SEPTEMBER 1991/$5

AIR FORCE

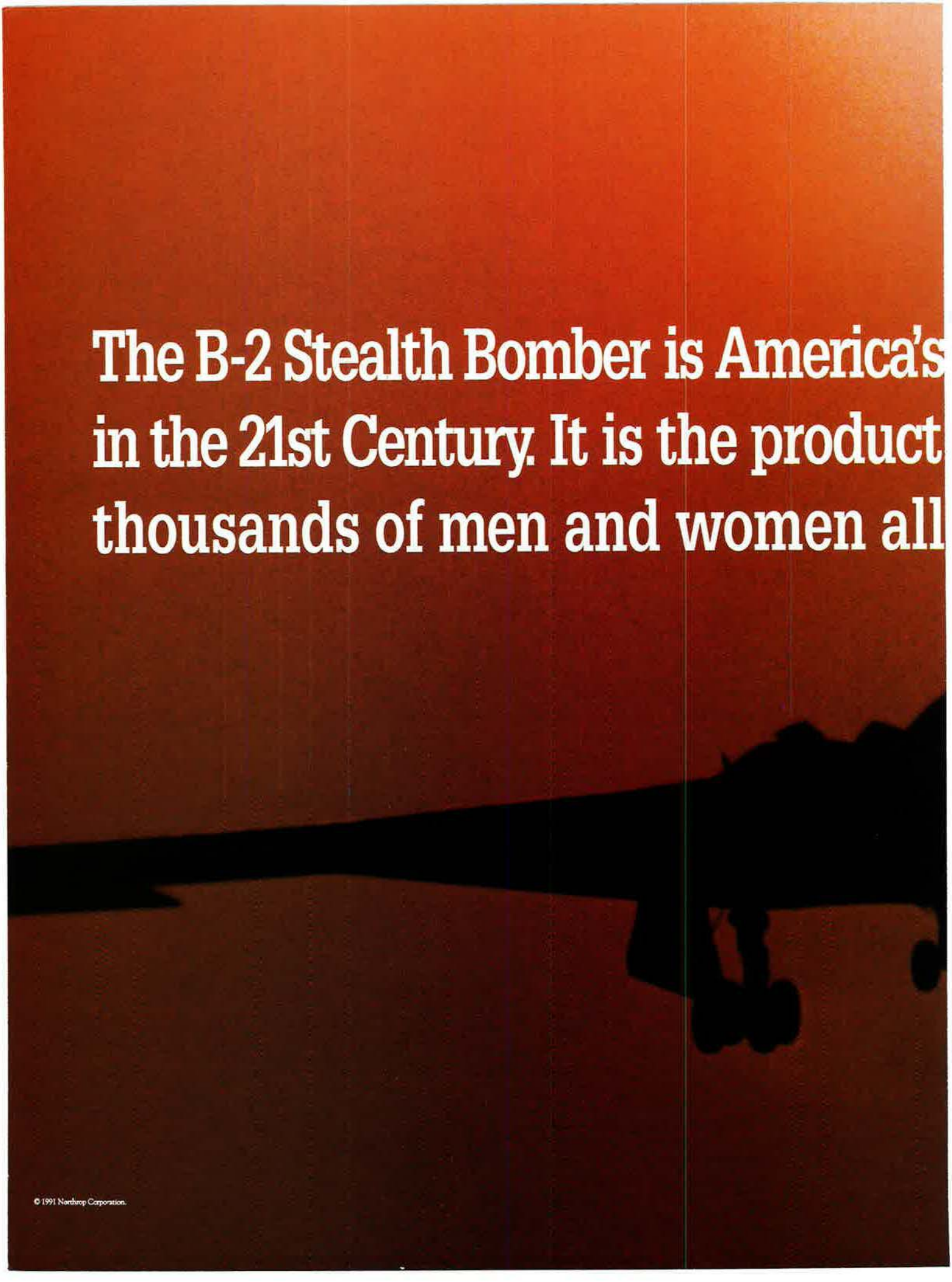
PUBLISHED [illegible] ASSOCIATION

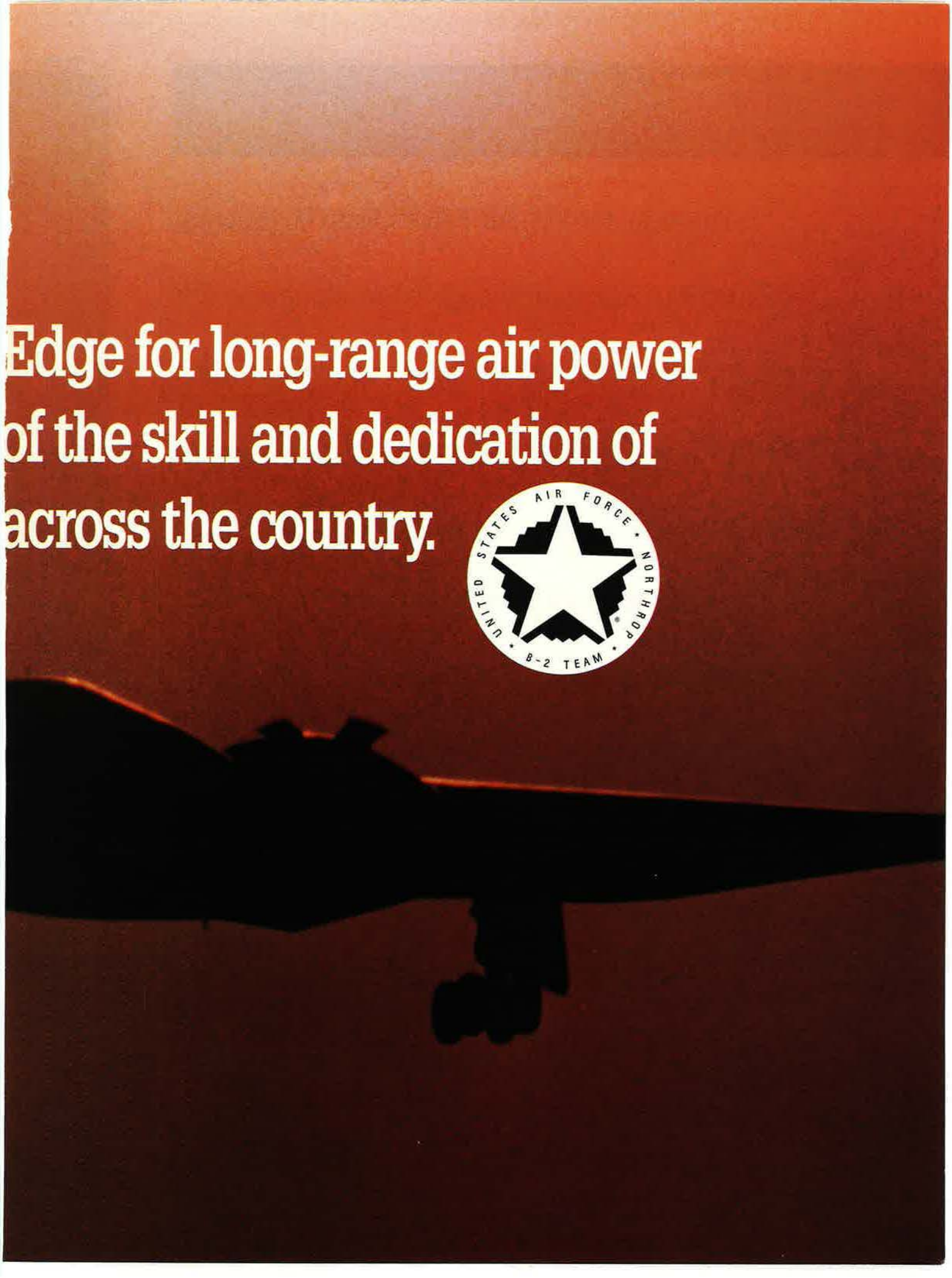
MAGAZINE

Full-Color Memories

Snapshots from Private Collections

The B-2 Stealth Bomber is America's
in the 21st Century. It is the product
thousands of men and women all




Edge for long-range air power
of the skill and dedication of
across the country.
UNITED STATES AIR FORCE
NORTHROP
B-2 TEAM

To Be Continued...

This year, the U.S. Air Force's Titan IV program continued its tradition of success by reaching another important milestone—its first launch from Vandenberg Air Force Base. The event also marked the 100th Titan space launch from the West Coast.

At Martin Marietta, we're proud to be part of an Air Force team providing assured access to space as Titan IV continues its transition to full operational status on both coasts.

To us, there's only one bottom line. Mission success.

MARTIN MARIETTA

6801 ROCKLEDGE DRIVE, BETHESDA, MARYLAND 20817

PHOTO COURTESY OF NASA


Turkey


Norway


Egypt


Denmark


Finland


Portugal


Indonesia


Venezuela


Belgium


Israel


The Netherlands


Singapore


Bahrain


United States


Korea


Pakistan


Thailand


Greece

No other fighter protects national defense budgets like the F-16.

World leaders know the F-16 as a powerful protector of freedom. Its performance in Desert Storm provided dramatic proof. But what makes the F-16 even more remarkable is its ability to win budget battles. Customers want cost credibility. And we give it to them. In fact, one country was able to buy four additional airplanes within its original budget for 36.

The F-16. For 18 nations, it not only protects, it saves.

GENERAL DYNAMICS
A Strong Company For A Strong Country

September 1991, Vol. 74, No. 9

AIR FORCE MAGAZINE

PUBLISHED BY THE AIR FORCE ASSOCIATION

Departments

About the cover: A rare full-color photograph from World War II portrays Capt. Dick Perley before a mission at Toul-Ochey, near Nancy, France, in 1944. For more colorful glimpses from the collection of noted aviation historian Jeffrey L. Ethell, see "Full-Color Memories," p. 40.

The Heritage of the Force

AIR FORCE Magazine (ISSN 0730-6784) September 1991 (Vol. 74, No. 9) is published monthly by the Air Force Association, 1501 Lee Highway, Arlington, VA. 22209-1198. **Phone** (703) 247-5800. Second-class postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** $21 per year; $48 for three-year membership. **Life Membership:** $300. **Subscription rate:** $21 per year; $25 per year additional for postage to foreign addresses (except Canada and Mexico, which are $8 per year additional). Regular issues $3 each. Special issues (USAF Almanac issue and Anniversary issue) $5 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send change of address to Air Force Association, 1501 Lee Highway, Arlington, VA. 22209-1198. Publisher assumes no responsibility for unsolicited material.

Editorial

By John T. Correll, Editor in Chief

Europe on the Rebound

THE Warsaw Pact is dead. The Russians are retreating 600 kilometers. At least half of the Americans are going home. A new arms-control treaty will lead to destruction of thousands of tanks, aircraft, and artillery pieces. It is difficult to say exactly where the border between East and West now lies.

The previous arrangements for defense of western Europe are obsolete. There is some clamor to disband NATO altogether, but that is unlikely to happen.

US European Command says the Soviets can make all of their arms-control reductions and still generate sixty divisions west of the Urals, with more available from the Far East. That is too much of a threat to ignore, and new threats are emerging. By the turn of the century, eight nations that were not part of the old Warsaw Pact will be able to target western Europe with ballistic missiles.

Sooner or later, NATO has to stop ducking the "out-of-area" question and address the problem of military aggression that challenges Allied interests but that occurs outside of Alliance territory.

Europe seethes with uncertainty. The former Soviet client states are struggling to establish direction and identity. A RAND Corp. study for the Pentagon nominates Poland. Czechoslovakia, and Hungary to be a permanent buffer zone between western Europe and the Soviet Union. As RAND acknowledges, however, those nations may have a different destiny in mind.

The civil war in Yugoslavia has awakened memories of the internecine turmoil that swept Europe regularly before the cold war imposed a precarious stability on the continent forty-five years ago.

Germany, reunified and potentially the dominant power in Europe, makes its neighbors nervous. There is also speculation that the Germans, long disposed toward closer ties with the East, may eventually throw in with the Soviet Union. The permutations feed on each other. For example, as Alexander Haig warns, an obsession to constrain Germany could itself lead to conflict.

Against this swirling backdrop and with no assurance of what the future holds, NATO is plunging ahead with a top-to-bottom revision of strategy and objectives. Its new approach assumes a much smaller force defending a considerably larger territory in which battle lines cannot be drawn in advance.

Sixty Soviet Divisions are just one factor NATO must reckon with in its revised strategy.

NATO forces should be well equipped. The US, Germany, and the Netherlands are donating modern tanks, armored vehicles, and artillery to Allies who will then satisfy arms treaty requirements by destroying older equipment. NATO's inventory of combat aircraft and helicopters is already below the treaty ceiling by a wide margin.

(The Soviets, who are provisioned massively, get less benefit from permissible transfer of equipment. According to the US Arms Control and Disarmament Agency, the Soviets can keep only thirty-five percent of what they had in Europe in 1988.)

By 1995, US deployments in Europe will consist of two Army divisions, three air wings, and a maritime presence in the Mediterranean. The Europeans are organizing a Rapid Reaction Corps, perhaps four divisions to be led by the British. It would be backed up by in-place defense forces composed of active and reserve troops for whom readiness standards would be relaxed. The ultimate backup is mobilization, relying heavily on reinforcements from the United States.

Some schemers are more ambitious in what they seek to achieve from the restructuring. They would like to build the "European pillar" of allied defense around the West European Union or some other alternative organization, thereby undercutting US influence in the Atlantic alliance.

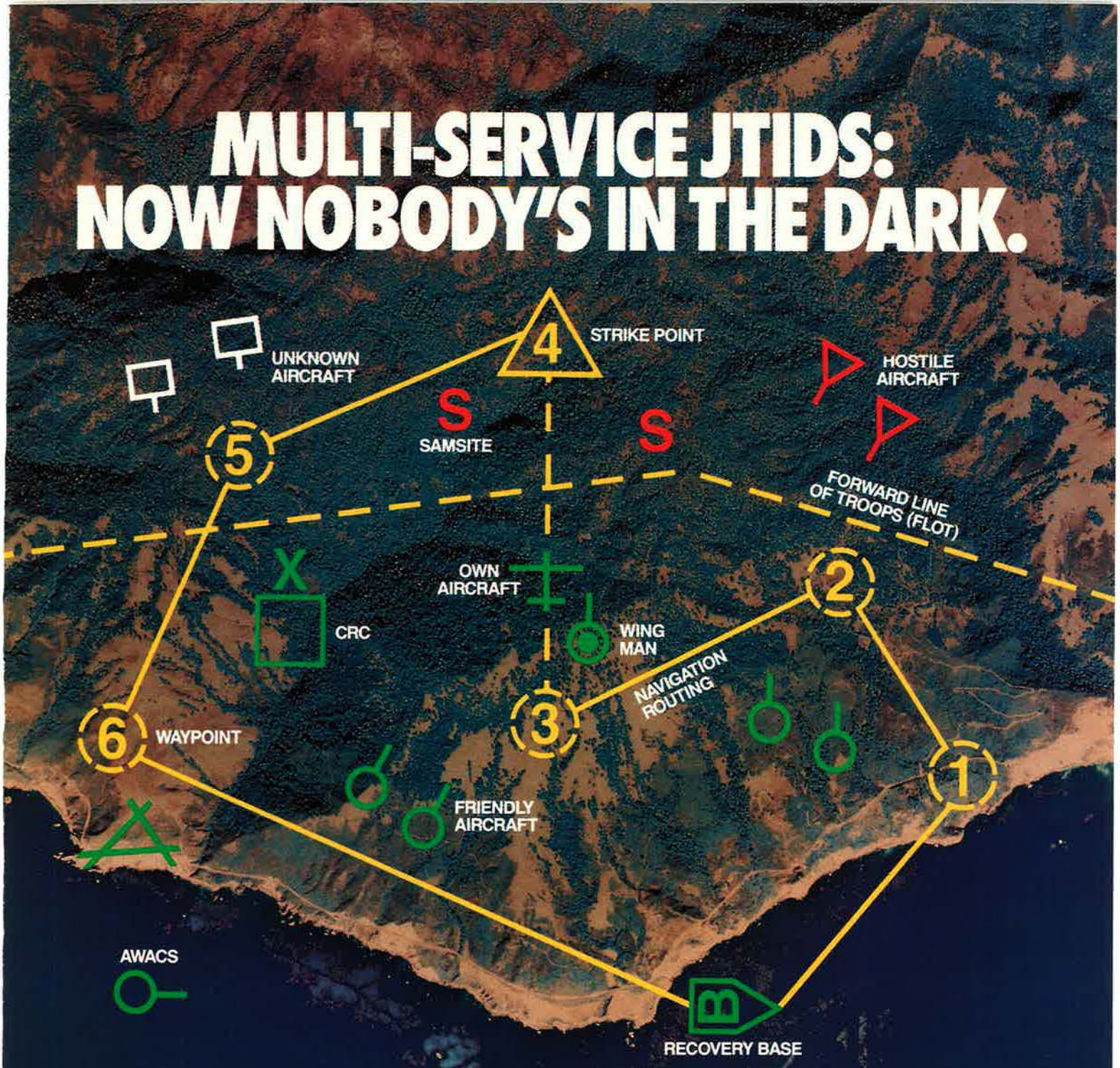
The prevailing view, so far at least, is that the security of Europe should be entrusted to NATO, and that for its own benefit and the good of the alliance, the United States must be involved. As Henry Kissinger observes, "without a clear American role, the psychological map of Europe as well as of Atlantic relations would be radically transformed." No proposal heard so far provides for a credible defense of Europe without American participation.

Geography and circumstance make Europe a crossroads of world events. Both world wars began there. The superpower confrontation played out most intensely there. The world's worst fears and greatest hopes still hang on what happens in Europe. If Europe is vulnerable or unstable, it will almost surely drift into trouble and the trouble will spread.

Planning on the rebound is not usually a good idea, but the changes of the past two years have been of such magnitude that it made no sense for NATO to wait longer to revise its strategy. Later, it may be necessary to adjust the adjustments.

Concern about European security was not some phase the West went through and can now regard as finished. It is a continuing problem and one we cannot escape. ■

MULTI-SERVICE JTIDS: NOW NOBODY'S IN THE DARK.



You're in a high-threat tactical environment. Imagine being able to see at a glance the entire battle scenario. Now, for the first time, U.S. forces will have real-time interoperable data to maximize tactical situation awareness on land, sea and in the air. This system capability is provided by the Joint Tactical Information Distribution System (JTIDS).

Contact Collins Avionics and Communications Division, Rockwell International, Cedar Rapids, Iowa 52498. (319) 395-2208. Telex 464-421 COLLENGR CDR.

Rockwell International

...where science gets down to business

COLLINS AVIONICS

Letters

The Luxury of Defense

The June editorial "The Measure of Affordability" *[see p. 4]* fueled my concern about the Advanced Tactical Fighter (ATF). While I support the notion that reductions are necessary in many areas of the federal budget, I cannot support the notion of avoiding technological upgrades in defense because of cost.

Many Americans deem it a right (and go to great lengths) to have the latest in automotive technology. Many also have in their homes the best in four-head VCR technology, remote phone systems, faxes, and computers. I am quite sure that many of them, like me, are in debt because of these. Yet the idea of denying ourselves the best in defense is often praised.

I am not advocating rampant defense spending. We must continually search for more cost-effective ways to do things. Until those ways emerge, we must do things the way we know how, trying to achieve a balance among defense, social programs, and leisure expenses without jeopardizing the success and effectiveness of any of them.

We recently were in a war where our opponent was equipped with antiquated technology and fought (as the June issue cover states) "The War the Enemy Never Saw." Their ability to defend themselves was at a level this country left behind years ago. If we allow ourselves to stall in defense upgrades, that same enemy (or another) may one day have technology that matches ours, and more than a handful of precious American lives will perish. If we are willing, for a while, to be in debt for the luxuries of life, then we must be willing, for a while, to be in debt for the luxury of freedom.

TSgt. George Sullivan,
USAF
Fort Meade, Md.

Strategic Economics

Your July issue was an excellent read—especially the articles dealing with military strategy. I agree that one hole in our emerging strategy of forward presence, crisis response, and reconstitution is the problem of the changing industrial base. *[See "A Hole in the Strategy," p. 7.]*

I believe there are other holes in the strategy that need to be addressed. My concern is with the organization and potential effectiveness of this modification of our Total Force policy.

Economic ideology and bureaucratic inertia may be standing in the way of this strategy. US economics texts from the 1960s do not provide the conceptual framework for managing US technological leadership in the next century. Japan, Inc., may be the better economic and government-management model to study—for both national military strategy and national economic policy insight. The former springs largely from the latter, and our Economics 101 seems to need tough-minded rethinking in view of our comparative economic success in recent years.

Organization and optimization of our Guard and Reserve Forces has to be rethought—especially the Air Guard. Why does this strategy need two blue-suit reserve components? How do the Navy, Marines, and Coast Guard get by with one reserve component each? Why do the governors need aerospace vehicles? Why all the diseconomies of scale in unit equipage and training in the Air Guard and Reserve? Asking these questions is much like asking: Why do we need fifty states, 3,049 counties, and 16,734 townships in the aerospace and information age, and why isn't military service, a stint at RAND, and an MBA or MPA a prerequisite to career continuation among policy practitioners? To answer by saying, "It grew that way," is a cop-out.

Ideally, good economics is also good politics. Good politics should also lead to good economics. Friends of our blue-water friends killed the politically motivated home porting scheme because it was not affordable. Thus, defense politics and bureaucratic economics may be the biggest holes in the strategy—especially the spread-the-wealth-around, build-the-political-base logic behind the Air (and Army) Guard force structure and 1960s notions of peace, prosperity, competitive markets, national security, and our national interest.

The new strategy requires swapping force structure for technological leadership, sustainability, and the other "ilities." Why not do it right? Work the defense politics first, then the economics and management. Maybe the military strategy will produce a lower net risk assessment with fewer holes.

Perhaps lack of political cover is the source of these strategic holes. Would a suggestion that our elected leadership consider a Total Force Military Strategy/Policy Commission similar to the base closure "leadership team" be too much of a tilt toward rationality in the politics/administration dichotomy? Writing as an old comptroller who has been bulldozed for a lack of political cover by unprincipled and strategy-avoiding policy practitioners, I make this experience-based and heartfelt recommendation.

Desert Storm suggested that we knew how to establish priorities and use our "instruments" of national security management to win one for a change. Let's get our "instruments" right in winning the peace and preparing for future contingencies. If we have holes in the strategy, we have no one to blame but ourselves.

Lt. Col. Larry Feltes,
AFRES (Ret.)
West Chicago, Ill.

Do you have a comment about a current issue? Write to "Letters," AIR FORCE Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Letters should be concise, timely, and preferably typed. We cannot acknowledge receipt of letters. We reserve the right to condense letters as necessary. Unsigned letters are not acceptable. Photographs cannot be used or returned.—THE EDITORS

Chaos in Naval Aviation

An item in the July 1991 "Aerospace World" *[see p. 18]* states that former

Secretary of the Navy John Lehman feels that Naval aviation is only five to ten years away from "chaos" unless the Navy alters its present course. This reminds me of the man who murdered his parents and then asked for clemency because he was an orphan. Naval aviation is in its present difficult state and must take the course it is on because of many of the decisions made by Lehman as Secretary of the Navy from 1981 to 1987, aided by Assistant Secretary of the Navy for Research, Development, and Acquisition Melvyn Paisley, who recently confessed to accepting bribes while in office.

For example, against the advice of many knowledgeable persons who advocated development of a stealth airplane, Lehman insisted instead for several years on upgrading the A-6E, an airplane with 1960s technology and the radar cross section of a B-36.

After the advent of the Air Force F-117 Stealth fighter, Lehman finally saw the light and belatedly gave the go-ahead for the development of the A-12 stealth attack aircraft. Unfortunately, because so much money had gone into the eventually canceled A-6F and other expensive programs, Lehman tried to acquire the A-12 with an unrealistically low program cost and abbreviated full-scale development time, combined with a fixed-price contract. This virtually doomed the program from the start.

Naval aviation must develop the F/A-18E/F now because, under current fiscal constraints, that is the only course that will enable us to achieve necessary force levels and maintain reasonable capability.

Vice Adm. William P. Lawrence,
USN (Ret.)
Falls Church, Va.

Intelligence Shortfall

I hope the Air Force Association didn't commission the white paper, "Air Force Performance in Desert Storm," that was referred to in "Aerospace World" in the June 1991 issue. *[See p. 14. EDITOR'S NOTE: It was a USAF white paper.]* It sounds more like opening comments read for the *Congressional Record* prefacing more substantive testimony. I can't wait to see how the lessons learned from the Gulf War will be treated.

Remarkably, the only area for improvement immediately "obvious" was the shortfall in tactical intelligence support and the "shortage of tactical reconnaissance." No wonder. Tactical reconnaissance has not changed since World War II, when the British were flying unarmed Spitfires in the European theater. US forces in Vietnam just added a fast-moving platform. We learned the hard way, flying night photoflash missions over North Vietnam, that maybe infrared sensors might provide a little more survivability, since the object was to get the "intelligence" home to be processed and disseminated to the ultimate user. The problem is, twenty-five years later, nobody can figure out who the ultimate user really is.

Tactical reconnaissance platforms in Desert Shield and Desert Storm were there—flying operational missions even before the war started.

Pre- and poststrike imagery was available throughout the war, piling up in a corner somewhere in the tactical air control center because the tactical leadership has never given much thought to how tactical reconnaissance is effectively employed and integrated in the "package."

Real-time tactical reconnaissance has been possible for some years now, but development of digital systems that permit editing, data link, and rapid dissemination of perishable intelligence information to the battle commander has languished for a decade. Line-of-sight, force-structure policymaking has hindered development of a new tactical reconnaissance platform, and development of digital pods is one of the longest-running DT&E programs ever. Now we've come full circle with the lessons learned in Desert Storm, realizing that we are overreliant on space-based national technical assets and rediscovering our failure to appreciate the utility and value of the airborne tactical reconnaissance platform.

I'm afraid another lesson we should have learned from Desert Storm, but didn't, was the need for the tactical leadership to come to grips with employment of tactical reconnaissance assets (if they have any in the future). The war didn't go on long enough to make believers out of anybody, or they would have known it was there for them the whole time. Ask the crews from Reno, Birmingham, Bergstrom, and Zweibrücken.

Steve Oxner
Calif. ANG
Huntington Beach, Calif.

Another First in Desert Storm

I enjoyed "Joint STARS Does Its Stuff" *[see June 1991 issue, p. 38]*, especially the description of Joint STARS's role in the targeting of the Iraqi FROG convoy. Your readership might be interested to learn of the involvement of officer and enlisted crew members flying on one of the Airborne Battlefield Command and Control Center (ABCCC) III's first combat missions. Based on Joint STARS's detection of the convoy, the ABCCC III crew verified the target with additional information sources, entered the convoy into the target nomination process, controlled the strike F-16s, and processed the resultant bomb-damage assessment. This is an excellent example of the manner in which airborne command and control acts as a true force multiplier.

CMSgt. Mark D. Doiron,
USAF
Tinker AFB, Okla.

Roundout Brigades Defended

I disagree with the statement in "The New Defense Strategy" *[see July 1991 issue, p. 26]* that the Guard's and Reserve's "overall image was shaken when some Army National Guard roundout brigades reported in sorry shape and could not be sent to the war zone without remedial preparations."

As an active Air Guardsman, I have been receiving a lot of information from the Army Guard leadership about how unfair this treatment of the roundout brigades was. I direct your attention to the vigorous defense of the roundout brigades by Maj. Gen. Robert F. Ensslin, Jr., president of the National Guard Association of the US, which appears in the July 1991 issue of *National Guard*.

On a slightly different matter, is the publicity surrounding the roundout brigades' failures, which somehow seem set up by the active-duty Army leadership (West Pointers), part of a strategy to save the active-duty combat arms from major DoD budget cuts and direct the ax at Guard combat forces?

I am an Air Force Academy graduate, and in the Guard I detect resentment toward the senior Academy-graduate network (Army, USAF, and Navy) and toward how it seems to benefit graduates of the service schools. Whether true or not, the perception exists, and it creates an environment where team playing becomes difficult.

S. John B. Nelson
Gilbert, Ariz.

Horner and the Warthogs

In "A Conversation with Chuck Horner" *[see June 1991 issue, p. 57]*, the commander of the air forces in Operation Desert Storm states that the big hero in A-10 operations was the Maverick missile and not the gun. The gun had a 99.83 percent success rate, and the Maverick a 97.33 percent success rate. Numbers are great, but General Horner didn't have to deal

AEROSTRENGTH®

TACTICAL PROPULSION. CLOSING FAST ON THE 750,000 MARK.

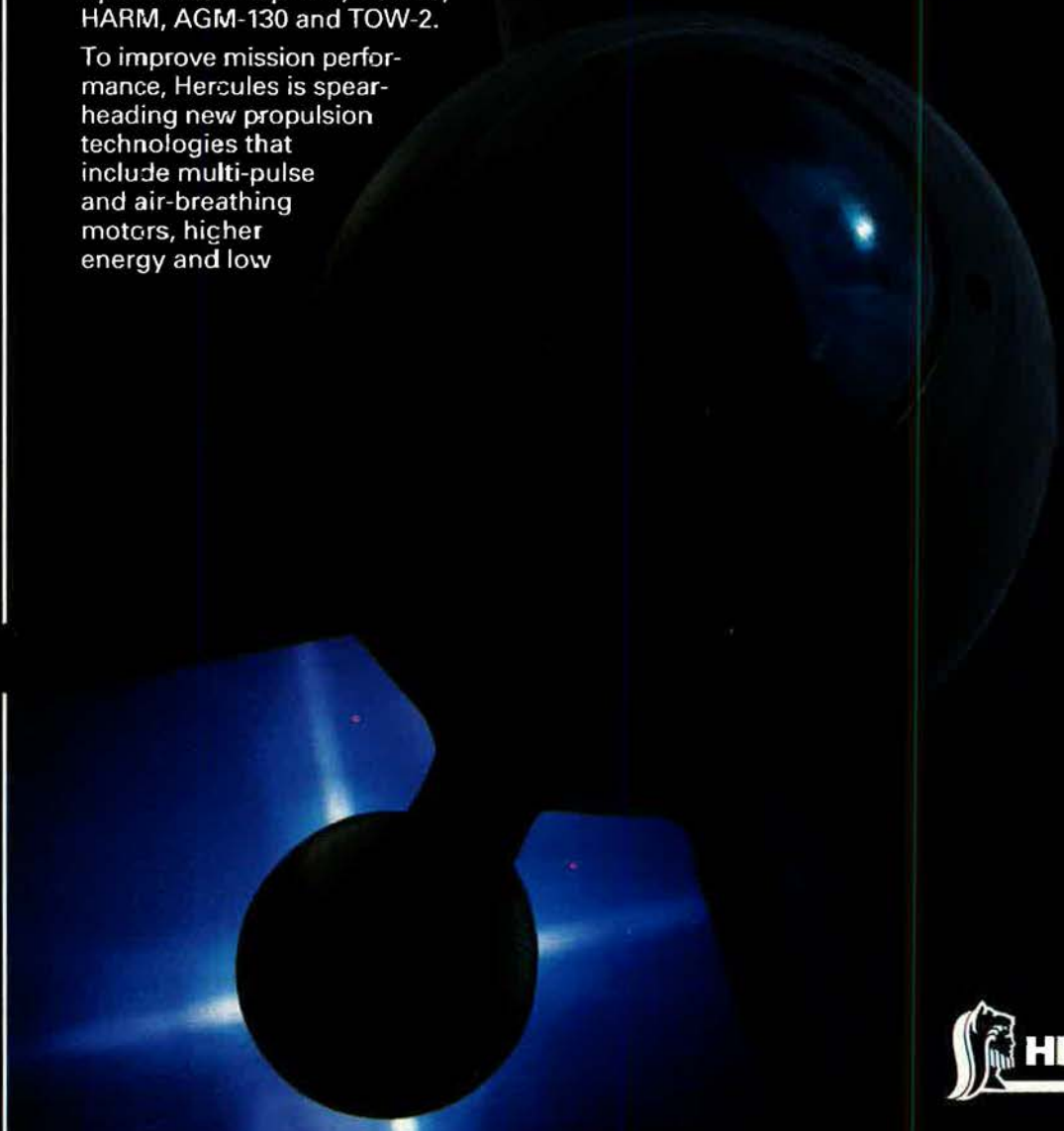
When the mission is tactical, America counts on Hercules. Our rocket motors provide power for half the missile systems in the U.S. tactical arsenal, and are on track to reach 750,000 deployed systems.

Hercules has been a major power in tactical propulsion for over half a century. Our solid propulsion systems power air and ground launched missiles, ranging from AMRAAM, ADATS, Phoenix, Sidewinder and Sparrow to Chaparral, Hellfire, HARM, AGM-130 and TOW-2.

To improve mission performance, Hercules is spearheading new propulsion technologies that include multi-pulse and air-breathing motors, higher energy and low observable propellants, insensitive propellants, rocket-assisted energy rounds, as well as graphite composite rocket motor components that improve system reliability, maintainability and mission effectiveness.

Hercules tactical propulsion. A solid contribution to national security.

Hercules Aerospace
Wilmington, Delaware 19894



HERCULES

A Unit of Hercules Incorporated

with the frustrations of pilots who had just returned from deep inside enemy territory, risking their lives for that great shot, only to have the missile not fire at all.

General Horner stated, "I think I had fourteen [A-10s] sitting on the ramp having battle damage repaired, and I lost two A-10s in one day [February 15]." During the entire war there were only thirteen A-10s damaged—five major and eight minor. These were spread throughout the war, and all but one were repaired and flew again. We did lose two planes from my wing on February 15, but General Horner fails to mention that the pilot of one of the planes received the Silver Star for his heroism while trying to cover his downed wingman. General Horner states that on that date (with only thirteen days left in the war), he pulled the A-10s back to go against only less formidable targets. By then the job was just about done.

In total, the A-10s destroyed twenty-five percent to fifty percent of all tanks destroyed, greater than fifty percent of all artillery pieces, and thirty-one percent of all APCs. They also had more air-to-air kills than the F-16. The A-10s' losses were the same as the F-16s', but none was from mechanical failure. I could go on with numbers, but, as I have shown, they don't always tell the story.

The A-10's days are numbered because it's not fast and sexy, but I am glad that the "Hog" went out with a bang. Whether they will admit it or not, its critics were proven wrong. Just ask any Iraqi tanker.

SSgt. Fred Schlenker,
USAF
Myrtle Beach AFB, S. C.

Premature Retirement

Thanks to AIR FORCE Magazine, I now have some appreciation for what it is like to read my own obituary. I refer, of course, to your erroneous report of my "retirement" in "Senior Staff Changes" in the July 1991 issue *[see p.22]*. On the positive side, your report did result in calls and letters from old friends—some expressing surprise, others welcoming me into their ranks. I don't know what your sources are or how you verify your information, but I'm happy to report that John Casciano is still active as ever, proudly serving as the new TAC DCS/Intelligence. To paraphrase Mark Twain, the reports of my retirement are greatly exaggerated!

Col. John P. Casciano,
USAF
Langley AFB, Va.

Who's a Geek?

It's time once again for some of our glamorous flyboys to take a look around them at any given base and recognize that pilots do not accomplish the total mission of the Air Force. Not only do support officers enable pilots to accomplish the flying mission, but there are six—count 'em, six—Air Force Specialty Codes aside from pilot that are considered operations: navigator, missileer, weapons controller, air traffic controller, space operations, and operations management.

Pilots consider all nonflying personnel to be geeks or shoe clerks. *[See "Dreaming Shoe Clerks," by Maj. Ray Castagnaro, July 1991 "Letters," p. 10.]* Even fellow officers designated by regulation as residents in operations career field billets are lumped into this collective description.

AIR FORCE
PUBLISHED BY THE AIR FORCE ASSOCIATION MAGAZINE

Publisher
Monroe W. Hatch, Jr.

Associate Publisher
Charles E. Cruze

Editor in Chief
John T. Correll

Executive Editor
Robert S. Dudney

Senior Editor
James W. Canan

Associate Editors
Colleen A. Nash, Frank Oliveri

Contributing Editors
John L. Frisbee
Brian Green
Bob Stevens
John W. R. Taylor

Managing Editor
Francine Krasowska

Assistant Managing Editor
Daniel M. Sheehan

Director of Production
Robert T. Shaughness

Art Director
Guy Aceto

Assistant Art Director
Sherryl Coombs

Research Librarian
Pearlie M. Draughn

Editorial Assistants
Amy D. Griswold, Grace Lizzio

Administrative Assistant
Wendy L. Rivera

Advertising Director
Charles E. Cruze
1501 Lee Highway
Arlington, Va. 22209-1198
Tel: 703/247-5800
Telefax: 703/247-5855

Director of Marketing Services
Patricia Teevan—703/247-5800

Assistant Director of Marketing Services
Elizabeth B. Smith—703/247-5800

AREA ADVERTISING MANAGERS
East Coast and Canada
By Nicholas—203/357-7781

Midwest
William Farrell—708/295-2305

West Coast
Gary Gelt—213/295-3050

UK, Benelux, France, Scandinavia, Germany, and Austria
Powers-Overseas Ltd.
46 Keyes House, Dolphin Square
London SW1V 3NA, England
Tel: (44) 71-834-5566
Telex: 24924 OPLIM G
Telefax: (44) 71-630-5878

Italy and Switzerland
Ediconsult Internationale S.A.S.
Piazzo Fontane Marose 3
16123 Genova, Italy
Tel: (010) 543659
Telex: 211197 EDINTI
Telefax: 10-566-578

BPA Circulation audited by Business Publication Audit

Letters

Major Castagnaro used the epithet "shoe clerks" in his letter to refer, I assume, to those who design both modifications to current aircraft and the aircraft of the future. Perhaps Major Castagnaro should consider where he and all flyers, as well as the rest of the world, would be without engineers: nowhere.

Also consider how degraded an engineer feels by being called a shoe clerk. That engineer has accomplished feats of academic skill and knowledge few people can brag about. After completing a rigorous degree program, that engineer has gone on to design and modify all the aircraft, weapon systems, and support equipment in the Air Force inventory.

Capt. Raymond Moschler, in the same letters column *[see "Insulted No More," p. 11]*, was thankful that insults hurled in his direction by Marine and Navy pilots had ceased following Air Force successes in the war. If more pilots—of all armed services—behaved professionally and responsibly, these insults would never have been voiced. Maybe this turn of events will give Captain Moschler pause and cause at least one Air Force pilot to reconsider his opinions and comments regarding his fellow nonpilot Air Force officers.

I'm not a shoe clerk, and I'm not a geek. I have sixteen years of successful Air Force service behind me. The majority of Air Force personnel, enlisted and officer, is not composed of pilots. It's time all Air Force members received the respect due them by all other Air Force members. We're a team. If certain factions consider themselves above and beyond the rest of us—that we're stupid excess baggage—perhaps they'd like to try to do their jobs without us.

Capt. William F. Sims, USAF
Ellsworth AFB, S. D.

CAP's Heroes

As one of the Air Force Association's charter members, I continued my USAF interest after active-duty retirement by joining various CAP wings wherever my business transfers took me. It was thus with great interest I read "CAP's Half Century" *[see July 1991 issue, p.41]*. In my flying years, I served as a search-and-rescue (SAR) pilot in Massachusetts, Maine, and Pennsylvania, with various headquarters assignments in the latter two.

Your article on the CAP's fiftieth anniversary was interesting and concise—in fact, too concise. How much more interesting it would have been to read about the many searches and rescues that saved the lives of countless people. It would have "put some meat on the bones" of the article. I am happy to say that while I participated in several real SAR efforts (and countless practices), there was never a "find" in an area I had previously searched.

More attention should have been paid to the cadet activities in actual SARs. All too often their duty is to trudge through wilderness to bring out the injured, dying, and dead, a grisly task when helicopter evacuation is impractical for any reason. While such incidents may have decreased in recent years, they remain distinct possibilities, and special tribute should be paid to some of the real cadet heroes and heroines in SAR work.

William M. Barrows
Hudson, Ohio

AFCOMS in the Trenches

"The Store in the Desert" *[see June 1991 issue, p. 85]* needs some clarification. The article leads the reader to believe that Army and Air Force Exchange Service stores were all over. Their goods were, but they weren't.

A secondary wartime role of the military assigned to the Air Force Commissary Service (AFCOMS) is to establish, set up, and staff Tactical Field Exchanges (TFEs) for troops in the field. We determine the commodities needed, order from AAFES, and then sell through the "exchange" we have set up. During Desert Shield and Desert Storm, AFCOMS operated twenty TFEs staffed by 108 enlisted personnel.

Additionally, AFCOMS in early June 1991 opened a TFE in Turkey with only merchandise assistance from AAFES. We also had deployed four enlisted military to northern Iraq to operate a TFE and were selling $12,000 to $14,000 worth of goods per day to our troops. Twenty additional AFCOMS personnel were operating TFEs and performing troop support functions at various locations in Turkey to support Operation Provide Comfort.

We appreciate that AAFES provided the merchandise to sell—it is a great morale booster. However, the AFCOMS enlisted personnel "in the trenches" should be given the credit they deserve.

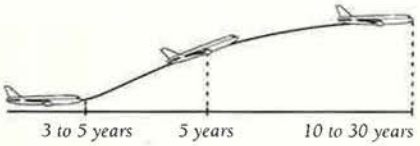
CMSgt. Russell N. Moffett, USAF
Kelly AFB, Tex.

Tomorrow's sky will be different from today's. Anticipating the future, the men and women of Snecma are already working to create the sky that future generations will know.

At Snecma, innovation puts a priority on three foremost objectives: reliability, economy and ecology.

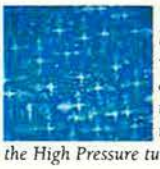
That is our ambition, our own way of advancing beyond today's skies.

Our main purpose is to build ever more high-performing, lower cost and environmentally friendly engines.



3 to 5 years of design and engineering. 5 years of development and 30 years of volume production: our engines are long-lived.

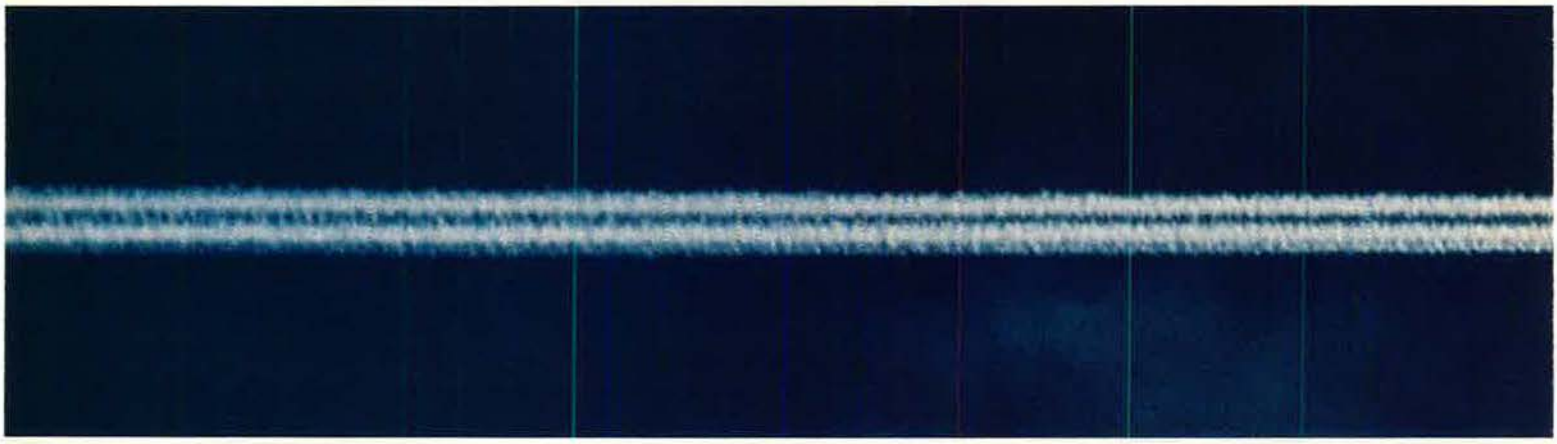
22 % of our turnover goes to R&D. 3,2 billion Francs (nearly $600m) in 1990, justified by the technological stakes involved.



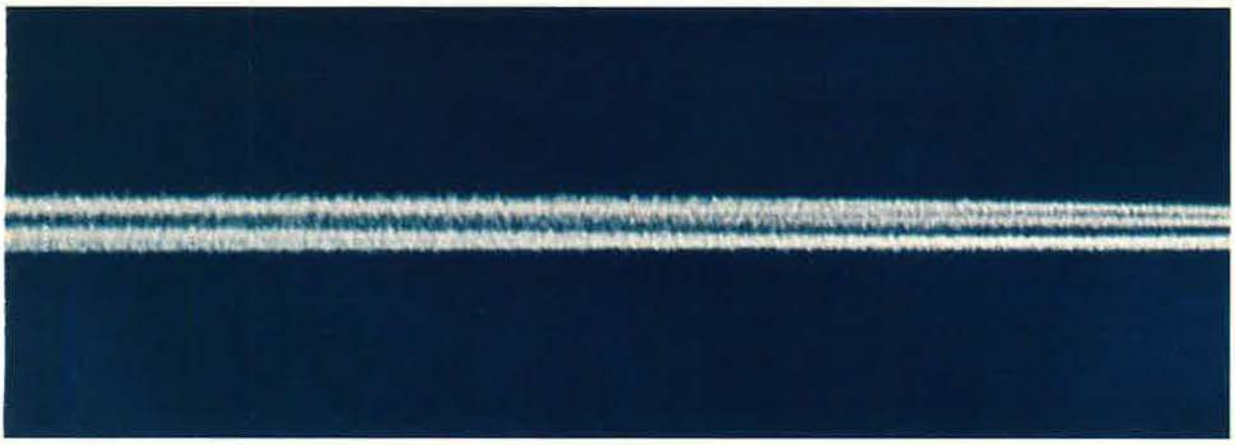
Snecma invents materials used by engine makers throughout the world. Example: AM1. This alloy, able to withstand very high temperatures (1200°C), is utilized in making the single crystal blades in the High Pressure turbine of the M88.

The lightest and most powerful engine in the world: the weight-to-power ratio of the M88 is 1,5 kg/100 hp, compared with 21 Kg/100 hp for a formula one engine.

SNECMA
POWER ALOFT



IN THIS BU
GOOD TRAC
IS EVI



JSINESS, A
K RECORD
ERYTHING.

Control Data's track record of success in electronic information technology spans 30 years, hundreds of programs and thousands of platforms. On land and sea, in air and space. So when you seek an experienced partner who can understand your specialized computing and information needs, depend on Control Data's Government Systems Group.

For an information package detailing how we can provide you with cost-effective, low-risk solutions, call us at 612-853-5000.

CONTROL DATA

By Brian Green, Congressional Editor

Consensus on SDI?

The Senate tried to reshape the US antiballistic missile effort and, in the process, may have strengthened its political support.

The Senate approved a Fiscal 1992 defense authorization bill that would restructure the Strategic Defense Initiative (SDI) and might well pave the way for deployment of a limited, ground-based antimissile defense system by the mid-1990s.

The bill approves $4.6 billion for SDI and sets three specific goals: deployment of an antiballistic missile system, "including one or an adequate additional number of ABM sites and space-based sensors," to provide "a highly effective defense of the United States against limited attacks of ballistic missiles," maintenance of strategic stability, and provision of effective theater missile defenses.

The bill aims at the development, for deployment by 1996, of a limited system (permitted by the 1972 Soviet-American ABM Treaty) consisting of 100 ground-based interceptors, fixed ground-based battle-management radar, and space-based and other sensors. The Senate measure also "urges" the President to seek immediately to negotiate changes in the ABM Treaty that would permit completion of a more extensive system. The SDI provisions were sponsored by Armed Services Committee Chairman Sen. Sam Nunn (D-Ga.), ranking Republican Sen. John Warner (R-Va.), and Sens. William Cohen (R-Me.), James Exon (D-Neb.), and Richard Shelby (D-Ala.).

The Senate SDI measure renounces short-term deployment of the "Brilliant Pebbles" missile defense. The Brilliant Pebbles system, the centerpiece of the Administration's own SDI program, would be based on small, largely autonomous, space-based interceptor missiles that would destroy ICBMs and their warheads by colliding with them. The bill does provide $625 million for continued research and development of this system.

The Senate action was based largely on an earlier proposal by Senators Warner, Cohen, and Richard Lugar (R-Ind.). Senator Cohen, in a speech on the floor, argued that the debate over deployment of Brilliant Pebbles "is undermining the creation of [a] consensus" on the issue of missile defense. He called for "steps . . . that will lead to strategic and tactical missile defenses in the next decade, when proliferation [of nuclear weapons and ballistic missiles] will have reached frightening proportions."

A background paper prepared by Senators Warner and Cohen noted that a limited defense system would not defend much of the US: "Technical data and physics strongly indicate that such a Treaty-compliant deployment would not provide an effective capability to defend our citizens against the majority of limited strike scenarios. Such a system would only protect a small sector of the United States, leaving Americans on our coastlines and in Alaska and Hawaii totally vulnerable."

The senators concluded that a key aspect of renegotiating the ABM Treaty must be "the right to increase the number of deployment sites and interceptors currently allowed."

Supporters hold that this limited approach will help to forge a new consensus on SDI. "I believe we have achieved a major breakthrough on SDI," said Senator Nunn. "We provide real defenses for the United States against limited missile attacks years earlier than had been proposed under the current SDI plan and do so within the framework of the ABM Treaty."

While the Senate measure is at wide variance with the House authorization bill in some respects, both emphasize tactical and theater missile defense and limited defense of the US against ballistic missile strikes. The House bill would provide SDI with only $2.66 billion and eliminate all funding, including R&D, for Brilliant Pebbles. The House increased the funding request for limited ground-based defenses from $674 million to $840 million—still well below the $1.5 billion in the Senate measure. It also created a new Joint Tactical Missile Defense program, funded at $857 million and run by the Army, to develop defenses for theater and tactical missiles. The Senate bill leaves this function with SDI. The differences must be resolved in a House-Senate conference.

Rep. Les Aspin, chairman of the House Armed Services Committee (HASC), recently argued in favor of limited defenses. He noted two trends that underscore the desirability of limited defenses: Despots like Saddam Hussein may not be deterred from using ballistic missiles, and a crumbling Soviet Union may not be able to prevent accidental or unauthorized launches. He argued that "we owe it to our people to investigate the possibility that breakthroughs in strategic defense technology might really gain the upper hand against the terrible weapons of nuclear war." The Brilliant Pebbles system, he said, was "too small and not technologically advanced enough to alter the strategic relationship" but would undermine arms-control efforts. He agreed that "we may well want to modify the ABM Treaty" but argued that political, technical, and military uncertainties made such modification premature.

The Administration has not taken an official position on the Senate proposal, but in a recent interview, Secretary of Defense Dick Cheney stated that "the House devastated SDI. The Senate committee bill is much better, far preferable. . . . It moves us down the road of a good SDI system." He also indicated his continuing support for Brilliant Pebbles.

The Secretary argued that the signing of a START treaty did not obviate the need for strategic defenses: "We believe that it's very important to go forward with deploying defenses against ballistic missiles. . . . By the end of the decade, we estimate there will be fifteen developing nations with ballistic missiles. Some of those will have nuclear weapons for them. So we have to get on with the business of defending the United States and our friends and allies overseas from ballistic missile attacks." ■

PEACEKEEPER

It's Living Up To Its Name

While the forces of freedom chip at totalitarian walls, strength keeps war at bay.

Peacekeeper's contribution to reducing tensions between the U.S. and the U.S.S.R., leading to the historic ending of the cold war, has not gone unnoticed.

Hats off to the USAF Ballistic Missile Organization and its associate contractors. TRW is proud to be part of that team.

Peacekeeper, the world's finest ICBM system -- on alert.

And Small Missile -- on the way!

TRW

TRW Ballistic Missiles Division
Space & Technology Group

Washington Watch

By Robert S. Dudney, Executive Editor

Running Hard to Stay Even

SEMATECH, working faster than promised, is pulling the US back up in the computer chip race, but the Japanese have been busy too.

"Impressive as they are, the weapons in Operation Desert Storm used chips that are less sophisticated than those found in the latest CD players and home video cameras. The challenge for America is to [make sure] we regain our capabilities to supply [such] leading-edge technology. The consequences of not doing so are grave—for our future military needs and . . . for our economy."

William J. Spencer, president and chief executive officer of SEMATECH, the Austin, Tex., semiconductor research consortium, made that statement not long ago to underscore the vital role silicon microchips play in US weapons, many of which gave stellar performances in the Persian Gulf War.

Dr. Spencer's context was much broader, however, in the sense that development of advanced microcircuits for future arms does not stand in isolation from the commercial chip industry. Indeed, SEMATECH's fourteen member firms include the Pentagon's top seven chip suppliers. As these key US firms go, Dr. Spencer suggests, so might go US forces.

Given its huge stake in the matter, the US should take heart at SEMATECH's performance. Evidence is growing that the joint Pentagon-industry consortium, formed four years ago to revive the US semiconductor sector, has made major strides to bolster an industry battered by Japanese competition.

No one is making final judgments, but studies and interviews with government and industry officials show solid achievement.

• The consortium is meeting an ambitious, three-part goal to develop advanced semiconductor production processes.

Phase one, which ended in 1989, saw SEMATECH demonstrate processes for high-yield production of today's premier, four-megabit dynamic random access memory (DRAM) chip, using circuit line widths measuring a mere 0.8 micron—about 120 times narrower than a human hair. Phase two, completed last spring, demonstrated and refined the processes to produce 0.5-micron line widths needed for the next-generation, sixteen-megabit DRAM chip.

Today, in phase three, SEMATECH is developing tools and methods to get US manufacturers strongly back in the race for the sixty-four-megabit DRAM chip. Plans call for SEMATECH to produce circuits of 0.35 micron by 1993. Dr. Spencer has no doubts he will meet that goal. In fact, he claims SEMATECH is ahead of schedule. By the end of 1992, says he, "we'll be at 0.35 micron. That should be available, early in 1993, to our member companies."

Thus, US industry will be able to move to production of sixty-four-megabit devices several years earlier than once forecast.

• SEMATECH has scored major gains in improving US chipmaking equipment and materials. In the process, it helped stem if not halt the erosion of a key domestic industry.

SEMATECH has focused its efforts on such high-profile hardware as stepper-aligners, scanning electron microscopes, and memory testers. One clear success story was rehabilitation of GCA Corp., a producer of lithographic steppers.

These machines, which transfer tiny circuit patterns to silicon chips, are the key to efficient, high-quality production. Recently, Japanese firms have dominated the stepper market. GCA, with the help of SEMATECH, upgraded its ALS 200 stepper to include greater reliability and is moving to introduce a "world-class," 0.5-micron stepper.

In other basic semiconductor infrastructure areas—adhesion, tungsten deposition, tracks, masks, photoresists—the story is much the same. "There's a series of success stories," says Dr. Spencer. "We think that, over the next twelve to fifteen months . . . we will have first-class performance in every major piece of equipment—from American suppliers."

The US supplier base, SEMATECH believes, is still too fragmented, and there are too many small, weak companies.

"We're going to end up . . . with a smaller number of companies," says Dr. Spencer. "Hopefully, they'll be stronger companies, and they'll be market leaders and will be able to sell in the global market."

• SEMATECH officials and member companies have mobilized US national laboratories and a large segment of the country's university system. The goal is to acquire basic research for advanced manufacturing, a process now showing results.

In a recent, highly favorable assessment of SEMATECH, the General Accounting Office (GAO) noted that the consortium had tapped into Sandia National Laboratory, N. M., to obtain procedures and advice to improve the reliability of US chip equipment. GAO also pointed out that the federal government's Oak Ridge National Laboratory in Tennessee has now undertaken a "high-risk" project to develop next-generation "etching" equipment, a development of potentially great importance for the entire chipmaking industry.

In academia, SEMATECH has established eleven Centers of Excellence, involving twenty-seven major universities. The centers have already yielded vital research results, and forty-five students who participated in the program have graduated with advanced degrees in semiconductor manufacturing.

Some observers believe the industry as a whole may be responding to the SEMATECH stimulus. The fortunes of US merchant semiconductor manufacturers in 1990 improved slightly, with US firms gaining worldwide market share for the first time since the mid-1970s, when Japanese chipmakers entered the market.

The Commerce Department's most recent figures show that the US foreign trade deficit in semiconductors dropped from $2.5 billion in 1989 to $1.5 billion in 1990. Also in 1990, US exports grew 9.7 percent, while the value of imports fell by two percent. The Commerce Department's analysts say that US semiconductor exports this year will grow ten percent.

SEMATECH officials are cautiously optimistic, with the emphasis on "cautiously." "It's still too early to tell whether that's real or if it's a one-year blip," Dr. Spencer says. "We've got to watch it another three or four years and see if it continues."

SEMATECH is not the first Pentagon venture into the US semiconductor field. In the late 1970s, DoD launched its very-high-speed integrated circuit (VHSIC) program, an effort in which a number of contractors produced advanced, military-qualified chips for a wide variety of weapons and systems. The VHSIC program, though strongly military in orientation, also had commercial implications.

The current Pentagon effort, led by the Defense Advanced Research Projects Agency, stems from the publication of a seminal report, "Semiconductor Dependency," in 1987 by the Defense Science Board. The message of the report was simple but sobering: The US military would soon have to depend on Japanese chips for its most advanced weapons unless it wanted to rely on second-best US semiconductors.

The anxiety created by the report was aggravated by claims of Japanese nationalists that Tokyo could and should threaten to withhold its semiconductors to gain greater leverage in dealings with Washington.

The difference between the two Pentagon efforts is that, today, much greater emphasis is placed on development of technologies needed for mass, factory-scale, commercial chipmaking.

SEMATECH is based on a concept known as "precompetitive cooperation." Once-fierce competitors now pool generic, "front-end" know-how in order to achieve economies of scale and absorb new technologies much more rapidly. Semiconductor technology is driven by the quest for faster and denser memory. Advances in the sophistication of memory products spur developments in logic chips and microprocessors, which in turn create greater requirements for superior memory performance.

Here SEMATECH has enjoyed considerable success. However, the overall task now looks more daunting than ever before.

This is especially true of the quest for ever-finer semiconductor line widths, the core of SEMATECH's high-technology effort. The initial strategic plan, written in 1988, forecast that achievement of 0.35-micron line widths by 1993 would put US firms ahead of the Japanese by six to twelve months. That is an eternity in the fast-moving world of semiconductor manufacturing, where sales prices decline rapidly and the first manufacturer to bring a product to market reaps virtually all the profits.

Now, Dr. Spencer says, "I don't think that will be true." He contends that the achievement of the 0.35-micron capability won't give SEMATECH members world superiority, only "parity" with the biggest and best of Japan's semiconductor houses.

"That's been fairly well documented," says William George, a former Motorola executive who recently became the consortium's chief operating officer. "There's no question that, worldwide, the race is heating up. There's a big rush to move forward as fast as possible."

What happened? SEMATECH officials say that the Japanese semiconductor industry has responded vigorously to the SEMATECH challenge and has moved much further and faster than anyone thought likely. "I think we underestimated what the Japanese would do," concedes Dr. Spencer. The feeling today at SEMATECH, he adds, is that "if we hit 1992 or early 1993 at full stride [with 0.35-micron technology] and run like hell for the next ten years, we ought to be able to stay even" with the Japanese competition.

SEMATECH emphasizes the survival of the semiconductor infrastructure —suppliers further upstream from the big merchant chipmakers—that provide tools and raw materials used by large-scale, commercial chip manufacturers.

The consortium has been pouring half of its annual $200 million operating budget into so-called "joint development projects" (JDPs) and "equipment improvement projects" (EIPs), the sole aim of which is to guarantee secure, domestic sources of supply for American manufacturers. At present, SEMATECH has about sixty JDP and EIP projects under way, the majority of which won't be completed until late this year or early next year.

Even before then, however, it is clear that the consortium has enjoyed striking successes.

One of these stems from a JDP between SEMATECH and GCA Corp., part of General Signal Corp., to bring forth

the company's new XLS lithography stepper. The project had been somewhat behind schedule. Now, says Dr. Spencer, things are back on track. One SEMATECH member company, analyzing the equipment in anticipation of making purchases for its own fabrication facilities, was said to be deeply impressed. Dr. Spencer reports that the firm characterized the new GCA equipment as "world class, as good as the best available," which up to now happened to come from Japan.

SEMATECH has a similar development contract with Silicon Valley Group Lithography Systems, formerly a division of Perkin-Elmer Corp., to develop a new breed of "step-and-scan" machine. "It's a very promising technology, with some important conceptual advantages over the standard stepper technology," says Mr. George. He characterized the new machine as a potential breakthrough, adding that SEMATECH is "very heavily involved."

SEMATECH has just completed an EIP to spruce up a special metal-etch system produced by Lam Research. The project produced an upgrade kit that transforms earlier versions of the device into more production-worthy, reliable, well-controlled tools. Several SEMATECH member companies already have installed the kit in their own plants. Five others have placed orders.

Another success story can be seen in the resuscitation of Genus Corp.'s once-dominant tungsten-deposition tool. Genus was once the world leader in this type of equipment. After going through a major slump and losing its market to Japanese firms, Genus linked up with SEMATECH and now turns out equipment of improved reliability and lower cost, once again recognized as the best in the world.

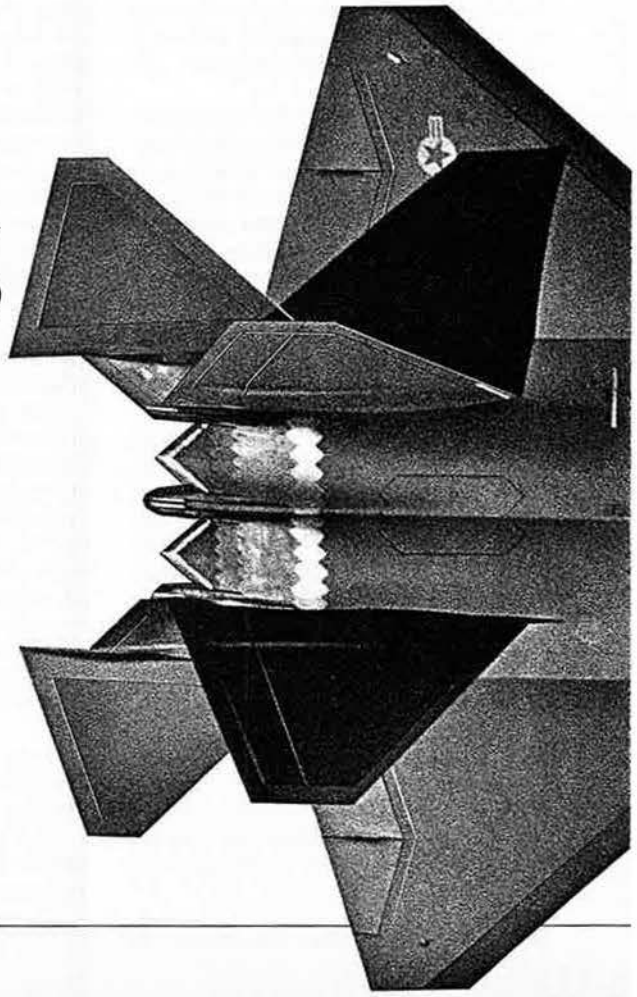
Earlier, SEMATECH completed a joint project with ATEQ Corp. of Oregon, one in which the reliability of its existing electron-beam tool rose by a factor of four. Another JDP helped Westech of Phoenix, Ariz., quadruple the productivity of a special planarizing tool.

The results are plain to see. Over the past two years, US equipment firms have greatly expanded their sales worldwide to semiconductor facilities. Dr. Spencer says that US suppliers have experienced a twenty percent increase in their share of the US market, which until recently was being overrun by Japanese tools. US firms, with much-improved products to sell, have also gone on to increase their market share in Europe and South Korea. "They've increased their market share everywhere except Japan," says Dr. Spencer. "We think that's a very positive sign."

On the downside, says Dr. Spencer, "the largest semiconductor manufacturers are all in Japan. So if you can't be a market leader in Japan, it's difficult to be a market leader elsewhere."

The supplier base faces other major challenges. In the past three years, sixty-two equipment producers and suppliers have disappeared. Some were involved in domestic mergers, but twenty-eight were bought by foreign interests—mostly by Japanese firms looking to gobble up new technologies.

One case in point is Semi-Gas Systems, Inc., long the principal US supplier of critical, high-purity gas systems for US chip manufacturing. SEMATECH had invested heavily in improvements at Semi-Gas, but Nippon



Sanso of Japan ultimately bought the company.

Dr. Spencer has continuing concerns about the supplier base in the US and about Japanese predation. "I'm sure there are [other target firms like Semi-Gas]. You probably ought to ask our friends overseas which ones they are going to pick off next. But I'm sure there are other American technologies that are going to be available to the Japanese."

Dr. Spencer recently learned that Nikon owns a percentage of the US company that supplies critical lasers for steppers. "The Japanese companies don't just buy other companies unless they are part of a strategic plan," says the SEMATECH official. "They're going after a technology."

Congress's original, five-year mandate to SEMATECH comes to an end next year. Already, however, the consortium's leaders have drafted plans for "SEMATECH II," a second, five-year installment in the drive to rescue the industry.

In August, SEMATECH II went to the Pentagon for review. If all goes well, funding will be contained in the Fiscal 1993 Pentagon budget, which will be presented in revised form early next year. The consortium is seeking to keep the current level of government financing ($100 million per year) over the next five years.

In some respects, this venture looks similar to the first SEMATECH program. The consortium would continue such successful programs as the development and demonstration of advanced process technologies and the JDPs and EIPs. Says Dr. Spencer, "As far as equipment development and process technology are concerned, I think we are going to have to work very hard to stay even with the competition. We spent fifteen years losing leadership, and we won't get it back quickly."

The achievement of 0.35-micron capability won't bring superiority, only parity with Japan's semiconductor houses.

After achieving commercially viable 0.35-micron line widths, he says, the push will be to achieve 0.25-micron, 0.15-micron, and .12-micron line widths, in that order, all printed on larger and larger silicon wafers. This will require greater technical achievements in lithography.

Yet, says Dr. Spencer, SEMATECH II will not be a mere straight-line continuation of what has gone on for the past five years.

"I think it's a fairly radical break from what has been done," says the SEMATECH president. "We'll now step back and begin to look at manufacturing as a system and begin to bring to bear systems capability, principally in the communications and software area, to solve manufacturing issues for semiconductors."

He predicts that the US industry, with SEMATECH leading the way, will move heavily to process modeling, equipment modeling, and wafer flow modeling.

"You'll see operating systems that have been developed for office information, or exchanging financial or economic data, brought to bear on the problem of how you build a manufacturing facility," says Dr. Spencer. "If we can bring US leadership in this kind of capability to bear on the manufacturing problem, we've got a major win. It's an area where the US has the leadership." ■

SCIENCE/SCOPE®

Vital to the defense of coalition forces in Operation Desert Storm were two Hughes Aircraft Company missiles, the Maverick and the TOW. The U.S. Air Force fired approximately 100 Maverick missiles per day, while Saudi forces relied heavily on TOW missiles to clear Khafji of invading Iraqi troops, destroying 46 armored vehicles. TOWs were also fired from Marine Corps Cobra helicopters during the Khafji battle, helping destroy 20 T-55 Iraqi tanks and armored personnel carriers. The Mavericks and TOWs were two of 55 different Hughes systems deployed to the Persian Gulf during Operation Desert Storm.

The U.S. Navy will be better able to train helicopter pilots for aerial minesweeping, thanks to a new one-of-a-kind minesweeping simulator for the MH-53E. Developed by Hughes, this simulator helps pilots master a mission that requires extreme concentration and very demanding flying... low-level, over water, while towing a minesweeping sled in 50 to 100 foot swells. This Operational Flight Trainer (OFT) incorporates significant advances in software technology, miniaturization, and complex visual displays to create extraordinary hands-on realism. It will help the Navy save a great deal of money in training that, until recently, technology could not simulate.

A landmark satellite network for the U.S. Army is providing training to National Guard and Army Reserve troops via satellite. The program is being run by Oklahoma State University using Hughes' InTELEconference Very Small Aperture Terminals (VSAT). The InTELEconference system offers an unprecedented range of meeting options, including two-way audiovisual conferencing, multi-site video interaction, and conventional lecture-style broadcasting. It uses state-of-the-art digital compression and VSAT technology to achieve high-quality, multi-site audio and video transmission at far lower costs than previously available.

The most powerful, technologically advanced satellites ever built for commercial mobile communications will soon be serving North America. The satellites, built by Hughes and Canada's Spar Aerospace Ltd., will each have the capacity to support 3,200 simultaneous mobile users on land or sea or in the air. The spacecraft will cover the entire United States and Canada, including Alaska, Hawaii, Puerto Rico, the Virgin Islands, and 200 miles of U.S. and Canadian coastal waters. In this joint effort, Hughes will provide the HS 601 satellite bus and Spar the communications payload.

In a major breakthrough in integrated circuit technology, Hughes has developed a technique for producing distinct lines approximately one three-millionth of an inch in width on semiconductor chips. These ultrasmall features, which are 100 times smaller than those of most commercial integrated circuits, will play a vital role in an emerging integrated circuit technology based on quantum physics. Rather than using electron beams, they were created with a focused ion beam since features in resist material can be defined much more accurately using ions. Scientists predict these semiconductor chips will operate 10 times faster than conventional circuits.

For more information write to: P.O. Box 45068, Los Angeles, CA 90045-0068

HUGHES

Subsidiary of GM Hughes Electronics

Aerospace World

★ During his late July visit to Moscow, President Bush signed the Strategic Arms Reduction Talks (START) Treaty, capping nine years of arduous negotiations. The landmark treaty—signed for the USSR by President Mikhail Gorbachev—is the first ever to reduce superpower arsenals of long-range nuclear weapons. It now goes to the US Senate for debate and ratification.

The accord, under discussion since May 1982, requires both sides to destroy hundreds of intercontinental-range missiles and thousands of warheads. Projections are that, seven years after the treaty enters into force, the two signatories will see net actual reductions of twenty to thirty-five percent in their stockpiles of warheads. It is estimated that the two nuclear superpowers today have a combined total of 23,000 nuclear warheads fitted to long-range delivery systems.

The two sides informally agreed on the final treaty details at the July economic summit in London. Specifically, the START accord limits the US and USSR to 6,000 "countable" warheads each, which are to be carried on no more than 1,600 offensive delivery systems. The warheads will be tallied under a complex set of counting rules in which each warhead on a ballistic missile will be counted in full but each heavy bomber, containing many gravity bombs, will count as only one weapon. "Countable" delivery systems are defined as (1) intercontinental-range missiles deployed on land or in submarines or (2) "heavy" bombers.

START also stipulates that neither side may deploy more than 4,900 warheads atop ballistic missiles. A further sublimit states that no more than 1,100 of a nation's warheads may be fitted on mobile missiles such as the Soviet SS-24 or SS-25.

The START restrictions are expected to produce a cut in Soviet heavy missiles and ballistic missile warheads of roughly fifty percent each and a cut of about thirty-five percent in the number of US ballistic missile warheads. The treaty allows the two nations to continue to modernize strategic arsenals. It will affect few of the strategic weapons that the United States has designed and deployed in the past decade.

F-16 fighters of the Air National Guard's 125th Fighter-Interceptor Group, Jacksonville International Airport, Fla., successfully launched seven AIM-7 Sparrow missiles in early June. This was the first such launch from operational F-16s. A high-speed, subscale drone was destroyed with a direct hit in the first launch.

The treaty creates strategic incentives to deploy warheads on bombers, which are viewed as less threatening than fast-flying ballistic missiles. USAF's B-2 Stealth bomber and B-1B bomber are not counted as cruise missile carriers under the agreement because neither is currently configured to carry cruise missiles.

The Soviet Union has pursued an active modernization program in recent years. In a Senate Armed Services Committee hearing, Maj. Gen. Stephen Croker, the Air Force's director of strategic, special operations forces, and airlift programs, pointed out that the USSR has significantly modernized its strategic arsenal, deploying more than 600 rail- and road-mobile missiles; two new, modified versions of the SS-18 superheavy ICBM; and two new strategic submarines equipped with new submarine-launched ballistic missiles (SLBMs).

The START accord, the third major arms-control agreement concluded in the Gorbachev era, marks a further dampening of the arms rivalry that was a principal feature of the cold war. This new treaty comes in the wake of the 1987 agreement eliminating intermediate-range nuclear force (INF) weapons in Europe and the 1990 Conventional Forces in Europe (CFE) Treaty that would cut levels of conventional forces on the Continent.

Apart from provisions cutting overall numbers of warheads, the START treaty is significant for imposing limits on "destabilizing" weapons that have created fears of a surprise, knockout attack. The principal problem has been the Soviet force of superheavyweight, ten-warhead SS-18s—a force that, in theory at least, possesses enough accuracy and combined explosive power to destroy a large portion of the US missile force in its silos. The treaty cuts this Soviet force in half, from 308 missiles to 154.

★ With the US and the Philippines still deadlocked after fourteen months of basing rights negotiations, nature intervened. Mt. Pinatubo, a

Anniversaries

- *September 17, 1911:* Flying a Burgess-Wright aeroplane, Calbraith P. Rodgers leaves New York on the first coast-to-coast flight across the US. He arrives in Pasadena, Calif., on November 5.
- *September 26, 1931:* The keel of the *Ranger,* the first aircraft carrier designed and built as such, is laid at Newport News, Va.
- *September 29, 1931:* Flt. Lt. G. H. Steinforth sets a new world speed record of 406.94 mph flying in a Supermarine S.6B from Ryde, Isle of Wight.
- *September 10, 1936:* Deutsche Luft Hansa begins a flying boat service between Bermuda and Hortes, Azores. The route is extended to New York in October.
- *September 23, 1941: Oberleutnant* Hans-Ulrich Rudel, flying a Ju-87, hits the 26,170-ton Soviet battleship *Marat* with a 1,000 kg bomb, sinking the ship. This feat is probably the greatest single success by a World War II dive-bomber pilot.
- *September 27, 1946:* A de Havilland DH.108 sweptwing research aircraft breaks up in the air over the Thames estuary, killing the pilot, Geoffrey de Havilland, Jr.
- *September 20, 1951:* Greece and Turkey become members of NATO.
- *September 20, 1951:* The Air Force recovers a monkey and eleven mice that had been launched into space in a research rocket. The animals suffer no apparent ill effects.
- *September 19, 1961:* NASA announces that its new Manned Space Center will be located near Houston, Tex.
- *September 30, 1971:* The US and USSR come to a Nuclear Accidents Agreement, under which each nation will advise the other of test accidents or detection of suspicious activity, in order to prevent accidental nuclear war.
- *September 5, 1986:* A Delta rocket carrying a Strategic Defense Initiative experiment is successfully launched from Cape Canaveral AFS, Fla., the first successful US space launch since the *Challenger* disaster the previous January.
- *September 11, 1986:* A Patriot surface-to-air missile successfully intercepts a US Army Lance target missile at White Sands Missile Range, N. M. This is the first use of the Patriot system to intercept a tactical ballistic missile.

long-dormant volcano, erupted, jeopardizing the long-term operation of Subic Bay naval base and Clark AB and lending urgency to the negotiations. The two sides thus reached agreement on July 17, a day on which the volcano spewed a new cloud of soot 49,000 feet high.

Under terms of the July 17 agreement, the United States will hand over the keys to ash-blanketed Clark AB by September 1992. The lease on Subic Bay, however, will be extended for a period of not less than ten years.

Clark AB had been shut down since June, when Mt. Pinatubo began its current sequence of eruptions. Most distressing for US forces in the Pacific, however, is the permanent loss of the sophisticated air combat training range at adjacent Crow Valley, the chief air-to-air and air-to-ground practice area for US and allied aircrews. The range's instrumentation and facilities were heavily damaged by the volcano, and estimates on repairing them ran into the tens of millions of dollars.

Crow Valley training will be transferred to a site in Alaska near Elmendorf AFB. Two of Clark's other major functions—a stopover for Military Airlift Command flights and a transit point for special operations forces—will be shifted to Subic Bay's Cubi Point naval air station.

A joint statement issued by the US and Philippine governments in July maintained that "cleanup and withdrawal operations" at Clark would be completed over a fourteen-month period, with the base to be "turned over to the Philippines no later than September 16, 1992." Philippine leftists opposed to the US presence in the island nation cheered the plan for the American pullout, but the decision came as a blow to some 30,000 Philippine employees at the base and nearby businesses.

Before the volcano's eruption, the US had sought ten- to twelve-year lease extensions for both Clark and Subic, at a cost of $360 million a year. Philippine officials demanded a total of $825 million a year for the bases, extending the leases for no more than seven years. The new accord will reduce direct base-related aid to $203 million annually, beginning in 1993.

Returning the Subic facility to its former operating condition represents a large, undisclosed cost for the United States. At the base, more than 200 buildings have collapsed under the weight of rain-soaked ash. Offi-

The eleventh Navstar Global Positioning System satellite was put into orbit by a McDonnell Douglas Delta II rocket launched from Cape Canaveral AFS on July 3.

Gen. Louis T. Seith, USAF (Ret.), left, was honored with the Air Force's Exceptional Meritorious Service Award for his accomplishments during a thirteen-year tenure as director of the Air Force Aid Society. Presenting the award is Gen. Michael P. C. Carns, Air Force Vice Chief of Staff.

cials say that restoration could cost hundreds of millions of dollars.

The agreement had to be ratified by the Philippine Senate, where opposition looked strong. The lowering of annual base-related aid will toughen that opposition in the twenty-three-member Senate. For the agreement to go into force, that body had to approve it by a two-thirds majority.

★ The International Atomic Energy Agency (IAEA) formally condemned Iraq for violating its agreement to declare and submit for inspection all of its nuclear research operations. It was the first time a state that is party to the Nonproliferation Treaty was cited for concealing efforts to develop nuclear arms.

The IAEA's action deliberately left open the possibility of renewed US military intervention to force Iraq to comply with UN Security Council resolutions demanding the elimination of Iraq's bomb-building capability. At the time, US Defense Secretary Dick Cheney left little question about the level and nature of danger Baghdad faced. "There shouldn't be any doubt in [Saddam's] mind that we're deadly serious about his coming into compliance," Secretary Cheney told Associated Press. "We obviously always have the ultimate sanction of military capability if we're called on to use it."

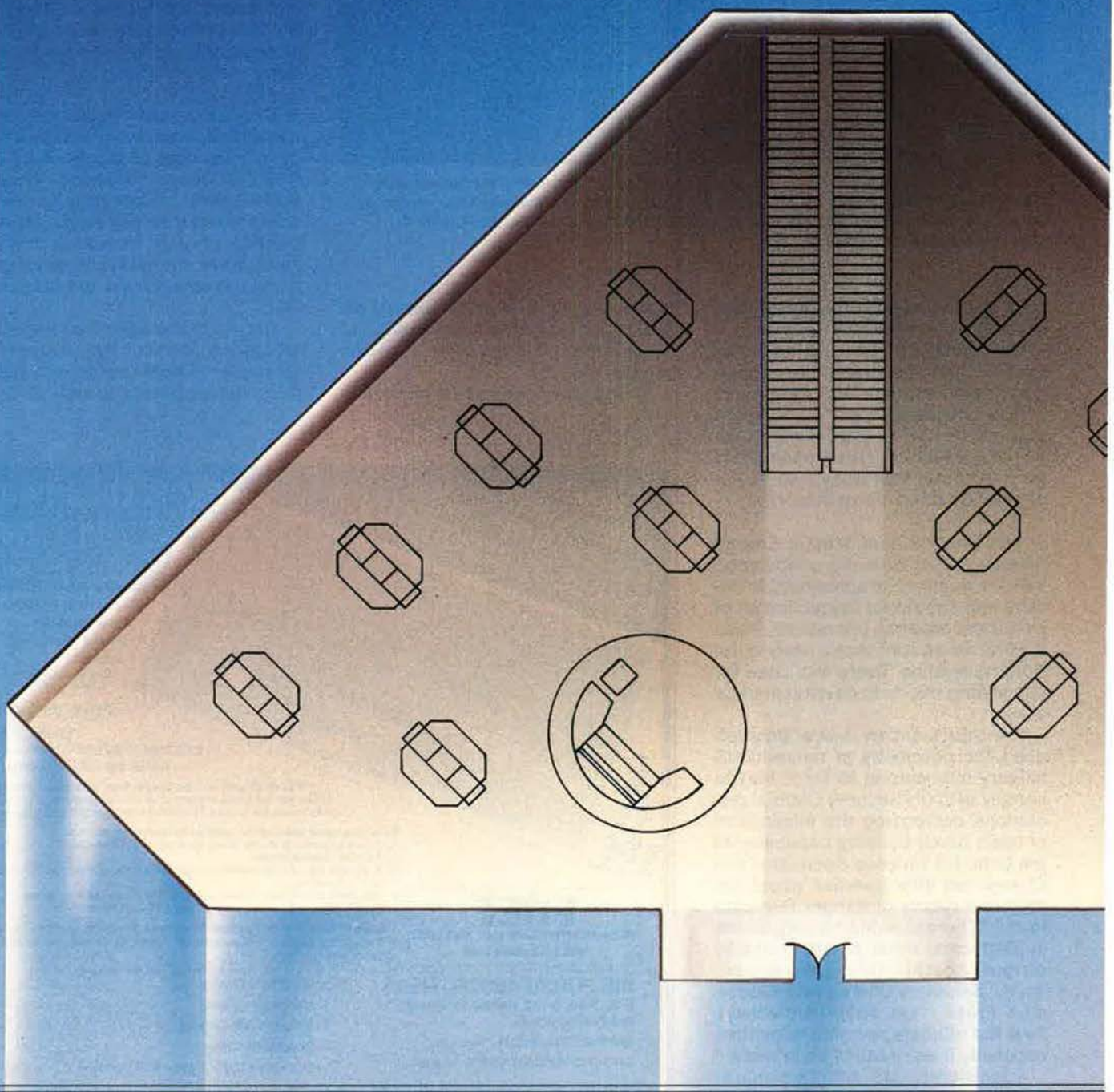
Specifically, US officials maintained that Iraq had not surrendered all of its stockpile of highly enriched uranium and had falsely insisted that a key uranium enrichment facility is a plant with "peaceful purposes." They quoted a preliminary intelligence community estimate that Iraq's stockpile—roughly fifteen to twenty-five pounds—had grown large enough to provide the makings of at least one nuclear weapon.

Though they questioned those estimates, UN officials observed in a formal statement that, because of Baghdad's negligible credibility, "only further inspections can establish the extent of the activities with regard to enrichment." The UN emphasized that Iraqi violations highlight the shortcomings of the existing inspection system. It called on all member states to grant the IAEA the right to inspect suspected nuclear sites not openly declared by those states. Iraq had maintained that it had no legal obligation to divulge the whereabouts of all nuclear installations.

★ Concerns about Iraq's remaining capabilities were heightened by a report, "Conduct of the Persian Gulf Conflict," prepared by the Pentagon at the request of Congress. An unclassified version of the study, released publicly on July 16, stated that Iraq "may have successfully concealed some unconventional weapons facilities."

The study characterized the US intelligence community's support for Operations Desert Shield and Desert Storm as successful overall. Still, the

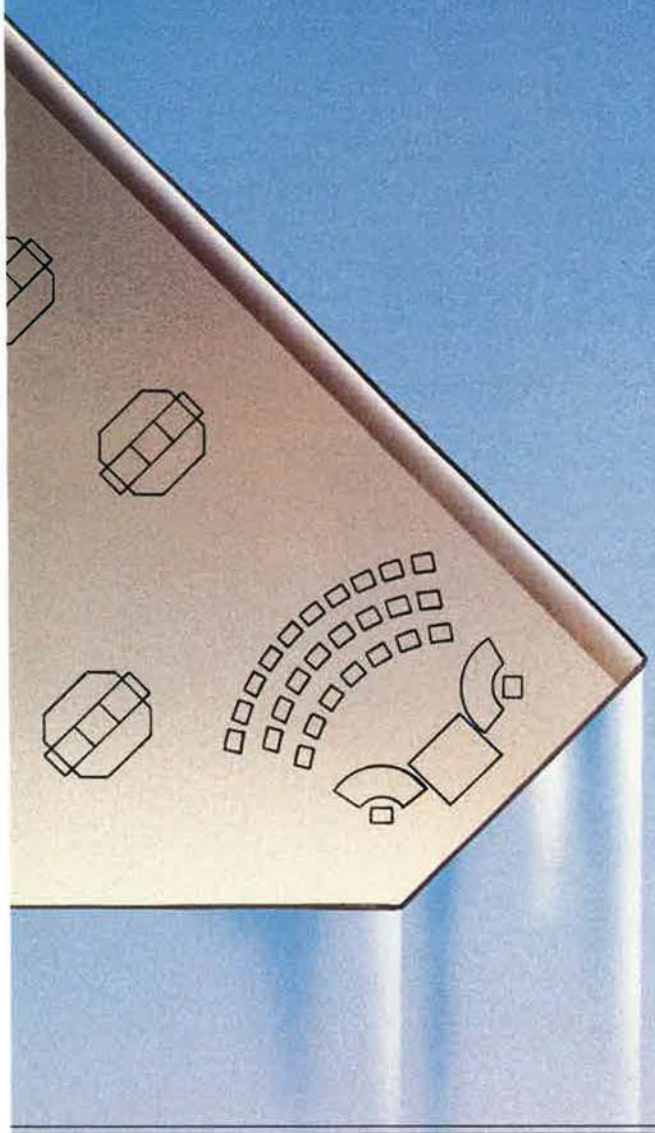
C^3I is taking off



Not coming to the show this year? Then for more information contact:

Director of Business Development
Command, Control, and Communications Systems
77 A Street
Needham, MA 02194 U.S.A.
Tel: 617-455-4021

at AFA.



GTE is C³I.

Visit the Atrium at the Sheraton Washington during the AFA Show Sept. 16-18 and see the exciting things GTE is doing in C³I.

Sit in on our "TV News" presentation and find out about our ID/IQ vehicles to meet your needs: Air Force Command and Control System (AFC2S), BIDDS Management Subsystem (BMS), Office Automation Secure Information System (OASIS), and Red Telephone Switching System (RTSS).

Check out the rest of our booth and learn about :

- ✔ Air Force Tactical Secure Data Communications System (TASDAC)
- ✔ Automated Weather Distribution System (AWDS)
- ✔ Coherent Signal Simulator (CSS)
- ✔ Communications System Segment Replacement (CSSR)
- ✔ Consolidated Space Operations Center (CSOC)
- ✔ Defense Message Transfer System (DMTS)
- ✔ Integrated Communications Platform 2010 (ICP 2010)
- ✔ Intelligence Centers
- ✔ Intelligent Voice Storage System — AN/UYH-15
- ✔ Joint Operations Planning and Execution System (JOPES)
- ✔ Multi-Level Message Release (MLMR) System
- ✔ Next Generation Switch
- ✔ Portable Imaging and Communications (PORTS)
- ✔ Portable Satellite Terminal (PoST™)
- ✔ Secure Systems
- ✔ Signal Processing
- ✔ Spacenet Transportable Terminals

We're looking forward to taking off on your needs at the Atrium, so please drop in.

GTE **Government Systems**

THE POWER IS ON

authors of the study found that "there were problems, compounded by the magnitude of the intelligence effort and the number of systems and agencies involved."

One of the areas singled out for its inadequacies was bomb-damage assessment (BDA). BDA efforts are still being analyzed, a process that is complicated by such factors as the sheer number of targets struck and the large number of assessments made by BDA cells. Precision guided munitions have further complicated the effort, according to the study, because of their tendency to leave minimal exterior damage to a target while destroying its interior.

The study also emphasized the importance of having plenty of available reconnaissance assets to support the BDA mission. "Broad-area, all-weather, search/surveillance systems are required to improve intelligence available to tactical commanders," the study said.

In a separate report released in late June, the Navy also cited as a weakness the supposed lack of adequate tactical reconnaissance. "The US Navy in Operation Desert Shield and Desert Storm" maintained that Navy F-14s with the Tactical Air Reconnaissance Pod System and unmanned aerial vehicles "performed as designed but could not meet the demand" for round-the-clock tactical reconnaissance. More assets and real-time reconnaissance would have helped the service coordinate air strikes and avoid duplication of effort, the report said.

★ **NEWS NOTES**—The Air Force announced that it found **cracks in the wing carry-through bulkheads of ten F-16s,** disclosing that the problem arose because the aircraft are being flown harder than originally planned and carrying an increased number of mission components that significantly increase total weight. Structural stress and damage were also found elsewhere in Block 40 and earlier aircraft.

The service decided not to ground the aircraft. Air Force spokesmen explained that USAF and General Dynamics (GD), the F-16 contractor, have agreed on the fixes to be implemented as cracks are discovered. The Air Force estimates that the fleet-wide repair will cost about $280 million. The Air Force maintains approximately 1,600 F-16s in active-duty and reserve units. Cracks began to appear between 1,000 and 1,500 flight hours.

"The F-16 has been modified with additional material since we originally acquired it," Pentagon spokesman Pete Williams said on July 23, "and everything you put on it adds to the weight of the total aircraft. So you look at that as one additional demand on the airframe structure. . . . Sometimes in combat you subject the plane to harder forces than the contractor predicted it would be consistently exposed to."

The center fuselage of each USAF F-16 has four wing carry-through bulkheads, consisting of upper and lower portions fastened together with bolts. General Dynamics spokesmen said that structural cracking is not an unusual occurrence. The firm characterized the cracks as "minute" and pointed out that the flaws were identified as part of the USAF/GD F-16 Structural Integrity Program, designed specifically to identify such problems. "The bottom line," says an official GD statement, "is that poten-

tial problems are being found in time to implement cost-effective fixes without having a negative impact on aircraft performance or overall fleet operation." No F-16 accidents have been attributed to the cracks. Late Block 40 and current Block 50 F-16s have structural modifications built in on the assembly line and will not require strengthening.

Gen. Colin Powell, Chairman of the Joint Chiefs of Staff, revealed for the first time **preliminary details of the US contribution to NATO's planned Rapid Reaction Corps.** The JCS Chairman told the Senate Foreign Relations Committee that the US would provide a "two-division Army corps" to one of the two planned multinational corps, along with what he termed "adequate" tactical air support. That would amount to nearly 160,000 US servicemen and -women, or roughly half the number now in Europe. General Powell also told the Senate panel that his goal is to have the US in command of one of the multinational corps.

In related news, British Chief of Defence Staff Field Marshall Sir Richard Vincent said that airlift for the NATO Rapid Reaction Force would probably come from the US, at least in the short term. "The Gulf has illustrated how you need strategic transport assets to do it," he told a group of reporters in London. "Indeed, certain nations, and in particular the United States, have offered to make a substantial contribution in that regard to the capability of the Corps."

In the long term, the Rapid Reaction Corps's requirement for strategic airlift may not, as was once thought, translate into sales of the McDonnell Douglas C-17 airlifter, now in development. A committee of the Western European Union (WEU) recommended that European nations rule out buying the C-17 because of its high cost. Instead, the committee urged the WEU Council of Ministers to adopt a plan for an all-European strategic airlift command, flying special military versions of Airbus A340 jetliners.

On June 18 and July 3, **landing gear problems caused the Air Force to cut short two separate B-2 bomber flights.** In both cases, the aircraft were diverted to landings without incident on Rogers Dry Lake Bed at Edwards AFB, Calif. Air Force officials said the problems were not related and were not considered serious.

In other B-2 news, the Senate Armed Services Committee, in marking up its final defense authorization bill, approved the Administration's request for **additional production funding** of the new bomber, but fell one vote short of backing a plan by its Subcommittee on Strategic Forces and Nuclear Deterrence, which recommended an accelerated buyout of all seventy-five planned B-2s by Fiscal Year 1996.

Testifying before two panels of the House Armed Services Committee, the General Accounting Office's director of Air Force issues recommended only a "minimum" production commitment to the B-2 until 1996, by which time it would have completed major testing milestones. Air Force officials cited a RAND Corp. report that found the B-2's test program was far enough along to have uncovered major, unpleasant surprises. The RAND study advised Congress to begin a "ramp-up to an increased production schedule in order to preclude any increased costs associated with a stretch-out."

Meeting for a **Milestone Zero re-**

The ALQ-161 defensive avionics system for the B-1B. High performance—flight proven.

The ALQ-99E tactical jamming system for the EF-111A. High performance—Desert Storm proven.

For further information contact:
AIL Systems Inc.
Subsidiary of Eaton Corporation
Commack Road, Deer Park, New York 11729

AIL
SYSTEMS INC.

view of the Navy's A-X medium attack aircraft, the Defense Acquisition Board approved a service plan to conduct the demonstration/validation phase with one contractor rather than two. The Navy wanted to avoid the high cost of prototyping two concept aircraft. The DAB determined, however, that the A-X schedule was too compressed and decided to extend the concept definition phase by three to four months.

Meanwhile, a team headed by Grumman Corp. and another led by McDonnell Douglas Corp. formed the **first two of several groups expected to compete for the A-X contract.** Grumman announced on July 16 that it had signed a teaming agreement with Boeing Co. and Lockheed Corp., while McDonnell Douglas said it will team with LTV Aerospace and Defense Aircraft Products Group.

On July 8, the Pentagon gave Congress a memorandum of understanding that governs the **planned sale of 120 F-16C/Ds to South Korea,** starting the clock on the lawmakers' formal thirty-day period for consideration of the sale. Voicing concern about issues of technology transfer, the amount of US-made components, and the inability of GAO to gather complete information on the sale, opponents on Capitol Hill vowed to try to extend the period for debate.

The Air Force announced on August 2 the award of $11 billion in engineering and manufacturing development (EMD) contracts to Lockheed Aeronautical Systems Co. and Pratt & Whitney for development of the F-22 air-superiority fighter. Lockheed is teamed with Boeing and General Dynamics to produce thirteen aircraft, eleven for flight testing and two for stress testing. Pratt & Whitney will produce thirty-three engines. The purpose of the cost-plus-award-fee EMD contract is to finalize design specifications while engineering drawings are prepared and preproduction aircraft are fabricated and tested.

Saying that there has been a "loss of integrity and efficiency" at the General Accounting Office, Sen. Pete Domenici (R–N. M.) and eleven other Republicans introduced a bill that would establish an **independent watchdog over Congress's investigative and audit arm.** Republicans charged GAO with pursuing a partisan agenda.

★ HONORS—Air Force men and women swept top honors in the 1991 Armed Forces Track and Field Championships June 2–7. The men's and women's teams earned first place against competitors from the Army, Navy, and Marine Corps. The Army placed second in men's and women's, the Navy third, and the Marine Corps fourth.

Michael Profit, McGuire AFB, N. J., took first place in the 100-meter high hurdles; Jeridan Strong, Seymour Johnson AFB, N. C., took first place in the pole vault competition; Edward Mecham, assigned to the Presidio in California, won the 3,000-meter steeplechase; Gail Conway, USAF Academy, Colorado Springs, Colo., placed first in the women's 800-meter run; Michael Michno, Wright-Patterson AFB, Ohio, won the 1,500-meter run; and Michael Dudley, Travis AFB, Calif., placed first in the 10,000-meter run.

The Air National Guard Noncommissioned Officer Academy Graduate Association announced the recipients of the **Maj. Gen. I. G. Brown Command Excellence Trophy,** presented annually to Air National Guard commanders who performed in an exemplary manner during the previous year. They are Col. Donald Durbin, Jr., deputy chief of staff for the 163d Tactical Reconnaissance Group, March AFB, Calif.; Col. Thomas Shellshear, Jr., deputy chief of staff for the 147th Fighter Interceptor Group, Houston, Tex.; Col. Bruce Schantz, commander of the 155th Tactical Reconnaissance Group, Lincoln, Neb.; Lt. Col. Fred Brown, Jr., commander of the 156th Aeromedical Evacuation Flight, Charlotte, N. C.; Brig. Gen. John Haack, commander of the 102d Fighter Interceptor Wing, Otis AFB, Mass.; and Col. Richard McLane II, commander of the 183d Tactical Fighter Group, Springfield, Ill.

★ APPOINTMENTS—The Air Force swore in **Dr. George Abrahamson** on July 1 as the service's **new chief scientist.** Dr. Abrahamson, a former member of the Air Force Scientific Advisory Board, has spent more than thirty years as a scientist. He will be responsible for long-range planning for science and technology, for organization and management of Air Force labs, and for fostering research relationships between the service and universities, industry, and government labs.

★ PURCHASES—The Defense Department is set to pursue the biggest computer procurement in its history. Dubbed the superminicomputer acquisition, or AFCAC 300, the program is managed by the Air Force Computer Acquisition Center, and it will comprise more than $1 billion worth of computers and related systems. Users from the Air Force, Army, Navy, Defense Logistics Agency, and Coast Guard, as well as civilian agencies, will be able to buy from the contract. It includes the planned purchase of some 130,000 computers, file servers, workstations, extensive networking hardware and software, 1.4 million lo-

Rockwell International Corp. announced that it would join forces with Aerojet and Boeing to develop a fully reusable, single-stage-to-orbit (SSTO) launch vehicle. Rockwell delivered its proposal July 9 to the Strategic Defense Initiative Organization for the technology demonstration phase of the SSTO program.

cal area network cables, and 50,000 network cards.

Beginning a program to convert all USAF cargo aircraft to the **Microwave Landing System** (MLS), Systems Command's Electronic Systems Division awarded a $17 million contract to **Canadian Marconi Co.,** of Montreal, Canada, to outfit 539 C-130 aircraft. The Air Force plans to shift all its cargo aircraft from the Instrument Landing System to the MLS, which covers eight times more area and has a range twenty miles greater.

The Air Force awarded **Rockwell International Corp.** a $2.7 million contract to develop an **improved target detection system for the AGM-130 rocket-powered standoff weapon.** The weapon's television camera will be replaced with a silicon charge coupled device (CCD) camera, correlation tracker, and rate stabilization platform. The CCD camera will improve the weapon's detection capability under hazy and cloudy conditions, and the correlation tracker is expected to improve target lock-on capability.

Under a six-year, $2.6 billion NASA contract, **Thiokol Corp. will build 142 redesigned solid rocket motors for the space shuttle program.** By September 30, 1997, the company will have built 136 flight motors and six test motors and provided launch site operations and flight and integration support.

Loral Defense Systems–Akron received a $47 million follow-on contract for **production of the Special Operations Forces Aircrew Training System.** The company will deliver the Combat Talon I (MC-130E) weapon systems trainer and Combat Talon I mission rehearsal device to the Air Force in 1993.

Winning a contract worth an estimated $47 million, **Texas Instruments Defense Systems & Electronics Group** was selected by General Dynamics for **full-scale development of the F-16 modular mission computer.** The computer, which will perform the functions now done by three separate on-board computers, will support upgrades in capability, such as forward-looking infrared and digital terrain-following radar.

The Advanced Fighter Technology Integration (AFTI)/F-16 resumed flight testing in July after eighteen months of modifications. The program, managed by Air Force Systems Command's Aeronautical Systems Division, will include close air support testing at night in its current flight test phase, which will add several new capabilities to the aircraft, including FLIR and a night-vision helmet display system.

The first Beech Aircraft–built T-1A Jayhawk trainer made its first flight on July 5. The aircraft took off from Beech Field, Wichita, Kan., climbed 14,000 feet, and performed routine first flight test procedures. The flight lasted approximately one hour.

★ **MILESTONES**—On July 1, **the Air Force began withdrawing the 401st Tactical Fighter Wing's F-16s from Torrejon AB,** Spain. The seventy-two-plane wing will be reduced at the rate of four aircraft every two weeks. The Air Force has not said for the record where they are being sent. Last year, the Madrid government asked the Air Force to vacate the base by May 1992.

McDonnell Douglas Helicopter Co. on July 2 announced the **first flight of its first production helicopter built without a tail rotor.** The MD 520N uses the "Notar" system for antitorque and directional control. The first aircraft is scheduled for delivery to the Phoenix, Ariz., police department, which plans to buy seven.

LTV claims to have developed the **world's largest computer-controlled robotic system** to perform automated drilling and fastening of composite and metallic structures on the B-2 bomber. The Robotics for Major Assembly is an automated, five-axis system that drills and fastens the large, highly contoured B-2 parts, which

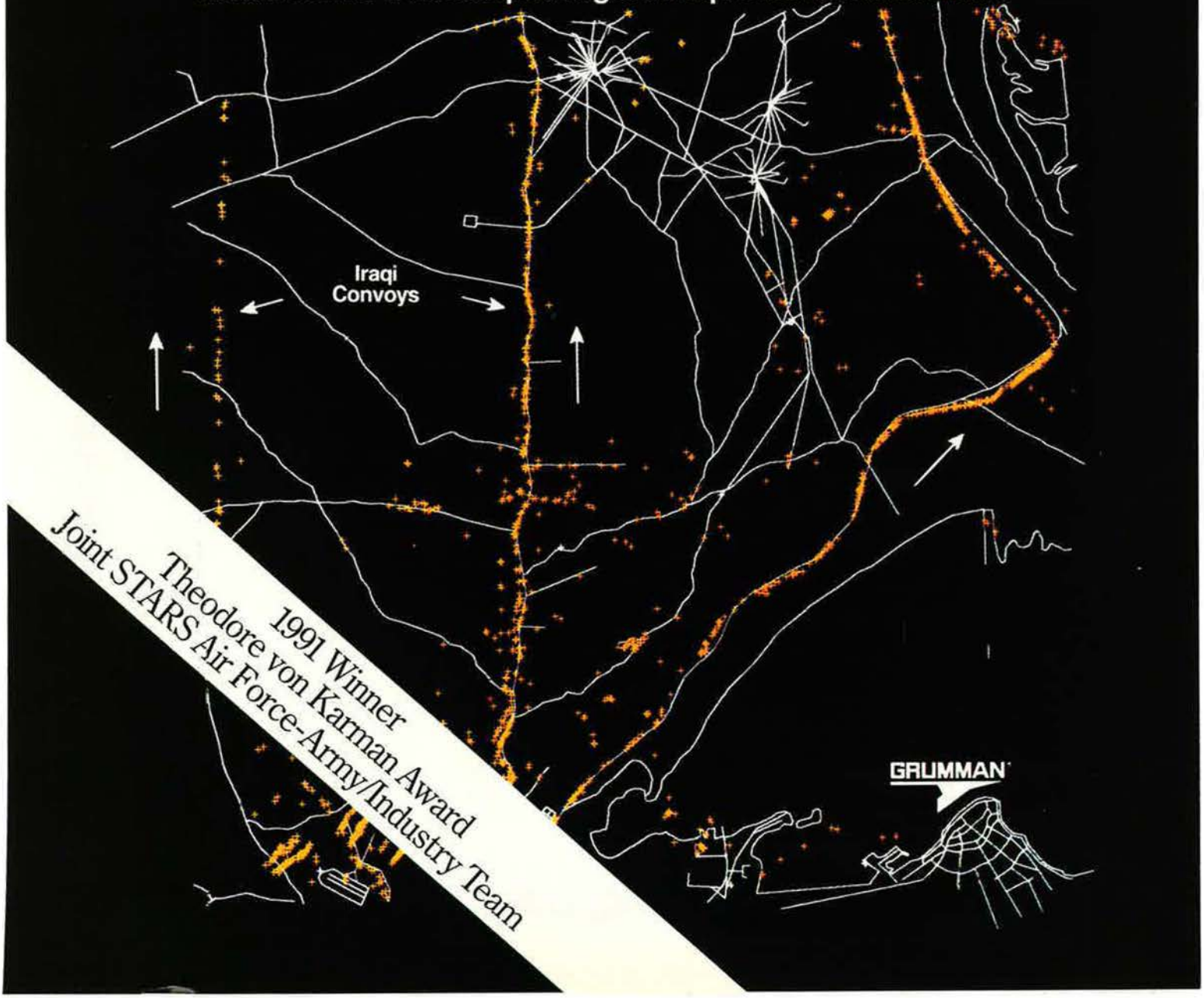
"...we will not ever again want to fight without a Joint STARS kind of system."

General Merrill A. McPeak
Chief of Staff
United States Air Force
TAC Symposium, Orlando, Florida
January 31, 1991

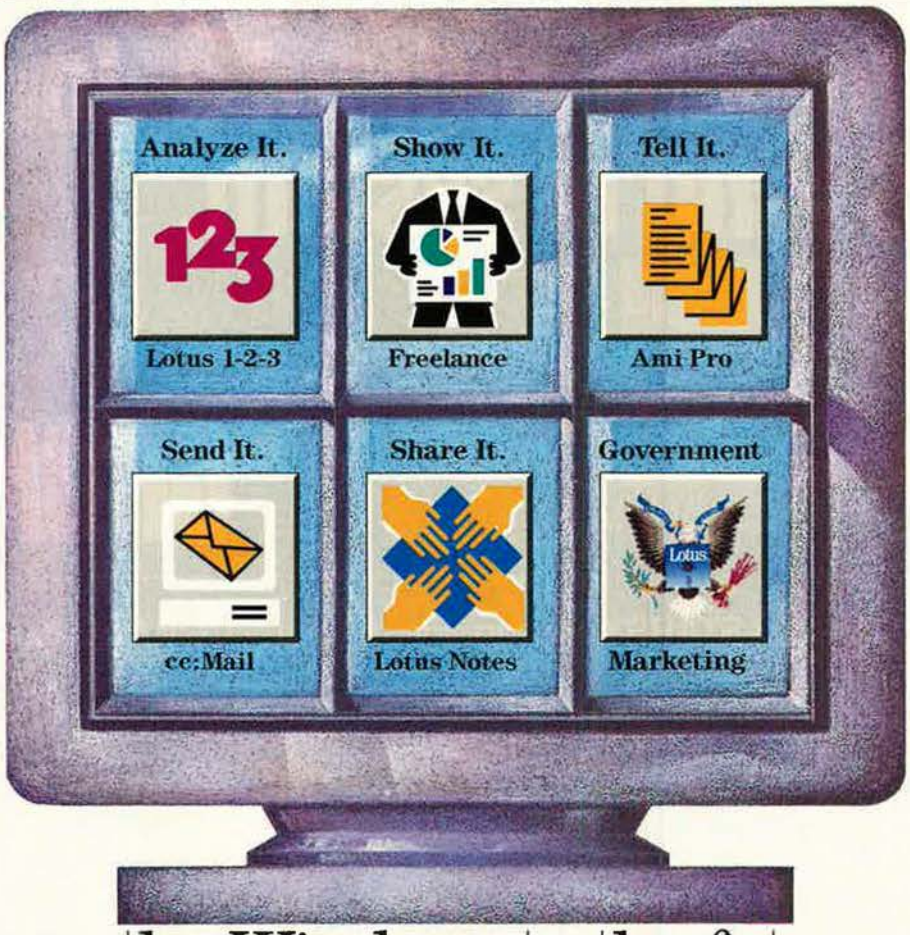
GRUMMAN

Grumman Melbourne Systems, Melbourne, Florida 32902

Actual Joint STARS scope image of Iraqi retreat from Kuwait.



1991 Winner
Theodore von Karman Award
Joint STARS Air Force-Army/Industry Team



Open the Windows to the future of Air Force computing.

Introducing Lotus software for Windows: The Complete Applications Suite That Flies Higher For The Air Force.

The most dramatic breakthrough in Air Force computing is here today: Lotus™ software for Windows,™ the first truly complete, integrated suite of desktop applications that does all of the jobs the Air Force needs to get done.

These fully Windows-compliant Lotus applications leverage and enhance the menus, windows, mouse, memory, icon, device, linking, and help facilities of Windows.

And only Lotus software gives you Smart-Icons,™ the customizable one-click commands that automate common tasks; a simplified install program, expanded help system, Adobe Type Manager,™ and other advanced technologies. It is clear that these Lotus applications are not only the best in their class. . . but the best integrated suite for the Windows environment.

Analyze It. 1-2-3™ for Windows: the government's most popular spreadsheet, now with the full power of Windows, and more.

Show It. Freelance Graphics™ for Windows: the award-winning presentation graphics program with a complete set of automated tools.

Tell It. Ami Pro™ for Windows: the top-rated Windows word processor. *(Software Digest, PC World,* and *PC Magazine).*

Send It. cc:Mail™ for Windows: the world's most popular electronic mail system.

Share It. Lotus Notes™ for Windows: the innovative group communications program that gives people a better way to work together.

Lotus®

Lotus Government Marketing
1000 Wilson Boulevard • Suite 2900
Arlington, Virginia 22209
Phone: (703) 243-7666
Fax: (703) 243-1341
BBS: (703) 527-2282

have composite surfaces with titanium or aluminum substructures.

In a test conducted at Edwards AFB, Calif., the **smallest kinetic kill vehicle planned for strategic defense demonstrated its flight and lock-on capabilities.** The LEAP II (named for the Lightweight Exoatmospheric Advanced Projectiles project), fourteen inches by six inches, launched itself from a cradle, rose to ten feet above a safety net, and hovered in position for seven seconds while keeping an infrared detector locked onto a thermal target 100 yards away. The target was a square metal plate warmed to simulate a reentry vehicle in the coast phase.

Westinghouse Airships of Baltimore, Md., has scheduled the **first flight of the world's largest nonrigid airship.** According to the company, the 220-foot, helium-filled vehicle will offer the largest platform available for long-endurance military, paramilitary, and civil surveillance, communications, and battle management applications. It features a fiber-optic flight-control system, vectored thrust, glass-fiber composite tail fins, and a Kevlar gondola.

Lifting off from Cape Canaveral aboard a McDonnell Douglas Delta II rocket on July 3, the **eleventh Navstar Global Positioning System satellite** achieved orbit.

★ **DIED—Arthur Raymond Brooks,** a World War I fighter pilot, of undisclosed causes on July 17 at his Summit, N. J., home. He was ninety-five. According to Karl Schneide of the National Air and Space Museum, Mr. Brooks shot down six German Fokker D-7s with his Spad XIII biplane and was brought down by enemy fire on four occasions. He is officially credited with 2.67 victories.

Mr. Brooks was awarded the Distinguished Flying Cross for his actions during a patrol in 1918. He and the pilots in two other aircraft were attacked by fighters of the feared Jasta 15, one of Germany's foremost squadrons. According to Mr. Schneide, the other allied pilots took evasive action, but Lieutenant Brooks flew his fighter directly into the twelve-plane enemy formation, shooting down two German planes and damaging two others. After landing, he found 126 bullet holes in his own aircraft.

After the war, Captain Brooks succeeded Capt. Eddie Rickenbacker as commander of the famed 94th "Hat in the Ring" Squadron, part of the US 1st Pursuit Group. He was a 1917 graduate of the Massachusetts Institute of Technology and later worked at Bell Laboratories in New Jersey, concentrating on electronic air navigation and communications systems. The Air and Space Museum in Washington, D. C., maintains an exhibit comprising Mr. Brooks's restored fighter, a sculpture of the pilot, and a video presentation in which he discusses his World War I exploits. ■

Index to Advertisers

Senior Staff Changes

RETIREMENTS: M/G David M. **Goodrich;** B/G John J. **Salvadore;** M/G John P. **Schoeppner,** Jr.

PROMOTIONS: To be **Lieutenant General:** James R. **Clapper,** Jr.; Eugene H. **Fischer.**

To be Brigadier General: John J. **Allen;** Peter C. **Bellisario;** Paul K. **Carlton,** Jr.; George P. **Cole,** Jr.; Roger G. **DeKok;** Robert S. **Dickman;** Patrick K. **Gamble;** John H. **Garrison;** Thomas D. **Gensler;** Francis C. **Gideon,** Jr.

Orin L. **Godsey;** John A. **Gordon;** Edward F. **Grillo,** Jr.; John B. **Hall,** Jr.; John W. **Handy;** Charles R. **Heflebower;** Thomas L. **Hemingway;** James L. **Higham;** Eldon W. **Joersz;** Dwight M. **Kealoha.**

Thomas E. **Kuenning,** Jr.; Normand G. **Lezy;** Donald E. **Loranger,** Jr.; Eugene A. **Lupia;** James I. **Mathers;** John M. **McBroom;** George K. **Muellner;** Lloyd W. **Newton;** Tad J. Oelstrom; Rudolf F. **Peksens.**

Thomas D. **Pilsch;** Robert F. **Raggio;** James M. **Richards** III; John B. **Sams,** Jr.; Monroe S. **Sams,** Jr.; Michael C. **Short;** Raymond A. **Shulstad;** Rondal H. **Smith;** Eugene L. **Tattini;** Anthony J. **Tolin;** Sue E. **Turner.**

To be **ANG Brigadier General:** Richard C. **Cosgrave.**

CHANGES: Col. (B/G selectee) Peter C. Bellisario, from Administrator, Malcolm Grow USAF Medical Center, MAC, Andrews AFB, Md., to Dir., Health Care Support, Hq. USAF/Surgeon General; Chief, Medical Service Corps; and Cmdr., Air Force Support Agency, Bolling AFB, D. C., replacing Col. Frank Rohrbaugh . . . **B/G Bruce J. Bohn,** from DCS/Communications and Computer Systems, Hq. TAC, Langley AFB, Va., to Dir., Plans & Policy, DCS/C4, Hq. USAF, Washington, D. C. . . . **M/G Robert A. Buethe, Jr.,** from Command Surgeon, Hq. TAC, Langley AFB, Va., to Dir., Medical Plans & Resources, Hq. USAF/Surgeon General, Bolling AFB, D. C. . . . **Col. (B/G selectee) Paul K. Carlton, Jr.,** from Cmdr., USAF Medical Center Scott, Hq. MAC, Scott AFB, Ill., to DCS/Med. Services & Training, Hq. ATC, Randolph AFB, Tex., replacing M/G Vernon Chong . . . **B/G Patrick P. Caruana,** from Cmdr., 42d AD, SAC, Grand Forks AFB, N. D., to Ass't DCS/Ops., Hq. SAC, Offutt AFB, Neb., replacing B/G Jerrold P. Allen . . . **M/G Vernon Chong,** from DCS/Med. Services & Training, Hq. ATC, and Cmdr., San Antonio JMMC, Randolph AFB, Tex., to Command Surgeon, Hq. USEUCOM, Vaihingen, Germany, replacing M/G (L/G selectee) Alexander M. Sloan.

M/G (L/G selectee) James R. Clapper, Jr., from Ass't C/S, Intelligence, Hq. USAF, Washington, D. C., to Dir., DIA, Washington, D. C. . . . **M/G Robert S. Delligatti,** from Vice Cmdr., Hq. ATC, Randolph AFB, Tex., to C/S, Hq. USAFE, Ramstein AB, Germany, replacing M/G Bruce J. Lotzbire . . . **B/G Lee A. Downer,** from IG, Hq. USAFE; DCS/Productivity, Hq. USAFE; and Cmdr., European Inspection and Safety Ctr., Hq. USAFE, Ramstein AB, Germany, to DCS/Ops., 2d ATAF, NATO, Rhinedahlen, Germany, replacing B/G (M/G selectee) James M. Hurley . . . **M/G Albert J. Edmonds,** from Ass't DCS/C4, Hq. USAF, Washington, D. C., to Dep. Dir., Defense-Wide C3 Support, Jt. Staff, Washington, D. C. . . . **B/G (M/G selectee) Lawrence P. Farrell, Jr.,** from Dep. Dir., Prgms., DCS/Productivity & Prgms., Hq. USAF, Washington, D. C., to Exec. Dir., Engineering and Program Support, DLA, Cameron Station, Va. . . . **M/G (L/G selectee) Eugene H. Fischer,** from Dir., Manpower and Organization, Hq. USAF, Washington, D. C., to IG, OSAF, Washington, D. C., replacing L/G Bradley C. Hosmer.

B/G (M/G selectee) Charles E. Franklin, from Prgm. Dir., AMRAAM, AFSC, Eglin AFB, Fla., to PEO, Tactical and Airlift Prgms., AFPEO, Hq. USAF, Washington, D. C., replacing M/G (L/G selectee) Edward P. Barry, Jr. . . . **B/G Benard W. Gann,** from Dir. for Strat., Prgms., and Policy, J-5, Hq. USSOUTHCOM, Quarry Heights, Panama, to Dep. Cmdr., Canadian NORAD Region, and Cmdr., 4722d Support Sqdn., TAC, CFC North Bay, Canada, replacing B/G Charles E. Fox, Jr. . . . **Col. (B/G selectee) Thomas D. Gensler,** from Command Surgeon, Hq. PACAF, Hickam AFB, Hawaii, to Command Surgeon, Hq. TAC, Langley AFB, Va., replacing M/G Robert A. Buethe, Jr. . . . **Col. (B/G selectee) Orin L. Godsey,** from Exec. to the CINC, Hq. SAC, Offutt AFB, Neb., to IG, Hq. SAC, Offutt AFB, Neb., replacing B/G James S. Savarda . . . **M/G Eugene E. Habiger,** from Dir., Prgms., DCS/Productivity & Prgms., Hq. USAF, Washington, D. C., to Vice Cmdr., Hq. ATC, Randolph AFB, Tex., replacing M/G Robert S. Delligatti . . . **Col. (B/G selectee) John W. Handy,** from Cmdr., 437th MAW, MAC, Charleston AFB, S. C., to Ass't DCS/Ops. and Transport, Hq. MAC, Scott, AFB, Ill., replacing B/G James L. Cole, Jr.

Col. (B/G selectee) Charles R. Heflebower, from Dep. Dir., Bases and Units, DCS/Productivity & Prgms., Hq. USAF, Washington, D. C., to Dir., Assignments, Hq. AFMPC, Randolph AFB, Tex., replacing Col. Timothy L. Titus . . . **Col. (B/G selectee) Thomas L. Hemingway,** from Vice Cmdr., AFLSC; and Dir., USAF Judiciary, Bolling AFB, D. C., to Staff Judge Advocate, Hq. MAC; and Chief Counsel, Hq. USTRANSCOM, Scott AFB, Ill, replacing Col. Bryan Hawley . . . **B/G (M/G selectee) James M. Hurley,** from DCS/Ops., 2d ATAF, NATO, Rhinedahlen, Germany, to Dir., Manpower and Organization, Hq. USAF, Washington, D. C., replacing M/G Eugene H. Fischer . . . **B/G Jean E. Klick,** from Vice Cmdr., Space Sys. Div., AFSC, Los Angeles AFB, Calif., to Cmdr., Western Dist., Def. Contr. Mgmt. Cmd., DLA, El Segundo, Calif., replacing B/G Kenneth G. Miller . . . **M/G Bruce J. Lotzbire,** from C/S, Hq. USAFE, Ramstein AB,, Germany, to Chief, Office of Defense Cooperation, Greece, USEUCOM, Athens, Greece . . . **B/G Bobbie L. Mitchell,** from Dep. Dir., AFCOS; and Dep. Dir., Plans, DCS/P&O, Hq. USAF, Washington, D. C., to Cmdr., 89th Airlift Wg., MAC, Andrews AFB, Md., replacing Col. James H. White.

B/G Jimmey R. Morrell, from Cmdr., 9th Space Div., AFSPACECOM, Patrick AFB, Fla., to Cmdr., Eastern Space and Missile Ctr., AFSPACECOM, Patrick AFB, Fla., replacing Col. John R. Wormington . . . **Col. (B/G selectee) Lloyd W. Newton,** from Cmdr., 12th FTW, ATC, Randolph AFB, Tex., to Cmdr., 833d AD, TAC, Holloman AFB, N. M., replacing B/G Travis E. Harrell . . . **M/G Richard J. O'Lear,** from Dir., Intel., Hq. USEUCOM, J-2, Vaihingen, Germany, to ACS/Intel., Hq. USAF, Washington, D. C., replacing M/G James R. Clapper, Jr. . . . **Col. (B/G selectee) Rudolf D. Peksens,** from Cmdr., 52d TFW, USAFE, Spangdahlem, Germany, to Ass't DCS/Ops., Hq. USAFE, Ramstein AB, Germany, replacing B/G Jeffrey G. Cliver . . . **Col. (B/G selectee) Thomas D. Pilsch,** from Ass't DCS/Requirements, Hq. MAC, Scott AFB, Ill., to Cmdr., US Forces Azores; and Cmdr., 1605th MASW, MAC, Lajes Field, Azores, replacing B/G Charles C. Barnhill, Jr. . . . **Col. (B/G selectee) James M. Richards III,** from Ass't DCS/Requirements and Test, Hq. SAC, Offutt AFB, Neb., to Ass't DCS/P&R, Hq. SAC, Offutt AFB, Neb., replacing B/G Charles T. Robertson, Jr.

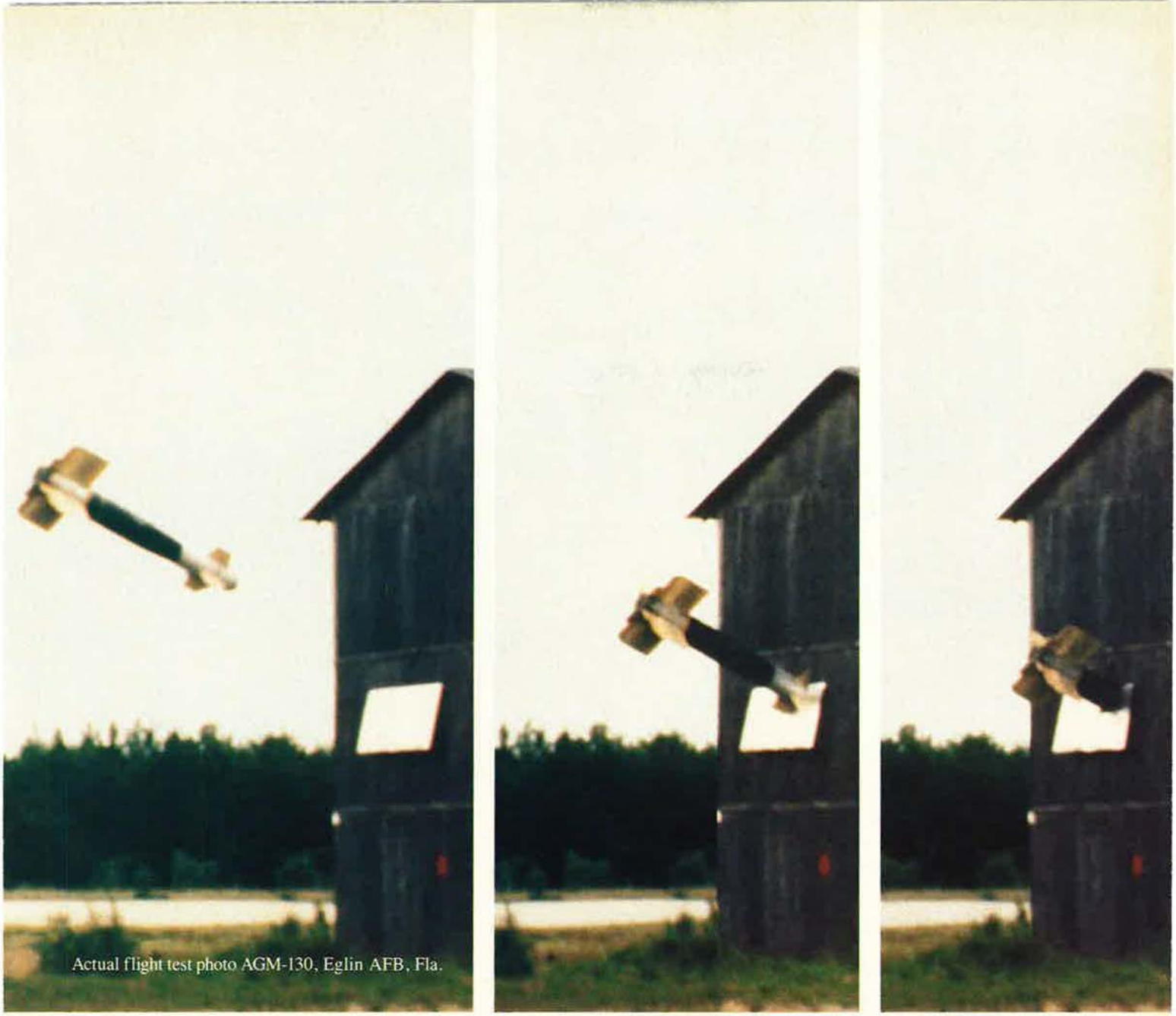
B/G Charles H. Roadman II, from Command Surgeon, Hq. USAFE, Ramstein AB, Germany, to Command Surgeon, Hq. MAC, and Command Surgeon, Hq. USTRANSCOM, Scott AFB, Ill., replacing retiring B/G Frederick W. Plugge IV. . . . **M/G Ervin J. Rokke,** from Assoc. Dep. Dir., Ops. for Mil. Support, NSA, Fort Meade, Md., to Dir., Intel., Hq. USEUCOM, J-2, Vaihingen, Germany, replacing M/G Richard J. O'Lear . . . **Col. (B/G selectee) John B. Sams, Jr.,** from Cmdr., CADRE, AU, Maxwell AFB, Ala., to Cmdr., 60th MAW, MAC, Travis AFB, Calif., replacing Col. William J. Begert . . . **Col. (B/G selectee) Michael C. Short,** from Cmdr., 67th TRW, TAC, Bergstrom AFB, Tex., to Ass't DCS/Ops., and Ass't Dep. Dir., Ops., TACOS, Hq. TAC, Langley AFB, Va., replacing B/G Everett H. Pratt, Jr. . . . **Col. (B/G selectee) Raymond A. Shulstad,** from Ass't DCS/Requirements, Hq. AFSC, Andrews AFB, Md., to Vice Cmdr., ESD, AFSC, Hanscom AFB, Mass., replacing B/G Frank Cardile . . . **M/G Kenneth E. Staten,** from Cmdr., AFDTC, AFSC, Eglin AFB, Fla., to DCS/Test & Resources, Hq. AFSC, Andrews AFB, Md., replacing B/G Roy D. Bridges, Jr. . . . **Col. (B/G selectee) Eugene L. Tattini,** from Ass't DCS/P&P, Hq. AFLC, Wright-Patterson AFB, Ohio, to Vice Cmdr., Space Sys. Div., AFSC, Los Angeles AFB, Calif., replacing B/G Jean E. Klick.

ANG CHANGE: M/G Drennan A. Clark, from Nev. Adjutant General, Hq. Nev. National Guard, Carson City, Nev., to Nev. Adjutant General and member, Reserve Forces Policy Board, Washington, D. C.

AFRES CHANGE: B/G James E. Sherrard III, from Cmdr., 4th AF, AFRES, McClellan AFB, Calif., to Cmdr., 4th AF, AFRES, McClellan AFB, Calif., and member, Reserve Forces Policy Board, Washington, D. C.

SENIOR EXECUTIVE SERVICE (SES) RETIREMENT: Grant C. **Reynolds.**

SES CHANGE: Diann L. McCoy, from Dep. Ass't to the Cmdr. for International Log., ILC, Hq. AFLC, Wright-Patterson AFB, Ohio, to Exec. Agent for Interim Standard Systems for Logistics Requirements, DCS/Materiel Mgmt., Hq. AFLC, Wright-Patterson AFB, Ohio. ■



Actual flight test photo AGM-130, Eglin AFB, Fla.

AGM-130. THE STANDOFF WEAPON SYSTEM THAT WON'T MAKE A DENT IN THE BUDGET.

In deep strikes against fixed or mobile high-value targets, precision, payload and range are essential to mission success. And to aircraft survivability.

The U.S. Air Force/Rockwell AGM-130 standoff weapon system has proved itself capable of not just fulfilling these requirements, but doing so at an affordable price.

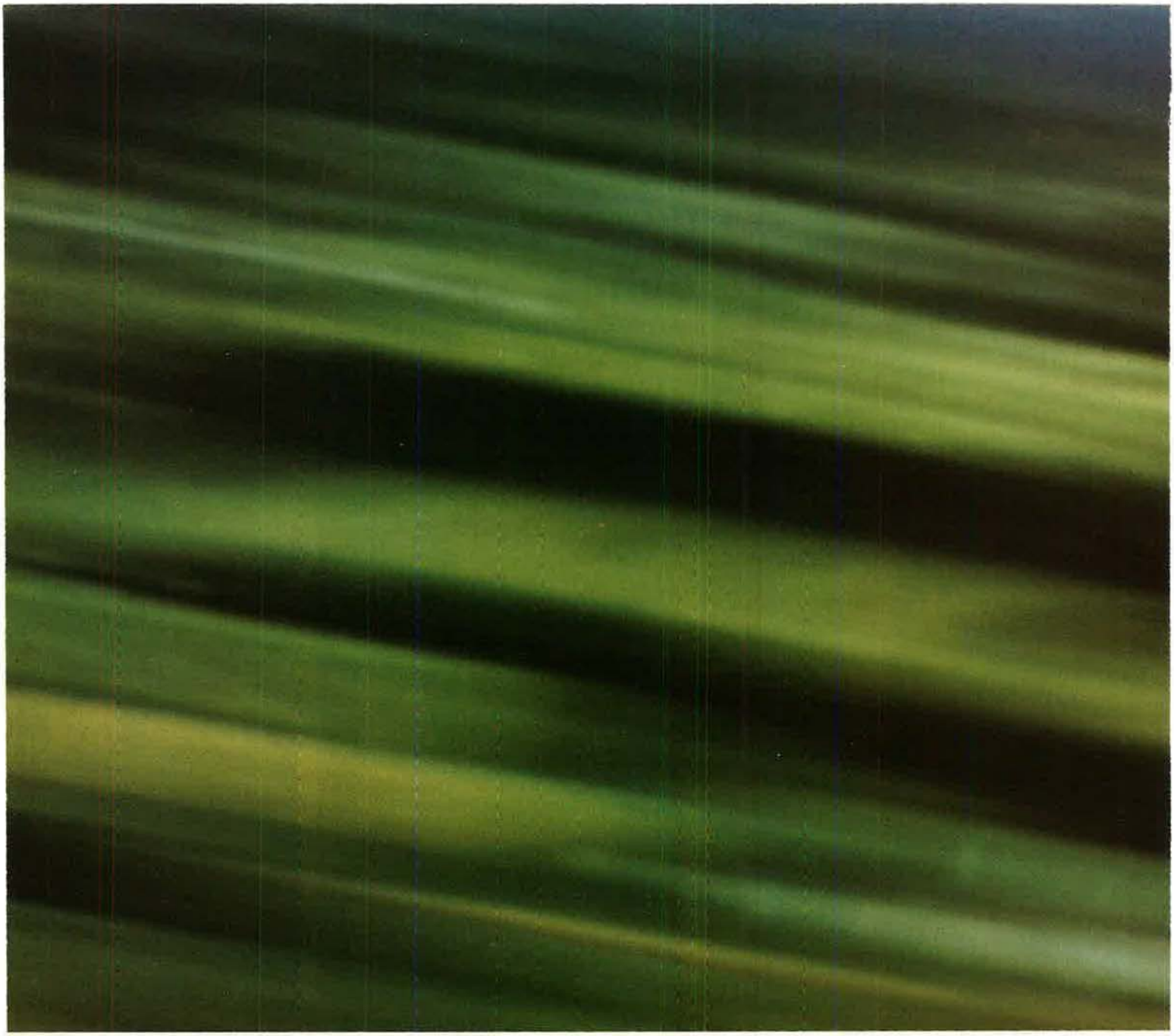
Recent development and operational tests demonstrated AGM-130's ability to deliver a 2,000-lb. warhead with pinpoint accuracy under a rigorous set of tactical profiles that included various range and altitude flights.

AGM-130 provides an unmatched combination of high lethality, aircraft survivability, flight profile flexibility and low cost. As a powered derivative of the modular GBU-15 system currently operational with the U.S. Air Force, it's built on proven technologies and tactics. And it benefits from GBU-15's established production, logistics, training and support resources.

No other weapon system can deliver as much punch with as much precision. And no standoff weapon system is as affordable. For more information, write: Tactical Systems Division, Rockwell International, 1800 Satellite Blvd., Duluth, Georgia 30136, or call (404) 476-6300.

Rockwell International

...where science gets down to business



A round trip ticket into hostile territory:

Surface-to-air missile threats against tactical aircraft have grown more sophisticated. That means the U.S. Air Force needs improved self-protection capabilities for its aircraft.

The answer: Raytheon's ALQ-184. An update of an existing ECM jamming pod, the new system will enable aircraft to cope with any foreseeable radar-guided threat right through the 1990s.

The key to the ALQ-184 is Raytheon multibeam technology. Through its use, the older pod's single high-power transmitter tube was replaced by a bank of reliable mini-tubes that feed a high-gain antenna array.

Results: The new system has greater sensitivity, faster response time, and higher effective radiated power. It can detect threat signals and direct high-power jamming signals against multiple hostile radars.

And because the ALQ-184 uses multiple mini-tubes instead of a single big one, even the loss of several tubes will not disable the system.

Fully maintainable by Air Force personnel, the ALQ-184 and its support needs are now in production. It's another example of how Raytheon's

the ALQ-184.

long experience with system fundamentals can improve an older system's capabilities.

For more information, write Raytheon Company, Government Marketing, 141 Spring Street, Lexington, MA 02173.

The ALQ-184 jamming pod is being deployed on U.S. Air Force F-4s and F-16s.

Raytheon

Where quality starts with fundamentals

These color photos offer a window on USAAF life in Europe during World War II.

—USAF/NASM

Full-Color Memories

—Robert T. Sand

—Richard H. Perley

NOTED aviation author and historian Jeffrey L. Ethell has amassed an important collection of color photography through contacts with numerous veterans over the past fifteen years. Only a small part of that collection is shown here. The rest can be found in the recently published *Fighter Command, American Fighters in Original WW II Color,* written with Robert T. Sand and published by Motorbooks International. Mr. Ethell is at work on a second volume, which will include color photography from the Pacific and Mediterranean theaters.

The photo credits here indicate the private collection from which each photograph comes. ■

These rare color photos document the individual triumphs, camaraderie, and everyday concerns of some of the 2.3-million-plus USAAF participants in World War II. Left, Capt. Dick Perley of the 313th Fighter Squadron pauses before a mission from Toul-Ochey, France. Above, members of the 55th Fighter Group can barely wait for the propeller to stop before clambering onto a P-51 to hear a blow-by-blow account from the pilot. Right, ground crew members scramble around a P-47 with a more lethal purpose, attaching a 500-pound bomb and reloading the .50-caliber machine guns for a ground-attack mission over France.


CAUTION

The return from a successful mission was an occasion for tired elation, general kibitzing, and "smoke 'em if you got 'em" relaxation. Here, ground crew and pilots of the 38th Fighter Squadron mill around their P-51s after a December 24, 1944, mission, during which the 38th scored four of the 55th Fighter Group's fifteen confirmed kills. Second from right is Squadron Commander Maj. John D. Landers, who finished the war as an ace credited with 14.5 kills.

—Robert T. Sand

—Robert T. Sand

Two of the chief nonmilitary concerns of the airmen of any era—food and a means of getting off base—can be seen in this photo of bicycles outside a mess hall at an Eighth Air Force base in England. Though the food was the same for everybody, a classic case of RHIP (Rank Has Its Privileges) at this base dictated that senior NCOs were issued bikes but lower-ranking enlisted personnel had to find their own transportation to town.

Picturesque farmhouses in the English countryside have been meccas for tourists and watercolorists both before and since the war, but these men are on a serious, if not terribly arduous or dangerous, mission on a rare sunny English day—finding and arranging barter for fresh eggs, a welcome relief from their all-too-familiar powdered counterparts.

—Mark H. Brown/USAFA

MAGNAVOX STOPS IT, BEFORE IT STOPS YOU.

Enemy jamming can put a mission in jeopardy. It can force your pilots to bug out before the objective is accomplished.

Magnavox ECCM can stop jamming. Magnavox has put more anti-jam margin in more places, for less money. And, we give you the most DB's per dollar.

With Have Quick, Have Quick II and Have Quick IIA, Magnavox offers the highest performance ECCM available. Performance that has made Magnavox the A/J leader.

We fielded the first A/J system 25 years ago, and we've continually improved it. Today, Have Quick offers ECCM protection that breaks the noise barrier, and delivers an MTBF of 2,800 hours in an F-15.

Discover how the Magnavox "slice system" adds performance — without Group A modifications. Learn what its inherent data capabilities can do for you.

Then you'll know why Have Quick is the Tri-Service standard and the choice of NATO. And, why it's your best defense when the enemy is in session.

Magnavox
Government and Industrial Electronics Company

1313 Production Road, Fort Wayne, IN 46808 USA Phone 219-429-6000 FAX 219-429-5459

"We give our customers tomorrow's technology now."

Lockheed leads.

From the outside, it may look like any other system. But inside, that's where you'll find the real difference. Sanders technology.

Lockheed Sanders leads in the development and application of new technologies – in avionics, surveillance, embedded processing, radar, antisubmarine warfare, countermeasures, displays, and signal processing systems.

At our Microwave Technology Center, for example, ground-breaking developments in gallium arsenide circuitry are revolutionizing military electronics. Smaller, more reliable, and less expensive, GaAs chips are forming the core of the military's electronic future. Our MIMIC-based modules are integral parts of Sanders countermeasure systems, expendable decoys, active antenna arrays, ground-based radars, and automated test systems.

Similar breakthroughs can be seen in our work with the most modern cockpit display systems. These will see widespread use in new aircraft as well as in the growing area of aircraft retrofits.

At Sanders, we're meeting customer needs with affordable technology. We're also finding ways to make quality, reliable systems even better.

PORTABLE SEARCH AND TARGET ACQUISITION RADAR.

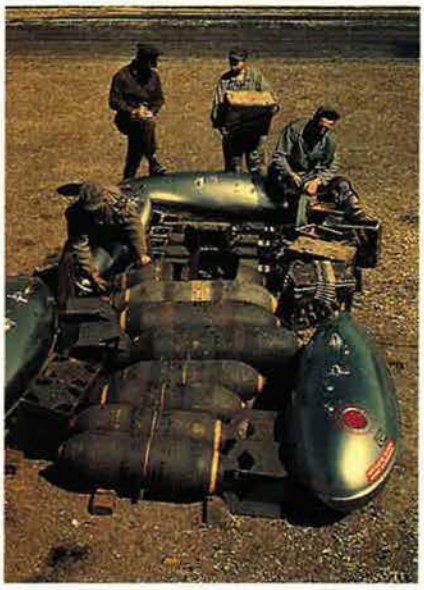
RADIO FREQUENCY TRANSMISSION LINE TEST SET.

COCKPIT DISPLAY SYSTEMS.

Lockheed Sanders

The death, gore, destruction, boredom, and routine of war are sometimes interrupted by scenes of powerful beauty. What USAAF ground crewman wouldn't thrill to view this sight, unseen by anyone under the age of fifty, of dozens of contrails at dawn as aircraft form up for one of the massive December 1944 bombing raids against the German homeland?

—Robert T. Sand



—USAF/NASM

—Robert T. Sand

Unsung heroes in every era, the weapon loaders and maintainers did their jobs in the European theater with the same professionalism that can be seen today. Whether carrying the ordnance for a flight of P-51s (above left) or fixing a rudder damaged in close-formation practice (left), they pursued their tasks secure in the knowledge that the pilots could do very little without them.

—Robert T. Sand

Do not be misled by the many photos taken on sunny days. Then, as now, the English weather was a formidable foe. Despite the relatively crude instruments and rudimentary comforts (e.g., minimal heat, makeshift relief tubes) available in the aircraft of 1945, pilots and ground crews racked up some impressive totals in the abysmal climate. The crew chief of this socked-in Mustang received a medal for its flying the most missions without a mechanical failure.

Strategists and policymakers virtually ignore proximity to entertainment when locating bases, but few factors were higher in priority to the men of Eighth Air Force. Often, the only means of escape to the big city was by rail, and the locomotive chugging into the station was the harbinger of a well-earned three days of rest and relaxation in the pubs, theaters, and nightclubs of wartime London.

—Alexander C. Sloan

—Robert T. Sand

Results were what counted, however, and results were what the pilots in the European theater got. One of the best, Capt. Leonard "Kit" Carson, accounted for 18.5 victories, most of them in this P-51. Life in the European theater could be difficult and dangerous, and too many never returned from their missions, but many would remember their time there fondly, and some would see it as the best time they ever had.

ROCKET DESIGN IS GETTING BACK TO BASICS.

A lot of smart people get skeptical when they're told that the National Launch System (NLS) won't contain the latest in technical gadgetry or cutting edge performance specifications.

After all, it takes a rocket scientist to design and build our latest launch system. Right?

Not necessarily. In fact, everything about NLS is intended to encompass one basic, not-so-revolutionary quality – simplicity.

The NLS will utilize existing commercial computer software instead of developing expensive and unproven new software programs. Line replaceable units in the avionics hardware will simplify repairs and reduce costly vehicle rollbacks. Forging and casting production techniques will virtually eliminate the need for welds, reducing inspection costs and improving reliability.

By keeping it simple, we can make NLS America's most cost-effective and reliable launch system ever. And basically, that's something every American can appreciate.

GENERAL DYNAMICS
A Strong Company For A Strong Country

AFA recognizes the best of the year in six operational mission areas.

The Finest Crews in the Force

By Amy D. Griswold, Editorial Assistant

EACH September, AFA presents six awards to honor the best crews in the US Air Force. These awards, bestowed at the National Convention in Washington, D. C., are the Claire Lee Chennault Award (for the outstanding aerial warfare tactician), the Curtis E. LeMay Award (best strategic aircrew), the Jerome F. O'Malley Award (best reconnaissance crew), the Thomas S. Power Award (best strategic combat missile crew), Best Space Operations Crew Award (best unit in Air Force Space Command), and the William H. Tunner Award (best Military Airlift Command aircrew).

Chennault Award winner Maj. Jerry L. Leatherman, assistant chief of Weapons and Tactics for the 37th TFW, helped plan and coordinate the use of F-117s in Operation Desert Storm. He also dropped two laser-guided bombs into an Iraqi communications center, a feat shown repeatedly in television coverage of the war.

Chennault Award

This year's Chennault Award goes to Maj. Jerry L. Leatherman, assistant chief of Weapons and Tactics, 37th Tactical Fighter Wing, Tonopah Test Range, Nev., and chief of the 37th TFW–Provisional's Desert Storm Combat Mission Planning Cell, based at King Khalid AB, Saudi Arabia. He is honored as this year's outstanding aerial warfare tactician for his role in planning and coordinating the use of F-117As in Operation Desert Storm.

Secure Communications Across the Board

ONE PHONE . . . TOTAL ACCESS
RED TELEPHONE SWITCHING SYSTEM (RTSS)

Now you don't need multiple telephones to satisfy your secure/nonsecure communications requirements. With the GTE RTSS, you can be confident that a single instrument provides total Red/Black communications with unequalled security, as well as robust connectivity and interoperability with other existing and future secure voice systems – tactical, strategic, and commercial.

RTSS includes a 20-year life cycle support program, and is backed by the proven GTE worldwide field support and logistics system. You can procure RTSS under Contract No. F34608-88-D0007 from the DoD through HQ EID, Tinker AFB, Oklahoma. Also, RTSS can be ordered by other Government agencies and services.

For further information, contact:
Marketing Manager
RTSS Program Office
GTE Government Systems Corporation
66 "B" Street
Needham Heights, MA 02194-2892
Phone: 617-455-4912
FAX: 617-455-4884

See RTSS demonstrations in the Atrium at the AFA Show.

GTE Government Systems

LTV/FMA team has 130-year headstart on JPATS.

In the search for our country's next trainer, LTV evaluated more than two dozen candidates from around the world.

Jets. Turboprops. Different seating and wing configurations. Until we singled out an aircraft that we believe has all the features to provide the best training to generations of future Air Force and Navy pilots: the Pampa 2000.

The Pampa 2000 is a team effort from LTV and Fabrica Militar de Aviones (FMA) of Argentina. LTV has more than 70 years' experience in aviation, making history with aircraft like the F4U Corsair and the A-7 Corsair II. FMA has been building military aircraft for more than 60 years. Since 1988, the Pampa has proven itself with a flawless record in the Argentine Air Force. Together, LTV and FMA are making the Pampa 2000 a world-class JPATS contender.

Watch for the Pampa trainer as it makes a U.S. flight demonstration tour this year.

LTV Aerospace and Defense **FMA**

L T V : L O O K I N G A H E A D

—USAF photo by Sgt. Renee Sitler

Current members of Crew S-01, this year's LeMay Award winner for the best strategic crew, are (from left to right) Maj. James W. Ewing, Maj. Stephen D. Schmidt, Capt. Todd C. Westhauser, Capt. Ludwig Schweinfurth IV, Capt. Lawrence Mercadente, 1st Lt. Samuel F. Nelson, MSgt. Noah L. Elliott, and TSgt. Benjamin A. Smith.

Major Leatherman's contributions to the F-117A program go back to his days in the wing weapons shop, when he served as wing representative to the F-117A weapons working group. He devised new tactics for the F-117 as the plane's mission shifted from small, covert operations to full-scale, conventional operations. Major Leatherman's careful records on the impact of heretofore rarely used live weapons resulted in new standards for the aiming of the GBU-10 Paveway II laser-guided bomb.

When Operation Desert Shield began, Tactical Air Command's contingency staff assigned the 37th TFW to develop a concept for F-117A operations against key Iraqi targets. As a member of the wing's contingency planning group, Major Leatherman helped develop the strategy that deployed the 415th Tactical Fighter Squadron to Saudi Arabia.

On arrival in Saudi Arabia, Major Leatherman set up a "deployed combat mission planning cell function." Working with Central Air Forces planners and tanker unit liaisons, he helped to fine-tune the plan for an opening attack by a package of F-117As. The plan's innovations included unique air refueling and rendezvous procedures that allowed large fighter packages to get in and out of the refueling area much faster than would be possible using normal procedures, while maintaining minimum communication between tankers and aircraft being refueled.

In addition to participating in all the planning work, Major Leatherman personally took part in the opening operations, delivering two laser-guided bombs into a critical communications center in Iraq.

LeMay Award

Crew S-01, a B-52 crew of the 7th Bombardment Wing, Carswell AFB, Tex., is this year's top strategic crew.

This unit consists of Maj. Stephen D. Schmidt, instructor aircraft commander; Maj. James W. Ewing, instructor aircraft commander; Capt. Todd C. Westhauser, instructor pilot; Capt. Ludwig Schweinfurth IV, instructor radar navigator; 1st Lt. Samuel F. Nelson, instructor navigator; Capt. Brian S. Fratus, instructor navigator; Capt. Lawrence Mercadente, instructor electronic warfare officer; Capt. Gregory L. Alexander, instructor electronic warfare officer; TSgt. Benjamin A. Smith, instructor aerial gunner; and MSgt. Noah L. Elliott, Jr., instructor aerial gunner.

As the 7th BMW's "most experienced and knowledgeable instructors," Crew S-01 was chosen to play a major role in the testing and operational integration of the Common Strategic Rotary Launcher (CSRL). In an operational weapons test under the Busy Luggage project, they released a B61 bomb from the CSRL over the Tonopah Test Range in Nevada. Having detected several potential problems, the crew developed important changes to SAC's CSRL checklist procedures, which are being incorporated command-wide.

Experience with the CSRL led to the crew's selection for a next-day deployment Global Cruise test launch of an air-launched cruise missile (ALCM) from the rotary launcher. This move helped to demonstrate, in the words of Maj. Gen. Frederick A. Fiedler, SAC's deputy chief of staff for Requirements, "the true operational capability of the B-52/ALCM weapon system." Crew S-01 performed a second Global Cruise test launch of an ALCM over the Canadian Test Range.

The crew members' knowledge and expertise led to "the ultimate honor": selection from all of the B-52 crews in SAC to brief President Bush and National Security Advisor Brent Scowcroft on the capabilities of the ALCM and advanced cruise missile (ACM) in preparation for strategic arms reduction talks. They also briefed a Department of Energy study team on operating procedures for the AGM-69A short-range attack missile (SRAM). Their demonstration helped to develop enhanced SRAM

Capt. Brian J. McNulty (left) and Capt. James C. Horton (below) of the 26th Reconnaissance Wing are this year's winners of the O 'Malley Award for best reconnaissance crew. Their "tactical aviation expertise, professionalism, and . . . 'can do' attitude" led their wing to victory at the international Reconnaissance Air Meet 1990.

evaluation within two weeks of becoming flight lead. He was Zweibrücken AB Company Grade Officer of the Quarter for the third quarter of 1990.

Captain McNulty has an "unsurpassed" record as an instructor weapon systems officer (IWSO) and is the youngest assistant flight commander in the squadron. He earned two consecutive "Exceptionally Qualified" ratings on both his annual WSO qualification evaluation and his initial instructor certification, the only IWSO at Zweibrücken to do so.

Captain McNulty led the wing's participation in an operational test and evaluation of the improved Tactical Electronic Reconnaissance (TEREC) system that "improved TEREC system electronic intelligence gathering by 100 percent." He was selected to be a primary escort officer for visiting Conventional Forces in Europe inspection teams and was named Zweibrücken AB Company Grade Officer of the Quarter for the first quarter of 1990.

safety procedures now in use throughout the command.

O'Malley Award

Capt. James C. Horton and Capt. Brian J. McNulty, 26th Reconnaissance Wing, USAFE, Zweibrücken AB, Germany, have excelled individually and as a team, earning the Jerome F. O'Malley Award for the best reconnaissance aircrew. Captains Horton and McNulty "have demonstrated a combination of tactical aviation expertise, professionalism, and an infectious 'can do' attitude that mark them as the most dependable, conscientious, and respected crew in tactical reconnaissance," in the words of their nomination papers.

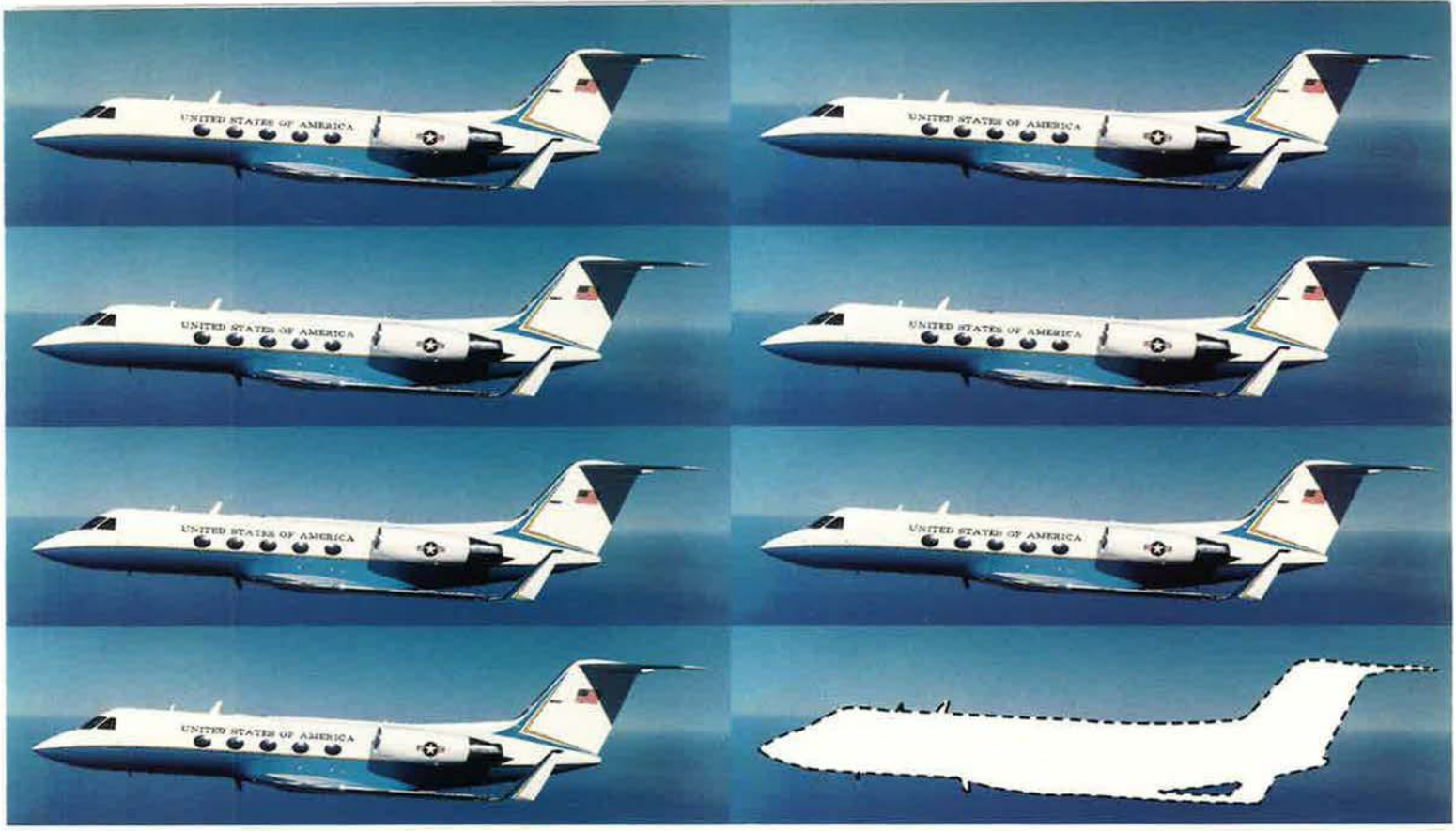
After intense competition, the two were selected to represent the 26th TRW at the international Reconnaissance Air Meet 1990, defending the wing's 1988 World Championship title. With them in the lead, the 26th TRW team won honors as top active-duty squadron, top day reconnaissance team, top sensor download team, second- and third-place overall crew, and second place overall team. Captain Horton had near-perfect results during the

competition, earning him the title of top active-duty pilot.

Back at Zweibrücken, Captain Horton was handpicked by the squadron commander to be the primary flight lead in a sensitive joint exercise with the French Air Force. He was also chosen to upgrade to flight lead and instructor pilot during 1990. He led a flawless tactical

Power Award

This year's outstanding missile crew is Crew S-220, 91st Strategic Missile Wing, Operations Training Division, 15th Air Force, Minot AFB, N. D. The "exceptional leadership" displayed by Capt. Michael E. Fortney and 1st Lt. Douglas R. Stickle as the wing's senior instructor crew helped propel their division



It's time to play it again, SAM.

U.S. Air Force Special Air Missions–SAM–is getting a real workout these days.

As political reforms proliferate around the globe, fostering new governments and new opportunities for peace initiatives, SAM is being called on to transport increasing numbers of our high level government and military leaders into all parts of the world.

More and more, SAM is relying on a fleet of seven C-20 Gulfstreams to help get the job done. And there's good reason to do so.

Far more versatile than large 4-engine aircraft, the C-20 Gulfstreams give SAM greater flexibility in flight planning, crew scheduling and utilization of aircraft types. They also cost less to operate and maintain. In short, they mean a more responsive, more cost-effective operation for the 89th Military Airlift Wing at Andrews Air Force Base.

The time to enlarge on this effectiveness is now. And the logical way to do it is with the C-20F Gulfstream, a version of our amazing Gulfstream IV.

This remarkable executive aircraft can fly non-stop nearly 5,000 statute miles in about 9.5 hours. It has the most advanced technology in its computerized flight management and information systems. It has a new generation of Rolls-Royce engines also chosen to power airliners. And even with all of its capabilities, it has proven to be surprisingly cost-effective in operation.

In every respect, C-20F Gulfstreams would complement the present C-20 Gulfstreams perfectly, right down to maintenance procedures, spares supply and support programs.

The role of Special Air Missions in the years ahead can only become more important, and it will need the most versatile, most productive, most modern transport aircraft available to it.

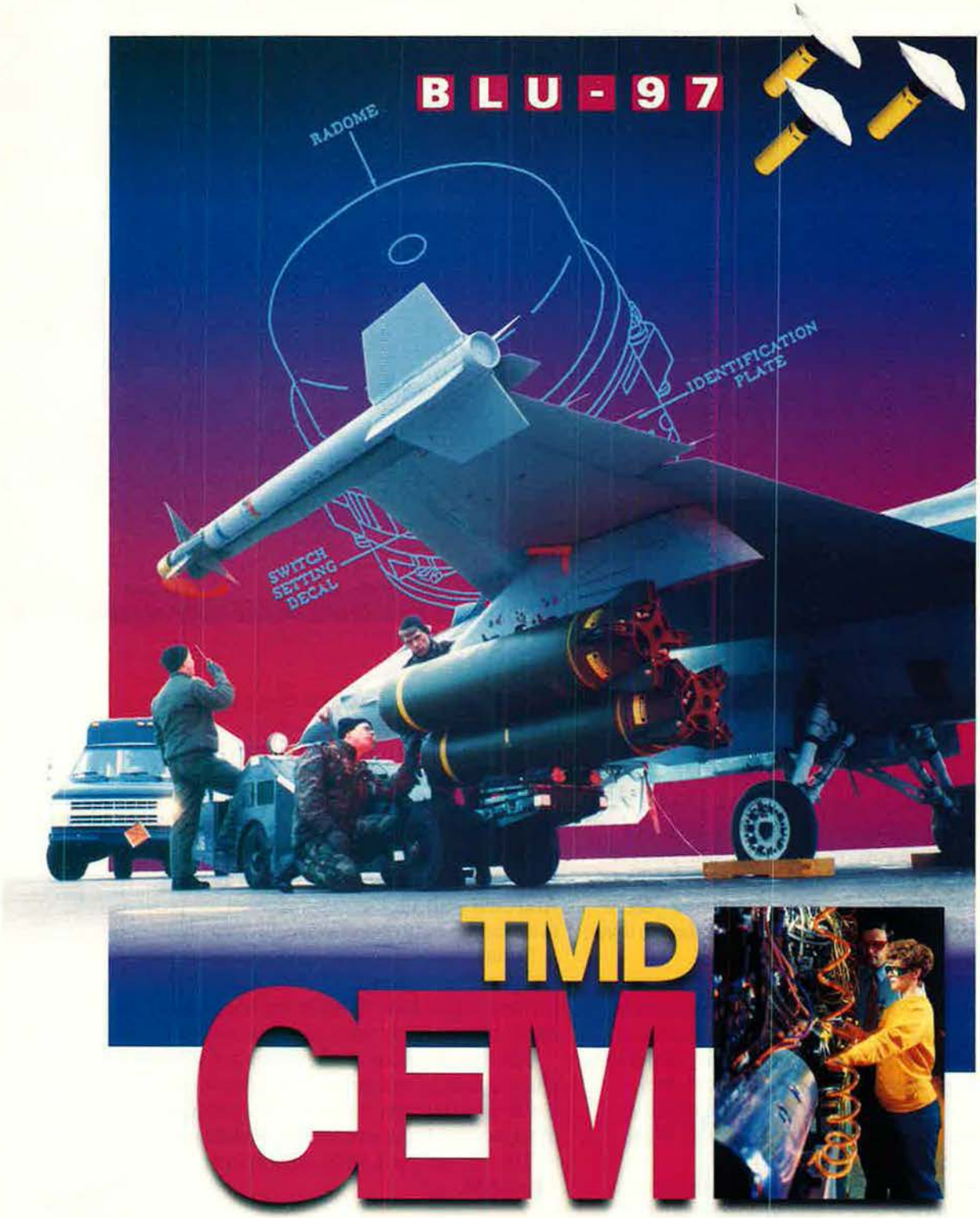
The way we see it, we're right in tune with SAM.

The C-20F Gulfstream.

Uncommonly versatile, uncommonly productive.

Gulfstream Aerospace

For information about maximizing Gulfstream jet aircraft in military applications, contact: Douglass G. Wood, Vice President, Military Marketing, Gulfstream Aerospace Corporation, 1000 Wilson Boulevard, Suite 2701, Arlington, Virginia 22209 U.S.A. Telephone: (703) 276-9500.



The Combined Effects Munition/CBU-87

Combat proven. The "weapon of choice" among *Desert Storm* pilots. Flexible, reliable, lethal. Count on it. ...Count on us.
Alliant Techsystems, 5901 Lincoln Drive, Edina, MN, 55436
Telephone: 612 939-2751

Visit our booth #2507 at the Air Force Association trade show.

ALLIANTTECHSYSTEMS

to a rating of Outstanding during their 3901st Strategic Missile Evaluation Squadron proficiency evaluation, the best rating achieved by any training division since 1987. Crew S-220 was awarded the 3901st SMES Certificate of Excellence for superior program management, five of their training division instructors received Outstanding Performer awards, and three programs they had started were rated Noteworthy by the 3901st SMES. One of those programs was the development of a 1,000-page library and computer database of weapon system information.

Captain Fortney and Lieutenant Stickle proved their skill operationally as well, leading the Minot operations team to a second-place finish in Olympic Arena 1990, during which they were recognized as the best crew in Fifteenth Air Force and the best Minuteman III crew in SAC.

The "exceptional leadership" of 1st Lt. Douglas R. Stickle (left) and Capt. Michael E. Fortney, the 91st SMW's senior instructor crew, propelled their division to a rating of Outstanding during their 3901st Strategic Missile Evaluation Squadron proficiency evaluation and garnered crew S-220 this year's Power Award.

Space Operations

This year's Space Operations award goes to the Titan IV launch crew of the 6595th Aerospace Test Group, Vandenberg AFB, Calif. Crew members are Capt. Brad Moore, launch controller; Capt. Glenn Martin, satellite countdown controller; and Capt. Gary Willmes, booster countdown controller. Together, they led a 500-person team in validation testing of the new $250 million Titan IV Space Launch Complex at Vandenberg and in the operational flight processing of the Titan IV launch vehicle in its first Titan IV mission from Vandenberg.

The launch crew's first big task was to help make the new launch complex operational. "Many of the existing launch facilities at Space Launch Complex Four East were dismantled and replaced with completely new, upgraded facilities," according to the crew's nomination. Captains Moore, Martin, and Willmes "managed the development, approval, and conduct of checkout and operational procedures for all launchpad systems," identifying problems and then devising and carrying out solutions.

Once the complex became operational, the crew prepared for the actual launch mission. This involved unique activities and presented many challenges. For the Solid Rocket Motor (SRM) stacking and checkout, the crew conducted a two-segment-per-day operation that "saved two weeks of valuable schedule time over previous SRM stacking operations," in the words of the crew's nomination papers.

The crew approved the design and developed the operational concept for the first use of the Remote Control Launch Control Center, which, by controlling countdown operations remotely rather than from the launch complex, represented a radical departure. It worked flawlessly.

Capt. Gary Willmes, Capt. Brad Moore, and Capt. Glenn Martin (left to right) prepare for the first Titan IV launch from Vandenberg AFB, Calif. The crew, from the 6595th Aerospace Test Group, oversaw all phases of the launch, from making sure the new launch complex was operational to preparing for and executing the launch.

A dramatic, 5,000-mile rescue mission to the south Pacific earned these crew members from the 63d MAW, Norton AFB, Calif., the Tunner Award for the top MAC crew. The captain of the two-person sailboat shown below had suffered a severe asthma attack days from shore. He would have died without the medication dropped by Capt. Ray R. Phillips and his crew.

Tunner Award

For a lifesaving rescue mission in the vast south Pacific, Capt. Ray R. Phillips and his crew, 63d Military Airlift Wing, Norton AFB, Calif., were selected as this year's top crew in Military Airlift Command.

A local night airdrop mission was transformed into a dramatic rescue mission to the south Pacific to find a two-person, fifty-foot-long sailboat and drop lifesaving medication for the ship's captain, who had suffered a severe asthma attack. His wife's distress call was picked up by a ham radio operator in Hawaii, who contacted the Rescue Coordination Center.

Joined by a flight surgeon, a pararescue jump team, and two crew chiefs, the crew had to work out the solutions to potential problems while en route to the search area. The 5,000-mile trip required an air refueling, which meant coordination with the tanker was critical, as were such fuel conservation measures as timing the descent perfectly.

Through radio patches, the crew established communication with the boat, enabling the MAC team members to keep abreast of the stricken man's condition and discuss airdrop procedures and other details with his wife.

The copilot spotted the boat through his binoculars and, fearful of losing sight of the boat if he looked away for even an instant, shouted his directions over the engine noise to the navigator next to him in the window rather than keying his microphone tc talk. The crew made a door bundle airdrop of supplies, which landed ten feet from the boat. The crew put the plane into a maximum endurance holding pattern to give them time to judge the effectiveness of the medication. A second drop was necessary, and after this medication was administered, the man's condition improved greatly. The Rescue Coordination Center credited Captain Phillips and his crew with a "save-and-a-half."

The members of Captain Phillips's crew were Lt. Col. Willis M. Simmons, Jr., flight surgeon; Maj. Michael D. McGary, pilot; Maj. David L. Randle, navigator; Capt. Carroll B. Powell, Jr., navigator; 1st Lt. Danny B. Harris, pilot; 1st Lt. Michael R. Kenmuth, navigator; MSgt. Vance C. Hoyle, flight engineer; TSgt. David L. Brown, loadmaster; TSgt. Everett E. Evans, Jr., pararescue; TSgt. James W. Murray, loadmaster; TSgt. John A. Reinhart, flight engineer; SSgt. David A. Vogele, pararescue; Sgt. Sharon L. Hollaway, loadmaster; Sgt. Robert E. Vaughan, pararescue; and SrA. Robert M. Semrau, Jr., pararescue. ■

Training Approach for Space, Air, Land and Sea

1

1 Alphavision 2000 – Visual Simulation System

Problems in training, resulting from environmental strain and emergency situations, where risk of life and health as well as loss of expensive material have to be avoided, can be solved by using training equipment.

To ensure optimal instruction and advanced training for operators and maintenance personnel, training approaches in accordance to customer requirements will be offered, starting with training analysis and concepts up to complex training systems and operations:

- Trainer Aircraft
- Operational & Tactics Trainers
- Part Task Trainers
- Simulator Subsystems (Visual-, Sound Simulation, Database Generation, Instructor Station, etc.)
- Computer Based Instruction
- System Design & Concept
- Training Task Analysis

2

3

2 Fanranger – Trainer Aircraft
3 Generic Flight Simulator

Please see us at the AFA '91
Booth 2601

Messerschmitt-Bölkow-Blohm GmbH
Military Aircraft Division
P.O.Box 80 11 60
D-8000 München 80
Germany
Telephone (0 89) 6 07-2 48 60
Telefax (0 89) 6 07-2 93 52

MBB
Deutsche Aerospace

AFA honors these twelve enlisted members as the best in the force in 1991.

The Outstanding Airmen of the Year

By Susan Katz Keating

THE AFA National Convention this month brings deserved recognition to twelve stellar performers in the US Air Force's enlisted ranks. These twelve—the Outstanding Airmen of the Year—are the pacesetters of the service. Until September 1992, they will wear on their uniforms a special badge signifying their status: the Outstanding Airman of the Year ribbon. Here are the special twelve of 1991.

TSgt. Rick R. Bloom, Base Information and Industrial Security Manager, 15th Security Police Squadron, 15th Air Base Wing, Hickam AFB, Hawaii, wrote the book on time management. During most of 1990, he carried out the duties usually handled by a two-person office. Not only did he manage the two largest information and industrial security programs in the Pacific area, but he also oversaw base resources protection and personnel security programs. In his spare time, he completed an associate's and a bachelor's degree, with honors.

TSgt. Rick R. Bloom

Sgt. Christopher L. Chestnut

Sergeant Bloom assumed management of Wheeler AFB's information security program, achieving a fifty percent increase in industrial security accounts and a twenty percent increase in information security accounts. He spearheaded the 15th ABW's classified reduction program, trimming the number of classified security containers by thirty-two percent. Sergeant Bloom also wrote and published two security pamphlets for the 15th ABW and helped the Hawaii Air National Guard set up its own improved information security program.

Sergeant Bloom was named the Pacific Air Forces Outstanding NCO of the Year and received PACAF's Lance P. Sijan Leadership Award. He was named 15th ABW Outstanding NCO of the Year and Information Security Manager of the Year. He was also the 15th Security Police Squadron's Outstanding NCO of the Year. He is at work on a second bachelor's degree.

Sgt. Christopher L. Chestnut, Tactical Aircraft Maintenance Technician, Phase Inspection Section, 56th Equipment Maintenance Squadron, MacDill AFB, Fla., performs his job like a seasoned veteran, though he has barely four years of Air Force service. Thanks in

WE'LL MAKE SURE YOUR BENEFITS AS AN OFFICER DON'T DIE WITH YOU.

The biggest surprise your widow will face is that none of your benefits come automatically. The right forms have to be filled out and filed, in the right place, at the right time. If they aren't, the checks won't come. And some of the benefits may be lost forever.

It's our government's way, and it's probably the best way. But if it's your family, it's the hard way. The Army and Air Force Mutual Aid Association will make sure your family always gets all the benefits they should, as soon as possible.

We'll do all possible paperwork for benefits or insurance. We will wire same day funds if needed. We make sure they never miss any benefits, as long as they live. That's our job. And, we never accept payment from your survivors.

Army and Air Force Mutual Aid Association
Ft. Myer, Arlington, Virginia 22211/ 1-800-336-4538
Please send me more information about AAFMAA.
My current status as a COMMISSIONED OFFICER is:
☐ Army ☐ Air Force ☐ Retired (under 60)
☐ Full time active duty
☐ NG/Reserve
Name _____ DOB _____
Rank _____ Soc. Sec. No. _____
Street _____
City _____ State _____ Zip _____
Phone(Work) _____ (Home) _____
AF 9/91

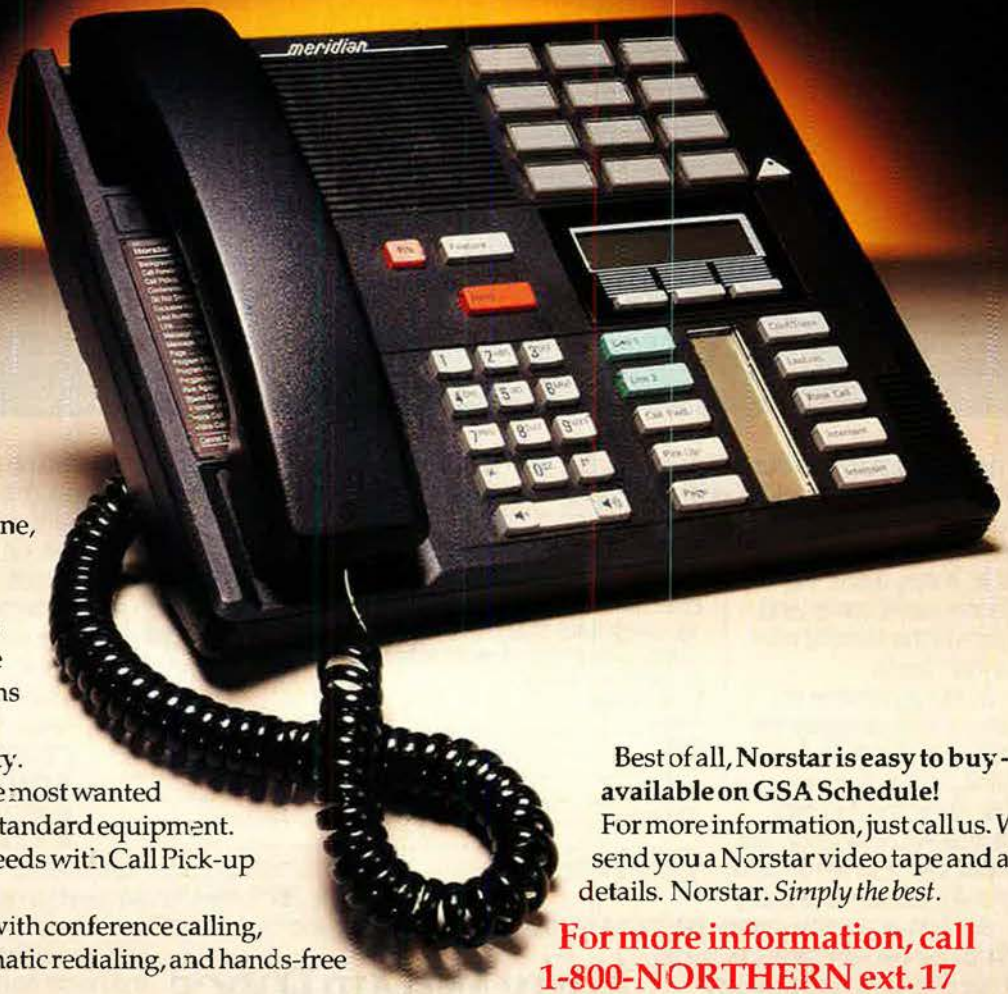
It's just one part of a whole lifetime of services that includes a yearly computerized summary of all your benefits; reliable, unbiased advice on insurance needs; counseling for retirement benefits; baseline universal life insurance; and use of our underground storage vault. All this and more is included in very low monthly membership dues, based on your age at joining. And you can remain a member after separation or retirement.

Since 1879 AAFMAA has been a non-profit service association run for military officers by retired military officers, providing peace of mind for the home front.

ARMY AND AIR FORCE MUTUAL AID ASSOCIATION
Peace of mind for the home front

For more information, call us toll free today. 1-800-336-4538 Ft. Myer, Virginia 22211

Your own secret weapon.



It may look like a phone, but this is Norstar. A powerful piece of weaponry designed to help you complete one of the toughest missions you'll ever face. Improving productivity.

Norstar provides the most wanted telephone features as standard equipment.

- Minimize staffing needs with Call Pick-up Groups.
- Improve efficiency with conference calling, speed dialing, automatic redialing, and hands-free answering.
- Reduce costs by connecting fax machines and other services without adding dedicated lines.
- Get all the benefits of advanced PBX systems with easy-to-add options like voice mail, automatic call distribution and music/information-on-hold without taking a big bite out of your budget.

Best of all, **Norstar is easy to buy -- it's available on GSA Schedule!**

For more information, just call us. We'll send you a Norstar video tape and all the details. Norstar. *Simply the best.*

For more information, call 1-800-NORTHERN ext. 17

nt northern telecom

TECHNOLOGY THE WORLD CALLS ON.™

GSA SCHEDULE

Northern Telecom Inc. Federal Systems

large part to his flawless maintenance performance, Phase Dock Two achieved a quality verification inspection pass rate of 98.3 percent, well above Tactical Air Command's standard of eighty-five percent. When the work load increased dramatically after the start of Operation Desert Shield, Sergeant Chestnut assumed the duties of the dock chief while his supervisor moved on to serve as a transportation augmentee. Sergeant Chestnut maintained a 100 percent on-time phase schedule.

Sergeant Chestnut played a major part in the transfer of twenty-six F-16A/B aircraft to four different Air Force Reserve (AFRES) and ANG units, all ahead of schedule. He was chosen to deploy with the 62d Aircraft Maintenance Unit to Nellis AFB, Nev., for Green Flag exercises. Although it was not required of him as a first-termer, he volunteered for the Rivet Workforce training program and completed the program's on-the-job training portion with the highest of marks. On his own initiative, Sergeant Chestnut learned to build up F-16 wheel and tire assemblies and has augmented wheel and tire production during aircraft maintenance unit deployments.

Sergeant Chestnut, a John L. Levitow Award honoree from the Noncommissioned Officer Preparatory Course, was promoted below the zone. He is at work on an associate's degree in aircraft maintenance technology.

TSgt. Harold L. Clark, Jr.

Sgt. Joe A. Dessenberger

SMSgt. Arthur L. Haney

TSgt. Harold L. Clark, Jr., Superintendent of Security Police Operations, RAF Welford, 501st Security Police Squadron, 501st Tactical Missile Wing, RAF Greenham Common, England, has responsibility for guarding a 650-acre munitions facility, the largest nonnuclear munitions storage area (NMSA) controlled by the United States Air Forces in Europe (USAFE). Recently, the munitions systems in Sergeant Clark's NMSA were declared a high-priority resource for Air Force warfighting capability. This called for immediate tightening of already stringent security requirements and necessitated significant changes at RAF Welford. His superiors say that Sergeant Clark accomplished the task without a hitch. When faced with retrieving 436 "controlled-area" badges and reissuing 872 "restricted-area" badges, he achieved a rate of 100 percent accuracy and accountability.

On Sergeant Clark's watch, the security team received a rating of Excellent in the denial/recapture exercise held during the January 1990 Nuclear Surety Inspection. During his flight's quality control evaluations, he led the group to a 100 percent pass rate. Thirteen of the fifteen team members achieved ratings of Outstanding.

Sergeant Clark earned the Inspector General Award of Excellence and the Air Force Achievement Medal for his role in the Nuclear Surety Inspection. In addition, he won the USAFE Lance P. Sijan Leadership Award and was named USAFE Outstanding Security Police NCO of the Year. He was the Ground Defense and 501st TMW NCO of the Year and of the Quarter. Sergeant Clark seeks an associate's degree in industrial security through the Community College of the Air Force (CCAF).

Sgt. Joe A. Dessenberger, Munitions Maintenance Specialist, 184th Tactical Fighter Group, Kansas ANG, McConnell AFB, Kan., regularly exceeds standards and aggressively pursues new techniques in his ANG duties. He has been appointed to the munitions maintenance and storage section's standardization and evaluation team, a select assignment, at a very early stage in his career. He helped develop a self-inspection checklist for the section, which increased reliability and overall section productivity. By testing and implementing a state-of-the-art master storage plan, Sergeant Dessenberger increased accountability and reduced the time required to conduct asset inventory.

As part of the standardization and evaluation team, Sergeant Dessenberger helped develop new procedures and standards for the section, increasing safety and productivity. His evaluation of a computer-generated master storage plan led to revision and improvement of the original computer program.

Sergeant Dessenberger has earned the John L. Levitow Award, the Academic Achievement Award, and honor graduate status from the NCO Preparatory Course. He was named Outstanding Munitions Maintenance Person of the Quarter and Munitions Branch Outstanding Airman of the Quarter. He is working on an associate's degree in electrical engineering.

SMSgt. Arthur L. Haney, Propulsion Division Superintendent, 2953d Combat Logistics Support Squadron, Tinker AFB, Okla., is director of the Air Force's largest military engine depot work force. He has proven an invaluable member of the logistics team. He was in charge of fifteen worldwide Depot Field Team repairs of engines, tasks that consumed more than 28,000 manhours of labor.

Sergeant Haney helped stave off what could have been yet another grounding of Strategic Air Command's B-1B fleet. He executed an urgent-action, safety time compliance technical order at all four B-1B bases simultaneously, then completed 363 engine-safety modifications to the bomber's GE F101 engine in fewer than ninety days.

USAFE leaders credit Sergeant Haney's personnel with a remarkable achievement at the 52d Tactical Fighter Wing, Spangdahlem AB, Germany: In less than four months, the engine repair team transformed the wing's deficit of fourteen spare engines into a surplus of twelve engines.

Eager to help his people get ahead, Sergeant Haney instituted a "get smart" program for his section, allowing each member one hour a day to study Professional Military Education materials. Their test results greatly improved. Sergeant Haney was named Unit Senior NCO of the Quarter and Air Force Logistics Command Outstanding Senior NCO of the Year. He is pursuing his master's degree in public administration.

SrA. Mark D. Hartburg, Sr., Pneudraulic-Mechanical Technician, 321st Field Missile Maintenance Squadron, 321st Strategic Missile Wing, Grand Forks AFB, N. D., established procedures to investigate vehicle accidents and equipment abuse, which achieved substantial savings and reduced critical equipment failures by thirty-three percent during the reorganization of the Vehicle Equipment and Control Branch, a task that involved equipment worth more than $22 million. Airman Hartburg took charge of the vehicle operator care, tire, and fire extinguisher account, resulting in a rating of Outstanding in vehicle care and a rating of Excellent in special-purpose vehicles from SAC's Inspector General. His procedures to investigate vehicle accidents and equipment abuse achieved substantial savings and reduced critical equipment failures by thirty-three percent.

Airman Hartburg designed new route folders and vehicle emergency jack kits. His safety-enhancing designs for the 321st SMW were adopted by seven other organizations at Grand Forks. As a representative on the Maintenance Deputate's Airman's Advisory Council, Airman Hartburg relayed the concerns and ideas of his peers directly to the senior wing leaders, leading, in part, to the authorization of improved overalls for the maintenance technicians.

Airman Hartburg has been recognized as 8th Air Force's Outstanding Maintenance Performer. He was also named ICBM Maintenance Technician of the Month for the 321st SMW and Squadron Airman of the Month.

MSgt. Robert V. Martens, Jr., Element Leader, 1724th Special Tactics Squadron, Pope AFB, N. C., was chosen to serve on an elite crew supporting the nation's most sensitive and demanding joint special operations missions. He has met the test, inspiring confidence during the most difficult situations.

Sergeant Martens, assigned to the Army's 75th Ranger Regiment, was the combat control liaison during Operation Just Cause follow-on missions. In that capacity, he served as primary linguist for three reconnaissance teams and participated in house-to-house searches, night ambushes, and daily patrols. As tactical team leader during a joint readiness training exercise, he helped set up a dirt runway, enabling more than forty aircraft to land and take off without incident. As primary team leader during another JRT exercise, Sergeant Martens developed extensive plans and conducted daily briefings with air and ground component commanders.

Sergeant Martens carried out an aggressive chemical warfare training program, performing all tactical tasks, including close air support live-fire training using protective gear and masks. His expertise and ability to judge personnel landed him in the unit's crucial operator selection course.

Sergeant Martens is a recipient of the Meritorious Service Medal for outstanding service. He also received the Air Force Commendation Medal for service in Just Cause and the Joint Service Commendation Medal for participating in Desert Storm. He was chosen NCO of the Year by the 1724th Special Tactics Squadron. He has an associate's degree in airway sciences and is pursuing a second degree in business management. He is also enrolled in the Senior NCO Academy correspondence course.

SrA. Mark D. Hartburg, Sr.

MSgt. Robert V. Martens, Jr.

MSgt. Christina J. Morris

TSgt. Michael R. Ogle

MSgt. Christina J. Morris, Noncommissioned Officer in Charge of Electro-Environmental Systems, 12th Field Maintenance Squadron, Randolph AFB, Tex., was a perfect fit when the newly organized electro-environmental shop needed a leader with an extensive technical background. She immediately instituted major management changes that reduced recurring aircraft problems. This contributed to the lowest deferred maintenance rates in the history of Air Training Command. She is credited with helping to maintain some of the highest mission capable rates in ATC.

Sergeant Morris's implementation of Rivet Workforce set the pace for ATC; her team achieved career-development course scores exceeding ninety percent. She was selected to be the 12th FMS's production superintendent. She filled in when the aerospace systems branch chief was absent, and she is praised by superiors for her ability to juggle the needs of six shops.

Sergeant Morris is completing her associate's degree in environmental ejection systems technology and pursuing a bachelor's degree in mechanical engineering. She completed the Senior NCO Academy

The CFM56 Engine . . . Proven Performer

KC-135R adapts to Desert Storm.

Global Mission Accomplished

CFM56 engines flew nearly 12,000 sorties to support USAF, USN and allied missions during Desert Storm. Since beginning service in 1984, we have chalked up a mission capability rate of 99.95%. Our powerplants are ready, capable and supportable for programs now and through 2040.

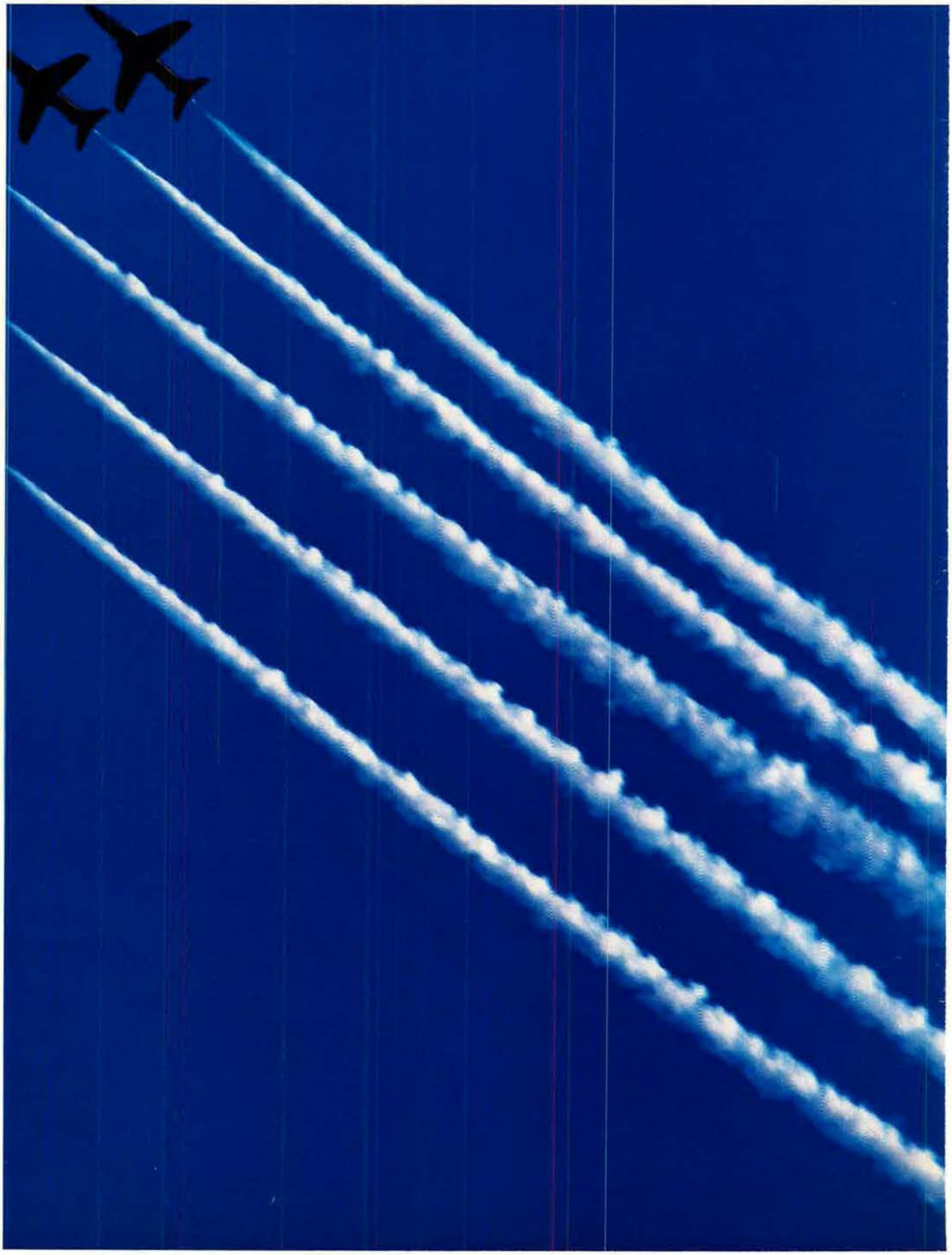
For example, USAF's KC-135R Modernization program benefits from 90% noise reduction, 27% fuel use reduction, 50%-plus more capability/power and one-tenth the maintenance workload . . . producing a significant savings in life-cycle costs.

CFM56 . . . a proven performer worldwide.

cfm international

A joint company of SNECMA, France and General Electric Co., U.S.A.

We've been blazing new trails for



thirty-eight years.

In the technological race, being ahead is the only place to be. So since the 1950s, we've been developing and applying new technologies in numerous major avionics projects for the Air Force, Navy and Army.

For instance, IBM processors can be found aboard the Air Force's B-52, B-1, F-4, F-15, E-3A and Combat Talon II, the Navy's A-6, A-7, S-3, P-3 and LAMPS as well as the Army's SOA helicopters. We're also part of many NASA projects such as the Apollo/ Saturn V, the Space Shuttle and the Space Station.

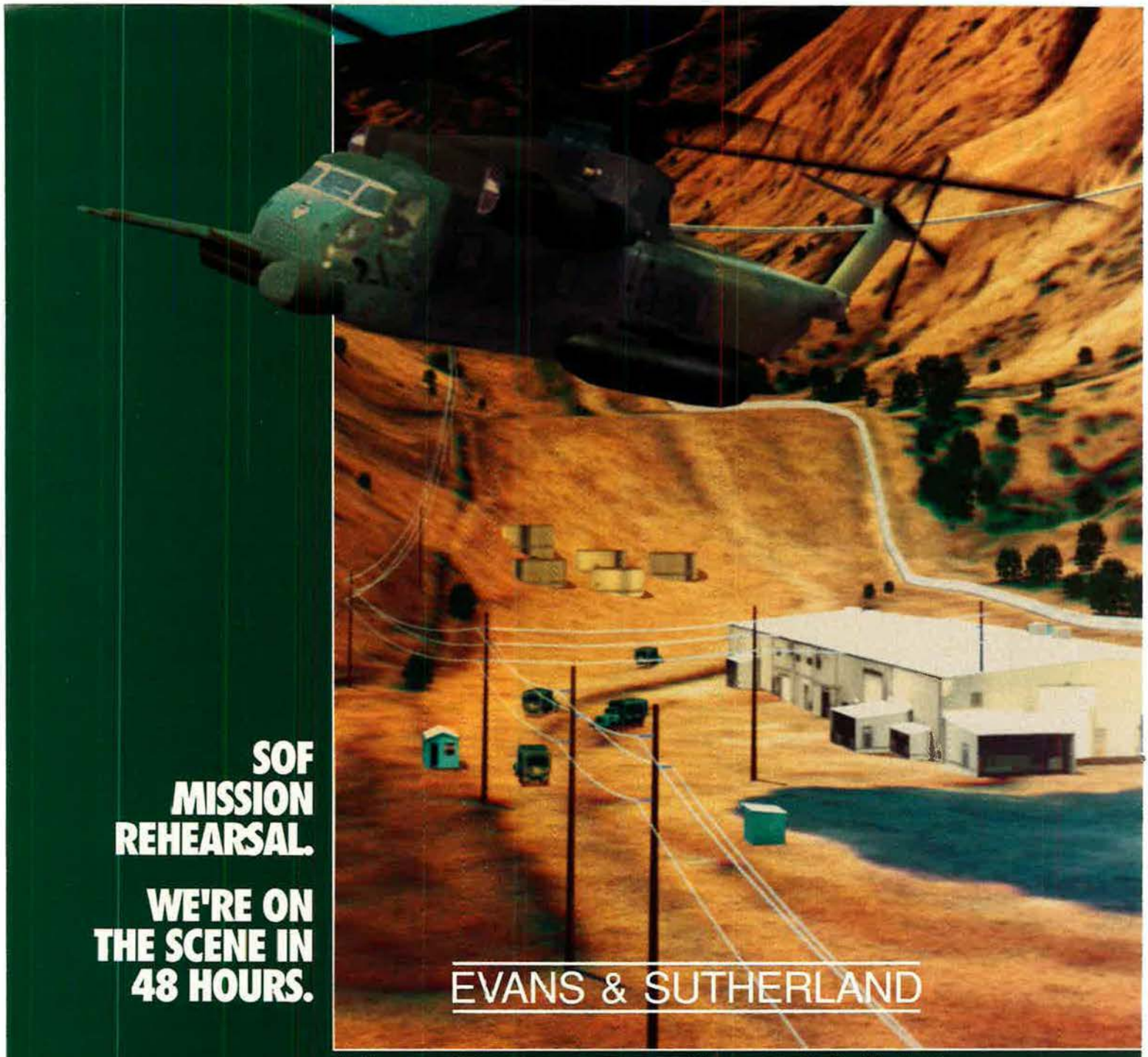
And we continue to raise the level of avionics even higher with VHSIC technology. We've developed the Common Signal Processor (CSP), the first all-VHSIC signal and data processor that offers supercomputer power for a wide range of applications. Another VHSIC-based program – Modular Avionics – will increase the performance, reliability, maintainability and flexibility of future aircraft.

These solutions show IBM technology at work. They also demonstrate how our Federal Sector Division tackles and solves problems of national importance for the Department of Defense, NASA and other federal agencies.

And with the world rapidly changing around us, the technological race leaves us with less breathing room than ever.

Reason enough to blaze new trails for years to come.

IBM®
FEDERAL SECTOR DIVISION



SOF MISSION REHEARSAL.

WE'RE ON THE SCENE IN 48 HOURS.

Until now, rapid database turnaround has been a major challenge for SOF mission rehearsal. Not any more.

Evans & Sutherland presents the new ESIG-4000 image generator. Designed with breakthrough architecture, it meets time-critical database requirements in as few as 48 hours.

Selected for the Air Force's SOF ATS program, the ESIG-4000 is unlike any other system. It takes separately processed terrain and feature databases, combines them in its hardware, and generates –in real time– a complete mission scenario.

This powerful capability totally eliminates the most time-consuming procedures of database modeling.

What's more, the flexible database format allows a mission scenario to be easily updated with late-breaking intelligence.

Advanced database processing is the catalyst for the ESIG-4000's ability to generate unrivaled visual fidelity. Giving aircrews a photo-realistic mission preview, the system provides a higher level of detail, generates greater terrain fidelity and supports full sensor simulation for NVG, LLTV and IR.

For a complete picture of the new ESIG-4000, contact: Evans & Sutherland, Simulation Division, 600 Komas Drive, Salt Lake City, Utah 84108. Tel: 801-582-5847, Ext. 6521, Fax: 801-582-5848

correspondence course in nine months.

TSgt. Michael R. Ogle, B-52 Flightline Expeditor, 92d Organizational Maintenance Squadron, Fairchild AFB, Wash., has brought tangible benefits to the Air Force as a manager and a technical expert. As program manager for replacement of the MC-1 autopilot system and remodification of the vertical tail assembly on all KC-135 aircraft, he reduced the modification flow time from 1,800 to 975 hours.

His design and development of a floating mount for the B-52's autopilot resulted in considerable savings. He designed, developed, and manufactured a special mount for the vertical fin assembly on 1955 and 1956 KC-135 aircraft, eventually adopted throughout the Air Force. He spotted a critical wiring problem on KC-135 aircraft, which led to an Urgent Time Compliance Technical Order.

Sergeant Ogle was NCO of the Year for the 92d BMW and NCO of the Quarter for both the 92d OMS and the 92d BMW. He was named John L. Levitow Honor Graduate from SAC's NCO Academy. He is working on a B.A. degree in education.

MSgt. Kelly E. Payne

Sgt. Jody L. Reburn

SMSgt. Michael C. Reynolds

MSgt. Kelly E. Payne, Personnel Systems Manager Technician, 439th Combat Support Group, AFRES, Westover AFB, Mass., was a key member of the personnel readiness unit, conducting the Presidential recall of the flying squadron for Operation Desert Shield. She achieved 100 percent of the objective in only twenty hours. Her duties included automating the mobilization orders and processing the unit for mobilization.

Sergeant Payne, in her efforts to improve mission programs, devised interfacing local databases to track Desert Shield participation and automated the tracking of immunizations for the clinic. Her method of entering updates improved data reliability. She established a new image of "customer service first" for Personnel Systems Management. She created automated slide presentations for Military Personnel System training and provided personal, classroom, or graphic training to 100 personnel technicians per quarter.

Sergeant Payne was AFRES Outstanding USAF Military Technician of the Year and has received Civilian Performance Awards for three years in a row. She received an associate's degree and is working toward a bachelor's degree. She was chosen to attend the Command NCO Academy.

Sgt. Jody L. Reburn, Medical Administrative Specialist, AFSC Regional Hospital Eglin, Eglin AFB, Fla., is an innovative manager who sets high standards. As a liaison between patients and staff, she has significantly reduced patient complaints and has successfully streamlined office procedures. Her development of two new forms for the Birth Registration Program cut processing time, and her new preparation and tracking procedures have reduced late registrations of birth certificates by twenty percent. She also developed a computer program for processing state forms.

Sergeant Reburn maintained a record of 100 percent on-time submission of birth registrations for more than 1,000 babies born during 1990. She processed more than 100 detailed birth certificates each month, 100 percent error-free. She completed the Red Cross CPR instructor course and has provided health care instruction for hospital personnel.

Sergeant Reburn was Airman of the Year for both the Air Force Development Test Center and the 3200th Support Wing. She is working toward a CCAF degree in medical administration and is also pursuing a bachelor's degree in business administration.

SMSgt. Michael C. Reynolds, Operations Superintendent, 5th Mobile Aerial Port Squadron, 313th Tactical Airlift Group, RAF Mildenhall, England, led his enlisted force in the deployment of the 5th MAPS to the Persian Gulf. Though he was on leave when the emergency erupted, the loadmaster returned voluntarily to deploy to southwest Asia in support of Operation Desert Shield. During the first three months, Sergeant Reynolds's team handled 5,500 aircraft carrying 168,000 passengers and 123,000 tons of cargo under austere conditions. During a three-month period, Sergeant Reynolds was the senior NCO for 116 personnel from ten different units, tasked with carrying out the largest airlift offloading operation in Air Force history.

At his home station, Sergeant Reynolds directed a training program that ensured high proficiency in all MAPS duties. He maintained the training of nineteen loadmasters to support NASA recovery missions, European passenger missions, and special requirements. In preparation for a year-long closure of the MAPS hangar, he created a plan to maintain proficiency and qualifications for loadmasters and airdrop equipment riggers. In addition to his usual duties, he filled in for six months as operations officer and for three months as first sergeant.

Sergeant Reynolds was Senior NCO of the Year for the 322d Airlift Division and 21st Air Force. ■

Susan Katz Keating, a free-lance writer in Washington, D. C., specializes in military topics. Her last article for AIR FORCE *Magazine, "The Spooky Question of Soviet Nukes," appeared in the October 1990 issue.*

These are the top crews and units of the Air Guard and Reserve.

All-Stars on Call

By Colleen A. Nash, Associate Editor

Here's the crew that captured this year's President's Award. The C-5 crew from the 709th Military Airlift Squadron overcame a serious in-flight emergency while on a mission in support of Operation Desert Storm. Their skill and teamwork saved the aircraft, its passengers, and its sensitive cargo.

THE Persian Gulf War shattered any lingering doubts about the strength of the Air Force's Total Force. In Operations Desert Shield and Desert Storm, Air National Guard and Air Force Reserve members turned in stellar performances across a broad range of operational missions. In the words of Gen. Merrill A. McPeak, USAF Chief of Staff, "They were ready when called on, they were moved immediately, and they were employed the minute combat began."

At its National Convention in Washington, D. C., this month, AFA presents four awards to outstanding Air Force Reservists and Air Guardsmen. The very best of the "On-Call Air Force" can be seen in the 1991 winners of the President's Award (top AFRES crew), the Earl T. Ricks Award (outstanding airmanship in the ANG), the AFRES Outstanding Unit Award, and the ANG Outstanding Unit Award.

The President's Award

This award goes to a 709th Military Airlift Squadron C-5 crew commanded by Maj. John R. Haszard. The crew's flawless handling of a serious in-flight emergency while on a mission in support of Operation Desert Storm proves there is no substitute for training.

The plane's crew consisted of Major Haszard; Maj. James V. Jordan, first pilot; MSgt. Sydney Redmond and TSgt. Samuel T. W. Davidson II, flight engineers; CMSgt. Steven R. Pennypacker and MSgt. Edwin R. Sullivan, standardization loadmasters; Sgt. Billy J. McKinley, dedicated crew chief; and MSgt. Larry E. Moseley, SSgt. Matthew J. Danaher, and A1C Christopher A. Persing, loadmasters.

On the morning of January 31, 1991, the C-5 was set to take off from Runway 23 at Westover AFB, Mass. The heavy airlifter was loaded with 240,000 pounds of fuel and 141,000 pounds of high-explosive, general-purpose bombs. Several passengers were nestled in the troop compartment.

Just as the transport reached rotate speed, a large flock of sea gulls was spotted rising up from the end of the runway. For the crew, it was too late to avoid the danger. Birds struck the right side of the aircraft. The C-5 shuddered, and noise and vibration came from the number three and number four engines. Major Jordan and Sergeant Redmond, the flight engineer at the panel, simultaneously noticed fluctuating fuel flow readings on engine number three. Sergeant Davidson spotted holes in the engine's cowling and a missing access panel. He recommended immediate shutdown, and Major Haszard pulled the number

COUNTDOWN TO FIRST FLIGHT

History in the making:

C-17: Ready for action.

The first C-17 multipurpose airlifter is complete. All preflight testing has been completed, and ahead lies a comprehensive two-year flight test program.

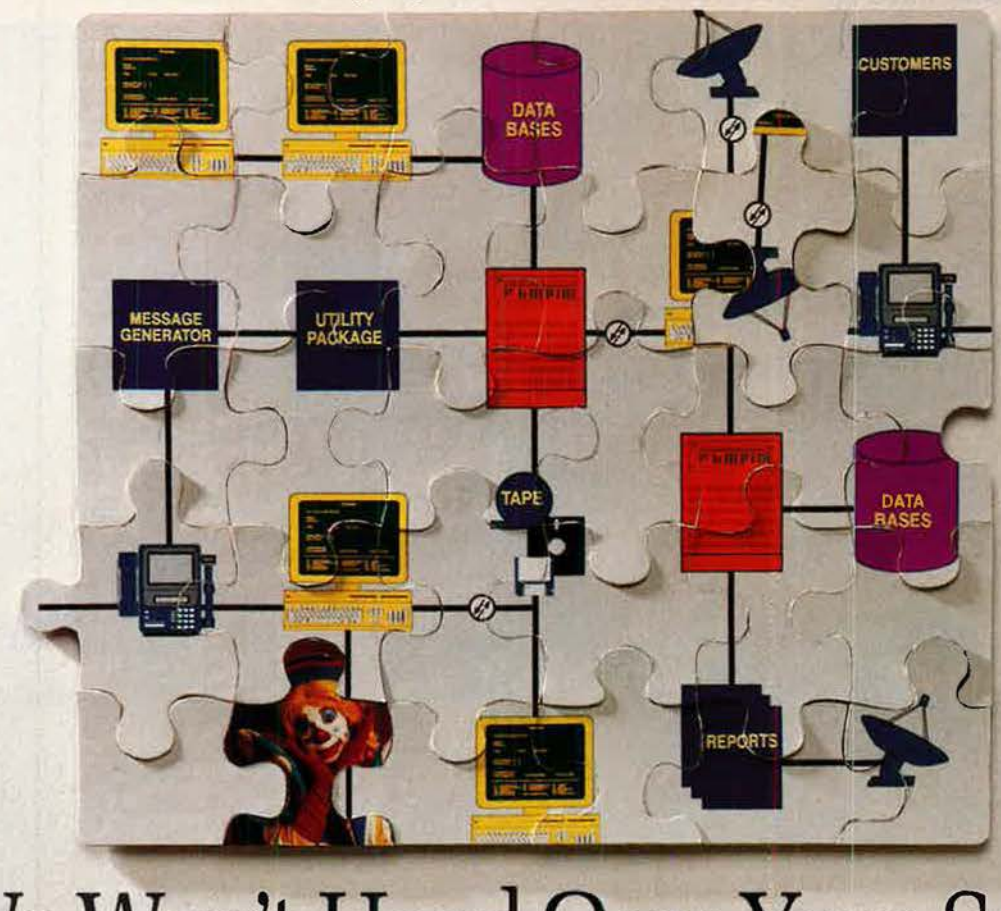
The C-17 gives our nation the needed mobility improvements necessary to project power in this changing world. Its unique flexibility allows delivery of heavy or light combat forces, or humanitarian aid, into airfields as short as 3,000 feet anywhere in the world.

The dedicated, professional employees of McDonnell Douglas and their suppliers from all parts of the country are working with their military customers to provide quality aircraft for the flight test program and for the deployment that will follow. The C-17 team takes pride in our efforts to get the job done—and get it done right.

MCDONNELL DOUGLAS

A company of leaders.

People-powered solutions from BDM



We Won't Hand Over Your System Until All The Pieces Fit.

There are many ways to design and integrate an information system. The easy way is to approach your system requirement as if it were basically like anyone else's, apply a formula or template, and make the pieces fit as well as possible. If there are loose ends, dead ends, and pieces left over, too bad.

The hard way is also the right way. The BDM people-powered way. BDM teams have already demonstrated its effectiveness to clients in the defense community, federal and state government, and the private sector.

BDM believes that to integrate your system, you need a firm and people who (1) understand exactly what you do and want to do, (2) understand the total operational context of the system, (3) understand the key technologies and their applications, (4) know all about software and CASE, and (5) have a solid track record of on-time implementation.

Anyone can sell you a system. BDM will find you the solution. BDM International, Inc., 7915 Jones Branch Dr., Code 8P, McLean, Virginia 22102.

BDM

Technology. Systems. Solutions. ***People.***

The Major Commands (continued)

Military Airlift Command

Hq. Scott AFB, Ill.

Commander in Chief
Gen. H. T. Johnson

21st Air Force
Lt. Gen. Vernon J. Kondra
McGuire AFB, N. J.

22d Air Force
Lt. Gen. Richard J. Trzaskoma
Travis AFB, Calif.

Air Rescue Service
Col. John D. Woodruff
McClellan AFB, Calif.

Aerospace Audiovisual Service
Col. Thomas E. Diamond
Norton AFB, Calif.

Defense Courier Service
Col. Chris L. Jefferies
Fort Meade, Md.

Pacific Air Forces

Hq. Hickam AFB, Hawaii

Commander in Chief
Gen. Jimmie V. Adams

5th Air Force
Maj. Gen. (Lt. Gen. selectee)
Richard E. Hawley
Yokota AB, Japan

7th Air Force
Lt. Gen. Ronald R. Fogleman
Osan AB, Korea

11th Air Force
Lt. Gen. Thomas G. McInerney
Elmendorf AFB, Alaska

13th Air Force
Maj. Gen. William A. Studer
Clark AB, Philippines

313th Air Div.
Brig. Gen. Joseph E. Hurd
Kadena AB, Japan

Strategic Air Command

Hq. Offutt AFB, Neb.

Commander in Chief
Gen. George L. Butler

8th Air Force
Lt. Gen. Martin J. Ryan, Jr.
Barksdale AFB, La.

Strategic Warfare Ctr.
Maj. Gen. Thad A. Wolfe
Ellsworth AFB, S. D.

7th Air Div.
Brig. Gen. (Maj. Gen. selectee)
Kenneth L. Hagemann, Sr.
Ramstein AB, Germany

15th Air Force
Lt. Gen. Robert D. Beckel
March AFB, Calif.

Strategic Missile Ctr.
Col. (Brig. Gen. selectee)
Thomas E. Kuenning, Jr.
Vandenberg AFB, Calif.

3d Air Div.
Maj. Gen. Robert E. Dempsey
Hickam AFB, Hawaii

14th Air Div.
Brig. Gen. Lawrence A. Mitchell
Beale AFB, Calif.

Tactical Air Command

Hq. Langley AFB, Va.

Commander
Gen. John M. Loh

1st Air Force
Maj. Gen. Lester P. Brown, Jr.
Tyndall AFB, Fla.

9th Air Force
Lt. Gen. Charles A. Horner
Shaw AFB, S. C.

12th Air Force
Lt. Gen. Thomas A. Baker
Bergstrom AFB, Tex.

USAF Tactical Air Warfare Ctr.
Maj. Gen. John A. Corder
Eglin AFB, Fla.

USAF Tactical Fighter Weapons Ctr.
Maj. Gen. Billy G. McCoy
Nellis AFB, Nev.

28th Air Div.
Brig. Gen. William J. Ball
Tinker AFB, Okla.

832d Air Div.
Brig. Gen. Ralph T. Browning
Luke AFB, Ariz.

833d Air Div.
Col. (Brig. Gen. selectee)
Lloyd W. Newton
Holloman AFB, N. M.

836th Air Div.
Brig. Gen. Eugene D. Santarelli
Davis-Monthan AFB, Ariz.

United States Air Forces in Europe

Hq. Ramstein AB, Germany

Commander in Chief
Gen. Robert C. Oaks

3d Air Force
Maj. Gen. Charles D. Link
RAF Mildenhall, England

16th Air Force
Maj. Gen. Gerald A. Daniel
Torrejon AB, Spain

17th Air Force
Maj. Gen. James E. Chambers
Sembach AB, Germany

TUSLOG
Maj. Gen. Ralph R. Rohatsch, Jr.
Ankara AS, Turkey

Field Operating Agencies

Air Force Audit Agency

Hq. Norton AFB, Calif.

The Auditor General
John W. Boddie

Air Force Center for Studies and Analyses

Hq. Washington, D. C.

Commander
Maj. Gen. George B. Harrison

Air Force Civil Engineering Support Agency

Hq. Tyndall AFB, Fla.

Commander
Col. Marshall W. Nay, Jr.

Air Force Civilian Personnel Management Center

Randolph AFB, Tex.

Director
Pat L. Schittulli

Air Force Combat Operations Staff

Hq. Washington, D. C.

Commander
Lt. Gen. Michael A. Nelson

Air Force Commissary Service

Hq. Kelly AFB, Tex.

Commander
Maj. Gen. Robert F. Swarts

Air Force Communications Command

Hq. Kelly AFB, Tex.

Commander
Maj. Gen. John S. Fairfield

Air Force Cost Center

Hq. Washington, D. C.

Commander
Col. Ronald S. Bowen

Air Force Inspection Agency

Hq. Norton AFB, Calif.

Commander
Maj. Gen. Alexander K. Davidson

Air Force Intelligence Support Agency

Hq. Washington, D. C.

Commander
Col. Storm C. Rhode III

Air Force Legal Services Center

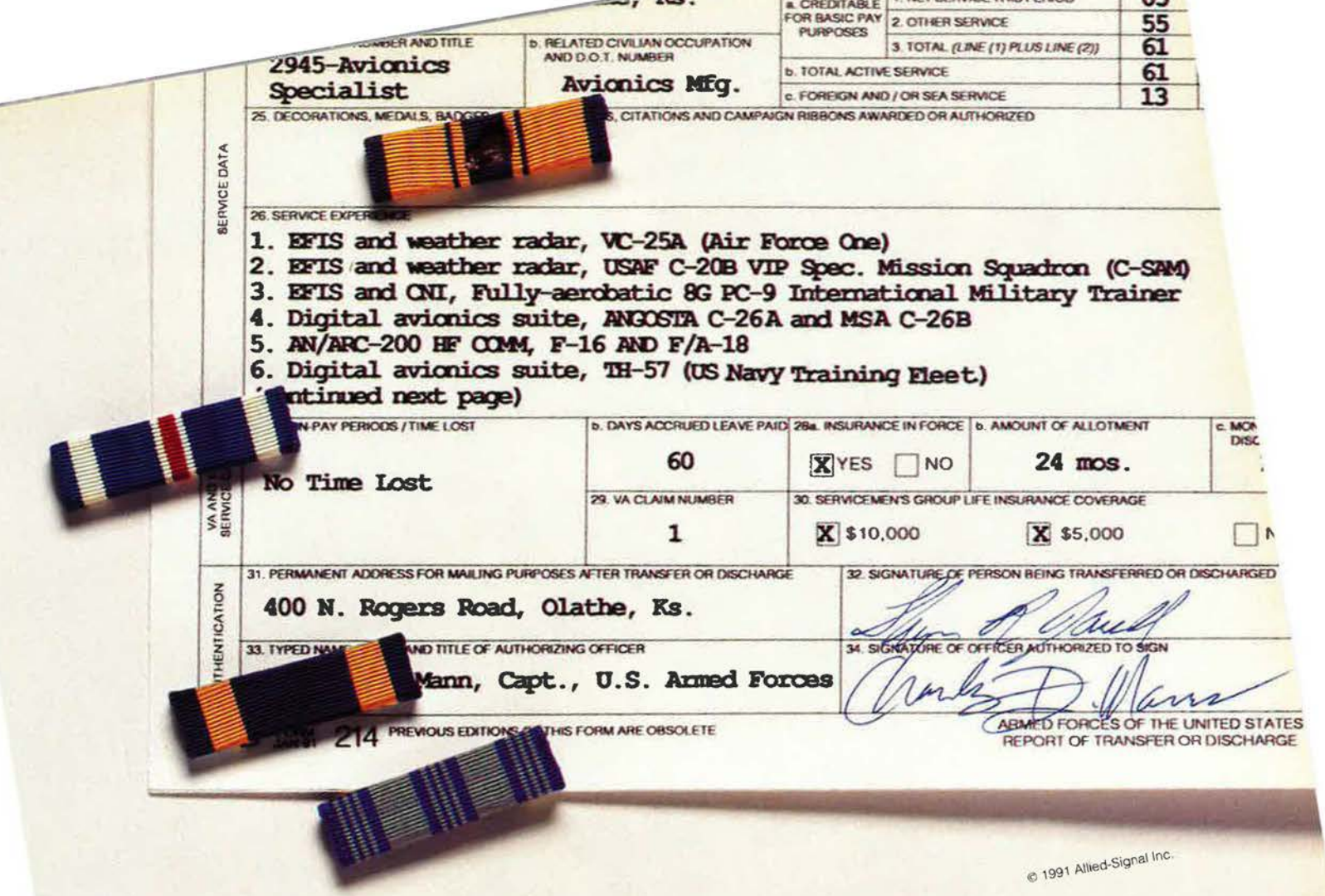
Hq. Bolling AFB, D. C.

Commander
Col. Thomas L. Hemingway

Air Force Management Engineering Agency

Hq. Randolph AFB, Tex.

Commander
Col. James S. Seevers



TO WIN JPATS... YOUR BEST BET IS TO CHOOSE A VET.

In the military training environment, nothing counts like experience. And Bendix/King supplies more commercial avionics to more civilian and military training operations than any other company in the world.

In the military sector alone, we're the established vendor of choice for off-the-shelf avionics.

In fact, Bendix/King supplies the only commercial EFIS used on a high-performance military trainer, the fully-aerobatic PC-9. Our avionics and EFIS—the same system proposed for JPATS—were recently selected as upgrades for the NASA T-38 Astronaut Training Fleet.

Also, we provide the EFIS and weather radar for the new VC-25A Air Force One and the entire USAF C-20B VIP Special Air Mission (C-SAM) squadron. We provide a full suite of digital avionics and displays for both the Air National Guard C-26A Operational Support Aircraft and the newly awarded C-26B Mission Support Aircraft fleets, and the HF communications system for the F-16 Air Defense Fighter

And Bendix/King has the widest selection of reliable, mission-tailored avionics in the industry. In fact, if you're looking for a single manufacturer to provide all the major avionics functions for JPATS, including low-cost collision avoidance and aerobatic AHRS, we're the logical choice.

What's more, only Bendix/King avionics systems combine state-of-the-art technology with established low-risk function, to better enable you to meet cost constraints and maintain aggressive schedule demands.

So, for your JPATS effort, you can have an optimum mix of proven military success, and documented commercial reliability—all at a cost that lets you maintain your competitive edge—or you can settle for less from someone else.

The choice is yours. For more information about Bendix/King avionics for JPATS, contact:

BENDIX/KING
Government Programs Department
400 North Rogers Road
Olathe, KS 66062-1212 Telex 669916 KINGRAD
Phone (913) 782-0400 Ext. 2484 FAX 913-791-1305

Allied Signal Aerospace

"IN AIR RESCUE THERE'S A WORD WE NEVER USE, 'NO'."

"We go when called. Day. Night. Bad weather. All terrain. Behind enemy lines...

"...'That others may live.' That's our motto.

"Demanding mission in peacetime, real tough in combat.

"With the MH-60G, I can do it all.

"Pave Hawk's got power, range, speed. And state-of-the-art systems.

"The only thing we need is more of them."

Actual endorsement or depiction not implied.

UNITED TECHNOLOGIES SIKORSKY AIRCRAFT

Field Operating Agencies (continued)

Air Force Military Personnel Center

Hq. Randolph AFB, Tex.

Commander
Maj. Gen. Billy J. Boles

Air Force Morale, Welfare, and Recreation Center

Hq. Randolph AFB, Tex.

Commander
Col. Roy D. Sheetz

Air Force News Center

Hq. Kelly AFB, Tex.

Commander
Col. William H. Johnson, Jr.

Air Force Office of Medical Support

Hq. Brooks AFB, Tex.

Commander
Col. Charles W. Morrison

Air Force Office of Special Investigations

Hq. Bolling AFB, D. C.

Commander
Brig. Gen. Francis R. Dillon

Air Force Reserve

Hq. Robins AFB, Ga.

Commander
Maj. Gen. John J. Closner III

Air Force Review Boards Office

Hq. Washington, D. C.

Deputy for AFRBO
Joe C. Lineberger

Air Force Safety Agency

Norton AFB, Calif.

Commander
Col. Charles W. Parker

Air Force Security Police Agency

Hq. Kirtland AFB, N. M.

Commander
Col. Fredric L. Miller

Air Force Technical Applications Center

Patrick AFB, Fla.

Commander
Col. James A. Jaeger

Air Reserve Personnel Center

Hq. Denver, Colo.

Commander
Col. James H. White, Jr.

Air Weather Service

Hq. Scott AFB, Ill.

Commander
Col. George L. Frederick, Jr.

Field Operating Agencies (continued)

National Guard Bureau–Andrews
Hq. Andrews AFB, Md.

Ass't Director, Readiness Support
Col. Larry K. Arnold

USAF Historical Research Center
Maxwell AFB, Ala.

Commander
Col. Elliot V. Converse III

7th Communications Group
Washington, D. C.

Commander
Col. William B. Rankin

Direct Reporting Units

Air Force District of Washington
Bolling AFB, D. C.

Commander
Brig. Gen. James L. Vick

Air Force Operational Test and Evaluation Center
Kirtland AFB, N. M.

Commander
Maj. Gen. Marcus A. Anderson

United States Air Force Academy
Colorado Springs, Colo.

Superintendent
Lt. Gen. Bradley C. Hosmer

Senior Enlisted Advisors

CMSgt. Jack E. Bowerman
Air Force Logistics Command
Wright-Patterson AFB, Ohio

CMSgt. Delamar T. Jones
Air Force Space Command
Peterson AFB, Colo.

CMSgt. James R. Robertson
Air Force Special Operations Command
Hurlburt Field, Fla.

CMSgt. Michael Di Gregorio
Air Force Systems Command
Andrews AFB, Md.

CMSgt. George T. Moriarty
Air Training Command
Randolph AFB, Tex.

CMSgt. Roy A. Boudreaux
Air University
Maxwell AFB, Ala.

CMSgt. Robert L. Munns
Electronic Security Command
Kelly AFB, Tex.

CMSgt. Richard A. Young
Military Airlift Command
Scott AFB, Ill.

CMSgt. Robert W. Hall
Pacific Air Forces
Hickam AFB, Hawaii

CMSgt. Joseph D. Cook
Strategic Air Command
Offutt AFB, Neb.

CMSgt. Tommy A. Roberts
Tactical Air Command
Langley AFB, Va.

CMSgt. Robert W. Bailey
United States Air Forces in Europe
Ramstein AB, Germany

Q: Which aerospace company has produced more military flight control systems than any other?

A:
- ☐ Allied Signal/Bendix
- ☐ General Electric
- ☐ Honeywell/Sperry
- ☑ Lear Astronics

Those who know Lear Astronics know that we're a top flight control house. In fact, we've produced more advanced military electronic flight control systems than any other aerospace company.

Our capabilities encompass design and simulation, system engineering, prototyping, complete production and testing, and rigorous quality management to MIL-STD-2000. Our experience includes flight control systems for the F-117, B-2, F-111, F-16 A-D, F-15E, Sweden's JAS-39 Gripen, and the Vehicle Management System for America's YF-22 Advanced Tactical Fighter. As well as many other programs, both military and commercial.

Looking for proven solutions? Harness the control systems experience of a world leader. For a brochure, contact Lear Astronics Corporation, 3400 Airport Avenue, Santa Monica, CA 90406. Phone (213) 452-8206; fax (213) 398-5630.

LEAR ASTRONICS™

Beech Aircraft, as prime contractor, has selected Pilatus, the renowned Swiss manufacturer of the PC-9 primary trainer, as a partner for the JPATS Program. A perfect match of experience and performance.

The Pilatus PC-9 provides a dramatic running start. It is already accepted worldwide as a superb student pilot trainer.

Beechcraft understands trainer requirements. The Beechjet T-1A Jayhawk will soon be entering the Air Force inventory as the new tanker/transport training aircraft. And every new Navy pilot has the first challenge of flight in the Beechcraft T-34C. Unsurpassed experience.

Beechcraft and Pilatus—the best of both worlds. With our missionization work underway...there's more to come. For information about Beechcraft/Pilatus for JPATS, call 1-800-835-7767 Ext. 605.

Beechcraft. Where new ideas take flight.

Beechcraft
A **Raytheon** Company

Senior Enlisted Advisors (continued)

CMSgt. Ronald D. Allison
Air Force Communications Command
Scott AFB, Ill.

CMSgt. Robert S. Gordon
Air Force Office of Special Investigations
Bolling AFB, D. C.

CMSgt. James A. Rossi
Air Force Reserve
Robins AFB, Ga.

CMSgt. Charles C. Porter, Jr.
United States Air Force Academy
Colorado Springs, Colo.

CMSgt. Richard A. Moon
Air National Guard
Andrews AFB, Md.

CMSgt. Nicholas L. Lewis
Air Force Technical Applications Ctr.
Patrick AFB, Fla.

CMSgt. Thomas H. Sanford
Air Force District of Washington
Bolling AFB, D. C.

Air Force Generals Serving in Joint and International Slots

FOUR STARS

Gen. Jimmie V. Adams
Air Component Cmdr. to USCINCPAC
Hickam AFB, Hawaii

Gen. George L. Butler
Director
Joint Strategic Target Planning Staff
Offutt AFB, Neb.

Gen. Michael P. C. Carns
Joint Requirements Oversight Council
Joint Staff
Washington, D. C.

Gen. James B. Davis
Chief of Staff, SHAPE
North Atlantic Treaty Organization
Mons, Belgium

Gen. H. T. Johnson
Commander in Chief
US Transportation Command
Scott AFB, Ill.

Gen. Donald J. Kutyna
Commander in Chief
North American Aerospace Defense Command
Commander in Chief
US Space Command
Peterson AFB, Colo.

Gen. John M. Loh
Commander in Chief
US Air Forces Atlantic
US Atlantic Command
Langley AFB, Va.

Gen. James P. McCarthy
Deputy Commander in Chief
US European Command
Stuttgart-Vaihingen, Germany

Gen. Robert C. Oaks
Commander
Allied Air Forces Central Europe
North Atlantic Treaty Organization
Ramstein AB, Germany

THREE STARS

Lt. Gen. Robert M. Alexander
Dep. Ass't Secretary of Defense
Military Manpower and Personnel Policy
Washington, D. C.

Lt. Gen. Thomas A. Baker
Commander, US Air Forces Southern Command
US Southern Command
Bergstrom AFB, Tex.

Lt. Gen. James T. Callaghan
Commander, Allied Air Forces Southern Europe
North Atlantic Treaty Organization
Naples, Italy

Lt. Gen. John B. Conaway
Chief, National Guard Bureau
Washington, D. C.

Lt. Gen. Ronald R. Fogleman
Deputy Commander in Chief
United Nations Command, Korea
Commander, ROK/US Air Component Command
Combined Forces Command
Osan AB, South Korea

Lt. Gen. Richard E. Hawley
Commander, US Forces Japan
Commander, US Air Forces Japan
Commander, WESTPACNORTH Air Defense Region
US Pacific Command
Yokota AB, Japan

Lt. Gen. Charles A. Horner
Commander, US Central Command Air Forces
US Central Command
Shaw AFB, S. C.

Lt. Gen. Charles A. May, Jr.
Senior Air Force Member
US Delegation, Military Staff Committee of the United Nations

Lt. Gen. Charles McCausland
Director, Defense Logistics Agency
Cameron Station, Va.

Lt. Gen. Thomas G. McInerney
Commander, Alaskan Command
US Pacific Command
Elmendorf AFB, Alaska

Lt. Gen. Gary H. Mears
Director, Logistics, J-4
Chairman, Joint Materiel Priorities and Allocations Board
Washington, D. C.

Lt. Gen. Thomas S. Moorman, Jr.
Commander, Air Force Component Command
US Space Command
Peterson AFB, Colo.

Lt. Gen. Donald Snyder
Vice Commander in Chief, US Air Forces Atlantic
US Atlantic Command
Langley AFB, Va.

Lt. Gen. Henry Viccellio, Jr.
Director, Joint Staff
Washington, D. C.

Lt. Gen. C. Norman Wood
Director, Intelligence Community Staff, CIA
Washington, D. C.

JOINT CHIEFS OF STAFF

Maj. Gen. David J. Pederson
Deputy Director for Operations
National Military Command System, J-3
Washington, D. C.

Maj. Gen. Michael E. Ryan
Vice Director, Strategic Plans and Policy, J-5
Washington, D. C.

US EUROPEAN COMMAND

Maj. Gen. Phillip E. Bracher
Director of C⁴ Systems, J-6
Stuttgart-Vaihingen, Germany

Maj. Gen. John M. Davey
Director, Plans and Policy, J-5
Stuttgart-Vaihingen, Germany

Maj. Gen. Ervin J. Rokke
Director, Intelligence, J-2
Stuttgart-Vaihingen, Germany

US SPACE COMMAND

Maj. Gen. Larry D. Fortner
Executive Director, Joint Strategic Defense Planning Staff
Peterson AFB, Colo.

Maj. Gen. Carl G. O'Berry
Director, Command Control Systems and Logistics, J-4/J-6
Peterson AFB, Colo.

US SPECIAL OPERATIONS COMMAND

Maj. Gen. Thomas E. Eggers
Deputy Commander in Chief
MacDill AFB, Fla.

Maj. Gen. Bruce L. Fister
Commander, Air Force Component Command
Hurlburt Field, Fla.

NORTH AMERICAN AEROSPACE DEFENSE COMMAND

Maj. Gen. Richard A. Pierson
Commander, Continental US NORAD Region
Tyndall AFB, Fla.

NORTH ATLANTIC TREATY ORGANIZATION

Maj. Gen. James G. Andrus
Chief of Staff, Allied Air Forces Southern Europe
Naples, Italy

Maj. Gen. James E. Chambers
Commander, Allied Tactical Operations Center
Commander, Allied Sector 3
4th Allied Tactical Air Force,
Allied Air Forces Central Europe
Sembach AB, Germany

Maj. Gen. Harald G. Hermes
Chief of Staff and Deputy Commander
4th Allied Tactical Air Force
Allied Air Forces Central Europe
Heidelberg, Germany

Maj. Gen. Donald A. Rigg
Deputy Commander, 6th Allied Tactical Air Force
Allied Air Forces Southern Europe
Izmir, Turkey

Maj. Gen. Alan V. Rogers
Ass't Chief of Staff, Operations, SHAPE
Allied Command Europe
Mons, Belgium

Maj. Gen. Ronald C. Spivey
DCS/Air, Allied Forces Northern Europe
Kolsaas, Norway

OFFICE OF THE SECRETARY OF DEFENSE

Maj. Gen. John C. Fryer, Jr.
Dep. Defense Advisor, US Mission to NATO
Military Advisor to the US Permanent Representative
on the North Atlantic Council
Brussels, Belgium

US ATLANTIC COMMAND

Maj. Gen. Raymund E. O'Mara
Deputy Commander in Chief and Chief of Staff
Naval Base Norfolk, Va.

US CENTRAL COMMAND

Maj. Gen. Donald L. Kaufman
Chief, United States Military Training
Mission to Saudi Arabia
Dhahran, Saudi Arabia

Maj. Gen. Burton R. Moore
Director of Operations, J-3
MacDill AFB, Fla.

Maj. Gen. Thomas R. Olsen
Deputy Commander, US Central Command Air Forces
Shaw AFB, S. C.

ROK/US COMBINED FORCES COMMAND

Maj. Gen. James F. Record
Chief of Staff, US Combined Forces Command
United Nations Command
Ground Component Command of Combined Forces Command
Seoul, Republic of Korea

JOINT SERVICE SCHOOLS

Maj. Gen. George W. Larson, Jr.
Commandant, Industrial College of the Armed Forces
National Defense University
Washington, D. C.

DEPARTMENT OF DEFENSE AGENCIES

Maj. Gen. Richard E. Carr
Deputy Director for Foreign Intelligence
Defense Intelligence Analysis Center
Defense Intelligence Agency
Bolling AFB, D. C.

Maj. Gen. William K. James
Director, Defense Mapping Agency
Fairfax Station, Va.

Maj. Gen. Robert W. Parker
Director, US Government On-Site Inspection Agency
Washington Dulles IAP, Va.

Maj. Gen. Walter E. Webb III
Director of Operations
Defense Nuclear Agency
Alexandria, Va.

JOINT SERVICING COMMANDS

Maj. Gen. Jeffery D. Kahla
Commander, Army and Air Force Exchange Service
Dallas, Tex.

EXECUTIVE OFFICE OF THE PRESIDENT

Maj. Gen. Robert M. Marquette, Jr.
Director, Emergency Operations
White House Military Office
Washington, D. C.

ORGANIZATION OF AMERICAN STATES

Maj. Gen. James J. LeCleir
Director, Inter-American Defense College
Inter-American Defense Board
Washington, D. C.

JOINT ELECTRONIC WARFARE CENTER

Maj. Gen. Gary W. O'Shaughnessy
Director
Kelly AFB, Tex.

US PACIFIC COMMAND

Maj. Gen. William A. Studer
Commander, WESTPACSOUTH Air Defense Region
US Facilities Commander
Clark AB, Philippines

US SOUTHERN COMMAND

Maj. Gen. Walter T. Worthington
Vice Commander, US Air Forces Southern Command
Bergstrom AFB, Tex.

Litton Command and Control

Systems and Solutions for C^2 . . . at every level!

MCE: AN/TYQ-23 *Modular Control Equipment* — now in production for the Air Force and Air National Guard and fielded in USAFE, providing next generation surveillance integration, weapons control and interoperability for the Tactical Air Control System (TACS).

PROC: The *Puerto Rico Operations Center* — Litton's Ada-coded commercial-based system for fixed-site C^2/Air Surveillance operations centers.

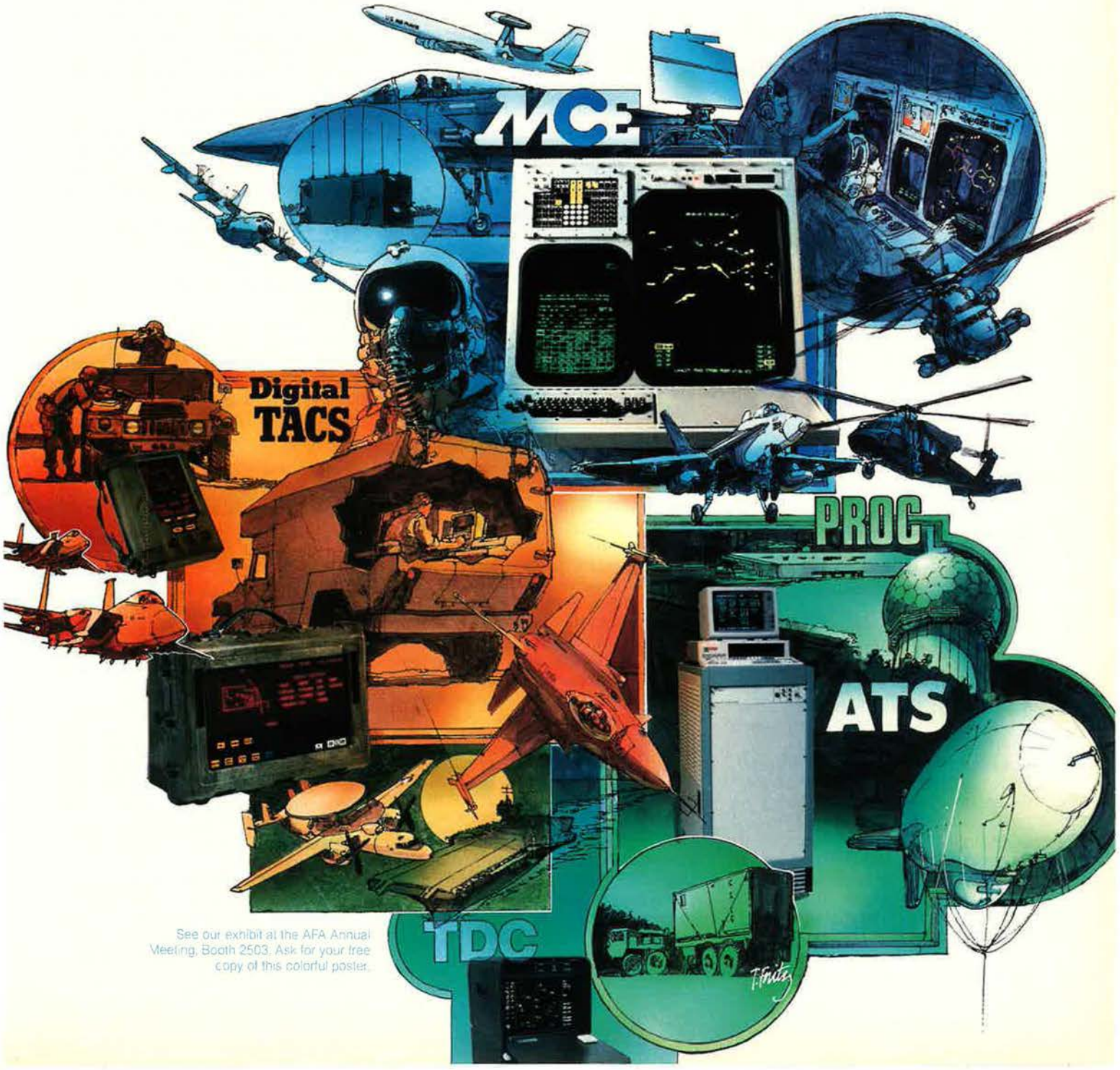
Digital TACS: Integration of Litton's family of flexible *Digital Communications Terminals* provides dramatic advances in Army/Air Force coordination and interoperability.

TDC: The fielded *Tactical Display Console* provides all services with an integrated air/land/sea tactical data link processing and display system (TADIL-A/TADIL-B/ATDL-1), and Ethernet™ interface to commercial-based systems.

ATS: The AN/GYQ-51 *Advanced Tracking System* provides radar signal processing and fully automatic, unattended tracking/air surveillance — exploiting existing sensors — for tactical, strategic and civil uses.

For additional information, contact: Business Development, Litton Data Systems, 8000 Woodley Avenue, Van Nuys, California 91409-7601, Phone: (818) 706-4400. Offices in: Hampton/Norfolk, (804) 850-1962; Washington/Arlington, (703) 920-4100; Boston (617) 863-0780; Brussels/Europe, 32-2-216-8057; Taipei, 886-2-719-7993

Litton
Data Systems



See our exhibit at the AFA Annual Meeting, Booth 2503. Ask for your free copy of this colorful poster.

Here's how the downturn in defense and other trends are affecting ten major contractors.

Turbulence Rocks the Industry

By Colleen A. Nash, Associate Editor

Boeing

Defense products: Aircraft, missiles, helicopters.
Defense contractor rank:* 11.
Financial status: Record sales and net profits in 1990, mostly due to growing commercial business.
Profitability of defense: Defense/space business posted operating loss of $474 million in 1989, $418 million in 1990.
Defense share of sales: In 1988, about thirty percent; in 1990, about twenty-one percent.
Internal shifts: Consolidated six divisions into a single Defense & Space Group in 1990.
Work force: Cut 3,700 jobs in Defense & Space Group in 1991.
Outlook: Part of winning F-22 ATF and RAH-66 Comanche teams, but programs won't produce profits for years. Funding uncertain for two other programs, B-2 bomber and V-22 aircraft.
Words from the top: "In defense and space, the market outlook remains uncertain at best."—*Frank Shrontz, Chairman and CEO*

General Dynamics

Defense products: Fighters, tanks, submarines, missiles.
Defense contractor rank: 2.
Financial status: In 1990, net loss of $578 million on $10.2 billion sales. Over 1986–90, share value fell seventy-one percent.
Profitability of defense: Absorbed $700 million in charges for Navy A-12, $120 million loss on Army SINCGARS.
Defense share of sales: In 1988, eighty-eight percent; in 1991, projected eighty percent. Downward trend expected to continue.
Losses/terminations: A-12 aircraft, Trident SSBN program, SSN-21 *Seawolf* submarine (may be cut from nine to six). Curtailment of USAF F-16 and US Army M1 tank production.
Internal shifts: Combined two missile divisions in 1990. Sub-making unit reorganizing, may shrink fifty percent by mid-1990s. One tank plant closing. Reducing capital spending.
Work force: Cut from 98,100 to 90,900 in first quarter 1991; announced possible thirty percent decline by 1995.
Outlook: Part of F-22 ATF team. Contract to build second *Seawolf* suspended by federal court. Orders for most major items dwindling.
Words from the top: "As part of our strategy to increase shareholder value, we intend to pursue opportunities to grow our successful commercial business."—*William A. Anders, Chairman and CEO*

Grumman

Defense products: Naval and surveillance aircraft, electronics.
Defense contractor rank: 9.
Financial status: In 1990, net income increased twenty-seven percent on record high sales; debt decreased by eighteen percent.
Defense share of sales: In 1985, eighty-four percent; in 1990, seventy percent.
Losses/terminations: Production of Navy A-6E attack and EA-6B jammer planes ends by January 1992. Production of F-14 could cease in early 1992. Advanced Warning System funding cut.
Internal shifts: In 1991, consolidated seven divisions into four groups; streamlined management.
Work force: Declining since 1987. Additional seven percent cut—1,900 jobs—planned for near future.
Outlook: E-8 Joint STARS production in mid-1990s. Will compete for Joint Primary Aircraft Training System and probably for Navy A-X. Without F-14, may have trouble staying in the airframe business.
Words from the top: "Defense spending may well decline by about one-third. A lot of companies are going to be hurt—no doubt about it."—*Renso L. Caporali, Chairman*

Lockheed

Defense products: Aircraft, missiles, space systems.
Defense contractor rank: 6.
Financial status: In 1989, earned $2 million on $9.9 billion sales. In 1990, sales up slightly but earnings rebounded to $335 million.
Profitability of defense: In 1989, wrote off $500 million on fixed-price development contracts; Aeronautical Systems Group posted $377 million operating loss.
Defense share of sales: In 1986, eighty-one percent; in 1990, seventy-four percent. Plans call for sixty percent share at end of five years.
Losses/terminations: Navy terminated P-7A program; Trident II SLBM program cut back. Air Force shrank Milstar satellite program.
Internal shifts: ASG consolidated operations in California and Georgia, closed main aircraft plant in Burbank, Calif. Combined and reduced electronics units.
Work force: Down twelve percent, to 73,000, at end of 1990; to 71,800 in first quarter 1991.
Outlook: Lead contractor on F-22 ATF program.
Words from the top: "We will continue to leverage our core skills to move into new but closely related markets. Over time this will enable us to lessen our dependence on defense."—*Daniel M. Tellep, Chairman and CEO*

LTV

Defense products: Aircraft components, missiles, tactical wheeled vehicles.
Defense contractor rank: 20.
Financial status: In first quarter 1991, overall net loss of $46.3 million. After woes in steel and energy sectors, filed for Chapter XI reorganization in 1986. Owes creditors $5 billion, has unfunded pension plan obligations.
Profitability of defense: In 1989, aircraft products group had $99.7 million operating loss; in 1990, $19.3 million operating loss. Missiles and electronics group had operating loss of $5 million in 1988. Aerospace and defense operating income rose in first quarter 1991.
Internal shifts: Trying to sell Sierra Research, the defense electronics unit. Entire aerospace and defense operation put on sale in May.
Losses/terminations: No funding for production of YA-7F.

*All standings are based on dollar volume of prime contract awards in Fiscal Year 1990.

Outlook: Major subcontractor on the B-2 bomber program, but the entire program faces uncertainty. No corporate buyers visible. Creditors trying to block sale of aerospace and defense units.
Words from the top: "When this is over, LTV will be a steel company, with a very, very small energy business."—*unnamed LTV executive quoted in trade press in May.*

McDonnell Douglas

Defense products: Fighters, transports, missiles, helicopters.
Defense contractor rank: 1.
Financial status: In 1990, revenues, net earnings rose, but operating earnings fell, from $737 million in 1988 to $185 million. Credit rating downgraded twice. Commercial segments prospering.
Profitability of defense: Major losses and write-offs in fixed-price development programs. Combat aircraft earnings down sharply since 1988. Recorded $350 million loss for A-12; says it could incur additional loss of $850 million on the program. Transport aircraft segment posted operating losses of $167 million in 1989 and $177 million in 1990. Missiles, Space and Electronic Systems segment's earnings grew last year.
Losses/terminations: A-12 canceled. Member of losing ATF and RAH-66 contractor teams. Lost South Korean contract for F/A-18 fighters. No future funds for F-15E, AV-8B, AH-64 Apache, or Harpoon/SLAM.
Internal shifts: Plans call for cost cutting and some organizational restructuring in 1991.
Work force: In 1990, cut by 16,000; in 1991 to date, cut by another 6,000.
Outlook: F/A-18 to stay in production for years, given Navy needs and foreign sales to Switzerland, others. Production of most other aircraft, missiles, would cease by 1994.
Words from the top: "Either this year or next year, nondefense aerospace sales will surpass defense sales for the first time ever."—*John F. McDonnell, Chairman and CEO*

Northrop

Defense products: Aircraft, electronics, guidance systems.
Defense contractor rank: 26.
Financial status: At end of 1990, had record high, $6.7 billion funded backlog of orders, posted thirty percent reduction in net debt, reported highest net income since 1985.
Profitability of defense: Wrote off $250 million investment on the F-23 ATF work. Missiles and Unmanned Vehicle Systems segment posted operating loss of $155 million in 1988, $142 million in 1989.
Defense share of sales: Heavily dependent on military orders, but will establish, by end of 1992, separate commercial unit.
Losses/terminations: Lost ATF competition. Tacit Rainbow canceled. B-2 program cut from 132 to seventy-five aircraft.
Internal shifts: In 1990, merged three electronics operations into a single operating unit, vacated 1.5 million square feet of operating facilities, and moved missiles and unmanned vehicles operations into their Aircraft Division facilities. Plans to close Newbury Park, Calif., facility this year.
Work force: Down from 48,000 to 37,000 since 1987. Another 1,000 on the block this year.
Outlook: B-2 funding uncertain. Forty percent share of F/A-18 program.
Words from the top: "Although our military business represents our largest segment now, and very likely in the foreseeable future, we intend to expand our presence in the commercial aircraft industry."—*Kent Kresa, Chairman, President, and CEO*

Raytheon

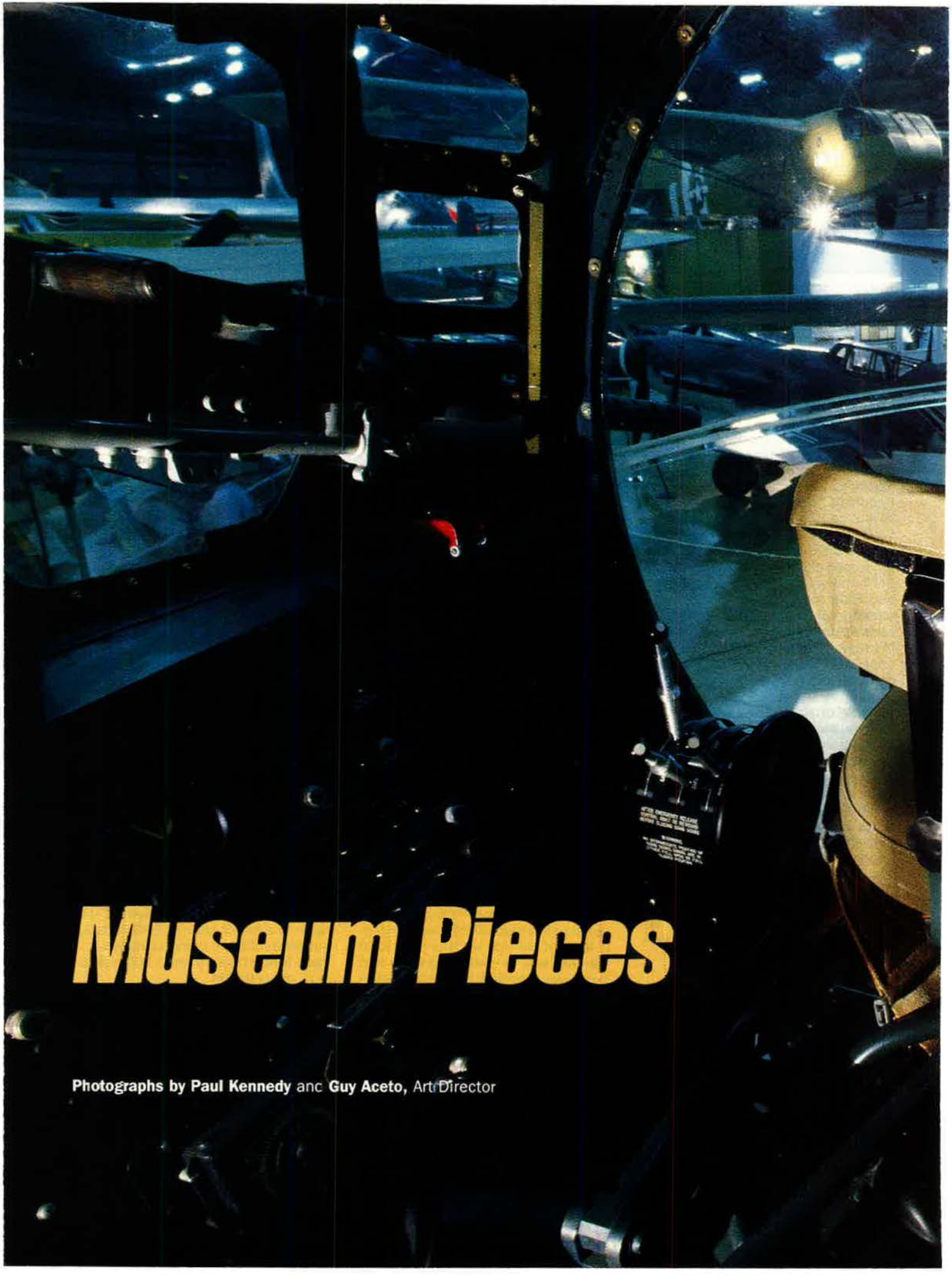
Defense products: Missiles, electronics, surveillance radar.
Defense contractor rank: 5.
Financial status: In 1990, record high earnings, sales, per-share earning. Commercial business flourishing.
Defense share of sales: Declined to forty-three percent in 1990; trend expected to continue.
Losses/terminations: Tacit Rainbow canceled. Patriot missile program nearing an end, though Congress moved to keep system in production for an additional period.
Work force: In June 1991, announced new layoff of 700 employees, mostly from its missile systems division. Earlier actions this year cut 1,900 jobs.
Words from the top: "We need a national policy that reflects the economic facts of life that we face in a world marketplace. In many cases, we find ourselves competing with foreign companies whose governments provide them with economic incentives."—*Dennis J. Picard, Chairman and CEO*

Unisys

Defense products: Computer systems for communications, navigation, weapons control.
Defense contractor rank: 16.
Financial status: Corporate net loss of $639.3 million in 1989; $436.7 million in 1990. Losses ascribed to softening of the US commercial computer market. Debt of roughly $3.7 billion, to be reduced in part by new sales of assets.
Defense share of sales: Defense Systems segment's DoD sales declined from eighty-three percent in 1988 to sixty-nine percent in 1991.
Losses/terminations: Subcontractor on losing ATF team and losing RAH-66 team.
Internal shifts: Began company-wide restructuring in 1989.
Work force: Defense Systems segment down from 24,000 in 1988 to 17,000 in 1991.
Outlook: Holds large Navy contracts for shipboard computers. Sale of defense operations considered a possibility. Recently reached settlement—expected to hit $190 million—for role in so-called Ill Wind scandal; awarded lucrative USAF computer contract.
Words from the top: "Given the challenges of the market, the economy, and the tasks we have set for ourselves, we expect a difficult 1991, especially in the first half."—*James A. Unruh, Chairman, President, and CEO*

Westinghouse

Defense products: Radars, avionics.
Defense contractor rank: 12.
Financial status: In 1990, $268 million corporate net income on sales of $12.9 billion. Growth in sales and operating profit for Electronic Systems Group, which includes both commercial and defense business. ESG has a $5 billion backlog.
Defense share of sales: As percent of sales, non-DoD portion of ESG's business rose from sixteen percent in 1986 to twenty-seven percent in 1990. Plans call for non-DoD work to increase to half of sales by 1995.
Losses/terminations: Cancellation of Navy A-12 halted program to produce radar and infrared systems. F-16 radar is a major user of ESG radars, but production is being curtailed.
Work force: Down some 1,200 due to A-12 cancellation.
Outlook: Possible FMS market for F-16 radars and upgrades. Low-rate production of Airborne Self-Protection Jammer (ASPJ) for Navy.
Words from the top: "It used to be that when you won a program, as long as you performed, you had a reasonable expectation of entering production. Today, you win, and then you may have to compete again and again. And there may not be any production."—*Richard A. Linder, President, Electronic Systems Group* ■



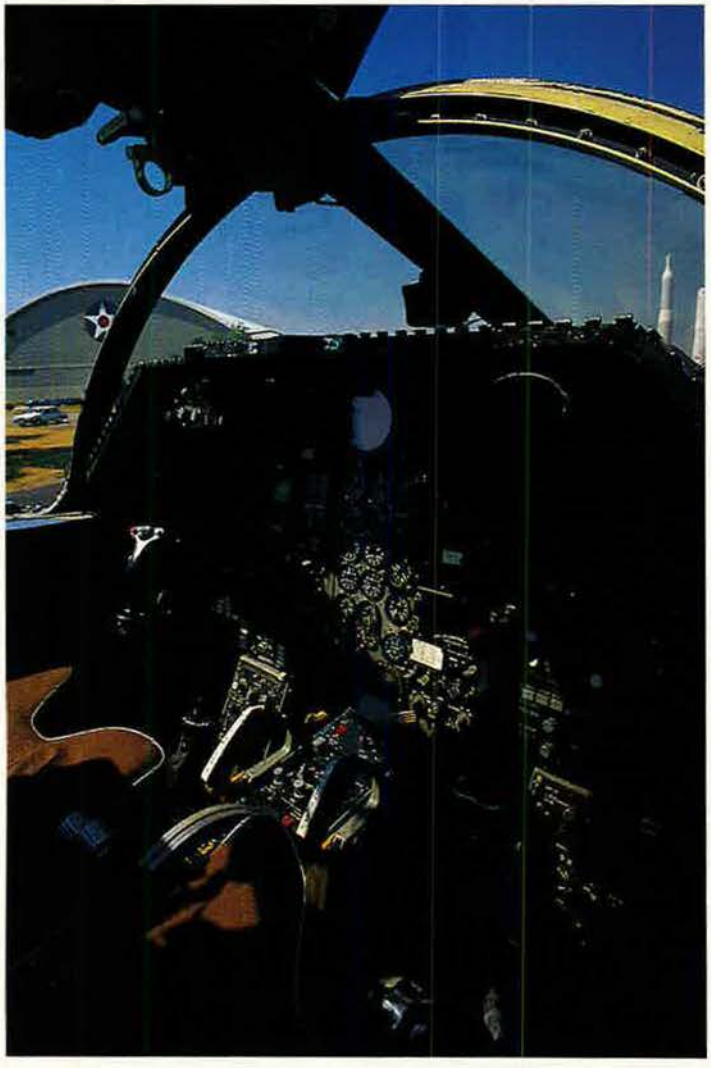
Museum Pieces

Photographs by Paul Kennedy anc **Guy Aceto,** Art Director


295857

Shoo Shoo Baby, *one of the last surviving B-17G bombers to have flown combat missions in World War II, is something special among the myriad aerospace attractions at the renowned US Air Force Museum, Wright-Patterson AFB, Ohio. The preceding pages show other planes in the museum's World War II gallery as seen from the bombardier's roost aboard the B-17. The museum features 200-plus airplanes and major missiles along with a multitude of other artifacts.*

—Photo by Paul Kennedy



—Photos by Paul Kennedy

The view from the cockpit of an F-111A on outdoor display (left) takes in the vast museum building at Wright Field. The F-111A, symbol of the Air Force's recent past, stands in sharp contrast to the Curtiss pusher plane (above), from the beginnings of powered flight. The Wright brothers learned to fly on Huffman Prairie not far from the Air Force Museum site. Oldest of its kind, the museum attracts 1.5 million visitors a year from around the world.

—Photo by Paul Kennedy

These three aircraft—a World War I Caquot Type R observation balloon, a vintage biplane pursuit ship, and a post–World War II C-124C Globemaster II transport—pretty much span the era of flight leading into the jet age and are star attractions. Among the other famous planes on display are Sopwith Camel and Spad VII fighters of World War I and the P-51 Mustang fighter of World War II.

—Photos by Guy Aceto

Early times in the cold war and in the new age of military jet aviation are symbolized by this cluster of airplanes in the Air Force Museum's vast confines (front to rear): a MiG-15 "Fagot" and an F-86 Sabre, Korean War adversaries, and a B-36J Peacemaker, the first plane to be housed in the original museum building in 1959 and, with a wingspan forty-five feet wider than a B-52's, still the largest one there. The B-36 was designed as an intercontinental bomber during World War II.

—Photo by Paul Kennedy

—Photos by Paul Kennedy

The cockpit of the B-36J (above) is a fine vantage point from which to view the surroundings from almost fifty feet up. The exhibit (left) of ammo, patches, rations, matches, soap-and-towel kit, and what-have-you gives museum-goers a good idea of life in an Air Force combat unit during the Korean War. The museum displays more than 6,000 documents, photos, and other artifacts and mementos.

—Photo by Paul Kennedy

Long a museum piece, the B-29 bomber Bock's Car (above), which dropped the atom bomb on Nagasaki, looks ready to fly after all these years. Its bombardier position is pictured below. The B-29 denotes the start of the nuclear age, a time of advances in all sorts of advanced aerospace technologies. Among displays depicting the march of those technologies is this missile exhaust assembly (right), a milestone in the progress of Air Force rocket propulsion.

—Photo by Guy Aceto

—Photo by Paul Kennedy

WHEN YOU'RE KEEPING THE PEACE, ONLY THE BEST IS GOOD ENOUGH.

FOR THE BETTER PART OF FOUR DECADES, THIOKOL HAS BEEN A FUNDAMENTAL PART OF THE UNITED STATES AIR FORCE STRATEGIC DETERRENCE, AND WE'RE PROUD OF IT.

FOR THIOKOL, *MINUTEMAN*, *PEACEKEEPER* AND *SICBM* ARE SYNONYMOUS WITH RELIABILITY, DEPENDABILITY, PERFORMANCE AND CONTINUOUS IMPROVEMENT.

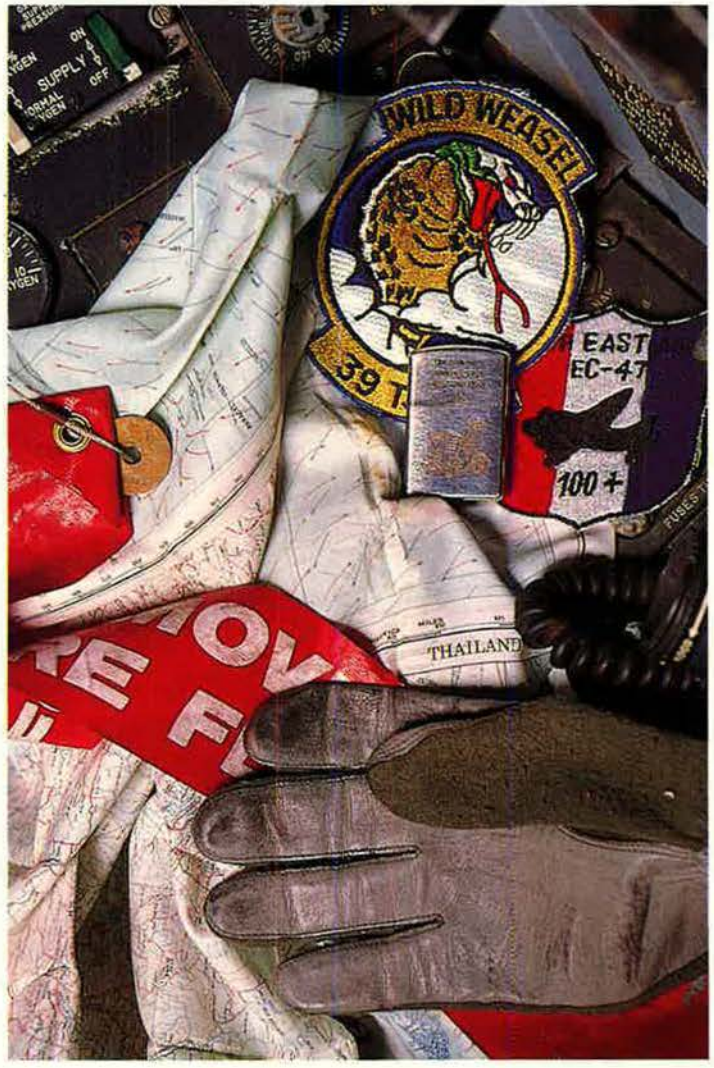
THAT'S WHAT IT'S ALL ABOUT AT THIOKOL, IMPROVEMENT AND MORE IMPROVEMENT, MAKING THE BEST BETTER.

Thiokol
CORPORATION

—Photo by Paul Kennedy

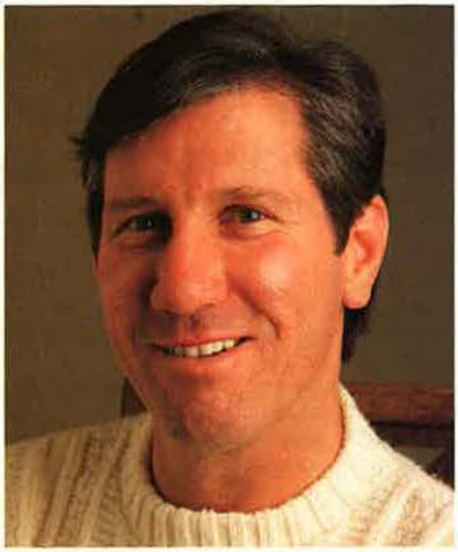
The elegant sweep of the SR-71 Blackbird is suggested in this glimpse from its cockpit. Among all latter-day aircraft on display, this plane—first among the high-flying, superswift SR-71s to fly an operational mission—probably best symbolizes modern flight. It came to the museum in March 1990, after racking up 2,981 flying hours in 942 sorties, more than any other SR-71 had ever done.

The Air Force Museum includes a rich reminder of USAF's role in the Vietnam War. The gloves, patches, and other mementos at right are in the cockpit of an F-105G Thunderchief Wild Weasel heavily involved in the electronic combat of the time. Though embryonic in the Vietnam years, EC came into its own in the Gulf War. The museum's F-111A from the Vietnam War (above), canopy up, overwing partially visible, was among those in the forefront of terrain-hugging flight.



—Photos by Paul Kennedy

"THROUGHOUT MY CAREER WE ALWAYS FOUND CARING, QUALITY HELP NEARBY AT LOCAL USPA&IRA OFFICES."



David W. Killam
U.S. Military (Ret.)

USPA&IRA programs for officers and senior NCO's have literally changed their lives. Each one is carefully formulated and tailor-made to meet your present and future needs. Call today for your free booklet or information on how you can attend one of our seminars. You'll discover how USPA&IRA can create a program that will help you become financially independent.

1-800-443-2104

USPA & IRA®

Helping professional military families achieve financial independence.

This testimonial was made voluntarily without payment of any kind.
United Services Planning Association, Inc. (USPA)
The Independent Research Agency for Life Insurance (IRA)

A NEW BENEFIT FOR AFA MEMBERS!

Road Service Protection

for You and Your Family.

YOUR BENEFITS* INCLUDE:

24 Hour Road Service and Towing • Accidental Death Insurance • Emergency Travel Assistance • Emergency Cash Advance • AuTour™ Personalized Auto Trip Planning • Locksmith Service • KeySafe Lock and Key Reimbursement • $5,000 Stolen Auto Reward • $2,000 Arrest Bond Certificate • Legal Defense Fee . . . and More!

This exclusive offer to AFA members from one of the oldest Nationally Operated Motor Clubs in the U.S. provides coverage for about 10¢ a day! Shop and compare and you'll see this is a bona fide Best Value! You, your spouse and all dependent children under 25 qualify for this unique Motor Plan offering a FREE FIRST MONTH. Enroll today. Then cut out the temporary membership card below to become an instant member. Use this card until your permanent membership card arrives and enjoy ALL benefits and services of the Plan designed for you.

Even if you already belong to a motor club, CALL US TODAY at 1-800-752-4775 for information on how to start your AFA Motor Plan and receive your FREE 30 DAY TRIAL MEMBERSHIP.

You may charge your $38.95 annual membership to your Visa, MasterCard, American Express or Discover card account by calling toll-free **1-800-752-4775** NOW. We'll be pleased to welcome you to the Motor Plan designed exclusively for our Air Force Association family. Call today!

To Enroll (or for information) call Toll-Free 1-800-752-4775 NOW!

MORE THAN 50,000 SERVICE PROVIDERS THROUGHOUT THE U.S. AND CANADA

CUT ON DOTTED LINE, FOLD
CARRY IN YOUR WALLET OR PURSE

Air Force Association
AFA MOTOR PLAN

NAME

Temporary Membership Card
PROVIDED BY NATIONAL MOTOR CLUB OF AMERICA, INC.

The following benefits apply to this Temporary Membership Card
- Not valid until Member calls 1-800-752-4775 to enroll in the Plan.
- This card provides allowable Road and Towing Service, and lost key/lockout service only on a reimbursement basis to a maximum of $45 plus free Personalized Trip Service. All other benefits will be activated upon receipt of your permanent Membership Card.

Temporary Membership Road and Tow Instructions
1. To get the nearest participating dealer or authorized towing service call 1-800-999-1615. Or, if none is available, call any nearby service facility.
2. Pay for the service and obtain a receipt.
3. After you pay your Membership dues and receive your Membership Kit, write your permanent Membership number (shown on your Permanent Membership Card) on the receipt with your name and address.
4. Send the receipt to us in a Claim Envelope and you will be reimbursed promptly.

SIGNATURE _____

NMC NATIONAL MOTOR CLUB

FOR IMMEDIATE ENROLLMENT CALL TOLL-FREE 1-800-752-4775

*Benefits and Services administered by National Motor Club of America, Inc. Certain conditions and state limitations apply.

The AFA Outstanding Squadron at the Air Force Academy is a repeat winner.

The First Is First–Again

By James A. McDonnell, Jr.

—USAF photo by Sgt. Cyd Boubon

Proud First Squadron officers pose with the AFA Outstanding Squadron trophy. From left are Cadet Lt. Col. James E. Parco, 1991 spring semester squadron commander; Cadet Lt. Col. Christina M. Harvey, 1990 fall semester squadron commander; and First Squadron Air Officer Commanding (AOC) Capt. Gary M. Looper.

ONCE again, the First Squadron of the United States Air Force Academy has won top honors as AFA's Outstanding Squadron of the Year, making it a back-to-back winner. The First was the top squadron in 1990, the first year that the squadron ever had captured the award. No one should have been surprised to find that it was the winner in 1991.

Lt. Gen. Charles R. Hamm, the recently retired Academy superintendent, put it this way at the Outstanding Squadron Banquet: "They've done it again. The First is first, and . . . across the board, these cadets were the best."

To be selected as the premier squadron among forty, the First amassed impressive accomplishments in all three of the basic areas of endeavor—academics, athletics, and military training. The First was named squadron of the month five straight times. It was its group's military squadron of the year. It sent six sports teams to the intramural playoffs. It was the first in its wing in academics for the spring semester. It provided its group's fall semester commander. Two of its cadets were selected for Euro-NATO flight training. It garnered two graduate scholarships—an almost unprecedented achievement. Two-thirds of the squadron's graduating seniors will go on to pilot training.

This is the thirty-second year that AFA, in cooperation with the Colorado Springs/Lance Sijan Chapter, has sponsored the black-tie event. About 600 friends and supporters of the Academy gathered in late May in Colorado Springs for this salute. An added element of this year's banquet was recognition of the many Academy graduates who served in Operation Desert Storm, five of whom lost their lives.

Capt. Scott Thomas, an F-16 pilot from Shaw AFB, S. C., represented alumni who participated in Desert Storm. He told the audience how the attributes instilled in him at the Academy translated into success in combat. Captain Thomas told the cadets that everything he learned came into play as he put his bombs on target, was downed behind enemy lines, and survived through the night to be rescued. He eluded enemy troops who were searching for him while his wingman (also an Academy graduate) circled his position, despite diminishing fuel, to guide the rescue effort.

The traditional "returning graduate" brought back to wish the squadron well was Gen. Ronald W. Yates, Class of 1960 and currently the commander of Air Force Systems Command. He urged the cadets to absorb the Academy experience, especially the moral code, into their lives. While the curriculum is important, he said, it is even more important to "learn how to learn." The Academy, he noted, is perhaps most valuable in teaching cadets not to set a project in motion without first "thinking through the problem." ■

Valor

By John L. Frisbee, Contributing Editor

The *Mayaguez* Incident

It was a "peacetime" military operation conducted by an *ad hoc* force of airmen, Marines, and sailors.

THE last US military forces left South Vietnam in April 1975 in what President Gerald Ford termed "a humiliating withdrawal." US military involvement in southeast Asia had ended. Or had it?

On May 12, 1975, the Cambodian Navy seized an American merchant ship, SS *Mayaguez,* in international waters off Cambodia's coast. The ship was being towed to Kompong Som on the mainland when word reached the White House. President Ford insisted that this not become another *Pueblo* incident. Beyond that, it was important to counter a growing feeling among US allies and adversaries that this country was "a helpless giant," an unreliable ally lacking resolve.

It was far from the simple military operation it might seem. The US had no diplomatic relations with the Khmer Rouge, which had taken over Cambodia a few weeks earlier. US forces in Thailand were inadequate for ground action against Cambodia. There were no US warships in the area.

The President ordered the carrier *Coral Sea* and other Navy ships to steam at full speed to the Gulf of Thailand and US military planes in the Philippines to find the *Mayaguez* and keep it in sight. A Navy P-3 located the ship anchored off Kho Tang Island, forty miles from the Cambodian shore. Several monitoring aircraft were damaged by fire from the island. This would be no picnic.

A battalion-sized Marine landing team was airlifted from Okinawa to U Tapao AB in Thailand, some 300 miles from Kho Tang. The destroyer *Holt* was directed to seize the *Mayaguez,* while Marines, airlifted and supported by the Air Force, were to rescue the crew, at least some of whom were believed to be held on Kho Tang. Concurrently, the *Coral Sea* would launch four bombing strikes on military targets near Kompong Som to convince the Khmer Rouge the US was serious.

On the morning of May 15, 175 Marines of a planned 600-man force were flown by helicopters of the 3d Aerospace Rescue and Recovery Group and the 21st Special Operations Squadron from U Tapao to Kho Tang, expecting only light resistance. They were met by a force of 150–200 heavily armed Khmer Rouge troops, who shot down three of the first eight helicopters and damaged two others. About 100 Marines were put ashore, but it soon became evident that substantial reinforcements on the ground would be needed. The assault force was supported by Air Force A-7s, F-4s, OV-10s, and AC-130s, but the attack was not going well.

While the firefight on Kho Tang was at its height, carrier bombing of targets on the mainland apparently convinced the Khmer Rouge leaders that they had underestimated US resolve. A fishing boat was seen approaching the destroyer *Wilson* with white flags flying. Aboard were the thirty-nine crewmen of the *Mayaguez*. The Marines on Kho Tang were ordered to disengage and withdraw. However, Khmer Rouge troops, perhaps directed by a local commander, continued the battle, turning from defense to attack as Air Force helicopters moved through heavy fire to withdraw US forces. The last of 230 Marines were not evacuated until after dark on the night of May 15.

As they had throughout the Vietnam War, helicopter crews performed with unsurpassed heroism. Four CH-53 and HH-53 crewmen were awarded the Air Force Cross, the last to be accorded that honor in southeast Asia: 1st Lt. Donald R. Backlund, 1st Lt. Richard C. Brim, SSgt. John D. Harston, and Capt. Rowland W. Purser.

Lieutenant Backlund began his day by putting a contingent of Marines on the destroyer *Holt* to assist in retaking the *Mayaguez.* He then landed the rest of his Marines on Kho Tang in the face of heavy fire. Early in the afternoon, Backlund escorted a damaged HH-53 to the *Coral Sea.* He returned to Kho Tang and recovered several wounded Marines and downed airmen at dusk, despite continuous ground fire and a grenade attack. Backlund had been flying since before dawn.

Lieutenant Brim flew his helicopter through a curtain of small arms and automatic weapons fire to land a group of Marines on the island. He courageously held his position, while enemy fire perforated his aircraft, until four seriously wounded Marines were aboard. Later he evacuated an aircraft load of Marines who were under attack and about to be overrun.

Sergeant Harston was a flight mechanic on a CH-53 in the first landing wave. His aircraft was hit and crashed in flames. Although wounded, Harston rescued three survivors from the burning helicopter and gave them covering fire as they swam away from shore. He reentered the CH-53 to rescue another wounded Marine and kept two shot-up leathernecks afloat with his damaged life jacket until they were picked up by a destroyer three hours later.

Captain Purser landed twenty-nine Marines on the island after being driven off in his first attempt. Returning to U Tapao, he picked up another group of Marines and flew them to Kho Tang. While evacuating wounded, his helicopter was severely damaged by enemy fire. He flew to the *Coral Sea,* helped make temporary repairs, then returned to the island, picked up fifty-four Marines, and carried them to the *Coral Sea* with one engine of his HH-53 shot out.

Eighteen Marines and airmen were killed or missing in the assault and withdrawal from Kho Tang. Twenty-three others were killed in a helicopter crash en route from Hakhon Phanom to U Tapao, but the objectives of the operation were achieved. The *Mayaguez* and its crew had been rescued, though at high cost.

The *Mayaguez* incident is no more than a footnote in most histories of the period. It and the men who carried out the rescue deserve better than that. At a time when its resolve was in doubt, the US showed the world that it would pay whatever price was necessary to protect its citizens and preserve its national honor. ■

To find out if you are paying too much for Homeowner's Insurance

(insures dwelling, personal property and personal liability)

or "Renter's" Insurance

(insures personal property anc personal liability)

call AFI 1-800-255-6792

Our rates are among the lowest anywhere! We are a centrally-located, direct writer insurer, with no agents or branch offices to support. These savings are passed on to our insureds with low rates.

We also save money on operating costs because a high percentage of our new insureds come to us through referrals from present policyholders, customers who are satisfied not only with our low rates but also with our personalized service and efficient claims operation.

For a no obligation price quotation, give us a call today, toll free.

ELIGIBILITY—Officers and senior NCO's (E-7, 8, 9) of all U.S. uniformed services; active duty, retired, regular, reserve or National Guard; also eligible are service academy and advanced ROTC cadets/midshipmen and former officers of all U.S. uniformed services.

Or fill out and mail

YES, I want to know more about: AFM-A

- ☐ Homeowner package to insure dwelling, personal property, personal liability.
- ☐ Personal property /personal liability "Renter's" package.

Name _____ Rank _____ Pay Grade _____ SSN _____

Address _____

City _____ State _____ Zip _____

ARMED FORCES® INSURANCE

FORT LEAVENWORTH, KS 66027-0346

Serving the Military Professional, Since 1887

Reviews

I Could Never Be So Lucky Again, by Gen. James H. Doolittle, with Carroll V. Glines. Here are the long-awaited memoirs of one of our greatest heroes. Now ninety-five years old, Gen. Jimmy Doolittle, assisted by longtime confidant and collaborator C. V. Glines, recounts in detail the record of an extraordinary life—from boyhood in Nome, Alaska, during the gold rush days and life as a stunt pilot to his work as a pioneer in aerospace science and technology, service as a pilot and senior leader during World War II, and numerous civilian achievements.

The book is meticulous in its retelling of General Doolittle's assembling and training of the Tokyo Raiders, the small band of airmen who in April 1942 mounted the famed surprise attack on the Japanese capital in the early days of the Pacific war. There are new details about General Doolittle's command of the air war over Italy and North Africa and his later command of Eighth Air Force. The book tells of General Doolittle's role in the postwar push for a separate Air Force and in the creation of the Air Force Association. Bantam Books, New York, N.Y., 1991. 574 pages with photos, index. $22.50.

Barons of the Sky: From Early Flight to Strategic Warfare, the Story of the American Aerospace Industry, by Wayne Biddle. This book traces the development of the American aerospace industry, using a combination of institutional history and individual biography. The author relied on the personal papers of Glenn Martin, whose company would become Martin Marietta, and Robert Gross, who acquired Lockheed, first founded by the Loughead brothers. *Barons of the Sky* is well-written and filled with anecdotes that illuminate the early struggles of the aviation industry. The author augments his anecdotes with strong biographical detail and captures the flavor of the emerging international market, describing US arms exports that made their way to Germany and Japan in the 1930s. Simon & Schuster, New York, N. Y., 1991, 366 pages with photos, notes, and index. $22.95.

Shooting Blanks: War Making That Doesn't Work, by James F. Dunnigan and Albert A. Nofi. The authors use "shooting blanks" as a metaphor for the futility that results from poor planning. "The most obvious cause of shooting blanks is that we misunderstand our military capabilities," they write. "Miscalculating opponents' capabilities comes in as a close second. Building inappropriate military forces is a result of the first two problems," and that "then becomes a major problem in its own right." Dunnigan and Nofi present cases in the context of five underlying causes: intelligence confusion, amateurism, media muddle, procurement puzzle, and wrong-war syndrome, ranging from the early days of World War I to Iraq's miscalculations in 1990. At times, the book is both entertaining and instructive, but the method and analytical approach are questionable. There are no source notes or footnotes. In many instances, assertions are made with little if any background material or explanation. An excellent chapter on the role of the media is weakened by the lack of source attribution. William Morrow and Company, Inc., New York, N. Y., 1991, 513 pages with charts and index. $25.00.

Fatal Decision: Anzio and the Battle for Rome, by Carlo D'Este. What began on January 22, 1944, as successful surprise landings by an Anglo-American amphibious task force at Anzio and Nettuno, Italy, "turned into a 125-day siege and one of the bloodiest campaigns of World War II." D'Este tells the story of the 36,000 men under the command of Maj. Gen. John Porter Lucas, complete with observations about indecisive Allied leadership that might have been more culpable than General Lucas for that "nightmare of unprecedented proportions." HarperCollins, New York, N. Y., 1991, with maps, photos, notes and index. $35.00.

CNN: War in the Gulf, by Thomas B. Allen, F. Clifton Berry, Jr., and Norman Polmar. *War in the Gulf* combines a superb written account of the Gulf War with superb visual images, including full-color illustrations, maps, graphics, and photographs. Unlike many of the "instant books" about the recent Middle East conflict, *War in the Gulf* is comprehensive. It delves into the background and causes of the war, not just the fast-paced drama of the war itself. The book begins with Arab nationalism challenging the Ottoman Empire in the opening decades of the twentieth century and moves through the arming of the Middle East, the world of Saddam, and his invasion of Kuwait. This sets the stage for a look at the establishment of the anti-Iraq coalition, the air campaign, and the ground war. Turner Publishing, Inc., Atlanta, Ga., 1991, 240 pages with index. $19.95 (paper).

Other Titles of Note

Understanding the Weather, by Robert C. McNeill. This book provides solid technical information on weather, especially basic definitions of such phenomena as wind shear, inversion, and tropopause. The first sixty-eight pages give an overview of the physics and technical aspects of weather. The rest of the book, divided into appendixes, includes more detailed discussions that complement the overview. Arbor Publishers, Las Vegas, Nev., Second Edition (Revised), 1991, 238 pages with index. $19.95 (paper).

American Warplanes 1908–1988: A Bibliography, by Myron J. Smith, Jr. Here is an aviation researcher's gold mine, with several thousand citations of books, documents, and magazine and journal articles on 525 fixed- and rotary-wing American aircraft. The author admits that his bibliography is by no means exhaustive, but he does provide a thorough and useful road map. The inclusion of the location and telephone numbers of aviation libraries around the country is especially helpful. Greenwood Publishing Group, Westport, Conn., 1991, 515 pages with appendices and indices. $65.00.

America's Small Wars, by John M. Collins. The author of numerous studies and books, Collins has once again produced a well-researched, useful reference work, this time on so-called "low-intensity conflict" (LIC). The first ninety pages are devoted to defining LIC, explaining its various forms and outlining US involvement and performance dating back to the anti-US insurrection in the Philippines (1899–1913) and continuing up to Panama (1987–90). The first section also contains excellent charts and maps. The remainder of the book includes sixty case summaries, key congressional actions, and a glossary. Brassey's (US), McLean, Va., 1991, 288 pages with notes and index. $30.00.

The New State of War and Peace, by Michael Kidron and Dan Smith. This international atlas is a mixed bag. There are some useful graphics and maps, including those dealing with United Nations operations, arms merchants, talks, and treaties—strictly factual material. The problem comes in when the authors "interpret" their data. For instance, "war" is defined so broadly that, according to the authors, France has been at war since 1977 (they never say with whom). France, the United Kingdom, Australia, Italy, and Austria are depicted as countries who "use official terror to affect the behavior of citizens." Put bluntly, this atlas is politically loaded. Simon & Schuster, New York, N. Y., 1991, 127 pages with notes and sources. $14.95 (paper). ■

INVESTMENT PERFORMANCE IS DETERMINED BY PROFITS... NOT PROPHETS.

We don't try to time the market. Our approach is different — one based on hard work, knowledge and pride. With over 20 years of experience, USAA Investment Management Company stands by its principles with the serious intent required to handle over $14 billion, including over $7 billion in mutual fund assets.

MEET KEN WILLMANN. . .

Vice President, Fixed Income Investments

Chartered Financial Analyst

13 years experience with USAA Investment Management Company

16 years experience in investment management

Manages $2 billion for USAA and its subsidiaries

Manages the High Yield Fund for USAA Tax Exempt Fund, Inc.

THE HIGH YIELD FUND. . .

$1.4 billion strong

9 years in existence

The 30-day yield for period ended June 30, 1991 is 6.88%.

The tax-equivalent yield (based on the 28% federal income tax bracket) is 9.56%.

Performance*

1 yr	8.27%
5 yr	8.13%
Inception	11.94%

USAA Investment Management Company . . . because investing requires hard work. Not guess work.

1-800-235-0484

*Average annual total returns for the period ended June 30, 1991; assume reinvestment of dividends and capital gains at net asset value. Past performance is no guarantee of future results. Your return and share price will fluctuate with market conditions and you may have a gain or loss when you sell your shares. ■ For more complete information about the High Yield Fund, including charges and expenses, call for a USAA Tax Exempt Fund, Inc. prospectus. Read it carefully before you invest or send money.

PUT YOUR MONEY WHERE YOUR TRUST IS
USAA INVESTMENT MANAGEMENT CO.

USAA

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.

PRESIDENT
Oliver R. Crawford
Austin, Tex.

BOARD CHAIRMAN
Jack C. Price
Clearfield, Utah

SECRETARY
Mary Ann Seibel
St. Louis, Mo.

TREASURER
William N. Webb
Midwest City, Okla.

NATIONAL VICE PRESIDENTS

Information regarding AFA activity within a particular state may be obtained from the Vice President of the Region in which the state is located.

R. Donald Anderson
Box 54, 2101 Executive Dr.
Hampton, Va. 23666-2416
(804) 838-7980

Central East Region
Delaware, District of Columbia, Kentucky, Maryland, Virgin a, West Virginia

Aaron C. Burleson
P. O. Box 757
Altus, Okla. 73522-0757
(405) 482-7594

Southwest Region
New Mexico, Oklahoma, Texas

H. R. "Bobby" Case
P. O. Box 16625
Mobile, Ala. 36616
(205) 866-7638

South Central Region
Alabama, Arkansas, Louisiana, Mississippi, Tennessee

Robert W. Gregory
616 Hanover Dr.
Wrightstown, N. J. 08562-9537
(609) 758-2973

Northeast Region
New Jersey, New York, Pennsylvania

Cecil H. Hopper
537 Granville St.
Newark, Ohio 43055-4313
(614) 344-7594

Great Lakes Region
Illinois, Indiana, Michigan, Ohio, Wisconsin

John E. Kittelson
141 N. Main, Suite 308
Sioux Falls S. D. 57102
(605) 334-3345

North Central Region
Minnesota, North Dakota, South Dakota

Alwyn T. Lloyd
P. O. Box 24271, M/S 2L-30
Seattle, Wash. 98124
(206) 544-8237

Northwest Region
Alaska, Idaho, Montana, Oregon, Washington

Robert N. McChesney
21 Lily Pond Rd.
Barrington, N. H. 03825
(603) 664-5090

New England Region
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Robert A. Munn
7042 East Calle Bellatrix
Tucson, Ariz. 85710-5333
(602) 747-9649

Far West Region
Arizona, California, Guam, Hawaii, Nevada

Raymond W. Peterman
11315 Applewood Dr.
Kansas City, Mo. 64134-3157
(816) 761-7453

Midwest Region
Iowa, Kansas, Missouri, Nebraska

Jack G. Powell
1750 S. Ironton
Aurora, Colo. 80012
(303) 755-2484

Rocky Mountain Region
Colorado, Utah, Wyoming

Roy P. Whitton
P. O. Box 1706
Lake Placid, Fla. 33852-1706
(813) 465-7048

Southeast Region
Florida, Georgia, North Carolina, South Carolina

INTERNATIONAL VICE PRESIDENTS

Robert A. Fisette
375 Avenue Louise, Box 3
1050 Brussels, Belgium

European Region

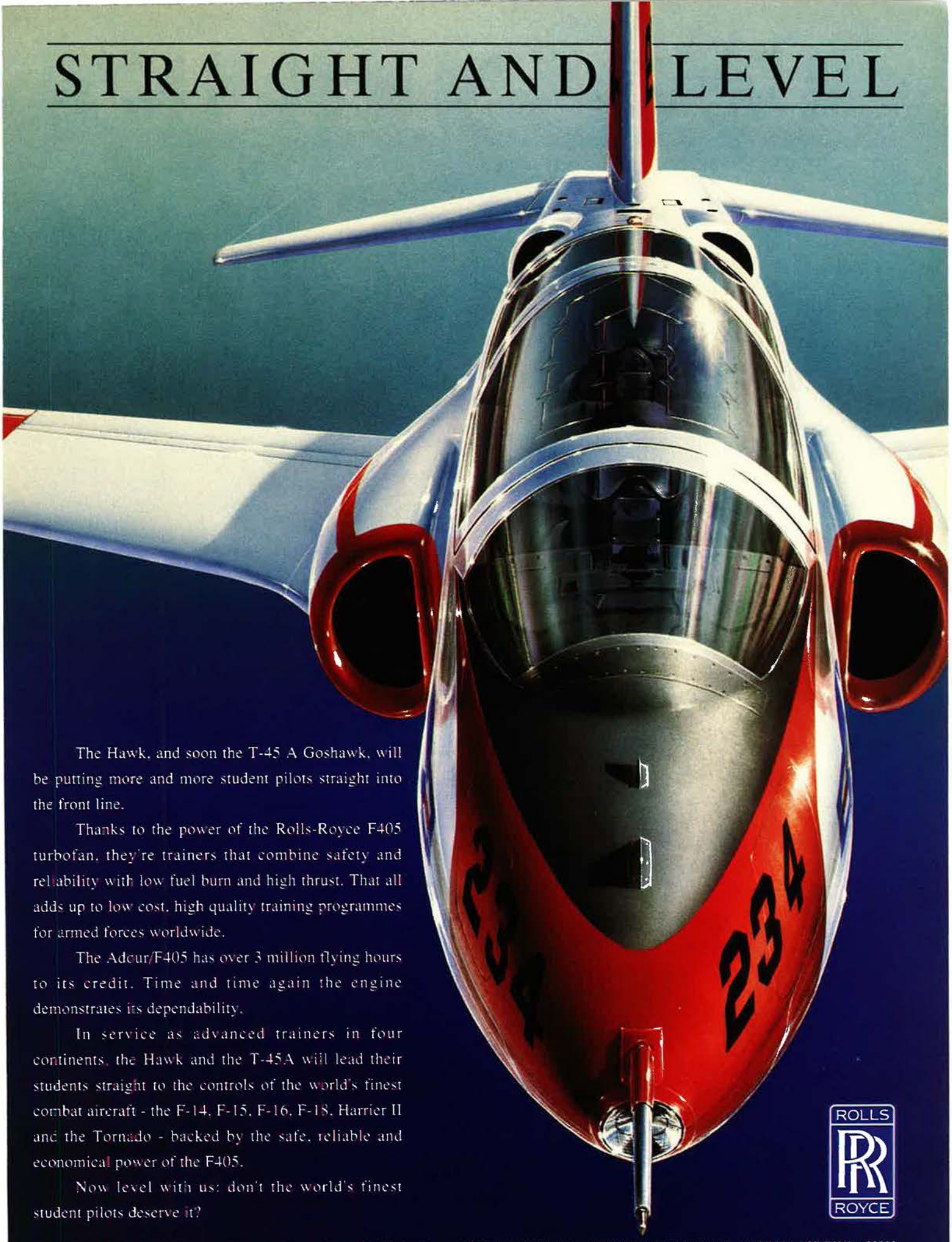
(Vacant)

Pacific Region

NATIONAL DIRECTORS

Donald D. Adams
Omaha, Neb.
John R. Alison
Washington, D. C.
Joseph E. Assaf
Hollywood, Fla.
Richard H. Becker
Oak Brook, Ill.
James C. Binnicker
Alpharetta, Ga.
David L. Blankenship
Tulsa, Okla.
John G. Brosky
Pittsburgh, Pa.
Richard S. Cain
Hopkins, S. C.
Dan F. Callahan
Nashville, Tenn.
Dan F. Callahan III
McMinnville, Tenn.
Robert L. Carr
Pittsburgh, Pa.
George H. Chabbott
Dover, Del.
Charles H. Church, Jr.
Lenexa, Kan.
Earl D. Clark, Jr.
Shawnee Mission, Kan.
M. Lee Cordell
Westchester, Ill.
R. L. Devoucoux
Portsmouth, N. H.
James H. Doolittle
Pebble Beach, Calif.
Russell E. Dougherty
Arlington, Va.
George M. Douglas
Colorado Springs, Colo.
Michael J. Dugan
Alexandria, Va.
Charles G. Durazo
McLean, Va.
Joseph R. Falcone
Rockville, Conn.
E. F. "Sandy" Faust
San Antonio, Tex.
Joe Foss
Beulah, Wyo.
Meryll M. Frost
Columbia Falls, Me.
Charles A. Gabriel
McLean, Va.
Cheryl L. Gary
Moreno Valley, Calif.
William J. Gibson
San Antonio, Tex.
Barry Goldwater
Scottsdale, Ariz.
Jack B. Gross
Harrisburg, Pa.
George D. Hardy
College Heights Estates, Md.
Alexander E. Harris
Little Rock, Ark.
Martin H. Harris
Winter Park, Fla.
Gerald V. Hasler
Albany, N. Y.
H. B. Henderson
Ramona, Calif.
John P. Henebry
Chicago, Ill.
Robert S. Johnson
Lake Wylie, S. C.
David C. Jones
Arlington, Va.
James M. Keck
San Antonio, Tex.
Arthur F. Kelly
Los Angeles, Calif.
John V. Kelly
Linthicum, Md.
Victor R. Kregel
Colorado Springs, Colo.
Jan M. Laitos
Rapid City, S. D.
Shelly D. Larson
Hubert, N. C.
Frank M. Lugo
Mobile, Ala.
Robert W. Marsh
Newington, Ga.
Nathan H. Mazer
Roy, Utah
William V. McBride
San Antonio, Tex.
James M. McCoy
Omaha, Neb.
Thomas J. McKee
Arlington, Va.
Edward J. Monaghan
Anchorage, Alaska
J. B. Montgomery
Los Angeles, Calif.
Bryan L. Murphy, Jr.
Fort Worth, Tex.
J. Gilbert Nettleton, Jr.
Los Angeles, Calif.
Ellis T. Nottingham
McLean, Va.
William C. Rapp
Williamsville, N. Y.
Julian B. Rosenthal
Durham, N. C.
Peter J. Schenk
Pinehurst, N. C.
Walter E. Scott
Dixon, Calif.
Joe L. Shosid
Fort Worth, Tex.
James E. "Red" Smith
Princeton, N. C.
William W. Spruance
Marathon, Fla.
Thos. F. Stack
Hillsborough, Calif.
Edward A. Stearn
Redlands, Calif.
James M. Stewart
Beverly Hills, Calif.
Bruce R. Stoddard
Tucson, Ariz.
Paul D. Straw
San Antonio, Tex.
Harold C. Stuart
Tulsa, Okla.
James M. Trail
Oro Valley, Ariz.
Walter G. Vartan
Chicago, Ill.
Forrest L. Vosler
Memphis, N. Y.
Larry D. Welch
Falls Church, Va.
A. A. West
Hayes, Va.
Sherman W. Wilkins
Bellevue, Wash.
Joseph A. Zaranka
Bloomfield, Conn.
Monroe W. Hatch, Jr.
(ex officio)
Executive Director
Air Force Association
Arlington, Va.
John O. Gray
(ex officio)
Executive Director Emeritus
Washington, D. C.
Rev. Richard Carr
(ex officio)
National Chaplain
Springfield, Va.
Capt. Steven Hiss
(ex officio)
Chairman, Junior Officer Advisory Council
Columbus AFB, Miss.
CMSgt. John Wright
(ex officio)
Chairman, Enlisted Council
Langley AFB, Va.
Michael J. Headly
(ex officio)
National Commander
Arnold Air Society
Brookings, S. D.

STRAIGHT AND LEVEL



The Hawk, and soon the T-45 A Goshawk, will be putting more and more student pilots straight into the front line.

Thanks to the power of the Rolls-Royce F405 turbofan, they're trainers that combine safety and reliability with low fuel burn and high thrust. That all adds up to low cost, high quality training programmes for armed forces worldwide.

The Adour/F405 has over 3 million flying hours to its credit. Time and time again the engine demonstrates its dependability.

In service as advanced trainers in four continents, the Hawk and the T-45A will lead their students straight to the controls of the world's finest combat aircraft - the F-14, F-15, F-16, F-18, Harrier II and the Tornado - backed by the safe, reliable and economical power of the F405.

Now level with us: don't the world's finest student pilots deserve it?

ROLLS RR ROYCE

ROLLS-ROYCE plc, 65 BUCKINGHAM GATE, LONDON SW1E 6AT. ROLLS-ROYCE INC., 11911 FREEDOM DRIVE, RESTON, VIRGINIA 22090.

E-SYSTEMS

Our Pledge

I pledge allegiance to the flag
of the United States of America
and to the republic for which it stands,
one nation
under God,
indivisible,
with liberty
and justice for all.

— Francis Bellamy, 1892

E-SYSTEMS

The science of systems.

1961–63	—	Dr. W. Randolph Lovelace II
1963–64	John B. Montgomery	Dr. W. Randolph Lovelace II
1964–66	Dr. Lindley J. Stiles	Gen. Laurence S. Kuter, USAF (Ret.)
1966–67	Dr. B. Frank Brown	Dr. Walter J. Hesse
1967–68	Dr. Leon M. Lessinger	Dr. Walter J. Hesse
1968–69	Dr. L. V. Rasmussen	Dr. Walter J. Hesse
1969–71	Dr. L. V. Rasmussen	J. Gilbert Nettleton, Jr.
1971–73	Dr. Leon M. Lessinger	J. Gilbert Nettleton, Jr.
1973–74	Dr. Wayne O. Reed	George D. Hardy
1974–75	Dr. William L. Ramsey	George D. Hardy
1975–81	Dr. William L. Ramsey	Sen. Barry Goldwater
1981–84	Dr. Don C. Garrison	Sen. Barry Goldwater
1984–86	George D. Hardy	Sen. Barry Goldwater
1986–87	Eleanor P. Wynne	George D. Hardy
1987–88	James M. Keck	George D. Hardy
1988–89	James M. Keck	George D. Hardy
1989–90	Gerald V. Hasler	James M. Keck
1990–91	Gerald V. Hasler	James M. Keck

H. H. Arnold Award Recipients

Until 1986, AFA's highest Aerospace Award was the H. H. Arnold Award. Named for the World War II leader of the Army Air Forces, it is presented annually in recognition of the most outstanding contributions in the field of aerospace activity. In 1986, the Arnold Award was redesignated AFA's highest honor to a member of the armed forces in the field of National Security. It continues to be presented annually.

YEAR	RECIPIENT(S)
1948	Hon. W. Stuart Symington, Secretary of the Air Force
1949	Maj. Gen. William H. Tunner and the men of the Berlin Airlift
1950	Airmen of the United Nations in the Far East
1951	Gen. Curtis E. LeMay and the personnel of Strategic Air Command
1952	Senators Lyndon B. Johnson and Joseph C. O'Mahoney
1953	Gen. Hoyt S. Vandenberg, former Chief of Staff, USAF
1954	Hon. John Foster Dulles, Secretary of State
1955	Gen. Nathan F. Twining, Chief of Staff, USAF
1956	Senator W. Stuart Symington
1957	Edward P. Curtis, Special Assistant to the President
1958	Maj. Gen. Bernard A. Schriever, Commander, Ballistic Missile Division, ARDC
1959	Gen. Thomas S. Power, Commander in Chief, Strategic Air Command
1960	Gen. Thomas D. White, Chief of Staff, USAF
1961	Hon. Lyle S. Garlock, Assistant Secretary of the Air Force
1962	Dr. A. C. Dickieson and John R. Pierce, Bell Telephone Laboratories
1963	The 363d Tactical Reconnaissance Wing, TAC, and the 4080th Strategic Wing, SAC
1964	Gen. Curtis E. LeMay, Chief of Staff, USAF
1965	The 2d Air Division, PACAF
1966	The 8th, 12th, 355th, 366th, and 388th Tactical Fighter Wings and the 432d and 460th Tactical Reconnaissance Wings
1967	Gen. William W. Momyer, Commander, Seventh Air Force, PACAF
1968	Col. Frank Borman, USAF; Capt. James Lovell, USN; and Lt. Col. William Anders, USAF—Apollo 8 Crew
1969	*(no presentation)*
1970	Apollo 11 Team (J. L. Atwood, Lt. Gen. Samuel C. Phillips, USAF, and Astronauts Neil Armstrong, Col. Edwin E. Aldrin, Jr., USAF, and Col. Michael Collins, USAF)
1971	Dr. John S. Foster, Jr., Director of Defense Research and Engineering
1972	Air Units of the Allied Forces in SEA (Air Force, Navy, Army, Marine Corps, and the Vietnamese Air Force)
1973	Gen. John D. Ryan, USAF (Ret.), former Chief of Staff, USAF
1974	Gen. George S. Brown, USAF, Chairman, Joint Chiefs of Staff
1975	Hon. James R. Schlesinger, Secretary of Defense
1976	Senator Barry M. Goldwater
1977	Senator Howard W. Cannon
1978	Gen. Alexander M. Haig, Jr., USA, Supreme Allied Commander, Europe
1979	Senator John C. Stennis
1980	Gen. Richard H. Ellis, USAF, Commander in Chief, Strategic Air Command
1981	Gen. David C. Jones, USAF, Chairman, Joint Chiefs of Staff
1982	Gen. Lew Allen, Jr., USAF (Ret.), former Chief of Staff, USAF
1983	Ronald W. Reagan, President of the United States
1984	The President's Commission on Strategic Forces (the Scowcroft Commission)
1985	Gen. Bernard W. Rogers, USA, Supreme Allied Commander, Europe
1986	Gen. Charles A. Gabriel, USAF (Ret.), former Chief of Staff, USAF
1987	Adm. William J. Crowe, Jr., USN, Chairman, Joint Chiefs of Staff
1988	The men and women of the GLCM Team
1989	Gen. Larry D. Welch, USAF Chief of Staff
1990	Gen. John T. Chain, Commander in Chief, Strategic Air Command
1991	Lt. Gen. Charles A. Horner, Commander, US Central Command Air Forces and 9th Air Force

W. Stuart Symington Award Recipients

Since 1986, AFA's highest honor to a civilian in the field of National Security has been the W. Stuart Symington Award. The award, presented annually, is named for the first Secretary of the Air Force.

YEAR	RECIPIENT
1986	Hon. Caspar W. Weinberger, US Secretary of Defense
1987	Hon. Edward C. Aldridge, Jr., Secretary of the Air Force
1988	Hon. George P. Shultz, Secretary of State
1989	Hon. Ronald W. Reagan, former President of the United States
1990	Hon. John J. Welch, Assistant Secretary of the Air Force (Acquisition)
1991	Hon. George Bush, President of the United States

INSTRUMENTATION DATA COLLECTION AT ITS VERY BEST!

DATATAPE's 19mm cassette tape recorder was developed to satisfy today's need to store massive amounts of technical data for analysis. Being a world leader in data collection, DATATAPE's recorders have taken a leading role in space, flight test, in hostile environments on land, and at sea. Our DCTR-LP Series of recorders are 19mm based, conforming to the ANSI (American National Standard Institute) format specification for ID-1 as specified in ANS X3.175 -1990, or MIL-STD-2179A. D-1 cassettes are available in three sizes (S, M and L), allowing you to efficiently and economically use the DCTR-LP Series for a wide range of applications. The DCTR-LP Series records over a continuously variable 8:1 input range from 25 to 400 Mbits/sec. There are four user defined reproduce rates over the 8:1 range to ensure maximum data handling capability. EDAC is utilized to provide Bit Error Rates of 1 x 10^{-10} or better.

- Two Auxiliary Data Channels
- Read After Write Capability
- Load Thread Time – 4.5 seconds
- Shuttle Speed – 300 in/s
- Record Time – 33 minutes at 400 Mbit/s
- Optional Variable Buffer provides for operation from zero to maximum data rate.

360 Sierra Madre Villa, Pasadena, CA. 91109-7014
For information on Data Collection Systems and Magnetic Head Replacements call (818) 796-9381

DATATAPE INCORPORATED
A KODAK COMPANY

Kodak

Aerospace Education Foundation Fellows

The following is a listing of Individual Fellows who have become Fellows since the last such listing in the September 1990 issue of this magazine.

Individual Jimmy Doolittle Fellows

(Listed in order of affiliation. Represents $1,000 contribution)

NAME	SPONSOR
(1990)	
Lt. Gen. Jimmie V. Adams, USAF	Iron Gate Chapter
H. W. "Rocky" Jones *(in memoriam)*	Virginia State AFA
Fort Worth Chapter	Texas State AFA
Lt. Gen. Gordon E. Fornell, USAF	H. H. Arnold Chapter
(1991)	
Hon. John J. Welch, Jr.	Central East Region
Lt. Gen. James S. Cassity, Jr., USAF	New Jersey State AFA/AEF
Lt. Col. Stephen L. Williams, USAF (Ret.)	New Jersey State AFA/AEF
Maj. Julio F. Ferreira, USAF	New Jersey State AFA/AEF
Herbert M. "Bud" West *(in memoriam)*	Central Florida Chapter
Communications, Operations Desert Shield/Desert Storm	Central Florida Chapter
Medical & Combat Support, Operations Desert Shield/Desert Storm	Central Florida Chapter
Family Support, Operations Desert Shield/Desert Storm	Central Florida Chapter
Lt. Gen. Henry Viccellio, Jr., USAF	Iron Gate Chapter
Donald K. "Deke" Slayton	Cape Canaveral Chapter
439th Military Airlift Wing	Massachusetts State AFA
438th Military Airlift Wing, Operations Desert Shield/Desert Storm	Thomas B. McGuire, Jr., Chapter
514th Military Airlift Wing (Assoc.), Operations Desert Shield/Desert Storm	Thomas B. McGuire, Jr., Chapter
170th Air Refueling Group, Operations Desert Shield/Desert Storm	Thomas B. McGuire, Jr., Chapter
Ruth E. Stein	John H. Stein
Lt. Gen. Charles A. Horner, USAF	Langley Chapter
Capt. Bradley R. Schuldt, USAF	Chicagoland-O'Hare Chapter

Individual Ira Eaker Fellows

(Listed in order of affiliation. Represents $1,000 contribution)

NAME	SPONSOR
(1990)	
Bob and Helen Seidel	Dallas Chapter
Sam E. Keith, Jr. *(in memoriam)*	Texas State AFA
Moya Lear	Nevada State AFA and the Thunderbird and Dale O. Smith Chapters
(1991)	
Strategic Airlift, Tanker, and Bomber Operations, Operations Desert Shield/Desert Storm	Central Florida Chapter
Reserve Components Operations, Operations Desert Shield/Desert Storm	Central Florida Chapter
Tactical Fighter and Airlift Operations, Operations Desert Shield/Desert Storm	Central Florida Chapter
Maj. Gen. Stephen M. McElroy, USAF	Charles A. Lindbergh Chapter
Col. Ruth M. Anderson, USAF	Iron Gate Chapter
Brig. Gen. Charles E. Franklin, USAF	Iron Gate Chapter
Gregory S. Kolligian	Iron Gate Chapter
Richard A. Freytag	Iron Gate Chapter
George M. Douglas	Colorado State AFA
Gen. H. T. Johnson, USAF	Seattle Chapter
Thomas W. Anthony	Maryland State AFA
John H. Stein	John H. Stein

Individual Barry Goldwater Fellows

(Listed in order of affiliation. Represents $5,000 contribution)

NAME	SPONSOR
(1990)	
Lt. Col. William Bryant Dougherty, USAF *(in memoriam)*	H. H. Timken, Jr.
John O. Gray	AFA Board of Directors
(1991)	
Gen. Robert D. Russ, USAF	Central Florida Chapter
Martin H. Harris	Central Florida Chapter

Aerospace Education Foundation 1990–91 AFJROTC Contest Winners

Subject: "Our Best Community Service Project"

First-Place Winner ($1,000)

John Jay High School, San Antonio, Tex.

Second-Place Winner ($750)

Northeast High School, Oakland Park, Fla.

Third-Place Winner ($500)

Cheyenne East High School, Cheyenne, Wyo.

AFA Units of the Year

YEAR	RECIPIENT(S)
1953	San Francisco Chapter (Calif.)
1954	Santa Monica Area Chapter (Calif.)
1955	San Fernando Valley Chapter (Calif.)
1956	Utah State AFA
1957	H. H. Arnold Chapter (N. Y.)
1958	San Diego Chapter (Calif.)
1959	Cleveland Chapter (Ohio)
1960	San Diego Chapter (Calif.)
1961	Chico Chapter (Calif.)
1962	Fort Worth Chapter (Tex.)
1963	Colin P. Kelly Chapter (N. Y.)
1964	Utah State AFA
1965	Idaho State AFA
1966	New York State AFA
1967	Utah State AFA
1968	Utah State AFA
1969	*(no presentation)*
1970	Georgia State AFA
1971	Middle Georgia Chapter (Ga.)
1972	Utah State AFA
1973	Langley Chapter (Va.)
1974	Texas State AFA
1975	Alamo Chapter (Tex.) and San Bernardino Area Chapter (Calif.)
1976	Scott Memorial Chapter (Ill.)
1977	Thomas B. McGuire, Jr., Chapter (N. J.)
1978	Thomas B. McGuire, Jr., Chapter (N. J.)
1979	General Robert F. Travis Chapter (Calif.)
1980	Central Oklahoma (Gerrity) Chapter (Okla.)
1981	Alamo Chapter (Tex.)
1982	Chicagoland-O'Hare Chapter (Ill.)
1983	Charles A. Lindbergh Chapter (Conn.)
1984	Scott Memorial Chapter (Ill.) and Colorado Springs/Lance Sijan Chapter (Colo.)
1985	Cape Canaveral Chapter (Fla.)
1986	Charles A. Lindbergh Chapter (Conn.)
1987	Carl Vinson Memorial Chapter (Ga.)
1988	General David C. Jones Chapter (N. D.)
1989	Thomas B. McGuire, Jr., Chapter (N. J.)
1990	General E. W. Rawlings Chapter (Minn.)
1991	Paul Revere Chapter (Mass.)

AFA's "Man of the Year" Award Recipients

State names refer to winner's home state at time of award.

YEAR	RECIPIENT(S)
1953	Julian B. Rosenthal (New York)
1954	George A. Anderl (Illinois)
1955	Arthur C. Storz (Nebraska)
1956	Thos. F. Stack (California)
1957	George D. Hardy (Maryland)
1958	Jack B. Gross (Pennsylvania)
1959	Carl J. Long (Pennsylvania)
1960	O. Donald Olson (Colorado)
1961	Robert P. Stewart (Utah)
1962	*(no presentation)*
1963	N. W. DeBenardinis (Louisiana) and Joe L. Shosid (Texas)
1964	Maxwell A. Kriendler (New York)
1965	Milton Caniff (New York)
1966	William W. Spruance (Delaware)
1967	Sam E. Keith, Jr. (Texas)
1968	Marjorie O. Hunt (Michigan)
1969	*(no presentation)*
1970	Lester C. Curl (Florida)
1971	Paul W. Gaillard (Nebraska)
1972	J. Raymond Bell (New York) and Martin H. Harris (Florida)
1973	Joe Higgins (California)
1974	Howard T. Markey (Washington, D. C.)
1975	Martin M. Ostrow (California)
1976	Victor R. Kregel (Texas)
1977	Edward A. Stearn (California)
1978	William J. Demas (New Jersey)
1979	Alexander C. Field, Jr. (Illinois)
1980	David C. Noerr (California)
1981	Daniel F. Callahan (Florida)
1982	Thomas W. Anthony (Maryland)
1983	Richard H. Becker (Illinois)
1984	Earl D. Clark, Jr. (Kansas)
1985	George H. Chabbott (Delaware) and Hugh L. Enyart (Illinois)
1986	John P. E. Kruse (New Jersey)
1987	Jack K. Westbrook (Tennessee)
1988	Charles G. Durazo (Virginia)
1989	Oliver R. Crawford (Texas)
1990	Cecil H. Hopper (Ohio)
1991	George M. Douglas (Colorado)

Christa McAuliffe Memorial Award Winners

YEAR	RECIPIENT	SPONSOR
1986	Allen T. King	Fort Wayne–Baer Field Chapter, Ind.
1987	Betty Ann Mosen	Sacramento Chapter, Calif.
1988	John W. Barainca	Salt Lake Chapter, Utah
1989	Dr. Ben P. Millspaugh	Mile High Chapter, Colo.
1990	Sue Ellen Darnell	Lexington Chapter, Ky.
1991	Melba Iris Harris	Mobile Chapter, Ala.

AFA's Network of Units Overseas

AFA UNIT	LOCATION
United States Air Forces in Europe (USAFE)	
Ankara	Ankara AS, Turkey
Charlemagne	Brunssum, the Netherlands
Dolomiti	Aviano AB, Italy
Eifel	Bitburg AB, Germany
Fens	RAF Alconbury, United Kingdom
Gateway to Freedom	Berlin, Germany
Gregory E. Miller	Incirlik AB, Turkey
Izmir	Izmir AS, Turkey
Lufbery-Campbell	Ramstein AB, Germany
Maj. Gen. Robert M. White	Heidelberg, Germany
Netherlands Eagle	Soesterberg, the Netherlands
RAF Bentwaters	RAF Bentwaters, United Kingdom
RAF Mildenhall	RAF Mildenhall, United Kingdom
RAF Upper Heyford	RAF Upper Heyford, United Kingdom
Red Raider	Torrejon AB, Spain
Sembach	Sembach AB, Germany
Spangdahlem	Spangdahlem AB, Germany
Wiesbaden	Lindsey AB, Germany
Zaragoza	Zaragoza, Spain
Pacific Air Forces (PACAF)	
Bataan Memorial	Clark AB, the Philippines
Captain Joseph McConnell, Jr.	Osan AB, South Korea
Keystone	Kadena AB, Japan
Manila	Manila, the Philippines
Misawa	Misawa AB, Japan
Tokyo	Tokyo, Japan
Wolf Pack	Kunsan AB, South Korea
Supreme Headquarters Allied Powers Europe (SHAPE)	
General Lauris G. Norstad	Mons, Belgium

AFA's Regions, States, and Chapters

The figures on the right indicate the number of affiliated members as of June 30, 1991. Listed below the name of each region is the name of the National Vice President for that region.

CENTRAL EAST REGION	**16,207**
R. Donald Anderson	
Delaware	1,177
Blue Hen	60
Delaware Galaxy	835
Diamond State	170
Henlopen Area	39
University	28
Wilmington	45
District of Columbia	1,520
Nation's Capital	1,520
Kentucky	796
General Russell E. Dougherty	565
Lexington	231
Maryland	3,422
Baltimore*	966
Central Maryland	439
College Park Airport	114
Thomas W. Anthony	1,903
Virginia	8,986
Danville	43
Donald W. Steele, Sr., Memorial	4,084
General Charles A. Gabriel	631
Jack Manch	111
Langley	2,687
Leigh Wade	115
Lynchburg	132
Richmond	392
Roanoke	309
Tidewater	319
William A. Jones III	163
West Virginia	306
Chuck Yeager	306
FAR WEST REGION	**33,931**
Robert A. Munn	
Arizona	5,869
Barry Goldwater	272
Cochise	115
Frank Luke	1,533
Green Valley	273
Phoenix Sky Harbor	1,472
Prescott	139
Tucson	2,065
California	23,726
Antelope Valley	865

*These chapters were chartered prior to December 31, 1948, and are considered original charter chapters; the Major John S. Southrey Chapter of Massachusetts was formerly the Chicopee Chapter.


NOTHING BEATS A BUD®
Bud
KING OF BEERS
Budweiser
KING OF BEERS
Brewed by our original process
Choicest Hops, Rice and Barley
Anheuser-Busch, Inc.
PLEASE RECYCLE OUR ALUMINUM CANS
BUDWEISER® KING OF BEERS® © 1990 ANHEUSER-BUSCH, INC • ST. LOUIS, MO

AFA's Regions, States, and Chapters (continued)

Bakersfield	86
David J. Price/Beale	808
Fresno*	528
General B. A. Schriever Los Angeles	1,415
General Curtis E. LeMay	1,329
General Doolittle/Los Angeles Area*	2,564
General Robert F. Travis	2,092
Golden Gate*	702
High Desert	808
Maj. Gen. Charles I. Bennett, Jr.	878
Monterey Bay Area	328
Pasadena Area	493
Redwood Empire	412
Riverside County	1,328
Robert H. Goddard	1,235
Sacramento	3,055
San Bernardino Area	1,979
San Diego	1,270
Tennessee Ernie Ford	1,248
Ventura County	303
Guam	267
Guam–Arc Light	267
Hawaii	1,515
Hawaii*	1,484
Maui	31
Nevada	2,554
Dale O. Smith	444
Thunderbird	2,110
GREAT LAKES REGION	**19,556**
Cecil H. Hopper	
Illinois	5,153
Chicagoland-O'Hare	1,301
Greater Rockford	68
Illini	682
Land of Lincoln	219
Quad Cities	163
Richard E. Carver	176
Scott Memorial	2,136
West Suburban	408
Indiana	2,013
Central Indiana	459
Fort Wayne–Baer Field Area	181
Grissom Memorial	500
Gus Grissom	165
Lawrence D. Bell Museum	47
Lester W. Johnston	32
P-47 Memorial	28
South Bend	310
Southern Indiana	180
Terre Haute–Wabash Valley	111
Michigan	3,395
Battle Creek	317
Hoyt S. Vandenberg	401
Huron	479
James H. Straubel	584
Kalamazoo	232
Lake Superior–Northland	750
Lloyd R. Leavitt, Jr.	139
Mid-Michigan	86
Mount Clemens	339
PE-TO-SE-GA	68
Ohio	7,739
Buckeye Skypower	223
Capt. Eddie Rickenbacker Memorial*	675
Cincinnati	365
Cleveland	587
Frank P. Lahm	296
Mid-Ohio	333
Steel Valley	224
Wright Memorial*	5,036
Wisconsin	1,256
Badger State	223
Billy Mitchell	711
Madison	322
MIDWEST REGION	**8,500**
Raymond W. Peterman	
Iowa	691
All-Iowa	404
Eastern Iowa	67
Mid-Iowa	70
Richard D. Kisling	150
Kansas	1,369
Contrails	54
Lt. Erwin R. Bleckley	855
Topeka	460
Missouri	2,365
Central Missouri	544
Harry S. Truman	574
Ozark	201
Spirit of St. Louis	1,046
Nebraska	4,075
Ak-Sar-Ben	3,797
Lincoln	278
NEW ENGLAND REGION	**6,936**
Robert N. McChesney	
Connecticut	1,441
Central Connecticut	180
Charles A. Lindbergh	212
First Connecticut	262
Flying Yankees	197
General Bennie L. Davis	70
General George C. Kenney	84
Igor Sikorsky	168
Northern Connecticut	204
Sergeant Charlton Heston	64
Maine	752
Eastern Maine	233
Major Charles J. Loring, Jr.	358
Southern Maine	161
Massachusetts	3,279
Boston	270
Laurence G. Hanscom	305
Major John S. Southrey*	314
Minuteman	327
Otis	197
Paul Revere	1,363
Pioneer Valley	144
Taunton	147
Worcester*	212
New Hampshire	925
Amoskeag	286
Pease	639
Rhode Island	263
Metro Rhode Island	263
Vermont	276
Burlington	276
NORTH CENTRAL REGION	**3,736**
John E. Kittelson	
Minnesota	1,395
General E. W. Rawlings	1,142
Richard Bong	253
North Dakota	1,176
General David C. Jones	539
Happy Hooligan	152
Red River Valley	485
South Dakota	1,165
Dacotah	299
Paha Sapa Waziata	19
Rushmore	847
NORTHEAST REGION	**13,348**
Robert W. Gregory	
New Jersey	4,054
Admiral Charles E. Rosendahl	135
Aerospace Founders	24
Atlantic City Area	185
Brig. Gen. Frederick W. Castle	201
Garden State	21
Hangar One	171
High Point	94
Hudson*	95
John Currie Memorial	64
Mercer County	182
Middlesex	111
New Jersey Public Affairs	30
Passaic-Bergen*	278
Sal Capriglione	120
Teterboro-Bendix	65
Thomas B. McGuire, Jr.	1,758

Tri-County	68
Union Morris	382
Wings	70
New York	5,381
Albany*	278
Brooklyn "Key"	401
Chautauqua	76
Colin P. Kelly	878
Forrest L. Vosler	336
General Daniel "Chappie" James, Jr., Memorial	150
Genesee Valley	289
H. H. Arnold	319
Hudson Valley	154
Iron Gate	299
Lawrence D. Bell	445
Lloyd Schloen–Empire	46
Nassau-Mitchel	274
New York Air Reserve & CAP	39
Niagara Frontier	130
Plattsburgh	388
Queens	233
Suffolk County	210
Thomas Watson, Sr., Memorial	195
Westchester-Falcon	241
Pennsylvania	3,913
Altoona	79
Beaver Valley	93
Brandywine	162
Bucks County	20
Colonel Stuart E. Kane, Jr.	192
Eagle	89
Erie	111
Freedom	386
Greater Pittsburgh*	506
Jimmy Stewart	37
Joe Walker–Mon Valley	146
Lehigh Valley	294
Lt. Col. B. D. "Buzz" Wagner	85
Metropolitan Philadelphia*	410
Mifflin County*	112
Olmsted	407
Pocono Northeast	193
Steel Valley	109
Total Force	242
York-Lancaster	240

AFA's Regions, States, and Chapters (continued)

NORTHWEST REGION Alwyn T. Lloyd	**8,670**
Alaska	1,718
Anchorage	1,189
Fairbanks Midnight Sun	529
Idaho	870
Boise Valley	490
Magic Valley	98
Snake River Valley	282
Montana	725
Big Sky	623
Bozeman	102
Oregon	1,301
Eugene	343
Klamath Basin	124
Portland*	834
Washington	4,056
Greater Seattle	1,339
Inland Empire	1,018
Tacoma	1,699
ROCKY MOUNTAIN REGION Jack G. Powell	**9,675**
Colorado	5,972
Colorado Springs/Lance Sijan	3,262
Flatirons	222
General Robert E. Huyser	112
Long's Peak	165
Mel Harmon	128
Mile High	2,013
Weld County	70
Utah	2,974
Gold Card	390
Ogden	692
Rocky Mountain	554
Salt Lake	492
Ute	639
Wasatch	207
Wyoming	729
Cheyenne Cowboy	729
SOUTH CENTRAL REGION H. R. ("Bobby") Case	**12,090**
Alabama	3,417
Birmingham	469
Gadsden	44
Mobile	338
Montgomery	2,221
Tennessee Valley	345
Arkansas	1,967
David D. Terry, Jr.	1,212
Fort Smith	88
General Ira C. Eaker	458
Ouachita	53
Razorback	156
Louisiana	2,595
Alexandria	433
Ark-La-Tex	1,359
Baton Rouge	290
Greater New Orleans Area	513
Mississippi	2,070
Golden Triangle	576
Jackson	191
John C. Stennis	1,303
Tennessee	2,041
Chattanooga	132
Everett R. Cook	448
General Bruce K. Holloway	516
H. H. Arnold Memorial	410
Lt. Gen. Frank Maxwell Andrews	535
SOUTHEAST REGION Roy P. Whitton	**26,051**
Florida	13,692
Cape Canaveral	1,514
Central Florida	1,283
Citrus Belt	171
Colonel H. M. (Bud) West	252
Eglin	2,793
Falcon	394
Florida Gulf Coast	292
Florida Highlands	191
Gainesville	147
General James R. McCarthy	261
General Nathan F. Twining	490
Gold Coast	451
Indian River	86
Jerry Waterman	1,262
John C. Meyer	254
John W. DeMilly, Jr.	584
Miami	484
Morgan S. Tyler	233
Ocala	103
On Wings of Eagles	130
Panama City	1,282
Peace River	127
South Bay	110
Southwest Florida	252
Spacecoast	74
West Palm Beach	472
Georgia	4,957
Athens	143
Atlanta	630
Carl Vinson Memorial	2,485
Chattahoochee Valley	74
Coosa Valley	63
Dobbins	838
Savannah	256
South Georgia	402
Southeast Georgia	66
North Carolina	3,811
Blue Ridge	225
Cape Fear	140
Eastern Carolina	87
First in Flight	41
Foothills	77
Kitty Hawk	73
Piedmont	393
Pope	943
Roanoke Valley	37
Scott Berkeley	1,112
Tarheel	398
Triad	285
Puerto Rico	237
San Juan	237
South Carolina	3,354
Charleston	1,035
Columbia	484
Ladewig-Shine Memorial	534
Strom Thurmond	313
Swamp Fox	988
SOUTHWEST REGION Aaron C. Burleson	**31,022**
New Mexico	3,161
Albuquerque	1,560
Fran Parker	765
Llano Estacado	836
Oklahoma	5,545
Altus	841
Central Oklahoma (Gerrity)	3,384
Enid	871
Tulsa	449
Texas	22,316
Abilene	973
Aggieland	181
Alamo	7,772
Austin	1,902
Concho	595
Corpus Christi	165
Dallas	1,297
Del Rio	398
Denton	218
Fort Worth	4,104
Ghost Squadron	161
Heart of the Hills	183
Houston	1,358
Lee Glasgow–Waco	243
Lubbock	570
Northeast Texas	333
Panhandle AFA	146
Paso Del Norte	222
Permian Basin	162
Wichita Falls	1,333

AFA's National Presidents


James H. Doolittle
(1946–47)


Thomas G. Lanphier, Jr.
(1947–48)


C. R. Smith
(1948–49)


Robert S. Johnson
(1949–51)


Harold C Stuart
(1951–52)


Arthur F. Kelly
(1952–53)


George C. Kenney
(1953–54)


John R. Alison
(1954–55)


Gill Robb Wilson
(1955–56)


John P. Henebry
(1956–57)


Peter J. Schenk
(1957–59)


Howard T. Markey
(1959–60)


Thos. F. Stack
(1960–61)


Joe Foss
(1961–62)


John B. Montgomery
(1962–63)


W. R. Lovelace II
(1963–64)


Jess Larson
(1964–67)


Robert W. Smart
(1967–69)


George D. Hardy
(1969–71)


Martin M. Ostrow
(1971–73)


Joe L. Shosid
(1973–75)


George M. Douglas
(1975–77)


Gerald V. Hasler
(1977–79)


Victor R. Kregel
(1979–81)


John G. Brosky
(1981–82)


David L. Blankenship
(1982–84)


Martin H. Harris
(1984–86)


Sam E. Keith, Jr.
(1986–88)


Jack C. Price
(1988–90)

AFA's Board Chairmen

Pictured are Chairmen who never served as National President.


Oliver R. Crawford
(1990–91)


Edward P. Curtis
(1946–47)


Carl A. Spaatz
(1950–51


James M. Trail
(1958–59)


Julian B. Rosenthal
(1959–60)


Jack B. Gross
(1963–64)


Daniel F. Callahan
(1979–81)


Edward A. Stearn
(1985–86)

AFA's First National Officers and Board of Directors

This panel of officers and directors acted temporarily until a representative group was democratically elected by the membership at the first National Convention.

OFFICERS

President: James H. Doolittle
First Vice President: Edward P. Curtis
Second Vice President: Meryll Frost
Third Vice President: Thomas G. Lanphier, Jr.
Secretary: Sol A. Rosenblatt
Assistant Secretary: Julian B Rosenthal
Treasurer: W. Deering Howe
Executive Director: Willis S. Fitch

BOARD OF DIRECTORS

John S. Allard
H. M. Baldridge
William H. Carter
Everett Cook
Burton E. Donaghy
James H. Douglas, Jr.
G. Stuart Kenney
Reiland Quinn
Rufus Rand
Earl Sneed
James M. Stewart
Forrest Vosler
Benjamin F. Warmer
Lowell P. Weicker
C. V. Whitney
J. H. Whitney

Bulletin Board

Seeking World War II survivors of a B-17 of the **525th Bomb Squadron,** 379th Bomb Group, 8th Air Force, that crash-landed on October 4, 1943, west of Paris. The crew included 2d Lt. Joseph Ondo (pilot), Robert Regnier, Willis Morter, Joseph La Spada, and Jack Sins. **Contact:** Léon Croulebois, 41 Rue Brancion, 75015 Paris, France.

Seeking information about assignments and activities during World War II of **Lt. Col. William N. Hite,** a P-51 pilot. **Contact:** Jack C. Price, 1501 Lee Highway, Arlington, VA 22209-1198.

For a book, I am seeking exterior and interior photos and slides of all versions of the **C-130 Hercules. Contact:** Frank McCurdy, 5244 Cameron Creek Cove, #70, Fort Worth, TX 76132.

Seeking any information about **Ralph Todd, Jr.,** a B-29 pilot in World War II. He died in a plane crash in Mountain Home, Idaho, during the Korean War. Also seeking information on his plane. **Contact:** Richard Duncan, 1101 Arcade Blvd., Sacramento, CA 95815-1301.

Seeking information and photos of two B-17Fs, ***Miss Quachita*** (serial #42-3040) and ***All American*** (serial #41-24406), for a diorama of damaged aircraft. Also seeking information on the 18th Fighter-Bomber Wing from the early 1940s to 1980s. **Contact:** B. J. Cantwell, 4806 Webster Ave., Oakdale, CA 95361.

Collector seeks **scrap pieces of Iraqi Scud missiles** and of US Patriot missiles. **Contact:** Dennis Bylina, P. O. Box 25844, Colorado Springs, CO 80936.

Seeking slides or photos of **aircraft flown by the 325th Fighter Group**/Fighter Wing/Fighter-Interceptor Wing/FWW/Tactical Training Wing suitable for permanent display at the 325th Tactical Training Wing, Tyndall AFB, Fla. **Contact:** Capt. Rex Marshall, 325th TTW/DOTG, Tyndall AFB, FL 32403-5000.

Seeking current addresses of former **Arnold Air Society** members. We have information of interest to AAS alumni. **Contact:** AAS Executive Management Office, P. O. Box 3610, Pinehurst NC 28374.

Seeking information on **Troy Gordon Cope,** an F-86 pilot with the 335th Fighter-Interceptor Squadron, 4th Fighter-Interceptor Group. He was declared missing in action in Korea on September 16, 1952. **Contact:** Troy Cope, 1793A Harper St., Santa Cruz, CA 95062.

Seeking **USAAF/USAF memorabilia** (World War II and 1950s uniforms, patches, insignia and flags). I am particularly interested in the China-Burma-India theater. **Contact:** George Dively, Jr., P. O. Box 10743, Alexandria, VA 22310-0743.

Seeking the whereabouts of **Joseph Kopecky,** who was based in Bristol in 1942 and invalided out of the Army in 1946 and returned to America. Last known address was Elkton, S. D. **Contact:** James Nelmes, 85 Spencer House, Mede Close, Redcliffe, Bristol BS1 6RN, England.

Seeking the whereabouts of **Philip Hodges,** who was stationed at Dowlish Wake, Somerset, UK, in 1943. **Contact:** Pauline Sully, 10 Wellings Close, Tatworth, Chard, Somerset TA20 2RY, UK.

Seeking copy of a **monograph on the nature/description of the fighter pilot,** much copied and shared during the 1960s. The gist of the message was, "You didn't have to fly planes to be a fighter pilot—it was an attitude." **Contact:** Col. Bob Roseen, USAF (Ret.), 1321 Friends Way, Fallbrook, CA 92028.

Seeking information, photos, and contact with veterans of the **University of Arizona AFROTC Det. 020 Precision Drill Team** in order to write a history of the team and plan an all-team reunion. I especially need information on team personnel prior to 1969 and from 1977 to 1985. **Contact:** L. Scott Bretzke, 601 Quiet Village, Arnold, MO 63010.

Seeking information on the whereabouts of **Sgt. J. Matulauskis,** a radio operator stationed with 20th Bomber Command Base in western China in 1944 under the command of Brig. Gen. Kenneth Wolfe. **Contact:** Bruno J. Zemaitis, P. O. Box 145, Santa Maria, CA 93456.

Seeking contact with members of the **7131st Tactical Fighter Wing,** Missouri ANG, who were assigned to the 7544th Air Police Squadron at Toul-Rosier AB, France, in 1962–63. Also need photos, patches, and any other items or information regarding this unit. **Contact:** SSgt. Mark R. Kreutzer, 7910 Crossroads, Apt. 15H, Charleston, SC 29418.

Seeking information on the whereabouts of **William "Woody" Wood,** a pilot with the 42d Tactical Reconnaissance Squadron stationed at Spangdahlem AB, West Germany, in 1956–57. **Contact:** Frank Perri, 30 Aylesbury Cir., Madison, CT 06443.

Seeking information on an **F-4E that was flown by the 3d TFW's Wing Commander,** serial #68-312, especially the history of the plane from build date to the end of its use in the service, including current standing. **Contact:** Frank J. McGroarty, 8072 Rushwood Ln., Sagamore Hills, OH 44067.

Seeking information on **Chester Orr** from Pittsburgh, Pa. He served with USAAF at Langford Lodge, Northern Ireland, in 1942–43 for approximately eighteen months. He also served in France. **Contact:** Muriel J. Sherlock, Cherith, 120 Moss Rd., Lambeg, Lisburn BT27 4LF, Antrim, N. Ireland.

If you need information on an individual, unit, or aircraft, or if you want to collect, donate, or trade USAF-related items, write to "Bulletin Board," Air Force Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Letters should be brief and typewritten. We cannot acknowledge receipt of letters to "Bulletin Board." We reserve the right to condense letters as necessary. Unsigned letters are not acceptable. Items or services for sale or otherwise intended to bring in money will not be used. Photographs cannot be used or returned.—THE EDITORS

Collector seeks donations of **USAF unit patches** for display. Also seeking contact with other patch collectors. **Contact:** Mark C. Barilovich, 3574 Rockhampton Ct., Colorado Springs, CO 80920.

Seeking the whereabouts of **Capt. Ted Phillips,** from Texas, who was stationed with USAF in Norfolk, England, in 1950. **Contact:** Edward Bell, 30 St Marks Rd., Hanwell, London W7 2PW, England. ■

Unit Reunions

Cochran Field
Personnel who served at Cochran Field, Ga., will hold a reunion October 4, 1991, in Macon, Ga. **Contact:** Raymond Hejl, 2031 Knightsbridge Pl., Macon, GA 31211. Phone: (912) 745-2350.

2d Fighter/Pursuit/FITS/FIS/TFTS
The 2d Tactical Fighter Training Squadron will host a reunion for all 2d Fighter/Pursuit/FITS/FIS/TFTS members who served from World War II through the present. **Contact:** Lt. Col. Robert C. Capes, 2d TFTS/CC, Tyndall AFB, FL 32403, or 2921 Briarcliff Rd., Panama City, FL 32405. Phone: (914) 283-2904 or (914) 769-4956.

7th Fighter Command
The 7th Fighter Command Association will hold a reunion December 4–8, 1991, in Hawaii. **Contact:** James C. Van Nada, 2751 Warren St., Eugene, OR 97405. Phone: (503) 683-8271.

8th Air Force Historical Society
Veterans of the 8th Air Force will hold their annual reunion September 17–22, 1991, in New Orleans, La. **Contact:** Ed Kueppers, P. O. Box 7215, St. Paul, MN 55107. Phone: (800) 833-1942.

36th Fighter Group
Members of the 36th Fighter Group will hold a reunion October 11–13, 1991, at the Sheraton Inn in Omaha, Neb. **Contact:** Leo Black, 2438 Newport Ave., Omaha, NE 68112. Phone: (402) 455-7781.

44th Bomb Group/Wing
Veterans of the 44th Bomb Group and Wing will hold a fiftieth-anniversary reunion September 11–15, 1991, at the Howard Johnson Hotel in Rapid City, S. D. **Contact:** William H. Topping, 1426 Vadera Ct., Fenton, MO 63026. Phone: (314) 225-7030.

48th Fighter-Interceptor Squadron
The 48th Fighter-Interceptor Squadron will hold a reunion for all current and former members October 3–5, 1991, at Langley AFB, Va. **Contacts:** 1st Lt. David P. Bredemeyer, USAF, 48th Fighter-Interceptor Squadron (TAC), Langley AFB, VA 23665-5535. Phone: (804) 764-2532 or DSN 574-2532. Ellen Genung, (804) 764-5158 or DSN 574-5158.

51st Fighter Group
Members of the 51st Fighter Group, which included the 16th, 25th, 26th, and 449th Fighter Squadrons, will hold a reunion September 11–15, 1991, at the Holiday Inn in San Diego, Calif. **Contact:** Nickum F. Parker, 249 S. Hwy. 101, #5607, Solana Beach, CA 92075.

57th FIS
Members of the 57th Fighter-Interceptor Squadron will hold a fiftieth-anniversary reunion September 27, 1991, at Keflavik NAS, Iceland. **Contact:** Maj. Douglas Stewart, USAF, 57th Fighter Interceptor (TAC), APO New York 09673-2055. Phone: DSN 450-5520.

Class 71-03
Members of Class 71-03 who served at Moody AFB, Ga., will hold a reunion October 18–20, 1991, at the Royal Sonesta Hotel in New Orleans, La. **Contact:** Ron Angermeir, 123 N. W. 4th St., Suite 503, Evansville, IN 47708. Phone: (812) 464-9190.

Readers wishing to submit reunion notices to "Unit Reunions" should mail their notices well in advance of the event to "Unit Reunions," Air Force Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information.

315th Bomb Wing
Veterans of the 315th Bomb Wing, which includes the 16th, 331st, 501st, and 502d Bomb Groups (24th, 73d, 75th, and 76th Air Service Groups), will hold a reunion October 2–5, 1991, at the Marriott Hotel in Oklahoma City, Okla. **Contact:** George E. Harrington, 3165 N. Atlantic Ave., Apt. B409, Cocoa Beach, FL 32931. Phone: (407) 784-0342.

317th FIS
The 317th Fighter-Interceptor Squadron (1960–64) will hold a reunion September 20–22, 1991, in Colorado Springs, Colo. **Contact:** Frank R. Wisneski, 3140 Springmeadow Dr., Colorado Springs, CO 80906-3739. Phone: (719) 576-4277.

388th Fighter-Bomber Wing
Members of the 388th Fighter-Bomber Wing who served at Clovis AFB, N. M., and Etain AB, France, between 1954 and 1957 will hold a reunion October 17–20, 1991, in San Antonio, Tex. **Contact:** W. M. Petefish, 102 Madrid Dr., Universal City, TX 78148.

405th Fighter Group
The 405th Fighter Group, 9th Air Force (World War II), will hold a reunion with the 509th, 510th, and 511th Fighter Squadrons September 18–22, 1991, at the Union Plaza Hotel in Las Vegas, Nev. **Contacts:** Lt. Col. George W. Janovitz, USAF (Ret.), 222 Azalea Ct., Fairfield, CA 94533. Phone: (707) 422-4429. Col. Arlie J. Blood, USAF (Ret.), 23316 Gray Fox, Canyon Lake, CA 92587. Phone: (714) 244-5994.

421st Night Fighter Squadron
The 421st Night Fighter Squadron will hold a reunion October 10–12, 1991, in New Orleans, La. **Contacts:** Al W. Lockard, 3101 Tigertail Dr., Los Alamitos, CA 90720. Phone: (213) 598-9151. Dan McGuire, (504) 923-1148.

450th Bomb Group
Members of the 450th Bomb Group will hold a reunion October 17–20, 1991, in St. Louis, Mo. **Contact:** Doid K. Raab, 5695 Ireland Rd., N. E., Rte. 4, Lancaster, OH 43130. Phone: (614) 536-7635.

455th Bomb Group
The 455th Bomb Group will hold a reunion October 3–6, 1991, in Colorado Springs, Colo. **Contact:** Col. Louie O. Hansen, USAF (Ret.), P. O. Box 6125, Spencer IA 51301. ■

Bob Stevens'

"There I was..."

NORTHROP'S B-2 DOESN'T HAVE AN OFFICIAL NAME YET, BUT IT HAS PICKED UP A COUPLE OF NICKNAMES. HERE'S THE STORY BEHIND THE NAME WE LIKE BEST. SOME ENGINEERS ARE HORSING AROUND, FLIGHT-TESTING 120TH-SCALE MODELS—THIS IS ALL VERY SCIENTIFIC, MIND YOU—

THE NICKNAME'S STUCK—IN FRONT OF EACH PILOT POSITION THERE IS AN AUTO CONTROL PANEL WITH—I'M NOT MAKING THIS UP—THREE BUTTONS. ONE SAYS "T.O.," THE NEXT, "GO TO WAR," THE THIRD, "BOOMERANG" (i.e., "RTB and LAND"—WHICH THE B-2 DOES WITH THE PILOT'S FEET FLAT ON THE FLOOR!).

AMAZING? YOU AIN'T SEEN NOTHIN' YET!!

Bob Stevens

Plug-in to the future with Pentastar

Automatic Test Equipment

Pentastar, a new name for Chrysler Military-Public Electronic Systems, is a prime defense contractor with over 35 years of experience. Our Mil-Spec automatic test equipment supports all types of systems, from missiles to armored vehicles.

We design and build the Direct Support Electrical System Test Sets (DSESTS) for the M1 tank and the M2/3 Bradley infantry fighting vehicle. Pentastar also has experience in vehicle electronics, power bus management systems and electrical interface units.

Our test system knowledge gives Pentastar the capability to meet your most stringent ATE requirements, today and tomorrow.

Test Program Sets

Our capabilities in digital and analog processing, RF, lasers and electro-optics technologies helps us design the vital link between standard Mil-Spec ATE systems and units under test. Pentastar's test program sets are known for their easy-to-use designs, rugged flexibility and low life cycle costs.

Our test equipment works because we understand modern weapon systems and their operational environment. All of which is why more and more customers are plugging into our capability.

Pentastar Electronics Inc.
A Chrysler Company
P.O. Box 1929
Huntsville, AL 35807-0929
Telephone: 205-895-2209
FAX: 205-895-2039

PENTASTAR
ELECTRONICS INC.
A CHRYSLER COMPANY

Light years ahead in capability

MDMSC: Smart choices for tough decisions.

THE ADVANCED CRUISE MISSILE: IT PUTS THE ENEMY ON EDGE–AND YOU AT EASE.

No other missile is equipped to deliver its punch deeper into hostile territory with greater precision or with less warning. The Air Force's new Advanced Cruise Missile (ACM) was designed to provide America with sustained and credible strategic deterrence. And it does. Currently produced by the McDonnell Douglas Missile Systems Company (MDMSC), ACM has the experience of successful programs like Tomahawk, SLAM and Harpoon behind it. Experience that will ensure high quality and productivity for the program.

ACM is coming on line now. An unsettling thought for America's enemies, a comforting thought for those responsible for our nation's defense.

MCDONNELL DOUGLAS

A company of leaders.