millimeter wavelengths. They also have quantum efficiencies as high as 70%, roughly a 2 to 5 db improvement over existing high-speed detectors.

Norway will improve its air defense with 18 mobile radars and accompanying fire distribution centers. Each new Acquistion Radar and Control System (ARCS) will replace three radars and multiple control centers required by a standard Improved-Hawk missile battery. The system incorporates the Low Altitude Surveillance Radar built by Hughes and displays built by Kongsberg Vaapenfabrikk of Norway. The radar radiates pencil-thin beams at multiple frequencies, which are able to automatically detect and track low-level threats, including helicopters and high-performance aircraft. ARCS provides significantly improved performance through severe clutter and electronic countermeasures. It can be moved to rugged locations and set up in minutes. The ARCS Adapted-Hawk, which substantially lowers logistics and maintenance costs, is controlled by two operators.

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the half-COLA. The changes in the CPI, though, will probably be the same for all retirees—military, Civil Service, and Social Security.

PCS Funding

A major factor adversely affecting retention in the Air Force is inadequate payment to Air Force members for the unavoidable costs they incur each time they are transferred. What was once a routine event has become a major career decision because of the increase in out-of-pocket expenses incurred by Air Force members as a result of these moves. A recent survey of Air Force personnel found that nearly one out of four retirement-eligible USAF members would choose retirement rather than face another PCS.

In 1983, an Air Force survey revealed that unreimbursed PCS expenses averaged $1,510 for mid-grade NCOs, $1,969 for junior officers, $2,395 for senior NCOs, and $3,258 for senior officers. *More than half* of all Air Force members transferred had to borrow or withdraw from their savings to meet these routine PCS expenses, the survey said.

In an effort to reduce this burden on its people, the Air Force has reduced the number of permanent changes of station by fifty-nine percent since 1974. Over this same period of time, the interval between moves has doubled.

In its original FY '85 Budget submission, the Air Force requested an increase in the PCS mileage allowance from thirteen cents to fifteen cents a mile. While this would not cover the entire shortfall, it would at least bring the mileage allowance up to the same level as that approved in 1982 for the Civil Service. The Air Force also requested an increase in household goods weight allowance for senior NCOs and officers and sought funding for the previously authorized four-day CONUS Temporary Lodging Entitlement (TLE).

OUTLOOK: Nothing this year. The House Armed Services Committee did not approve any of these items. Later, in the President's revised budget, the Air Force withdrew its request for these funds.

VHA and Health Care

The Variable Housing Allowance was authorized by Congress in 1980. Its purpose was to help military personnel pay for housing in high-cost areas of the continental United States. During FYs '83 and '84, Congress placed a cap on a member's total housing allowance (VHA and BAQ) to reduce the cost of the program. This cap limits the total housing allowance to $800 per month for members with dependents and to $600 per month for members without dependents.

Congress insists that the original intent of the VHA program was for it to apply only to high-cost-of-living areas, and notes that it has been expanded to cover every city in the US except for one town in New Mexico. As a result, the cost of the program has skyrocketed, from about $350 million in 1980 to $1.2 billion in 1983.

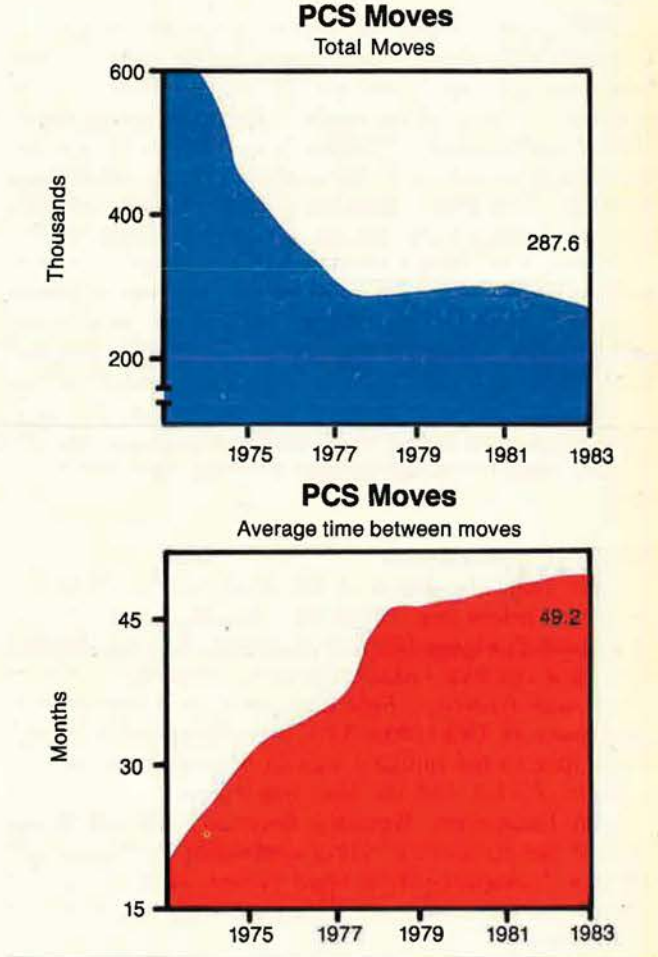
OUTLOOK: Don't look for any increase in VHA this year. There may even be some attempts to limit VHA to high-cost areas or to reduce the number of personnel eligible to receive it.

Health care has traditionally ranked high in importance to military people. The Air Force is trying to increase the number of physicians and support staff, but reductions in end strength and construction funds could delay some of the planned improvements to the health-care package.

The major concern for the CHAMPUS program is one of controlling costs. Among the best ways to accomplish that is to encourage more people to use military medical facilities instead of civilian doctors and hospitals. Using this approach, cost growth was successfully contained in FY 1983. However, in FY '85, the increase in private-sector medical costs is expected to drive up the cost of CHAMPUS by at least ten percent.

OUTLOOK: More patients treated in military medical facilities with emphasis on developing ways to further restrict the issuance of nonavailability certificates.

Some ideas keep coming back no matter how often they are shown to be unworkable. This seems to be true of the "user fee" (which is a proposal to charge military dependents and retirees a $10 fee each time they use a military medical facility).



Last year the Senate Appropriations Committee considered this idea and rejected it after testimony showed that no savings would result. Now the Congressional Budget Office (CBO) is back with another suggestion for the "possible" dollar savings that could be realized by a user fee.

OUTLOOK: This item has superficial appeal and keeps surfacing in Congress. It probably won't get through this year. But, like the proverbial bad penny, it could be back next year.

Commissaries Continue

After the Grace Commission recommended closing all US commissaries or privatizing them (turning management over to the private sector) for a savings of $320 million to $600 million annually, Congress, for the first time in years, held hearings devoted expressly to reviewing the military commissary operation.

Like other critics of the commissaries, the Grace Commission argued that commissaries no longer function in the way Congress intended them to when they were established in 1866—that is, to provide foodstuffs and supplies to "troops stationed at remote outposts" where there was little access to markets. In addition, the Commission contended that commissary privileges are merely an "implied entitlement" and not a benefit guaranteed by law.

However, many congressmen believe that closing commissaries would have such a negative impact on recruiting and retention that the consequences would ultimately negate the savings projected by the Commission.

OUTLOOK: The HASC has reaffirmed its belief that commissaries are a "key element in the military compensation package" and are "critical, not only to recruiting . . . but, more importantly, to retaining highly skilled professionals." Senate Armed Services Committee members have also disputed the Grace Commission findings. This bodes well for continuation of the commissary system as is, but the HASC has asked DoD to discontinue off-base advertising and to conduct an independent study of commissary pricing systems to ensure that savings to patrons are actually what commissary officials claim them to be—twenty to twenty-five percent below private-sector prices. Industrial representatives testified that they believe the in-house evaluations conducted within the commissary system are "too biased" and that actual savings are only eight percent or less.

Tax-Free Allowances

Last year, the Internal Revenue Service floated a proposed ruling that would have disallowed any portion of a home mortgage interest deduction that was attributable to a tax-free military housing allowance. *(See "A Grotesque Notion," February '84 issue.)* This was an outgrowth of IRS ruling 83-3, which applied to clergy. Reference to the military was eliminated from the final version of 83-3, but the idea lingers on.

Last December, Treasury Secretary Donald Regan agreed not to issue a ruling applicable to the military until a "comprehensive legal review of the issue" is completed—meaning no action until tax year 1985, at the earliest.

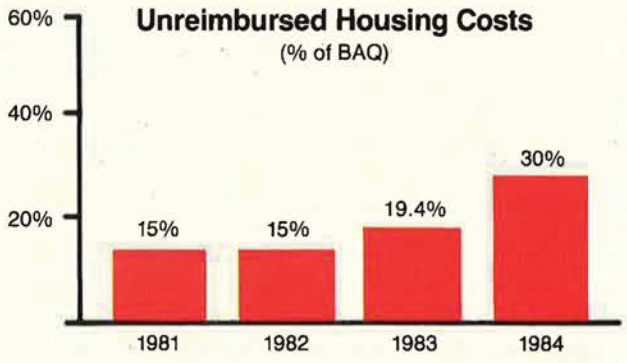
Meanwhile, legislation to exempt the military permanently from such a ruling has been stymied. Congressman Stan Parris (R-Va.) and Senators John Warner (R-Va.) and Jesse Helms (R-N. C.) have each introduced legislation to preserve the deductions permanently for the military. Representative Parris tried twice to get his bill attached to House tax legislation as an amendment, but was unable to do so.

Sen. Robert Dole (R-Kan.), however, inserted as part of his amendment to the Senate deficit-reduction package a provision delaying the implementation of 83-3 to tax year 1986 and, as a result of a compromise with Senators Warner and Helms, delaying implementation of any ruling concerning the military until 1986. This deficit-reduction package passed on May 16 and now goes to a conference with the House.

OUTLOOK: As part of the compromise, Senator Dole has agreed to hold joint hearings on the Warner bill for a permanent military exemption. That bill already has the cosponsorship of SASC Chairman John Tower (R-Tex.) and prominent SASC members Roger Jepsen (R-Iowa), Strom Thurmond (R-S. C.), Barry Goldwater (R-Ariz.), and Paul Trible (R-Va.). The IRS is not expected to release any information on its legal review until late this year, but has been asked to comment on the Warner bill during the hearings process.

Air Force Families

The Air Force recognizes that the attitudes of family members are major factors in a member's career decisions and productivity. One of the efforts to care for the needs of Air Force families has been the establishment of base Family Support Centers. These Centers provide aid for families in crisis situations, support during family separations, spouse employment information, and help in PCS reassignments.



The Air Force planned to have forty-three centers in operation by the end of FY '85.

OUTLOOK: There is significant congressional support for USAF family programs. But reduction in funds associated with the President's revised budget for FY '85 has delayed construction of four family centers this year. USAF may encounter more delays next year.

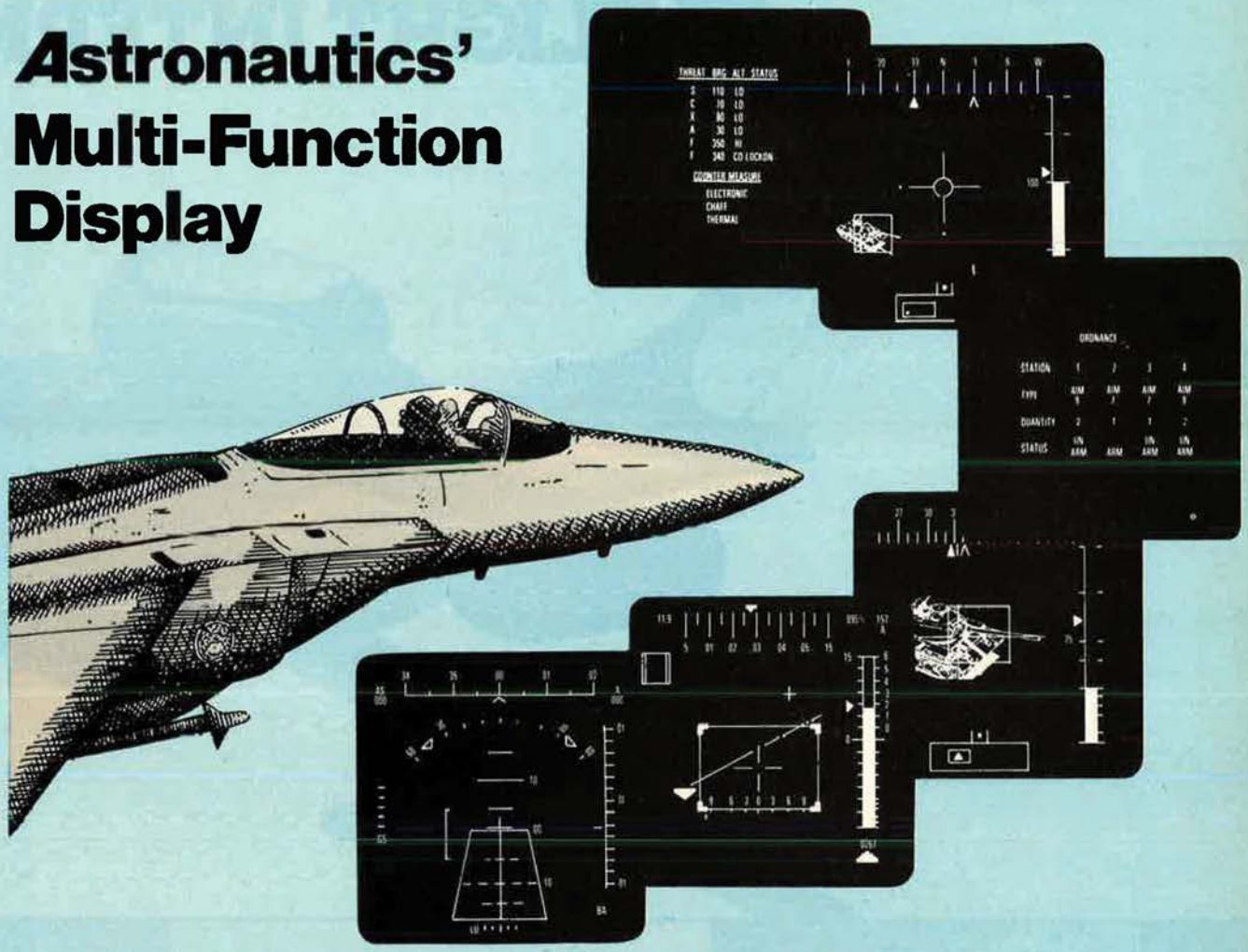
Civilian Employees

Air Force civilian personnel account for almost twenty percent of Air Force strength and perform a broad range of duties. The Office of Personnel Management is designing a new Civil Service pension system to supplement the Social Security coverage that began for new employees on January 1, 1984.

The Air Force has long supported the principle of pay comparability for civilian employees, and has urged Congress to enact legislation that would eliminate the present disparity between Civil Service and private-sector pay. Resolution of this disparity would be particularly significant for blue-collar workers.

OUTLOOK: Not much will happen on the retirement package in an election year. A pay raise of 3.5 percent coming in January of 1985 is likely. ■

Astronautics' Multi-Function Display



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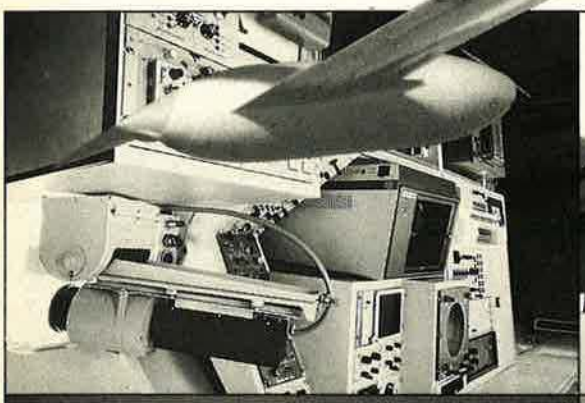

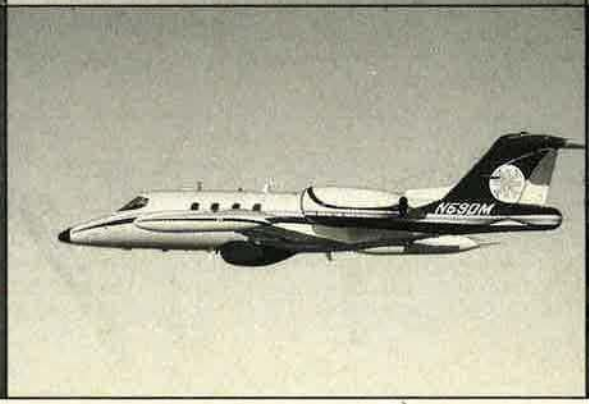

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Seven Come Eleven

In the March "Valor," Bill Shomo was credited with being the only American to score seven victories in one mission. A sharp-eyed reader has named another who matched that feat.

BY JOHN L. FRISBEE

On September 3, 1943, as the Allied invasion of Italy got under way, the Italians threw in the towel. Even so, there were to be many months of fighting before German troops were driven out of the peninsula in a bloody campaign that absorbed virtually all Allied military power in the Mediterranean.

While granting that Italy had first priority in the Med, Winston Churchill also had his eye on another prize—the Greek Dodecanese Islands lying off the southwest coast of Turkey in the Aegean Sea. They were garrisoned largely by Italian troops who, Churchill judged, would cooperate if the islands could be seized before the Germans took over. Capturing the islands, he thought, might bring neutral Turkey into the Alliance and open the Dardanelles and Bosporus as a short supply route to beleaguered Russia. But Allied forces in the eastern Med had been stripped to support the Italian campaign and to prepare for the Normandy invasion. About all that was left was a Royal Navy squadron of a dozen ships and a few RAF aircraft.

Churchill's plea for a minor diversion from Italy fell on nearly deaf American ears. Finally, General Eisenhower agreed to send some long-range P-38 fighters and a few cannon-carrying B-25s to help out. The 14th Fighter Group was moved from its base in Tunisia to Gambut 2, an RAF strip of sand near Tobruk, a few miles west of the Egyptian border. From that desert paradise they were to escort Royal Navy ships and to attack German convoys headed for the Greek islands.

The group's 37th Squadron was commanded by Maj. William L. Leverette, who had arrived in North Africa late in August. Bill Leverette was not your average replacement. He had spent two years teaching fighter tactics in the States, had more than 1,000 hours in fighters, and was no stranger to the gunnery range.

On October 9, Major Leverette led seven P-38s on a mission to protect Royal Navy warships near the island of Rhodes. As they reached the ships, a formation of some thirty Ju-87 Stuka dive bombers was sighted approaching from the west. Leverette dispatched one flight of three P-38s to fly top cover while his flight closed with the Stukas.

The Stuka was not a particularly nimble aircraft, but it wasn't to be approached casually, either, especially when encountered in wholesale lots. In addition to wing-mounted guns, it carried a rear gunner manning a flexible machine gun. And with so few hunters (Leverette's wingman was a new, nervous, slightly trigger-happy lad) attacking so many targets, conserving ammunition was the key: "Get in close and make every round count." What happened in the next few minutes is best described by Bill Leverette himself in this debriefing account:

"We peeled off into the middle of them, and I got two almost before they knew we were there. The gunner in the first started to fire, but stopped as soon as I let go. We came back behind them again, and I got on the tail of another. His gunner stopped firing as soon as I opened up, and the pilot bailed out. My fourth was a thirty-degree deflection shot from 200 yards. Then I gave a lone plane a burst of cannon and machine-gun fire from a twenty-degree deflection. That finished him.

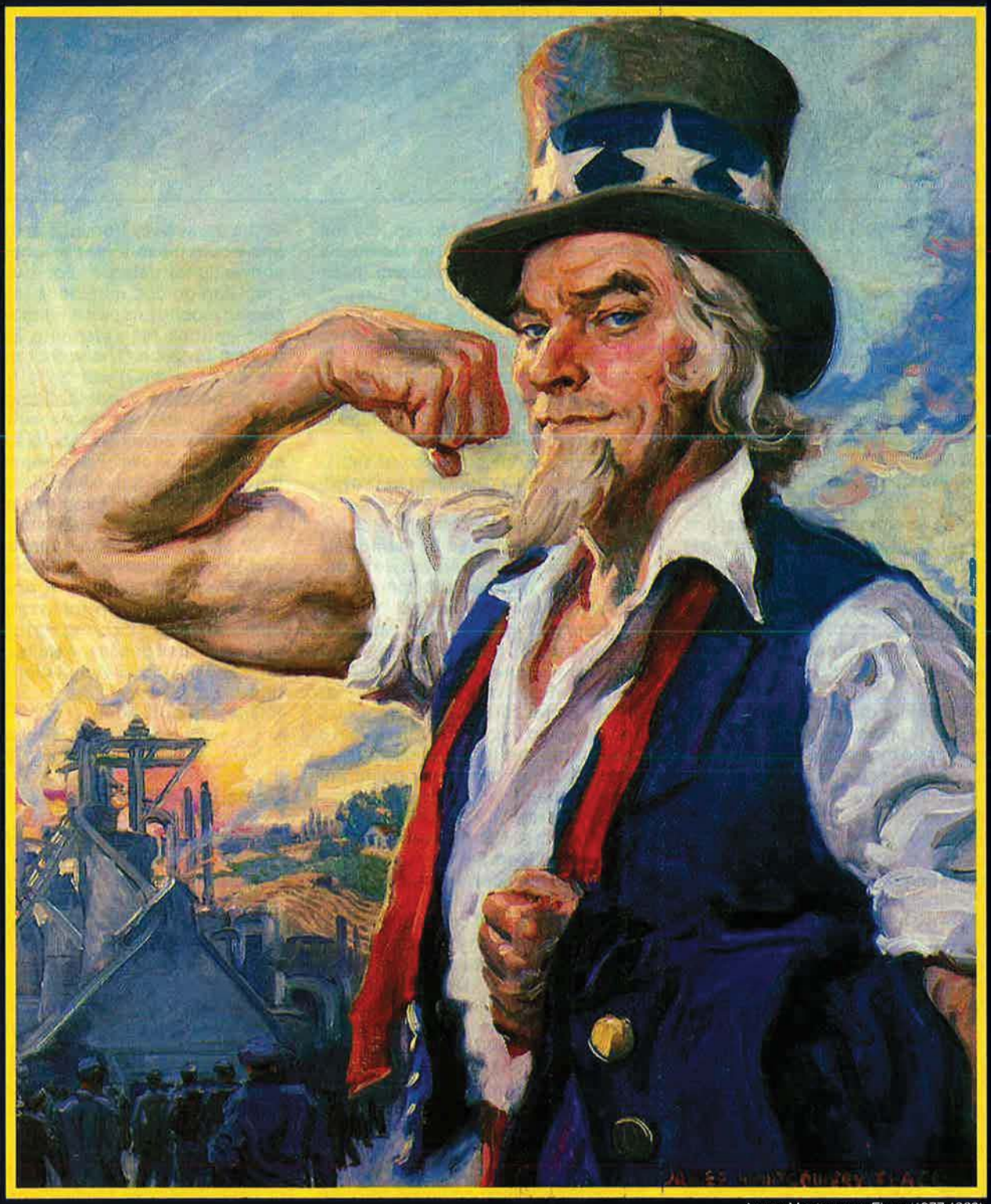
"I came in directly behind the sixth. His gunner opened up before I did, but I got him with my first shots. The plane nosed down a little, and I gave him a burst in the belly. I was closing fast and had started to go under him when he nosed almost straight down, his propeller shot off. I tried to dive under him, but didn't quite make it. My left prop cut two feet into his fuselage as he went down. My last hit was the best. I was closing on him from the right when he turned into me. I rolled into a steep bank to the left and got him while firing from an almost-inverted position."

While all this was going on, the leader of Leverette's second element downed five Stukas, and his wingman got three. After disposing of a Ju-88 that was escorting the dive bombers, the top-cover flight came down to drop another Stuka. A few got through to make their bomb runs; the rest either jettisoned, headed for home, or ended up in the sea.

For his combat leadership and individual performance, Bill Leverette was awarded the Distinguished Service Cross, this nation's second highest award for valor. But his combat career didn't stop there. The group soon returned to the Italian campaign where Leverette downed two Me-109s and two Me-110s for a total of eleven victories, ending his war as one of the top twenty aces in the Mediterranean theater. ■

Bill Leverette stands proudly beside the P-38 Lightning he was flying on October 9, 1943, the day he shot down seven German Stukas on a single mission.

It's time to build a stronger America.



James Montgomery Flagg (1877-1960)

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Examining the Nuclear Dilemma

Weapons and Hope, by Freeman Dyson. Harper & Row, New York, N. Y., 1984. 340 pages with index and bibliography. $17.95.

This latest offering in the recent onslaught of books seeking a solution to the nuclear dilemma comes from an ideologue searching for a nonnuclear world. Author Freeman Dyson, a scientist who also wrote *Disturbing the Universe,* examines the historical and cultural contexts in which nuclear weapons evolved and looks for practical answers to the problems posed by nuclear weapons. As part of his search, the author debates the strengths and weaknesses of various strategies for US national defense policy.

The book is divided into four sections, the first three of which could be passed over by a reader with little interest in the technical and historical background from which today's nuclear weapons have grown. Dyson admits to a somewhat disjointed format since the chapters do not represent links in the chain of an argument.

The final section, the heart of the book, is a philosophical groping for a coherent concept for national defense. The author views the problem of finding a way to safer ground as the central issue of our time. To this end, he examines seven strategic concepts upon which a "rebirth of hope" can be based.

The concepts of assured destruction, limited nuclear war, counterforce, and unlimited defense are rejected in short order as immoral, unstable in a crisis, and ultimately suicidal. The time-proven policy of deterrence, which has prevented a nuclear holocaust as well as another conventional world war, is flatly rejected because of what the author perceives as basic weaknesses—a reliance on rational behavior and incompatibility with Soviet policy.

Two of the remaining concepts—nonviolent and nonnuclear resistance—represent unilateral disarmament and are viewed favorably by the author. Some astounding assertions are made regarding unilateral disarmament and the ineffectiveness of nuclear blackmail. The author would ideally choose nonnuclear resistance as a strategy and would accept the risk of leaving the Soviet Union with nuclear weapons despite his acknowledgment of possible increased Soviet expansionism.

The virtues of nonnuclear resistance are naïvely promoted as providing a "basis for a stable balance of power." Mr. Dyson believes that the risk of being destroyed by the Soviets is the same with or without a US nuclear force. There is little comfort for his readers in the claim that "we can be destroyed with nuclear weapons but we cannot be conquered. . . . If Soviet leaders were contemplating a nuclear attack upon a nonnuclear United States, they would recognize that we would in the long run remain a formidable political and military power and that our power could not be permanently suppressed."

Such naïveté is surpassed only by his belief that US nuclear disarmament would lead the Soviets to look upon their nuclear weapons as obsolete.

The author's final concept is a middle ground between nuclear war and unilateral disarmament that he labels "live and let live." Dyson perceives this strategy as the most attainable way to rid the world of nuclear weapons. It is, he believes, a reason to hope. The author redeems himself somewhat with his "live-and-let-live" policy, which he sees as satisfying the demands of military realism and human decency.

"Live and let live" is defined as nonnuclear resistance achieved through negotiation instead of unilateral action. This concept views nuclear weapons only as bargaining chips to be negotiated away while retaining a measure of parity with the Soviets. Oddly, the author believes that the US need not "insist on any elaborate technical definition of the meaning of parity." Such a trusting attitude reflects little concern for stability.

The move away from nuclear weapons would mean a new emphasis on conventional defense. For example, precision-guided munitions and dispersed mobile forces are cited as realistic options for defending Europe against invasion. The author sees in his policy a rebirth of hope for the future because it would change our underlying strategy from assured destruction of Soviet society to assured survival of our own. He is hopeful for the future and actually believes the US and the Soviet Union can negotiate away all nuclear weapons.

Mr. Dyson summarizes that a "live-and-let-live" strategy is "not an escape from the dilemma. It does not abolish the danger. It promises only to diminish danger by bringing together in the cause of peace the skills of warriors and the moral indignation of victims."

One can only hope.

—Reviewed by Kathleen McAuliffe, Contributing Editor.

Crisis in Central America

Rift and Revolution: The Central American Imbroglio, edited by Howard J. Wiarda. American Enterprise Institute for Public Policy Research, 1984. 392 pages with index. $19.95 hardcover; $10.95 softcover.

Why are many Central American governments unstable? The complex answers to that question are addressed in this book edited by Howard J. Wiarda, Director of the American Enterprise Institute's Center for Hemispheric Studies.

In all, there are twelve essays on the region by thirteen authors, scholars in Latin American studies who have direct research experience in the area. Most of them have testified before the National Bipartisan Commission on Central America, perhaps better known as the Kissinger Commission.

The editor states that the purpose of this book is "to fill a severe information and understanding gap with regard to Central America by offering a

collection of stimulating readings, and to reserve detailed policy prescriptions for other forums." He does issue a caveat regarding this by noting that a few of the authors, notably Jiri and Virginia Valenta and Jeane J. Kirkpatrick, do offer policy prescriptions.

There is a detailed discussion of the political system, particularly the city-state. "Ultimately the stability of the entire system rested on maintaining low levels of politicization among the rural and urban masses and maintaining sufficient economic oportunities in the city to absorb the more ambitious members of these groups," writes Roland H. Ebel in his chapter, "The Development and Decline of the Central American City-State." In this system, the wealth and power are in the hands of a small elite, with the vast majority of people living in poverty. Costa Rica, the only country in the region with a fairly long history of genuine democracy (more than thirty-five years), is alone in having a sizable middle class.

Ebel and other authors in the book detail how economic modernization in the region brought more people into the middle class and gave them opportunities for advancement. Unfortunately, the 1970s brought soaring oil prices and lower prices for sugar and coffee, which dampened these growing economies. Wars between Central American countries also disrupted intraregional trade.

Jiri and Virginia Valenta's chapter on Soviet influence in the Caribbean basin gives many details of Soviet support to Cuba, to the Sandinistas in Nicaragua, to the rebels in El Salvador, and to the New Jewel Movement in Grenada. The Valentas also discuss the Soviets' objective of improving their projection of power into the region, particularly seapower. The authors don't believe the Soviets have sufficient strength in the region at this time to disrupt sea lanes that are vital to the United States. However, with Cuba's help, they could cause some mischief:

"Obviously the essentially defensive Cuban navy cannot challenge U.S. Naval power in the Caribbean basin. Yet given U.S. confrontation with the Soviet Union in another region (the Persian Gulf or Europe), the Cubans could put constraints on U.S. mobility and capacity to respond, causing significant delays in U.S. deployment."

Even after detailing Soviet influence in the region, the Valentas go on to echo other authors in the book by arguing that the main problems in the Caribbean basin are "miserable living conditions, hunger, and unemployment, which invite violence and revolution."

The final essay, "The Apple of Discord: Central America in U.S. Domestic Policies" by Mark Falcoff, discusses the growth and diversification of groups in the United States that, since the Vietnam War, have become interested in foreign policy. "Churches, universities, and human rights groups, as well as single-issue 'solidarity' organizations, have thus come to form an alternative foreign policy establishment in the United States," he writes.

He also discusses President Reagan's address on Central America before a joint session of Congress, in which the President noted that Americans did not want "another Vietnam," but also didn't want "another Cuba," either. Mr. Falcoff notes the "traditional ambivalence on the part of Americans about foreign affairs generally and their country's proper role in particular."

Rift and Revolution: The Central American Imbroglio provides an excellent overview of the indigenous and externally induced causes of instability in Central America. Readers seeking an understanding of the Central America beyond the headlines would do well to study this book.

—Reviewed by Capt. Patricia R. Rogers, USAF, Contributing Editor.

New Books in Brief

Engineers and Electrons, by John D. Ryder and Donald G. Fink. This well-designed, handsome book is a publication of the Institute of Electrical and Electronics Engineers and commemorates that organization's centenary anniversary. An informal and nontechnical history of electronics technology over the past 200 years, the authors focus here on the men who made electronics history—Edison, Steinmetz, Marconi, Babbage, and many others. This people-oriented approach helps to demystify and enliven a subject that is often too difficult or tiresome for the average reader. With illustrations, appendices, and index. Available from IEEE Service Center, 445 Hoes Lane, Piscataway, N. J. 08854, 1984. 251 pages. $29.95 clothbound.

Monte Cassino, by David Hapgood and David Richardson. This book is no jejune history; rather, it is a riveting tale of the events leading to the destruction by American bombers of the hilltop Benedictine abbey that had come to symbolize Allied frustration during the Italian campaign of late 1943 and early 1944. In large measure, this book illustrates the difficulty of coalition warfare, with commanders on the Allied side fighting amongst themselves and with their political masters over the conduct of the campaign. In particular, the book relies on much newly available material to paint a day-by-day picture of events from the vantage point of the participants—the ground troops, airmen, civilians, and the monks hiding in the abbey. It is this telling from the participants' point of view that makes for an especially page-turning read. With illustrations, notes and sources, bibliography, and index. Published by Congdon & Weed, Inc., distributed by St. Martin's Press, New York, N. Y., 1984. 269 pages. $17.95.

Phantom, by Bill Sweetman. Though author Sweetman's text is relatively brief and somewhat overshadowed by the excellent illustrations, this book does provide an adequate overview of the history of the Phantom. However, those looking for the definitive story on the F-4 will have to look elsewhere. Instead, the emphasis in this large-format, four-color book is on James Goulding's superb gatefold illustrations and line drawings and the many operational photos of the McDonnell Douglas-built fighter. Indeed, the gatefold paintings are suitable for framing—if the reader doesn't mind mutilating this attractive book. This is the second of the Jane's Aircraft Spectacular series. Jane's Publishing Inc., New York, N. Y., 1984. 52 pages. $10.95.

Planning and Organizing the Post-war Air Force, 1943–1947, by Herman S. Wolk. This book tells two stories. In a broad sense, author Wolk relates here the complex history of how post-war US defense policy was shaped and how the newly independent Air Force fit into US defense plans. More specifically, this is the story of the birth of US Air Force as an institution—its organization, force structure, roles, and missions. Indeed, the two stories are closely entwined. As the first Secretary of the Air Force, Stuart Symington, once said: "The question of whether we shall have adequate American airpower may be, in short, the question of survival." With illustrations, appendices, notes, bibliographic note, and index. Published by the Office of Air Force History, available from the Superintendent of Documents, GPO, Washington, D. C. 20402, 1984. 359 pages. $12.

—Reviewed by Hugh Winkler, Assistant Managing Editor.

THE BULLETIN BOARD

By James A. McDonnell, Jr., MILITARY RELATIONS EDITOR

Unknown Vietnam Veteran Finally Interred

"An American has returned home. God bless him."

With this prayer, President Ronald Reagan began the 1984 ceremonies marking the interment of an Unknown Serviceman of the Vietnam War.

The high state of the art in medical care of wounded, an ability to air-evac casualties with more success than in any previous war, and a marked increase in the skills involved in identifying remains all contributed to the amazing fact that the Vietnam War produced less than a handful of truly unidentifiable casualties. Among other aspects of this situation was the difficulty of designating an "unknown" to represent Vietnam veterans in Arlington Cemetery's Tomb of the Unknown Soldier, where representatives from three other wars rest in eternal tribute.

Additionally, there has been real concern among some veterans groups and the National League of Families that designation of a Vietnam War Unknown would signal an end to government concern for the some 2,500 Americans still listed as missing in Southeast Asia.

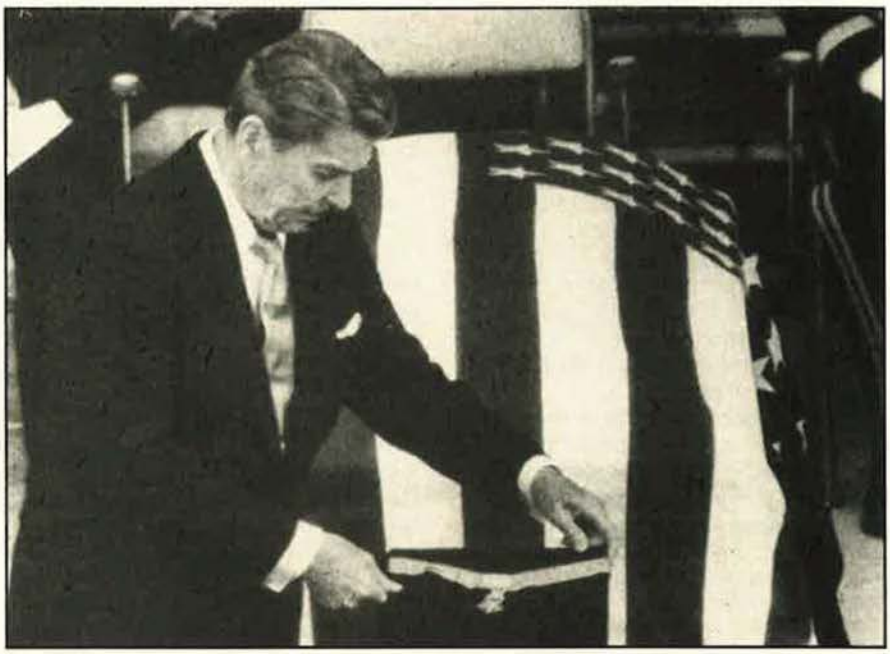
However, under a bipartisan congressional effort, a Vietnam War Unknown was finally designated. The Unknown was awarded the Medal of Honor *(see photo)* and lay in state in the Rotunda of the Capitol between May 25 and May 28 before being buried with full honors in the Memorial Amphitheater at Arlington.

Designation of the Unknown involved all the military services and Congress. The Navy, with a Coast Guard escort, moved the remains by ship from Hawaii to San Francisco. The Air Force then flew the Unknown from Travis AFB, Calif., to Andrews AFB, Md. The Army headed up a multiservice ceremonial unit that carried the remains from Andrews AFB to the Capitol.

A sampling of congressional comments underscored the broad, bipartisan support for this effort. Rep. G. V. Montgomery (D-Miss.) said that he saw no indication that this action would "stop the search" for those still missing. Congressman John McCain (R-Ariz.), himself a former POW, said he did not believe the Administration or anyone else would view this as a "closing of the chapter" and insisted that "we must continue to make every effort to receive a full accounting for those who are missing in action."

Rep. William F. Goodling (R-Pa.) perhaps summed up the overall sentiments of many in Congress best when he said, "The interment of an unknown soldier from this conflict recognizes the sacrifices that our Nation's fine young men made in Southeast Asia. This recognition is fully merited and long overdue."

President Reagan, speaking at the gravesite, said that "we must remember that we cannot today, as much as some might want to, close this chapter in our history. . . . One way to honor those who served in Vietnam . . . is to rededicate ourselves to securing the answers for the families of those missing in action—for they still sacrifice and suffer."



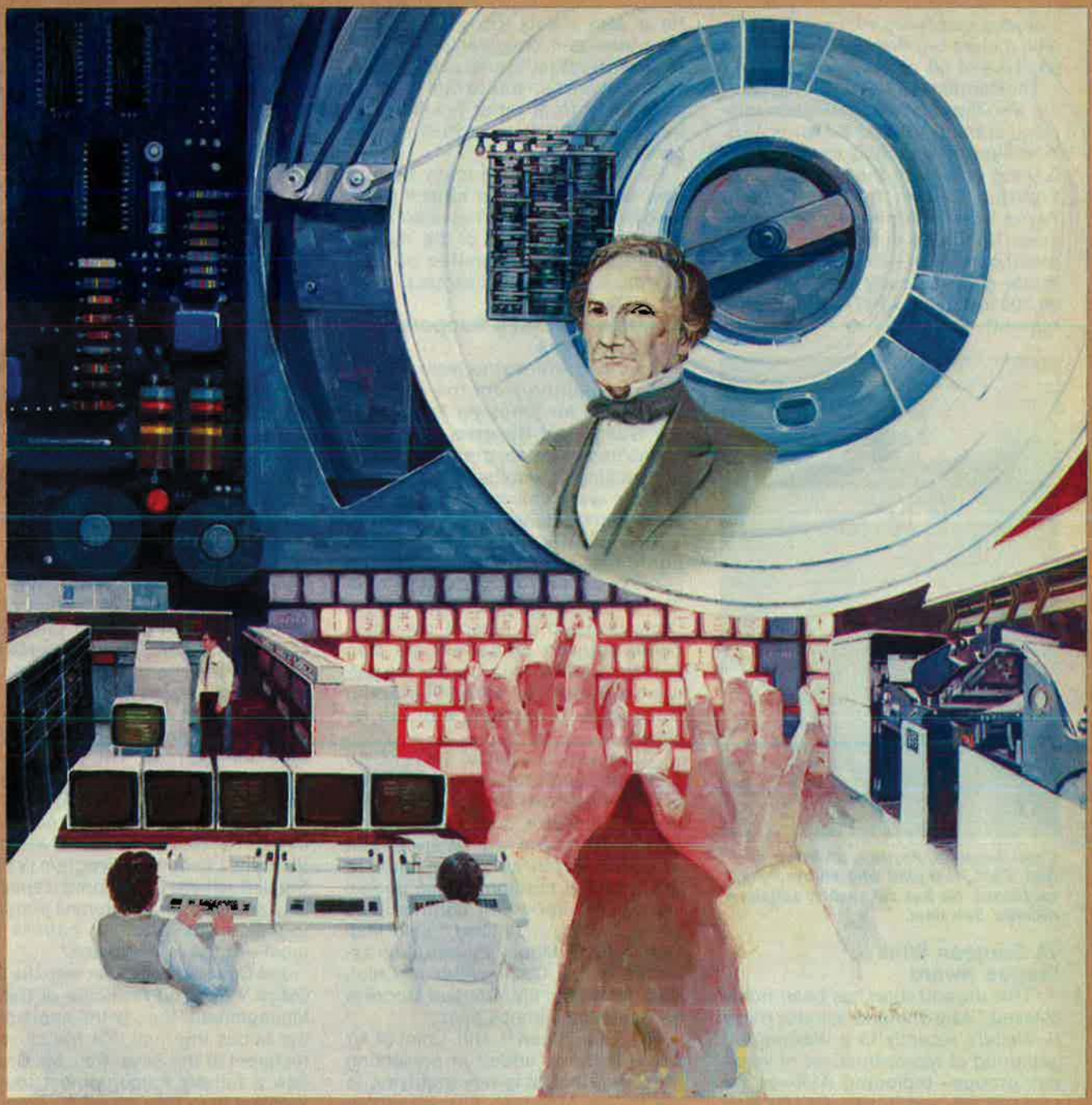
President Reagan bestows the Medal of Honor on the Unknown Serviceman of the Vietnam War during interment ceremonies at the Memorial Amphitheater of the Arlington National Cemetery. See item. (Photo courtesy UPI/Bettmann Archive)

Test Pilot "Relaxes" With Sailplanes

Capt. James M. Payne, an Edwards AFB, Calif., test pilot whose duty includes flying supersonic jets to six miles' altitude, relaxes during his off-duty hours in his sailplane *(see p. 126)*. Recently, he flew his craft in pursuit of three American soaring records. Those records will become official after verification by the National Aeronautic Association and the Soaring Society of America.

Captain Payne flew his modern fiberglass sailplane to an altitude of 35,200 feet above sea level over the eastern slope of the Sierra Nevada mountains, about thirty-five miles south of Mount Whitney. During the two-hour-and-forty-minute flight, he broke existing records in Standard Class altitude gained and Standard Class absolute altitude and set a new fifteen-meter-class altitude-gained mark.

Standard Class sailplanes are those with wings of fifteen meters' width and with no flaps or other lift devices, while the fifteen-meter-class category



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includes sailplanes with wings of fifteen meters but that can incorporate any type of lift device.

The Captain is a 1974 USAFA graduate who flies test and evaluation missions in the F-16XL at Edwards AFB. That aircraft is a highly modified delta-wing version of the standard F-16 Fighting Falcon fighter. Captain Payne has been piloting sailplanes since 1971. One of the records he is seeking to better—Standard Class altitude gain—is currently pegged at 20,300 feet. Who set it? Captain Payne himself!

Capt. James M. Payne is an Edwards AFB, Calif., test pilot who enjoys flying sailplanes. He has set several sailplane records. See item.

VA Surgeon Wins Teague Award

"This organization has been richly blessed," said VA Administrator Harry N. Walters recently to a Washington gathering of representatives of veterans groups—including AFA—as he praised VA employee Dr. Gustav Rubin, M.D.

Dr. Rubin had just been named recipient of the VA's Olin E. Teague Award. The Award goes annually to a VA employee (or team) whose achievements have been of special benefit to veterans with service-connected injuries. The honor is named for the late US Congressman from Texas who was Chairman of the House Committee on Veterans Affairs for eighteen years.

Dr. Rubin won the annual award for his well-known interest in and compassion for his patients at the Veterans Administration's Prosthetic Evaluation Testing and Information Center in New York City. He is Chief of the Special Prosthetic Clinic Team there. He is also widely recognized as an innovative and imaginative designer of new prosthetic and orthotic devices. Patients unable to find effective assistance from other facilities are frequently referred to Dr. Rubin for his creative attention.

He has constructed many devices now used routinely in rehabilitation medicine. Dr. Rubin has also been honored as Physician of the Year by the President's Committee on Employment of the Handicapped.

American Airlines Supports The Reserves

American Airlines has received special recognition from the National Committee for Employer Support of the Guard and Reserve—the DoD-sponsored volunteer group that seeks the backing of employers whose employees are members of military reserve components.

American was honored for its enlightened personnel policies concerning military reservists. More than 350 of the company's pilots are actively involved in reserve activities. Other support personnel are also part-time military. In all, some ten percent of American's 36,000-person work force is involved with the reserves.

"Approximately half of SAC's KC-10 crews are Air Force reservists, some of them American Airlines pilots who, in effect, 'recycle' experience gained on active duty and with American and who add depth and dimension to SAC's global mission. These people are making important contributions without being mobilized," said Maj. Gen. John D. Moore, mobilization assistant to the Commander in Chief, SAC. In civilian life, General Moore is an American Airlines pilot.

Maj. Gen. Sloan R. Gill, Chief of Air Force Reserve, added in presenting the award that "it is very gratifying to me to see American Airlines recognized for their active and long-time support of the Guard and Reserve. It is very apparent that their corporate philosophy concerning civic responsibilities clearly recognizes not only their obligations to their employees and the communities they serve, but also the US Government as a whole."

Meanwhile, under a DoD reorganization, the Employer Support Group has been moved and now falls under a newly created office—the office of the Assistant Secretary of Defense for Reserve Affairs. This unit—which takes over the administration of the reserve program from its former home under the DoD Assistant Secretary for Manpower, Reserve Affairs and Logistics (now renamed to drop the Reserve Affairs title)—has just received its first boss. Confirmed by the Senate to head the office is highly decorated Vietnam vet and best-selling author James H. Webb. At age thirty-eight, Mr. Webb is one of the youngest men ever to fill such a high-level DoD position.

A 1968 Naval Academy graduate, he was a Marine platoon and company commander in Vietnam and holds the Navy Cross and Silver Star. Son of a retired Air Force colonel, Mr. Webb grew up on a number of military bases. He has written extensively and has received critical acclaim for his novels, which include *Fields of Fire, A Sense of Honor,* and *A Country Such As This.*

VVLP: Vets Helping Vets

"It's a privilege for me to be able to share with a younger Vietnam veteran some of the success I've been fortunate enough to have had."

That helps explain why a highly decorated Air Force retiree has become the "sponsor" of the first veteran-owned small-business pilot project in the nation. California's Harbor City was the site of a grand opening recently of a Midas International franchise unit that was financed by a Vietnam veteran and that is operated by Vietnam veterans. The franchise is also supported by the US Small Business Administration (SBA) through the Marine Bank of Milwaukee, Wis. It is, said Pat Gilstrap, National Vietnam Veterans Leadership Program (VVLP) Small Business Development specialist, "an example of veterans supporting veterans where it counts the most—in the marketplace."

Joe Craver, a volunteer with the San Diego VVLP and President of Galaxy Management, Inc., is the sponsor of the Midas International franchise. A recipient of the Silver Star, Mr. Craver flew a full Air Force combat tour in Vietnam in C-123s carrying commando units out of Tan Son Nhut. Tony Matthews, the manager of the Midas International unit—which is, incidentally, the first franchise operation in the country to be established through the VVLP program—is a Navy veteran of Vietnam.

The VVLP is a federal program administered by ACTION, the national volunteer agency. The program encourages successful Vietnam veterans across the nation to volunteer their time, effort, and creative leadership to help solve the problems still facing some of their fellow veterans *(see also "Bulletin Board," January '82 issue).* The program is the brainchild of Thomas W. Pauken, Director of ACTION and a Vietnam veteran. It

THE BULLETIN BOARD

was launched by President Reagan on the eve of Veteran's Day 1981.

Fifty operational VVLPs have been established around the country. More than 4,500 volunteers have come forward to donate more than 50,000 hours of time to improve the material and financial situation of Vietnam veterans. Most of the volunteers are Vietnam veterans who are also community leaders.

In the Los Angeles VVLP, for example, just under 300 veterans have been helped with job-placement services. However, no such initiative as the franchise operation had been part of any VVLP anywhere in the country until Joe Craver came along. He saw this as an opportunity to combine the investment pursuits he's been following in retirement with a chance to help out a younger Vietnam veteran who was managing an apartment building in which Mr. Craver was an investor. He and Mr. Matthews teamed up with ACTION officials, the bank, the Small Business Administration, and Midas International to kick off the operation. *(See photo.)*

Pat Gilstrap, who can't talk enough about California ground-breaker Craver, says: "At age thirty-seven, Vietnam veterans are at the prime of their entrepreneurial years and . . . represent a national leadership resource ideally suited for small-business management." He is hoping that this spearhead effort by Air Force veteran Craver will spark others to look for opportunities to invest in Vietnam-veteran-managed franchises. Last year, the SBA was funded by Congress to administer a loan program directed specifically to Vietnam-era and disabled veterans. This SBA program ties in superbly with the efforts of the VVLP, which hopes to see many more instances of vets helping vets.

Los Angeles County recently issued a scroll saluting the joint venture by Midas International and the VVLP. Those present at the ceremony included (from left): Pat Gilstrap, VVLP Business Development Director; franchise "sponsor" Joe Craver; Mitch Maricich, Deputy to the County Supervisor; and Jim Guyer, SBA Deputy Regional Administrator. See item.

Herman Wolk, right, Chief of the General Histories Branch of the Office of Air Force History, recently presented a copy of his new book,* Planning and Organizing the Postwar Air Force, 1943–47, *to Air Force Chief of Staff Gen. Charles A. Gabriel. Looking on is Chief of the Office of Air Force History Richard H. Kohn. (For an article by Mr. Wolk, see "The Quiet Victory" on p. 80 of this issue.)

Air Force Tough in Sports Competition

The Air Force men's volleyball team has captured the 1984 interservice championship with a perfect 6–0 record. The dominant Air Force team won its ninth consecutive title—an unprecedented streak—at McChord AFB, Wash. Eleven team members were chosen to go on to play in the United States National Volleyball Championships.

Meanwhile, Air Force keglers took top honors at the 1984 Interservice Bowling Championships at Fort Huachuca, Ariz., by winning three out of four bowling events. The tournament pitted forty-eight of the military's best bowlers against each other in team, doubles, singles, and all-events competition.

After a slow start, the Air Force men's team finally captured first place in doubles, singles, and all-events competition. The Army took team honors.

Air Force men took not only first but also second and third place in doubles competition. Air Force women placed second. In the singles battle, Air Force men took first and second place and Air Force women were first. Air Force men and women finished one, two, and three in the all-events standings.

The men's team moved on to the ABC Masters Tournament in Reno, Nev., and the women entered the Avon-WIBC Queens Tournament in Niagara Falls, N. Y.

Short Bursts

In late May, the **Vietnam Veterans Memorial** administration unveiled the clay model of the **sculpture of the three servicemen that will be added to the Memorial.** More than 10,000 people sometimes visit the site in one day, and it is fast approaching the status of "most visited" of Washington's attractions. At press time, a General Accounting Office (GAO) audit gave a clean bill of health to the Memorial Fund's bookkeeping procedures. Those procedures had come under attack in the media.

The bad news—**commissaries got hit with some $2.5 million in bad checks last year.** The good news—less than two percent of the 35,866 "bouncers" went unrecouped.

The **"best command social actions program in the Air Force" award**—the Brown Award, named for the late Col. L. J. Brown, a social actions pioneer—has gone **to TAC for 1983.** TAC previously won in 1978 and 1981.

More than **200,000 veterans suffer hearing problems** related to their military service. Hearing loss is the largest single category of service-connected disabilities.

The Air Force is **looking for more than 1,400 NCOs to sign on as recruiting sergeants** nationwide. Those interested will want to know that a recent survey of blue-suit salespeople found them "significantly" more satisfied with their jobs than the average airman. That's true in spite of the fact that the survey also found that more than half the recruiters spend fifty-one hours or more a week on the job. That's not too surprising when you consider that the survey also found that it takes about seven leads to get one sign-up.

Are you getting all the veterans benefits to which you and your family are entitled? To help you find out, you might want to check **a new government booklet, "Federal Benefits for Veterans and Dependents, 1984."** It's

already a best-seller. To get yours, send $2.25 to Dept. 36-EL, Superintendent of Documents, Washington, D. C. 20402. Or call (202) 783-3238 with your Visa or MasterCard number.

The Army and Air Force Exchange Service—in addition to offering convenience and savings on goods and services to its patrons—is also the **largest single employer of military family members.** AAFES employs almost 22,000 military family members in the US and overseas. It also provides part-time jobs for some 2,500 off-duty military members. All told, about half of the total worldwide work force of almost 70,000 people are members, family, veterans, or retirees.

THE BULLETIN BOARD

VA has cut **one-third off the premium rates for Servicemen's Group Life Insurance.** For the maximum coverage of $35,000, the new premium will be $2.80 per month, compared to the current charge of $4.06. Active-duty people will save an aggregate of about $33 million, while Ready Reservists will save about $14 million. Premiums for Reservists with part-time coverage will stay the same.

Selective Service says it can now provide the **first inductees within thirteen days** of a mobilization and 100,000 people within just thirty days after the whistle blows. ■

SENIOR STAFF CHANGES

PROMOTIONS: To be **General:** Larry D. **Welch.**

To be **Lieutenant General:** David L. **Nichols;** Bernard P. **Randolph.**

To be **AFRES Major General:** Herman J. **Carpenter;** William L. **Harper;** Alan G. **Sharp.**

To be **AFRES Brigadier General:** Ronald C. **Allen,** Jr.; Boyd L. **Eddins;** George D. **Eggert;** Richard L. **Hall;** William N. **Rowley;** Stuart L. **Schroeder;** David S. **Trump;** Walter G. **Vartan;** Richard D. **Wood;** Duane A. **Young.**

RETIREMENTS: B/G Duncan W. **Campbell;** M/G Robert W. **Clement;** B/G Duane H. **Erickson;** M/G William G. **MacLaren,** Jr.; Gen. Robert T. **Marsh;** M/G Robert F. **McCarthy;** M/G Leighton R. **Palmerton;** B/G David L. **Patton;** M/G M. Roger **Peterson;** M/G Robert C. **Taylor;** B/G Marion F. **Tidwell.**

CHANGES: Col. (B/G selectee) Joseph W. Ashy, from Cmdr., 37th TFW, TAC, George AFB, Calif., to Cmdr., 57th FWW, TAC, Nellis AFB, Nev., replacing B/G Michael C. Kerby . . . **L/G John T. Chain, Jr.,** from DCS/P&O, Hq. USAF, Washington, D. C., to Dir., Political Mil. Affairs, Dept. of State, Washington, D. C. . . . **B/G William M. Constantine,** from Dep. Dir., Int'l Negotiations, J-5, OJCS, Washington, D. C., to Dep. Dir., J-3 (Recon., Space, EW, & C³CM), OJCS, Washington, D. C. . . . **B/G Donald L. Cromer,** from Dir., Space Sys., OSAF, Washington, D. C., to Dep. Cmdr., Launch & Control Sys., Space Div., AFSC, Los Angeles AFS, Calif., replacing B/G Donald J. Kutyna . . . **B/G James L. Crouch,** from DCS/Data Sys., Hq. SAC, Offutt AFB, Neb., to Dir., C³ & Computer Sys., Hq. USREDCOM, & Dep. Dir., C³ & Computer Sys., JDA, MacDill AFB, Fla., replacing B/G Donald L. Moore.

Col. (B/G selectee) Philip M. Drew, from Cmdr., 18th TFW, PACAF, Kadena AB, Japan, to Asst. Dep. Dir., Political Mil. Affairs, J-5, OJCS, Washington, D. C. . . . **B/G Robert D. Eaglet,** from DCS/Plans & Prgms., Hq. AFSC, Andrews AFB, Md., to Dep. Cmdr., Development & Acquisition, Armament Div., AFSC, Eglin AFB, Fla., replacing B/G Gerald C. Schwankl . . . **Col. (B/G selectee) James E. Freytag,** from Cmdr., AFWAL, ASD, AFSC, Wright-Patterson AFB, Ohio, to Dep. for Strat. Sys., ESD, AFSC, Hanscom AFB, Mass., replacing B/G Michael H. Alexander . . . **M/G William A. Gorton,** from Dir., Operational Requirements, DCS/RD&A, Hq. USAF, Washington, D. C., to Cmdr., 16th AF, USAFE, Torrejon AB, Spain, replacing retiring M/G Robert W. Clement . . . **B/G Michael C. Kerby,** from Cmdr., 57th FWW, TAC, Nellis AFB, Nev., to Dep. Dir., Legislative Liaison, OSAF, Washington, D. C., replacing B/G (M/G selectee) Clifford H. Rees, Jr.

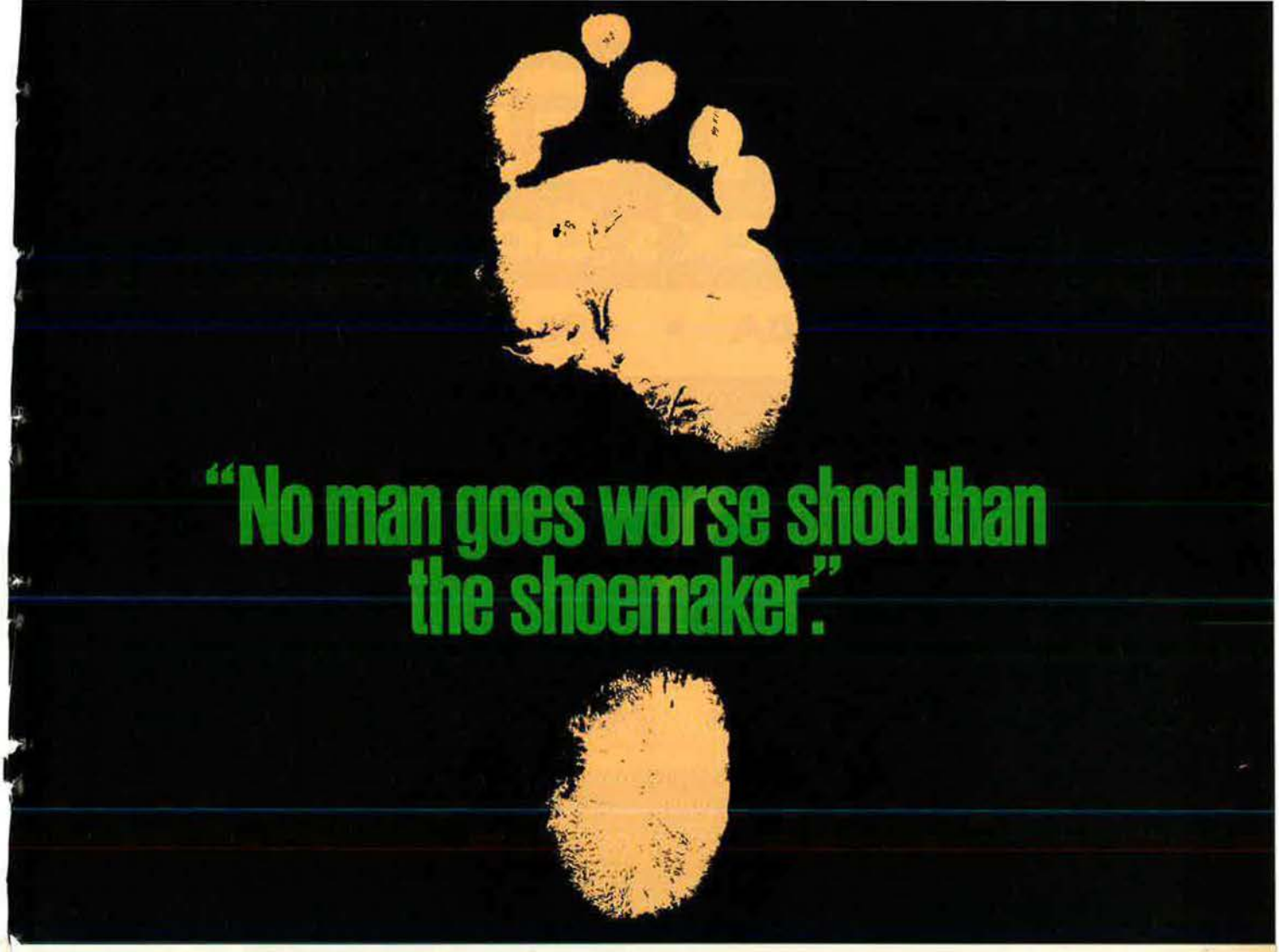
B/G Donald J. Kutyna, from Dep. Cmdr., Launch & Control Sys., Space Div., AFSC, Los Angeles AFS, Calif., to Dir., Space Sys. & C³, DCS/RD&A, Hq. USAF, Washington, D. C., replacing M/G Joe P. Morgan . . . **Col. (B/G selectee) Robert H. Ludwig,** from Cmdr., Pacific Comm. Div., AFCC, Hickam AFB, Hawaii, to Cmdr., Strat. Comm. Div., AFCC, & DCS/Communications-Electronics, Hq. SAC, Offutt AFB, Neb., replacing B/G John T. Stihl . . . **M/G James P. McCarthy,** from Dir., Legislative Liaison, OSAF, Washington, D. C., to DCS/Plans, Hq. SAC, Offutt AFB, Neb., replacing M/G Harold J. M. Williams . . . **B/G Joel M. McKean,** from Senior Mil. Advisor to the Dir., ACDA, Washington, D. C., to Asst. Dep. Dir., Force Development & Strat. Plans, J-5, OJCS, Washington, D. C. . . . **B/G Donald L. Moore,** from Dir., C³ & Computer Sys., Hq. USREDCOM, & Dep. Dir., C³ & Computer Sys., Joint Deployment Agency, MacDill AFB, Fla., to Vice Cmdr., Hq. AFCC, Scott AFB, Ill., replacing retiring B/G Duncan W. Campbell.

M/G Joe P. Morgan, from Dir., Space Sys. & C³, DCS/RD&A, Hq. USAF, Washington, D. C., to Dir., Quality Assurance, DLA, Cameron Station, Alexandria, Va. . . . **Col. (B/G selectee) Eric B. Nelson,** from C/S, Hq. AFSC, Andrews AFB, Md., to DCS/Plans & Prgms., Hq. AFSC, Andrews AFB, Md., replacing B/G Robert D. Eaglet . . . **M/G (L/G selectee) David L. Nichols,** from Asst. DCS/P&O, Hq. USAF, Washington, D. C., to DCS/P&O, Hq. USAF, Washington, D. C., replacing L/G John T. Chain, Jr. . . . **M/G Gerald L. Prather,** from Asst. C/S, Info. Sys., Hq. USAF, Washington, D. C., to Cmdr., Hq. AFCC, Scott AFB, Ill., replacing retired M/G Robert F. McCarthy . . . **M/G (L/G selectee) Bernard P. Randolph,** from Vice Cmdr., Space Div., AFSC, Los Angeles AFS, Calif., to Vice Cmdr., Hq. AFSC, Andrews AFB, Md., replacing L/G Robert M. Bond.

B/G (M/G selectee) Clifford H. Rees, Jr., from Dep. Dir., Legislative Liaison, OSAF, Washington, D. C., to Dir., Legislative Liaison, OSAF, Washington, D. C., replacing M/G James P. McCarthy . . . **Col. (B/G selectee) John Serur,** from Dir. of Materiel Mgmt., Sacramento ALC, AFLC, McClellan AFB, Calif., to Cmdr., Defense Contract Admin. Services Region, DLA, Los Angeles, Calif., replacing B/G John H. Voorhees . . . **Gen. Lawrence A. Skantze,** from Vice C/S, Hq. USAF, Washington, D. C., to Cmdr., Hq. AFSC, Andrews AFB, Md., replacing retiring Gen. Robert T. Marsh . . . **B/G John T. Stihl,** from Cmdr., Strat. Comm. Div., AFCC, & DCS/Communications-Electronics, Hq. SAC, Offutt AFB, Neb., to Asst. C/S, Info. Sys., Hq. USAF, Washington, D. C., replacing M/G Gerald L. Prather . . . **B/G Richard J. Trzaskoma,** from Asst. DCS/Ops., Hq. MAC, Scott AFB, Ill., to Vice Cmdr., 23d AF, Hq. MAC, Scott AFB, Ill., replacing retired B/G Philip S. Prince.

Col. (B/G selectee) Charles A. Vickery, from Cmdr., 63d MAW, MAC, Norton AFB, Calif., to Asst. DCS/Ops., Hq. MAC, Scott AFB, Ill., replacing B/G Richard J. Trzaskoma . . . **B/G John H. Voorhees,** from Cmdr., Defense Contract Admin. Services Region, DLA, Los Angeles, Calif., to Dep., J-4/J-7, Hq. USEUCOM, Vaihingen, Germany, replacing retiring B/G Marion F. Tidwell . . . **L/G (Gen. selectee) Larry D. Welch,** from DCS/P&R, Hq. USAF, Washington, D. C., to Vice C/S, Hq. USAF, Washington, D. C., replacing Gen. Lawrence A. Skantze . . . **M/G Harold J. M. Williams,** from DCS/Plans, Hq. SAC, Offutt AFB, Neb., to Dir., Operational Requirements, DCS/RD&A, Hq. USAF, Washington, D. C., replacing M/G William A. Gorton.

SENIOR ENLISTED ADVISOR CHANGES: CMSgt. Carl A. Roberts, to SEA, Hq. MAC, Scott AFB, Ill., replacing retired CMSgt. Harry E. Davis . . . **CMSgt. David A. Sheeder,** to SEA, Hq. AFSINC, Kelly AFB, Tex. ■



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AFA Intercom

AFA's Enlisted Council And JOAC on the Way To a Productive Year

AFA's Enlisted Council and Junior Officer Advisory Council Executive Committee held their first two meetings of the new AFA year in San Antonio, Tex., in March, and in Washington, D. C., in June.

In San Antonio, the Councils visited the Basic Military Training Center at Lackland AFB to get a good picture of new Air Force accessions. Also, they were welcomed to this 1984 Council activity by AFA President Dave Blankenship and Maj. Gen. Robert C. Oaks, USAF Director of Personnel Plans. Also on hand was Chief Master Sergeant of the Air Force Sam E. Parish.

At both meetings, the Councils continued work on their 1984 projects—a booklet for new junior officers and one for new NCOs. They also developed a prioritized listing of the issues that they believe are important to their peers and that should be addressed by AFA.

AFA's active-duty councils advise the AFA President on matters affecting their constituencies. Also, they serve the Air Force as a resource group for exploration of various personnel plans. Both groups plan to meet at the AFA National Convention in September.

Enlisted Council

This Council, which includes a majority of the Air Force's Outstanding Airmen for 1983, advises the AFA National President on matters concerning the enlisted force. CMSgt. James C. Binnicker of Randolph AFB, Tex., is Council Chairman. The Vice Chairman is CMSgt. Richard J. Tinneny, Maxwell AFB, Ala. SMSgt. Robert E. Jacques, Randolph AFB, Tex., is Recorder.

Members are MSgt. Daniel Alati, Offutt AFB, Neb.; TSgt. Frank M. Anderson, Minot AFB, N. D.; TSgt. Pearl E. Dandridge, Willow Grove ARF, Pa.; Sgt. Steven A. Dubron, Luke AFB, Ariz.; A1C Susan E. Ducharme, Peterson AFB, Colo.; SMSgt. Marvin L. Kennedy, RAF Woodbridge, UK; SrA. Christopher Menna, Suffolk Co. Airport, Westhampton Beach, N. Y.; MSgt. Thomas Merrick III, John Hay AS, Philippines; MSgt. Harold O. Overton, Hickam AFB, Hawaii; Sgt. Tommy A. Roberts, Gunter AFS, Ala.; TSgt. Carol L. Santos, Wright-Patterson AFB, Ohio; CMSgt. Richard C. Schneider, Washington, D. C.; TSgt. Guadalupe Silva, Vandenberg AFB, Calif.; TSgt. Mark A. Smith, Charleston AFB, S. C.; and Sgt. Mary L. Young, Grand Forks AFB, N. D.

Chief Master Sergeant of the Air Force Sam E. Parish is Council Advisor.

Junior Officer Advisory Council

This Council advises the AFA National President on matters affecting junior officers and includes at least one representative from each Air Force major command and separate operating agency. The Council's Executive Committee is chaired by Capt. Terry L. Barton, Maxwell AFB, Ala. Capt. Timothy J. Fyda, Langley AFB, Va., is Vice Chairman. The Recorder is Capt. Ronald D. Fuchs, Kelly AFB, Tex.

Other JOAC Executive Committee members are Lt. Gary L. Brinner, Lincoln, Ill.; Capt. Sidney L. Evans, Jr., Wright-Patterson AFB, Ohio; Capt. Timothy J. Kaufman, Washington, D. C.; Capt. Ricky B. Kelly, Peterson AFB, Colo.; Capt. Gary L. Kirsteatter, Scott AFB, Ill.; Capt. Craig M. Little, Langley AFB, Va.; 1st Lt. John P. Loughnane, Chicago, Ill.; 1st Lt. Andrea M. Niezgoda, Andrews AFB, Md.; Capt. William T. O'Connell, USAF Academy, Colo.; Capt. Elaine M. Parker, Offutt AFB, Neb.; Capt. Chris Sarandos, Kelly AFB, Tex.; Capt. James H. Sebree, Jr., Laughlin AFB, Tex.; and Capt. Richard M. Zimmerman, Randolph AFB, Tex.

Maj. Gen. Robert C. Oaks, USAF Director of Personnel Plans, is Council Advisor.

AFA Policy Advisors

The Air Force Association's Policy Advisors, who are all volunteers,

Enlisted Council


Binnicker


Alati


Anderson


Dandridge


Dubron


Ducharme


Jacques


Kennedy


Menna


Merrick


Overton


Roberts


Santos


Schneider


Silva


Smith


Tinneny


Young


Parish

counsel the National President on policies and developments pertinent to their fields of expertise.

The following Policy Advisors were selected by the National President to serve during 1984 because of their expertise in areas vital to AFA's mission: Lt. Col. John D. Ballard, Tulsa, Okla., Air National Guard Advisor; CMSgt. James C. Binnicker, Randolph AFB, Tex., Enlisted Advisor; Lt. Gen. John P. Flynn, USAF (Ret.), San Antonio, Tex., Veterans Advisor; Lt. Col. Leon D. Gordon, USAF (Ret.), Scotch Plains, N. J., Junior AFROTC Advisor; CMSAF Richard D. Kisling, USAF (Ret.), Washington, D. C., Retiree Advisor; Capt. John A. Loucks, USAF Academy, Colo., Junior Officer Advisor; Brig. Gen. Edward L. McFarland, USAFR, Tulsa, Okla., Air Force Reserve Advisor; Jack P. Murrell, Washington, D. C., Civilian Personnel Advisor; Maj. Diana J. Potter, Norman, Okla., Senior AFROTC Advisor; Kenneth A. Rowe, Richmond, Va., Civil Air Patrol Advisor; Maj. Gen. James L. Tucker, Jr., USAFR, Abilene, Tex., Medical Advisor; and Dr. Michael I. Yarymovych, El Segundo, Calif., Science Advisor.

—By Gillian C. Norton

Junior Officer Advisory Council


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Fyda


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Parker


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Zimmerman


Oaks

AFA Policy Advisors


Ballard


Binnicker


Flynn


Gordon


Kisling


Loucks


McFarland


Murrell


Potter


Rowe


Tucker


Yarymovych

Iron Gate "Comes of Age" With Twenty-first Air Force Salute

AFA's New York Iron Gate Chapter mounted its Twenty-first National Air Force Salute in late March and moved well into its second million dollars raised for Air Force-related charities.

The sparkling, black-tie event is eagerly awaited each year by New York society. This year's theme, "Youth," was especially appropriate for the Salute's twenty-first birthday. As noted by Tom McKee, National Salute Committee Chairman, "The Air Force is the youngest service and our young people in blue are the leaders of the next century."

Youth was indeed in evidence, including Manhattan Civil Air Patrol Group cadets who presented the colors; a group of enlisted men and women from McGuire AFB, N. J., all of whom had won honors at the base and who were hosted by AFA's Thomas B. McGuire, Jr., Chapter; and, as a special guest, 2d Lt. Cyd Birns, an Iron Gate Chapter member who is currently in pilot instructor training at Randolph AFB, Tex., and who is the daughter of Iron Gate member Sid Birns.

Following a time-honored tradition, the Salute honored military and AFA leaders through investiture as Aerospace Education Foundation Jimmy Doolittle or Ira Eaker Fellows. Each Doolittle and Eaker Fellowship represents a $1,000 tax-deductible donation to the Foundation.

During the presentation of the awards, AEF Board Chairman Sen. Barry M. Goldwater (R-Ariz.) echoed the evening's theme in saying, "As you've heard, our theme tonight is youth. And, being young means you're open to new ideas." He then discussed the new directions in which the Foundation is moving *(see related item, p. 133).*

Senator Goldwater presented Jimmy Doolittle Fellowships to Herbert R. Dimmick, the Honorary Chairman of the Salute and a long-time Iron Gate Chapter stalwart; Harold W. Miller, this year's Salute Foundation Chairman; and Gen. Andrew P. Iosue, who as Commander of Air Training Command is in many ways responsible for recruiting and training youth for the Air Force.

The three Ira Eaker Fellows exemplified, as Senator Goldwater said, "the span of military aviation, from World War I right up to tomorrow's

headlines." Honored were retired Col. George A. Vaughn, the leading living American World War I ace with thirteen victories; America's top living ace, retired Col. Francis S. (Gabby) Gabreski; and the then-Associate Administrator of NASA (now DoD's Director of Strategic Defense), Lt. Gen. James A. Abrahamson, USAF.

The Chapter also presented its highest award, the Maxwell A. Kriendler Memorial Award, to Secretary of the Air Force Verne Orr. Making the presentation, Chapter President Fred Glass commented: "Our honoree tonight . . . a successful businessman and superb state administrator before President Reagan called him to Washington . . . is recognized as someone who never forgets the people equation in defense matters."

The entertainment for the glittering event provided further recognition of the role of youth. On hand were the massed voices of the 100-plus-member US Air Force Academy Cadet Chorale. Singing some special numbers with the Chorale was Alyson Kirk, the last person to play "Annie" on Broadway this year.

A surprise presentation saw Herb Dimmick honored by the Air Force for his role as Chairman of the National Salute from 1980 to 1983. Air Force Secretary Verne Orr presented him with a specially prepared plaque and saluted him for the assistance to Air Force-related charities funded by Salute receipts.

Monies raised by the annual Salutes go to the Air Force Aid Society, the Air Force Enlisted Widow's Home, the Air Force Village Foundation, the Falcon Foundation, the Air Force Historical Foundation, the Aerospace Education Foundation, the National Aviation Hall of Fame, the Iron Gate USAF Academy Award for Airmanship, and the Iron Gate CAP Scholarship.

Next year's salute will be on Saturday, March 23.

—By James A. McDonnell, Jr.

Number One

AFA's Iron Gate Chapter remains the largest contributor to both the AEF Jimmy Doolittle and Ira Eaker Individual Fellow programs. To date, the Chapter has sponsored ninety-three Jimmy Doolittle and twelve Ira Eaker Fellowships.

AEF Board Chairman Sen. Barry Goldwater, right, presents Jimmy Doolittle Fellowship plaque to Salute Foundation Chairman Harold W. Miller. (Photos by Sid Birns)

Air Force Secretary Verne Orr, right, who received the Kriendler Award during the Salute, discusses the charity event with, from left, AFA President David L. Blankenship, USAF Chief of Staff Gen. Charles A. Gabriel, and Mrs. Blankenship.

A Look to the Future: New Directions for AEF

The Aerospace Education Foundation's Executive Committee, taking into account the projected move into expanded facilities in the Air Force Association's new National Headquarters Building and with a look to the future, approved new directions for the Foundation at its meeting in February. The Committee strongly supported the AFA and AEF staffs' recommendation that the Foundation would do well to take advantage of this transition period to move in newer and ever-challenging directions.

Prior to deliberating and making its decisions, the Committee was furnished a comprehensive report that encompassed a review and analysis of current operations, including the nonprofit Air Force course distribution program. The report also proposed new directions and a suggested review of Foundation purposes and objectives, including the officer and trustee structure. The Executive Director and the staffs of both AFA and the Foundation provided detailed briefings and analytical data to the Committee.

One review compared the structure, organizations, and operating relationships that exist between other associations and their foundations with those between AFA and its Aerospace Education Foundation. Using the results of a recent survey con-

ducted by the American Society of Association Executives, the review noted that AEF is very similar to the majority of association foundations regarding its organization for educational purposes, sources of income, parent organization support, and close relationship and responsibility to its parent organization.

The major educational pursuits of the Foundation for the past sixteen years have been the nonprofit sale of USAF technical courses, the management of three major national symposia, and the support of Air Force Junior ROTC. The major sources of revenue have been the philanthropic support of generous AFA members, plus annual, direct contributions from the Air Force Association, the Iron Gate Chapter's National Air Force Salute, the Los Angeles Air Force Ball, the Air Force Ball of Mid-America, the San Bernardino Chapter's Bob Hope Charity Golf Tournament, other AFA chapter programs, and interested individuals.

In addition, AEF raises funds through its sponsorship of the corporate and individual Jimmy Doolittle Educational and Ira Eaker Historical Fellowships, the Salute to the Senior Statesmen, the Jimmy Doolittle Salute, and the sale of Jim Straubel's historical "story of AFA," *Crusade for Airpower.* The Foundation is also involved in several joint publishing efforts with the Air Force Historical Foundation.

During the Committee meeting, results were presented of a recent feasibility study and economic evaluation that assessed the continuation of the nonprofit sale and distribution of Air Force technical courses to our nation's schools. Although the program has made a needed and major contribution to America's educational and vocational training system, the study recommended that it should be terminated due to the increase in the number of community colleges and technical schools that fill this educational niche, which has resulted in a significant decline in course sales.

Due to the exponential growth in the rate of technological change, both in the content of course materials and in the methods of instruction, the small staff of AEF is incapable of maintaining the currentness of existing course material. Finally, the uncertainty of future sales and the excessive time required to recover invested costs all argue against continued involvement.

Distribution of Air Force courses to the civilian educational community served a valid and urgent need during the 1970s and early 1980s by providing educationally well-developed courses to our nation's schools and, particularly, to the large number of community colleges. That need has been well satisfied. The program received nationwide recognition from various organizations for its educational contributions and achievements *(see accompanying box).*

The Air Force course distribution program also played a role in the accreditation of Air Force courses and in the establishment of the Community College of the Air Force and CCAF's subsequent associate degree-granting authority.

One of the new directions approved by the Executive Committee was the establishment of an Aerospace Education Center, the essence of which will be "outreach" of educational efforts to the entire organization, its affiliates, and the general public. Using the conference room in the new National Headquarters Building, a series of educational seminars, symposia, laboratories, colloquia, and lectures will be conducted on a wide variety of aerospace topics. The proceedings of these events will be recorded on both audio- and videotape, published in booklet form, and widely distributed throughout the Association and its affiliated groups.

Two follow-on projects—both to be conducted under the auspices of the Center—will be a dynamic "Forum for the Future" and an "Aerospace Education Resource Office." The former will provide AFA's regional, state, and chapter organizations with comprehensive information, views, and expert opinion on the full range of Association concerns. By using these resources, AFA organizations will be better able to relate to their local communities the latest developments in aerospace training, equipping, and employment that affect our nation and those who serve it. The latter will serve as a generator, an interpreter, and a clearinghouse of information to provide assistance to educators, scholars, and the media on aerospace topics and the role of aerospace in the evolution of our society.

Another Foundation initiative that was adopted in principle was the "Partners In Education" program. The primary goal of this program will be to develop local programs with AFA members, chapters, and associates in the field to contact local business and industry officials and encourage the lending of assistance, in the form of resources and expertise, to improve local educational programs. This program would directly support a recent Presidential Proclamation and new National Partnership in Educational Programs being established by the White House Office of Private Sector Initiatives. An implementation plan is now being developed by the staff.

The Foundation's Executive Committee also adopted a precise definition of "aerospace education" for use by the Foundation and for describing its purposes: "Aerospace education is that branch of general education concerned with communicating knowledge, skills, and attitudes about aerospace activities and the total impact of air and space systems on society." Also, the Committee approved continuation of all programs, but directed the orderly phaseout and termination of the declining program of nonprofit sale and distribution of Air Force technical courses. The Committee approved continued participation with the Air Force Historical Foundation on major book efforts now under

Awards Received by AEF

YEAR	ORGANIZATION	RECOGNITION
1974	National Society for Performance and Instruction	Outstanding Organization Award
1976	American Society for Training and Development	Human Resources Development Award
1980	National Congress on Aerospace Education	Crown Circle Award for "Evidence of a lifetime of performance demonstrating the zenith of leadership in aerospace education"

way, and directed the staff to investigate the feasibility of publishing "Aerospace Heritage," a magazine-style booklet that will contain reprinted stories of selected acts of unusual valor by Air Force personnel over the years.

In addition to their action in approving the four new programs, the Committee asked the AEF President to appoint ad hoc committees to study the purpose, objectives, and officer and trustee structure of the Foundation, to suggest prerequisite qualifications for those individuals who serve as officers and trustees, and to recommend individuals for such positions. The Executive Committee recommended that the ad hoc committees pay particular attention to the funding requirements of the Foundation.

The Foundation staff currently is developing detailed programs and procedures to implement the Executive Committee's actions and recommendations.

Unit Reunions

AACS
The Airways and Air Communications Service (AAF/USAF) alumni will hold their eighth annual reunion on September 20–23, 1984, in Tulsa, Okla. **Contact:** Bob Powell, P. O. Drawer 51325, Tulsa, Okla. 74151. Phone: (918) 836-4546.

Air Commando Ass'n
The Air Commandos will meet for their fourteenth annual reunion on October 5–7, 1984, at the Officers' Club at Hurlburt Field, Fla. **Contact:** Hap Lutz, P. O. Box 7, Mary Esther, Fla. 32569. Phone: (904) 243-4601.

Bombardiers Alumni Ass'n
Members of the Bombardiers Alumni Association (BAA) will hold their reunion on August 15–19, 1984, in Nashville, Tenn. **Contact:** Kenneth L. Ross, P. O. Box 158557, Nashville, Tenn. 37215. Phone: (615) 373-0575.

Confederate Air Force
The Southern Minnesota Wing of the Confederate Air Force will hold its seventh annual World War II airpower display on August 3–5, 1984, at the St. Paul (downtown) Airport. **Contact:** Confederate Air Force, Fleming Field, Hangar No. 3, South St. Paul, Minn. 55075. Phone: (612) 455-6942.

Graham AB
Members of the 3300th Pilot Training Group of Graham AB, Marianna, Fla., will hold a reunion on August 17–18, 1984, at the Holiday Inn in Marianna, Fla. **Contact:** Graham AB Reunion Committee, P. O. Box 668, Langley AFB, Va. 23665.

ICBM Pioneers
Military, Civil Service, and contractor personnel associated with the US Air Force elements at Inglewood, Calif., who were responsible for developing the Atlas, Titan, and Minuteman intercontinental ballistic missiles (ICBMs) and the Thor intermediate-range ballistic missiles (IRBMs) will hold a reunion, marking the establishment of the nation's ICBM program in 1954, on October 5–6, 1984, in Los Angeles, Calif. **Contact:** ICBM Pioneers, P. O. Box 444, Hawthorne, Calif. 90250.

Radio Operators
A reunion will be held on August 11–12, 1984, at the Conrad Hilton Hotel in Chicago, Ill., for all radio operators and permanent party personnel who passed through the Stevens Hotel (now the Conrad Hilton) during World War II. **Contact:** Lt. Col. Andy M. Kmetz, USAF (Ret.), 1715 W. Haven Dr., Champaign, Ill. 61820.

Retired Enlisted Ass'n
The Retired Enlisted Association (TREA) is sponsoring the first reunion of Armed Services Retired Enlisted men and women at the Las Vegas Hilton, Las Vegas, Nev., on July 19–21, 1984. **Contact:** The Retired Enlisted Association, P. O. Box 50584, Washington, D. C. 20004.

New AFA Address

The Air Force Association is moving this month into new offices at the AFA National Headquarters Building in Arlington, Va. The new address for AFA Headquarters is as follows:

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

Submissions to "Unit Reunions" should be mailed to the above address and marked to the attention of the "Unit Reunions" editor. Please include unit designation, date of reunion, the specific location of the reunion, and a contact address. Please allow at least two months lead time for reunion announcements. (Sorry, but no reunion announcements can be accepted over the telephone.)

Retired Judge Advocates
Retired Air Force Judge Advocates will hold their first reunion on October 19–22, 1984, at the Hyatt Regency Hotel in San Antonio, Tex. **Contact:** Col. Tom Krauska, USAF (Ret.), 401 Candleglo, San Antonio, Tex. 78239. Phone: (512) 655-3112.

Sergeant Pilots
The Reunion Committee for Sergeant Pilots of the Army Air Corps will hold a reunion on October 10–14, 1984, in San Antonio, Tex. **Contact:** Robert E. Pace, 126 Sherri, Universal City, Tex. 78148. Phone: (512) 658-1903.

Sherman Field
Veterans of Sherman Field will hold their seventh annual reunion on September 7–9, 1984, at the Ramada Inn in Leavenworth, Kan. **Contact:** Roscoe Swenson, 2053 Highland Ave., Salina, Kan. 67401. Phone: (913) 827-2577.

Silver Wings Fraternity
The twenty-sixth annual convention of the Silver Wings Fraternity will be held on September 13–16, 1984, at the Grand Motor Lodge in Reno, Nev. **Contact:** Silver Wings Fraternity, Box 1228, Harrisburg, Pa. 17108. Phone: (717) 232-9525.

Warbirds
The thirteenth annual Gathering of Warbirds will be held at the Madera Municipal Airport, Madera, Calif., on August 17–19, 1984. **Contact:** Arnie Schweer, P. O. Box 5138, Fresno, Calif. 93755. Phone: (209) 255-5812.

2d Photo-Mapping Squadron
Members of the 2d Photo-Mapping Squadron, 311th Photo Wing, will hold a reunion on August 17–19, 1984, at the Hilton Hotel in Grand Junction, Colo. **Contact:** George M. Tweedy, Rte. 2, Chattaroy, Wash. 99003.

4th Strategic Air Depot
Veterans of the 4th Strategic Air Depot, Eighth Air Force, stationed at Wattisham-Hitcham, England (1943–45), will hold their sixth reunion in conjunction with the Eighth Air Force Historical Society in Los Angeles, Calif., on October 3–7, 1984. **Contact:** 4th Strategic Air Depot Association, P. O. Box 196, Henrietta, N. Y. 14467.

8th Air Force Historical Society
Members of the 8th Air Force Historical Society will hold their tenth annual reunion on October 3–7, 1984, in Los Angeles, Calif. **Contact:** 8th Air Force Historical Society, P. O. Box 3556, Hollywood, Fla. 33083.

14th Air Force Ass'n
The Flying Tigers of the 14th Air Force Association, Inc., will hold their thirty-seventh annual convention on September 13–16, 1984, at the Grand Hotel on Mackinac Island, Mich. **Contact:** Jack Hild, 2150 Iroquois Ave., Detroit, Mich. 48214.

Staff Changes at Air Force Magazine

In May, Guy Aceto joined the staff of Air Force Magazine as Art Director. He replaces William A. Ford, who had been Art Director since 1974. Mr. Ford has joined the staff of *Pilot* magazine, published by the Aircraft Owners and Pilots Association.

Mr. Aceto is a graduate of the Corcoran School of Art in Washington, D. C., and the Art Institute of Pittsburgh. He served four years in USAF as a medical technician, specializing in intensive care and medevac.

In another recent change, Edward J. McBride, Jr., who has been an Editorial Assistant since August 1982, has been promoted to Staff Editor. Joining the staff as Editorial Assistant is Philip E. Musi, who graduated in 1983 from the University of Maryland with a B.S. degree in zoology and a B.A. in English.

22d Bomb Group
Veterans of the 22d Bomb Group, including the 2d, 19th, 33d, and 408th Bomb Squadrons, will hold their thirty-fifth annual reunion on August 29–September 2, 1984, at the Westin Oaks Hotel in Houston, Tex. **Contact:** Jack Clark, P. O. Box 4734, Patrick AFB, Fla. 32925. Phone: (305) 636-5004.

27th Bomb Group
A reunion will be held for the 27th Bomb Group on October 12–14, 1984, in Montgomery, Ala. **Contact:** Charles Cook, 3822 Cumberland Way, Lithonia, Ga. 30058. Phone: (404) 981-3945.

32d Troop Carrier Squadron
Former members of the 32d Troop Carrier Squadron, 314th Troop Carrier Group, Ninth Air Force, will hold their fifth reunion on October 25–28, 1984, at the Marriott Hotel, Interstate North, Atlanta, Ga. **Contact:** W. R. Bomar, 1706 Niskey Lake Trail, S. W., Atlanta, Ga. 30331. Phone: (1-414) 344-3064. David Klarer, 573 McIntire Dr., Fairborn, Ohio 45324. Phone: (1-513) 878-5722.

33d Fighter Group
Former World War II fighter pilots who flew combat missions with the 33d Fighter Group (now the 33d Tactical Fighter Wing) are invited to a reunion in Fort Walton Beach, Fla., on October 2–6, 1984. **Contact:** W. D. Jones, P. O. Box 104, Shalimar, Fla. 32579.

34th Air Depot Group Ass'n
Members of the 34th Air Depot Group and attached units will hold a reunion on September 6–8, 1984, at the North Park Inn, Dallas, Tex. **Contact:** Joe Myers, 2729 Ostrom Ave., Long Beach, Calif. 90815. Phone: (213) 421-2166.

40th Bomb Group
The fifth reunion of the 40th Bomb Group will be held on October 19–21, 1984, in Williamsburg, Va. **Contact:** Ira V. Matthews, 1805 N. Indian Creek Dr., Mobile, Ala. 36607. Phone: (205) 478-8202.

Class 43-G
Former members of Class 43-G, Williams Field, Chandler, Ariz., will hold a reunion on September 26–30, 1984, in Colorado Springs, Colo. **Contact:** Earvie T. "Bud" Cloyd, 4236 N. 34th Pl., Phoenix, Ariz. 85018.

48th Fighter Squadron Ass'n
Veterans of the 48th Fighter Squadron, 14th Fighter Group, will hold their reunion on October 25–27, 1984, at the Holiday Inn Central, Lafayette, La. **Contact:** Frank Resweber, 110 Acadian Dr., Lafayette, La. 70503. Phone: (318) 234-1617.

49th Fighter Squadron
Veterans of the 49th Fighter Squadron, 14th Fighter Group, will hold their reunion on October 26–28, 1984, in Orlando, Fla. **Contact:** Sheril Huff, 3200 Chetwood Dr., Del City, Okla. 73115. Phone: (405) 677-2683.

78th Fighter Squadron
A reunion for former members of World War II's 78th Fighter Squadron will be held on August 3–5, 1984, in Madison, Wis. **Contact:** Clyde Mortensen, P. O. Box 82, Hartland, Wis. 53029. Phone: (414) 367-5628.

80th Fighter Group
The 80th Fighter Group "Burma Banshees" will hold a reunion on October 25–28, 1984, in San Antonio, Tex. **Contact:** Col. Michael Navarro, USAF (Ret.), 26 Altair La., Colorado Springs, Colo. 80906. Phone: (303) 473-7917.

93d Troop Carrier Squadron
Members of the 93d Troop Carrier Squadron, 439th Troop Carrier Group, will hold their reunion on October 17–20, 1984, at the Collinsville Hilton Inn, Collinsville, Ill. **Contact:** Tom Morris, 456 St. George's Ct., Satellite Beach, Fla. 32937. Phone: (305) 773-6960.

During AFA's Electronics Symposium held recently at Hanscom AFB, Mass., Lt. Gen. James W. Stansberry, right, Commander of AFSC's Electronic Systems Division, was presented an AFA Special Presidential Citation by AFA President David L. Blankenship. The Citation read, in part, "General Stansberry combined superb military leadership qualities with expert skills. . . . His extraordinary achievements have earned him the lasting respect and appreciation of our Association and our nation." (Photo by Bill Belanger)

Kevin Clary, right, President of AFA's Chicagoland-O'Hare Chapter, presents a silver mug to Lt. Gen. James A. Abrahamson, USAF, during the Chapter's seventh annual Defense Symposium held in March in Chicago, Ill. General Abrahamson was one of several speakers who addressed the gathering. Others included Sen. Charles H. Percy (R-Ill.), US Coast Guard Commandant Adm. James S. Gracey, Assistant Secretary of the Air Force Tidal W. McCoy, and Lt. Gen. James R. Brickel, USAF. (Photo by Ben Minardi)

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AFA's 1984 National Convention and Aerospace Development Briefings and Displays

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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.

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Current Registration Fee (after September 3) $110.00

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Tickets may also be purchased separately for the following:

____ Aerospace Education Foundation Luncheon @ $38 each $ _____
____ AF Secretary's Luncheon @ $38 each $ _____
____ AF Chief of Staff Luncheon @ $38 each $ _____
____ Annual Reception @ $38 each $ _____
____ AF Anniversary Reception and Dinner Dance @ $80 each $ _____
Total for separate tickets $ _____

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* **Note:** Official convention delegates, national directors, vice presidents, and committee members meeting at convention should not use this form. Your registration information has been mailed separately to you and you are eligible to register for "Red," "White," "Blue," or "Flag" convention packages.

Accounting and Finance Watches the Bottom Line

By Capt. Patricia R. Rogers, USAF
CONTRIBUTING EDITOR

A specially modified register has validated, classified, and summarized the day's total receipts for the Accounting and Finance Office at AFA National Headquarters. Betsy Corvin and Robin Herzberg, accounting assistants, have just finished processing more than 1,000 checks for the daily bank deposit.

According to Fred Musi, AFA's Comptroller, that's an average day. All incoming and outgoing checks must pass through his office; the monthly volume generally exceeds 20,000 checks.

"Of course, that's just part of our departmental operation," says Mr. Musi. "Our primary function is to maintain an accounting system, using proper internal controls, that provides management and our membership with the assurance that AFA's assets are safeguarded against unauthorized use. In addition, that system must ensure that the accounting records are sufficiently reliable to permit the preparation of essential financial statements that present fairly the financial position of the Air Force Association. To achieve these objectives, it is necessary to compile and record transactions in accordance with generally accepted accounting principles and then to subject those transactions to proper audit, analytical, and interpretive procedures.

"The responsibilities of the Accounting and Finance Department touch on every facet of AFA's operations. Consequently, practically everything that AFA does in carrying out its activities has a dollar sign attached to it," Mr. Musi explains.

In this regard, the Comptroller should be familiar with all areas within the Association. And Mr. Musi is. He has worked with AFA, either directly or indirectly, almost since the organization's inception. In the early years, from 1948 to 1964, he audited AFA's books as a CPA on the staff of an independent New York-based accounting firm engaged for the annual audit. In 1964 he joined the Association as its Comptroller.

"When I first joined AFA, we were a hand-to-mouth operation," says Mr. Musi. "Over the years we have grown and developed to a point where we are financially sound." *(See AFA's financial statement on page 12.)*

AFA's current balance (net worth) exceeds $9 million. "This provides a good, sound financial basis for what lies ahead in the acquisition of AFA's new headquarters building," Mr. Musi added. He has been heavily involved in all financial stages of the building acquisition.

John Smith, Assistant Comptroller, assists Mr. Musi in the day-to-day operations of the department. The nine-year AFA veteran supervises maintenance of the books and records for the Aerospace Education Foundation (AFA's affiliate) and for the Association. Thus, he oversees many activities, including accounts receivable and payable, investments, sales tax reports, disbursements of petty cash, and expense vouchers.

"We're here to protect AFA's assets," affirms this Boston native, who recently passed his CPA exam.

AFA's Accounting and Finance Department (from left): Joan Herzberg, John Smith, Mildred Neider, Fred Musi, Robin Herzberg, Margaret Glover, Janet Hensler, Betsy Corvin, Maria Winter, and Paul Montalbano.

AFA's financial records were fully computerized in 1983. Staff accountant Paul Montalbano was instrumental in that project and is responsible for the still-continuing conversion from manual to computer records.

The Comptroller's office has two long-time employees. Mildred Neider joined the staff as an accounting assistant and Joan Herzberg followed a month later in that same capacity more than twenty-six years ago. Their long-time loyalty to AFA makes them two of the most senior staff members.

"Millie," besides doubling as Mr. Musi's secretary, handles the payroll and always elicits a smile from her fellow employees—even when she doesn't have paycheck in hand. Mrs. Neider also takes care of employee insurance and retirement records, as well as maintaining records of all registrants to AFA's National Convention and various symposia.

Mrs. Herzberg, among other responsibilities, is in charge of accounts payable. In addition to paying the bills, she processes for collection all memberships charged to credit cards and prepares various summary analyses, such as recaps of AFA's monthly income.

Margaret Glover, another AFA veteran who has seventeen years' service, acts as purchasing agent in the acquisition of office equipment and supplies. In this capacity, she maintains inventory records and oversees repairs of all equipment.

Other accounting assistants supporting the day-to-day operations of the Accounting and Finance Office are Maria Winter and Janet Hensler. Mrs. Winter's duties encompass advertising billings, accounts receivable, petty cash, bank reconciliations, and analysis of computer time. Mrs. Hensler checks expense accounts, prepares selected monthly journal voucher entries, audits magazine distribution reports, and prepares distribution analyses of reproduction and postage costs.

In addition to totaling the day's cash receipts, Ms. Corvin summarizes and distributes telephone and delivery service costs. She also handles most of the input of transactions into the computer. Robin Herzberg, Joan Herzberg's daughter, sorts the mail, follows up on collection of bad checks, and fills orders for requests of past magazine issues.

With the heavy volume of work, especially during peak periods, everybody also has several additional jobs. "One way or another, though, it all gets done," said Mr. Musi.

That's really the bottom line for the folks in Finance!

This Is AFA

The Air Force Association is an independent, nonprofit, aerospace organization serving no personal, political, or commercial interests; established January 26, 1946; incorporated February 4, 1946.

OBJECTIVES: The Association provides an organization through which free men may unite to fulfill the responsibilities imposed by the impact of aerospace technology on modern society; to support armed strength adequate to maintain the security and peace of the United States and the free world; to educate themselves and the public at large in the development of adequate aerospace power for the betterment of all mankind; and to help develop friendly relations among free nations, based on respect for the principle of freedom and equal rights for all mankind.

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Information regarding AFA activity within a particular state may be obtained from the Vice President of the Region in which the state is located.

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Kansas City, Mo. 64134
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(605) 343-0729
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Warner Robins, Ga. 31099
(912) 922-7615
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Robert Gass
(ex officio)
National Commander
Arnold Air Society
Los Angeles, Calif.

AFA Intercom

95th Bomb Group
A reunion for the 95th Bomb Group (an Eighth Air Force B-17 unit) will be held on October 21–23, 1984, at the Landmark Motor Hotel, Metairie, La. **Contact:** Zach T. Stanborough, 1900 Feronia St., Metairie, La. 70005. Phone: (504) 835-0127.

306th Bomb Group Ass'n
Veterans of the 306th Bomb Group and the 367th, 368th, 369th, and 423d Bomb Squadrons and service units (stationed at Thurleigh, Bedfordshire, England) will hold their ninth annual reunion on October 25–27, 1984, at the Green Oaks Inn, Fort Worth, Tex. **Contact:** Reginald L. Robinson, P. O. Box 16917, Fort Worth, Tex. 76162. Phone: (817) 923-2791 or (817) 293-3061.

315th Bomb Wing
The first reunion for the 315th Bomb Wing will be held on October 4–6, 1984, at the Holiday Inn in Cocoa Beach, Fla. **Contact:** George E. Harrington, 4600 Ocean Beach Blvd., Apt. 505, Cocoa Beach, Fla. 32931.

315th Troop Carrier Group
A reunion for the 315th Troop Carrier Group will be held on October 4–6, 1984, at the Marines' Memorial Club in San Francisco, Calif. **Contact:** Robert L. Cloer, 1417 Valley View Dr., Yuba City, Calif. 95991. Phone: (916) 674-3681.

339th Fighter Squadron Ass'n
A reunion for former and present members of the 339th Fighter Squadron will be held on September 20–23, 1984, at the Campbell House Inn in Lexington, Ky. **Contact:** Richard Cowles, 745 Harrison, Belding, Mich. 48809.

345th Bomb Group
The 345th Bomb Group, Fifth Air Force, and the 498th, 499th, 500th, and 501st Bomb Squadrons will hold their reunion on September 5–9, 1984, at the Stouffer's Dublin Hotel in Columbus, Ohio. **Contact:** Sandy Cortesio, 906 Drake, Centerville, Iowa 52544. Phone: (515) 856-6565.

364th Fighter Group Ass'n
The second reunion of the 364th Fighter Group, Eighth Air Force, will be held on October 11–14, 1984, in San Antonio, Tex. **Contact:** Chelius H. Carter, 9730 Evander Rd., Millington, Tenn. 38053.

367th Fighter Group
Members of the 367th Fighter Group, including the 392d, 393d, and 394th Fighter Squadrons, will hold a reunion on October 11–14, 1984, in San Diego, Calif. **Contact:** Jack T. Curtis, 437 Cedar Dr., Beaver Shores, Rogers, Ark. 72756.

380th Bomb Group
The 380th Bomb Group "Flying Circus" will hold its reunion on October 11–14, 1984, in El Paso, Tex. **Contact:** Forrest "Tommy" Thompson, 2401 Lakeview Dr., Heber Springs, Ark. 72543. Phone: (501) 362-2891.

384th Bomb Group, Inc.
The ninth reunion of the 384th Bomb Group will be held in San Antonio, Tex., on October 11–14, 1984. **Contact:** 384th Bomb Group, Inc., P. O. Box 1021A, Rahway, N. J. 07065.

409th Bomb Group Ass'n
The 409th Bomb Group will hold its reunion on October 4–7, 1984, at the Daytonian Hilton, Dayton, Ohio. **Contact:** Eugene B. Nelson, Rte. 1, Box 129A, Alpine, Ala. 35104.

452d Bomb Group
Veterans of the 452d Bomb Group (H), an Eighth Air Force unit that was stationed in England during World War II, will hold their reunion on October 20–23, 1984, in Reno, Nev. **Contact:** Rom Blaylock, P. O. Box 2526, New Bern, N. C. 28561.

455th Bomb Squadron Ass'n
The 455th Bomb Squadron "Whitetail Marauders" will hold its third annual reunion on October 4–7, 1984, in Colorado Springs, Colo. **Contact:** Howard Kaiser, 3110 Spring Meadow Dr., Colorado Springs, Colo. 80900.

3083d Aviation Depot Group
A reunion for all former members (1956–62) of the 3083d Aviation Depot Group and the 3096th Aviation Depot Squadron will be held on October 5–7, 1984, in Fairfield, Calif. **Contact:** Ed Craig, 2499A Martin Rd., Fairfield, Calif. 94533.

Coming Events

July 13–15, **Pennsylvania State Convention,** Carlisle Barracks . . . July 20–21, **Oklahoma State Convention,** Oklahoma City . . . 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 AFB/Goldsboro . . . August 17–18, **Arkansas State Convention,** Little Rock . . . August 17–18, **New York State Convention,** Mitchel Field . . . August 18, **Georgia State Convention,** Warner Robins . . . August 18, **Michigan State Convention,** Southfield . . . August 18, **New Mexico State Convention,** Alamogordo . . . August 18, **Wisconsin State Convention,** Milwaukee . . . August 24–26, **California State Convention,** Irvine . . . August 24–26, **Oregon State Convention,** Portland . . . September 8, **Arizona State Convention,** Luke AFB . . . September 16–20, **AFA National Convention and Aerospace Development Briefings and Displays,** Washington, D. C.

Intercom

During the South Carolina State AFA Convention held recently in Clemson, S. C., keynote speaker Sen. Strom Thurmond (R-S. C.), second from right, was invested as a Jimmy Doolittle Fellow of the Aerospace Education Foundation. Presenting the Fellowship medallion was AEF President Dr. Don C. Garrison, second from left. Looking on were Doug Catington, left, South Carolina State AFA President, and Lee Lingelbach, AFA Vice President for the Southeast Region.

4080th Strategic Recon Wing
Former members of the 4080th Strategic Reconnaissance Wing who served at Turner AFB, Ga., Laughlin AFB, Tex., or Davis-Monthan AFB, Ariz., from 1956–66 will gather for a reunion on August 17–18, 1984, in Del Rio, Tex. **Contact:** Timothy F. Deason, P. O. Box 1348, Del Rio, Tex. 78841. Phone: (512) 775-1341.

7505th USAF Hospital
Members of the 7505th USAF Hospital will hold a reunion on September 26–30, 1984, in San Antonio, Tex. **Contact:** Raymond D. Cole, 106 Dartmouth Way, Niceville, Fla. 32578. Phone: (904) 678-7445.

Wilmington Warriors Ass'n
We are planning a dinner in October 1984 for former members of the 2d Ferrying Group "Wilmington Warriors" who served at New Castle County Airport in Wilmington, Del., during World War II.

Please contact the addresses below for additional information.

Carl L. Smith
1070 Locust St.
Denver, Colo. 80220
Phone: (303) 322-1030

or

Onas P. Matz
7504 Brooklyn Ave., N. E.
Seattle, Wash. 98115
Phone: (206) 524-4322

10th Radar Calibration Squadron
Former members of the 10th Radar Calibration Squadron, including the 3d Radar Calibration Unit, are trying to organize a reunion to be held either late this year or in 1985.

Please contact the address below for more details.

Peter D. Summer
404 Arrowhide Dr.
Montgomery, Ala. 36117

Class 44-J
We are trying to organize a fortieth-year reunion to be held in October 1984 in Amarillo, Tex., and would like to hear from members of Class 44-J.

Please contact one of the addresses below.

John C. Adams
P. O. Box 843
Panhandle, Tex. 79068

or

James C. Britt
2462 Sherwood Villa
Columbus, Ohio 43221

Class 47-C
All former members, not just graduates, of the first USAF pilot class, known as the "Guinea Pigs," are urged to contact the address below.

Robert Campion, Jr.
Box 88
Richardson, Tex. 75080

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COTTON CLASSICS!

Style #1910, $18.50
Features: *4 button placket; 2 pieced fused collar; Pearl buttons; Right side pocket with flap; Double needle tailoring; collar stays; Full golfer cut.*
Sizes: *S-M-L-XL-XXL*
Colors: *White, Navy, Camel, Red, Kelly Green*

Style #2400, $15.50
Features: *Ladies version-2 Button placket; Fashion knit collar; Banded sleeves; Long rear tail.*
Sizes: *S-M-L-XL*
Colors: *White, Bone, Navy, Kelly Green, Lavender*

CASHMERLON™!

Style # 1001, $22.50
Features: *Full turnback cuff; fully fashioned saddle shoulder; full golfer cut.*
Sizes: *S-M-L-XL-XXL*
Colors: *White, Navy, Chocolate, Burgundy*

Style #2001, $22.00
Features: *Ladies Version-Full turnback cuff; fully fashioned; raglan sleeve.*
Sizes: *S-M-L-XL*
Colors: *White, Lt. Blue, Navy and Plum*

ALL WEATHER WEAR!

Style #JK 1700, $31.00
Features: *100% nylon water repellent rain jacket; noise resistant fabric; heavy zippers; hidden hood; action knit under arms allows for free and easy movement; Two front zip pockets.*
Sizes: *S-M-L-XL-XXL*
Colors: *Lt. Blue, Navy, Camel*

Style #JK 2700, $30.00
Features: *Ladies version of JK1700*
Sizes: *S-M-L-XL*
Colors: *Yellow, Navy, Plum*

Style #	Color	Size	Quantity	Price
		Shipping and handling		3.00
		TOTAL AMOUNT ENCLOSED		$

Enclose check or money order made payable to the Air Force Association and send to AFA, 1501 Lee Highway, Arlington, VA 22209-1198. (Virginia residents please add 4 percent sales tax.)(Please allow six to eight weeks for delivery.)

7-84

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Bob Stevens'

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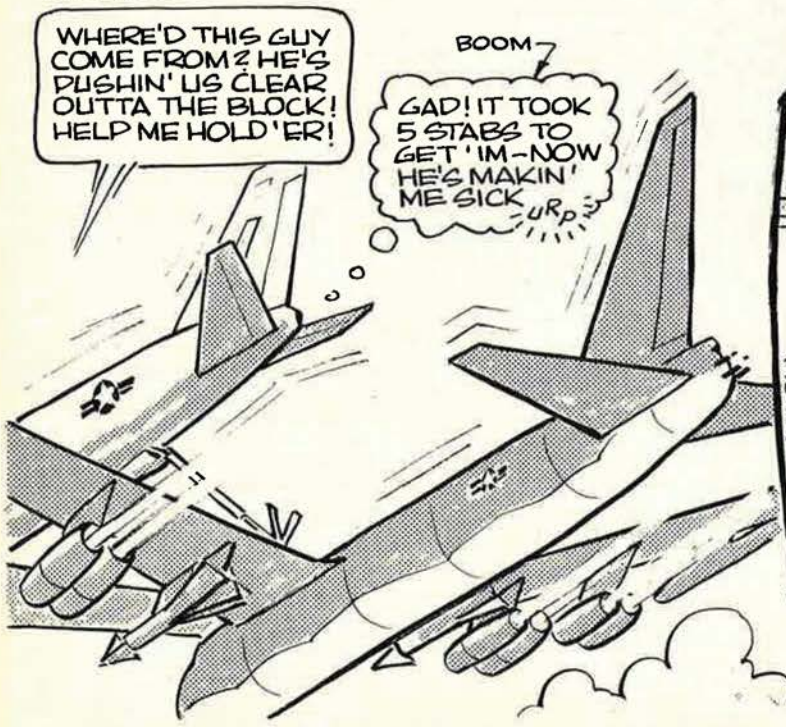
AIR REFUELING TAKES SPECIAL SKILLS. ROUGH AIR, LONG ORBIT TIMES, MISSED HOOK-UPS, and EXTENSIVE TDY BUILD CREW CHARACTER. BOTH OF THESE ARE TRUE STORIES ABOUT KC-135 CREWS ... LONG THE BACKBONE OF THE FORCE.

DURING THE LAST FLAP, CREWS ROTATED TO **SEA** ON A 3-MONTH BASIS. BOOM OPERATORS ACTED AS LOADMASTERS ON FERRY MISSIONS—

AFTER A ***LONG*** FLIGHT TO GUAM—

THANKS TO CAPT. R. WILDE SALT LAKE CITY

A '52 HOOKED UP TO A KC-135 IS THRASHING AROUND LIKE A SNAGGED MARLIN—

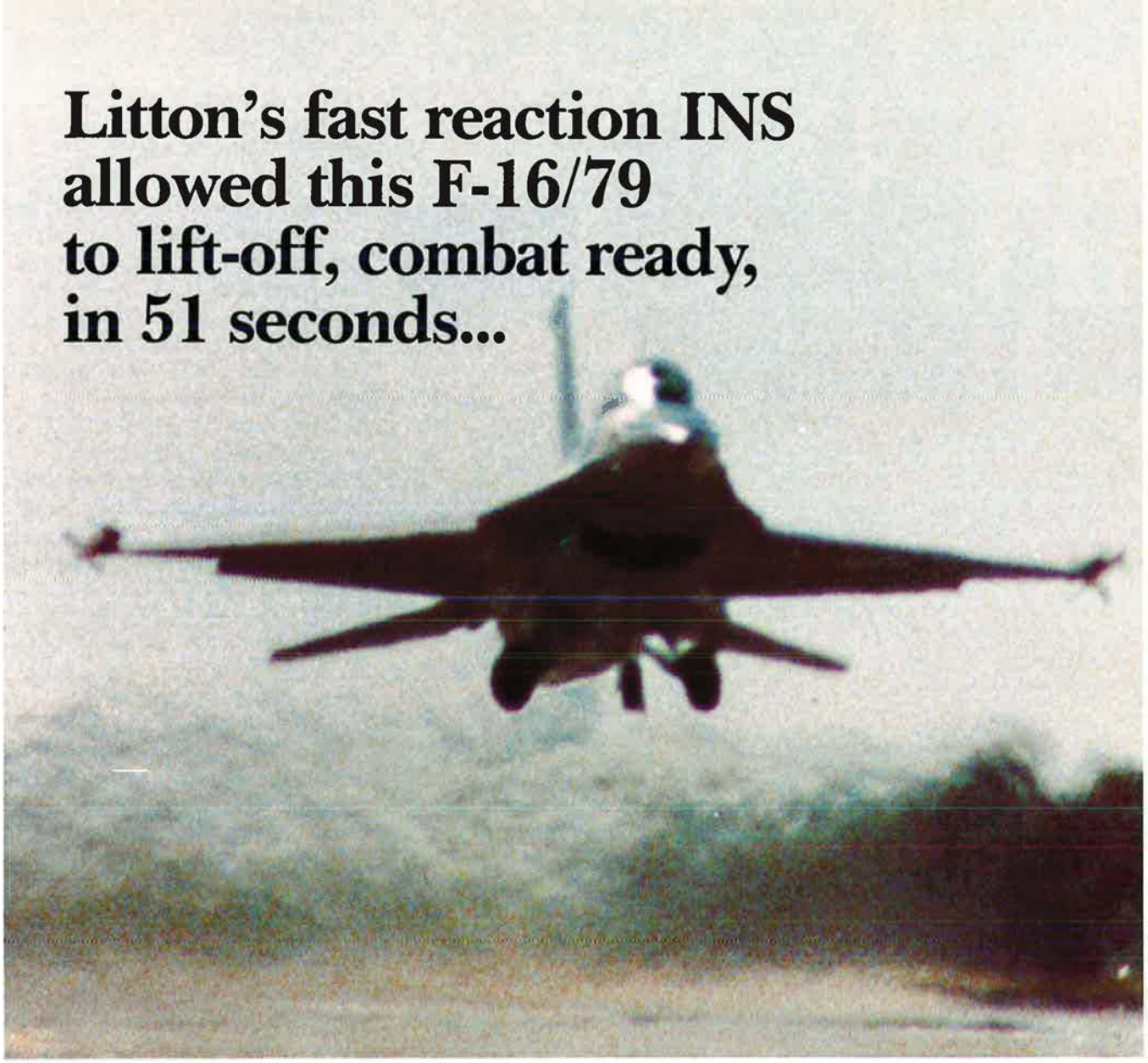


SUDDENLY THE TANKER FLIGHT DECK DOOR OPENS—

J. GRIFFIN TAB BOOKS

Bob Stevens

Litton's fast reaction INS allowed this F-16/79 to lift-off, combat ready, in 51 seconds...



Fast alignment

From a cold start, and without ground power, Litton's fast reaction LN-39 standard INS permits **brake release in less than 35 seconds.** INS alignment is performed concurrently with engine start. . .when the pilot and his aircraft are ready, so is the INS. It fully supports all INS-dependent avionics, and combat mission requirements.

Hands-off scramble

The INS will automatically start and align upon application of aircraft power. When the pilot releases his brakes and begins his taxi or take-off roll, Litton's new "Auto-Nav" feature will automatically switch the Inertial Navigation System from the alignment to the navigate mode. **The pilot touches no INS controls during the entire scramble sequence.** Auto-nav eliminates the degraded performance associated with failure to switch to "nav" before brake release.

Litton's fast reaction LN-39 INS allowed the demonstration of **the fastest combat-ready scramble that has ever been achieved.**

If you would like to know more about Litton's navigation system that will help you scramble faster than ever before, contact our Director of Business Development at 818-715-4321, or write to Litton Industries' Guidance and Control Systems, 5500 Canoga Avenue, Woodland Hills, California 91365.

Litton

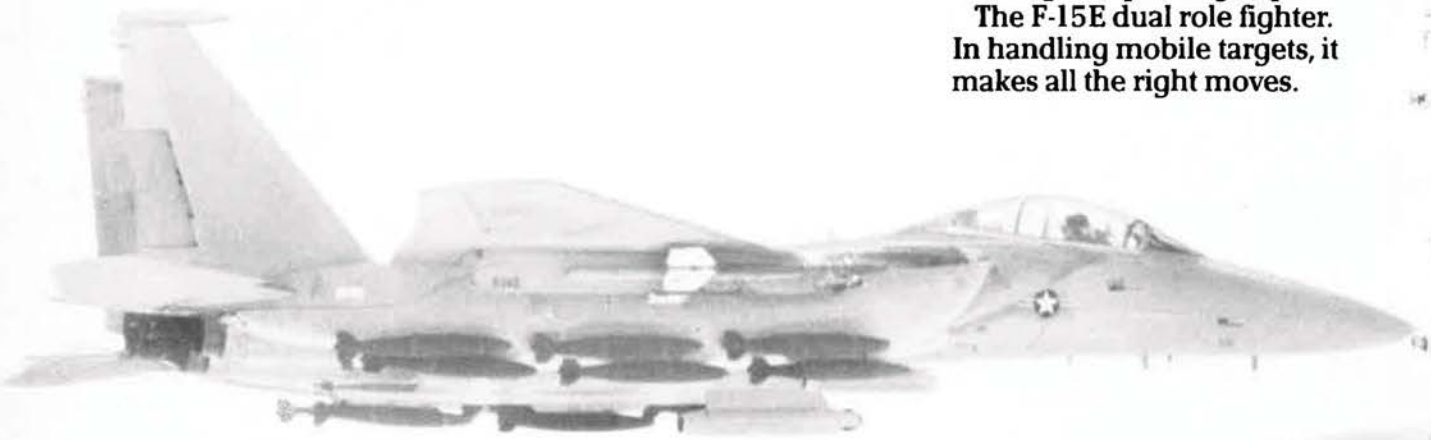
WHEN A TARGET'S ON THE MOVE, IT'S TOUGH TO STAY ON THE MARK.

Interdiction missions against moving ground targets demand precision.

Only manned aircraft have the flexibility to succeed against mobile targets—to hit the enemy where he is, not where he was. Global defense calls for very capable aircraft—aircraft not only with range, endurance and survivability, but also with accurate navigation, sighting and weapons delivery.

That's why the F-15E dual role fighter is the plane for the job. Its Hughes APG-70 precision mapping radar is the world's most capable, showing the crew with photographic clarity exactly where the target is. LANTIRN sensors guide them to the target and let them pinpoint it precisely in bad weather, day or night. So nothing escapes the eyes of an Eagle. And thanks to superior speed and maneuverability, nothing escapes its grasp.

The F-15E dual role fighter. In handling mobile targets, it makes all the right moves.



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