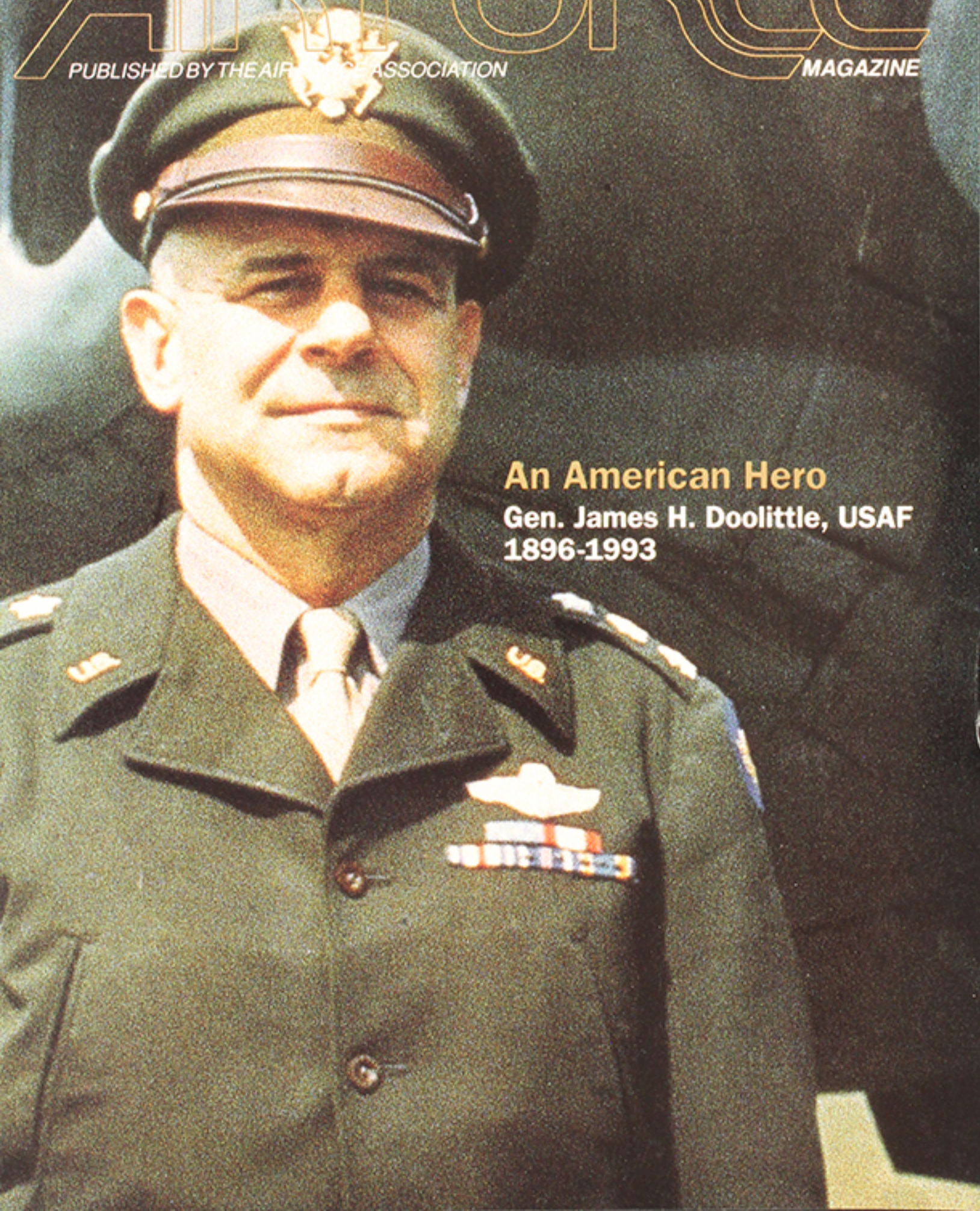


NOVEMBER 1993/\$3

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE



An American Hero

Gen. James H. Doolittle, USAF
1896-1993



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MAGAZINE

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About the cover: Jimmy Doolittle stands in front of a P-38 in England in 1944. Photo from the National Air and Space Museum, via Jeffrey Ethell.

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Warning Signs on National Security

IT IS abundantly clear by now that the new world order of the 1990s will not be peaceful or benign. The threat of global war has receded, but regional instability and conflict have intensified. It is clear also that the United States cannot and should not retreat from a position of strength and leadership. Our security, our interests, and our responsibilities make it imperative that we remain a world power.

Contrary to the expectations of some, the mission for US armed forces did not end with the fall of the Warsaw Pact and the Soviet Union. In 1993, US forces were engaged in three extended contingencies abroad. Since the end of the Persian Gulf War, the Air Force has flown more than 155,000 sorties in Somalia, Iraq, and the Balkans. Throughout the spring and summer, the nation's leaders debated whether US combat power should be committed in Bosnia. Limited US military force has been used nine times this year against Iraq. The probability is very high that American troops will fight again somewhere before this decade is over.

Much of the world is at war or on the brink of it. As the year began, fifty-four armed conflicts—twenty large enough to be defined as wars—were in progress around the world. The vast area of the former Soviet Union is engulfed by political challenge, territorial dispute, violence, and instability. These troubles could easily escalate and spread. New conflicts threaten in the Middle East and on the Asian rim.

The number of nations with high-technology armament and weapons of mass destruction is increasing. More than a dozen nations have operational ballistic missiles today. The capability to employ missiles at intermediate and intercontinental range will proliferate with time.

To defend its security and protect its interests, the United States plans to follow a strategy that is notably reliant on airpower. The Department of Defense has determined that the primary characteristic of the future force structure should be the ability

to fight and win two major regional conflicts, nearly simultaneously. The strategy assumes that we do not know where the next conflict will occur but that it will be in a location where we do not have sufficient forces in place to deal with it.

That is not a complete or an automatic formula for calculating force structure, nor is it intended as such. It is, however, a sensible focus for a reasonable strategy. Unfortunately, the US defense program as currently planned is not consistent with such a strategy.

The Air Force Association believes that a dangerous gap is developing in our national security posture. We do not believe that the projected defense program is adequate, either to carry out the declared strategy or to secure the nation's interests.

One year ago, the Air Force Association expressed its support for the careful plan to draw down to a considerably smaller but highly capable "Base Force," designed to deter or defeat aggression, defend the nation's interests, respond to crisis, and provide a modest forward presence abroad.

Since then, the Base Force plan has been abandoned in favor of a program that will make the structure of the armed services conform to radical and predetermined budget reductions. The force we get should not depend on what some arbitrary percentage of the Gross Domestic Product will buy but rather on what valid military requirements indicate is necessary.

In our assessment, the Administration's plan will not provide the capabilities required, nor will it support the kind of force described by either side in last year's Presidential election campaign. We believe that the defense program as currently projected will give the nation appreciably fewer troops, combat units, and weapons than has been officially acknowledged. The US Air Force, critical to the evolving strategy, could lose more than half of its force structure and field fewer than 800 fighter aircraft and well under 150 operational bombers before the turn of the century.

US technological superiority, a vital advantage for the smaller forces of the future, is also in doubt. Every major weapon system in development is under attack by factions that want to divert the funding to other uses. It is preposterous to argue, as some do, for example, that four tactical aircraft developments, spread over twenty-five years to meet the needs of both the Air Force and the Navy, would be excessive and unaffordable. Proposals to upgrade existing systems are routinely challenged as well. Our space-launch capability is obsolete and inadequate, and funding for essential military assets in space is precarious.

Much of the nation's defense industrial base is gone. More of it is going. The industrial base needed to support US military strategy of the future may not be available. The continuing loss of production infrastructure and of a work force with critical skills weakens US security strategy, which posits "reconstitution" (the creation of new forces and the mobilization of industry to meet new challenges) as a central element.

Early warning signs on national security have begun to appear. Force readiness is not a problem yet, but it is on the edge and vulnerable. A modest difference in resources at this point could leave airplanes on the ground and ships docked in port.

Morale and confidence of the troops are growing concerns. The men and women of the armed forces are more apprehensive than we have seen them in many years. This, we believe, is the combined effect of continual force cuts, extended deployments and the work load borne by the smaller force that remains, pay caps targeted on military members and veterans, the Administration's headlong push for homosexuals in the armed forces, doubt that national leaders understand or respect the military, and general anxiety about the future of their nation, their service, and their careers.

The United States no longer needs a military force of the size it maintained at the peak of the Cold War. In fact, the armed forces have been

reducing steadily since the 1980s. Even under the Base Force plan—which has now been undercut—defense expenditures as a percentage of GDP would have fallen to their lowest level in more than fifty years.

As we draw down and pull back from bases abroad, however, the forces remaining must be of sufficient size and capability to deter or defeat aggression across the spectrum of conflict. They must be prepared to project power with assurance to any point where it may be required. For this, the nation must have a balanced mix of land, sea, and air forces, trained to a high state of readiness and equipped with the best systems and weapons we can provide. All of these forces will be critically dependent on airlift.

The bulk of this force would typically deploy to combat from bases in the United States, prepared to strike hard and fast to counter an enemy assault that may already be under way. That puts special emphasis on land-based, long-range airpower, which offers the rapid global reach, flexibility, penetration, airborne battle management, and sustained sortie generation that a major regional conflict will demand. Among the capabilities and features essential to air combat units committed to a major regional conflict are these:

- A significant force of stealth aircraft. Stealthy platforms can pass through an enemy's airspace with low probability of being engaged effectively by radar-directed or radar-assisted air defenses. This is an important advantage for our nation in combat operations.

- Precision guided weapons. Not long ago, such terms as "surgical strike" and "pinpoint accuracy" were not to be taken literally. Surgical strikes have become a fact. Pinpoint accuracy may not be far away.

- Highly reliable systems to sustain the number of sorties required with a smaller force and to minimize extensive field maintenance.

- Intelligence from air and space to enable the commander to put striking power where it counts and to deny the enemy the advantage of surprise.

- Rapid, all-weather target acquisition and identification. In today's warfare, information (and the effective use of it) ranks alongside firepower and maneuver in military importance.

- A full complement of modern airlifters and tankers. Without modernization and replacements, airlift capability will decrease by about half in the years ahead. That would constrain disastrously the nation's power to respond to crises abroad.

- A high caliber of electronic warfare systems for defense, offense, and battle management, well integrated with other forces.

The force that won the Gulf War no longer exists. The existing force, not yet drawn all the way down to the size forecast, is operating at an arduous tempo to meet operational commitments. Fighter and mobility forces are particularly pressed. The Air Force of the future may draw combat units from a service half the size of the Air Force that waged the Desert Storm air campaign. Unless system modernization proceeds, that force will be left to fight the conflicts of the twenty-first century with the same equipment—obsolescing and in reduced numbers—employed in the Gulf War.

The nation expects its security and interests to be protected whenever

and wherever they are threatened. When its armed forces go to war, it expects them to prevail. These expectations are not realistic if we impose an arbitrary and unreasonable ceiling on what we are willing to invest in our national security.

The defense share of federal outlays has declined from fifty-seven percent in the 1950s to forty-three percent in the 1960s to twenty-seven percent in the 1980s and was dropping toward sixteen percent in the 1990s before the latest reductions were prescribed. At that level, further losses will have a devastating impact.

The time is urgent for us to notice the warning signs on national security and correct our course. We must not wait until it is proved over some field of battle that our accounting was misguided. ■

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Projecting Power

I take strong exception to "The Lion's Share of Power Projection" [June 1993, p. 38]. The value of the aircraft carrier battle group grows as the overseas-based force structure erodes. The article relied on several flawed assumptions to produce conclusions that lauded the consummate flexibility and crushing firepower of landbased air, while questioning the utility of costly, yet largely impotent, carrier air. I challenge four assumptions.

First, the use of airpower to repel an invasion of Kuwait and Saudi Arabia (or South Korea) was the central premise of the article. A force of 2,000–3,000 tanks, 6,000–7,000 armored personnel carriers, and up to 25,000 support vehicles was to conduct a "zero-warning" invasion. I doubt that "ten armored and mechanized divisions, supported by additional infantry divisions," could be moved with zero warning. Be that as it may, the initial US response would likely include stationing a carrier battle group and afloat Marine Air Ground Task Force in the vicinity. Recent history suggests that the carrier battle group is the preferred regional power-projection instrument of the national command authorities. Other actions could include alerting, and possibly moving, CONUS-based air and ground units to the theater and moving naval reinforcements from other theaters.

Second, the article's focus was restricted to operations in either Kuwait and Saudi Arabia or Korea. The existing infrastructure in these theaters is worth billions of dollars and makes them ideal for the introduction of landbased airpower. Such infrastructure is unavailable in many parts of the world. When large-scale forced entry is required, only naval expeditionary forces can operate with no reliance on existing infrastructure to project power ashore, secure airfields and beachheads, and enable the introduction of Air Force and Army units.

Third, the article stated, "The contribution of [landbased fighter-bombers] to US military capabilities does not appear to be overly sensitive to access to forward bases in the theater

of operations. *given sufficient tanker support*" (emphasis mine). This assumption is highly suspect. In the initial days of such an operation, airlift forces would be assigned to move ground elements of the Army's XVIII Airborne Corps and Marines to meet prepositioned stocks.

Operation Restore Hope demonstrated that a large portion of the tanker fleet must be dedicated to supporting a major airlift operation. I believe that assuming ninety percent of Air Mobility Command transports as well as elements of the Civil Reserve Air Fleet (CRAF I and II) would be available by Day Four is very optimistic. I question the ability of the current (or projected) tanker fleet to support simultaneously the airlift and fighter-bomber sorties that were the basis for the measures of evaluations (MOEs).

Fourth, the article indicated that Suppression of Enemy Air Defenses (SEAD) requirements would account for fifty percent of A-6E and F/A-18 sorties on Days One to Five, twenty-five percent on Days Six to Ten, and fifteen percent thereafter. The EA-6B, neither mentioned in the article nor factored into the USN-USMC "SEAD tax," is the most versatile SEAD aircraft in the arsenal, combining hard-kill and soft-kill capabilities in a single platform. This asset is integral to Navy-Marine strike packages. With EA-6Bs in the strike packages, only a handful of A-6E sorties and far less than fifty percent of F/A-18 sorties would be dedicated to SEAD. It is unclear whether the study factored in the effect of F-4G "Wild Weasel" and EC-130H

"Compass Call" assets. These would disrupt enemy C³ networks and increase MOE rates across the board.

As a Naval Flight Officer, I admit to a biased perception of the Navy and Marine Corps as America's premier quick-reaction power-projection force. Objectivity requires me to acknowledge, however, that the Air Force and the Army are the key forces in a sustained power-projection operation.

Lt. Cmdr. K. C. Coggins,
USN
Kolsaas, Norway

A Giant Step Backward

I concur with Raytheon and Lockheed that the competitions between depots and contractors are not fair [*Leaner Links and Tighter Squeezes*, September 1993, p. 55]. Although guidelines have been developed to "level the playing field," it is impossible to conduct a truly fair competition.

It is impossible for depot contracting agencies to remove the bias associated with such awards. Depots have a major economic impact on a community. Air Logistics Center commanders are under pressure from community leaders to preserve jobs at the ALC. Although contracting officers do not work directly for the ALC commander, I doubt they are immune from this pressure. Losing work previously performed at the depot to a contractor could also be construed as losing face.

General Yates commented that manufacturers do not fare well in these competitions because their overheads are too high. While this may be true, I submit that the government doesn't know its actual overhead costs.

I manage a contract at a base that is closing. Despite the closure, the government intends to keep this facility open and continue the project. Recently, a representative from Air Combat Command informed me that the future of the facility was being reevaluated. ACC needed to ascertain the real operating cost because, in the past, the now-deactivated host wing had "absorbed" the overhead. How much depot facility overhead is not accounted for because certain costs are "absorbed" by the host base?

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

TIMES CHANGE. SO DO F-16s.

The world has seen some dramatic changes since the first F-16 was introduced. The Berlin Wall has come down. The Soviet Union and Warsaw Pact have been dissolved. And new potential trouble spots have emerged.

Dramatic

changes in weapon technology have also taken place. Fighter aircraft have improved radar capabilities, faster computers and more advanced weapons.

Through the years the F-16 has proven it can truly stay ahead of the threat.

Its ability to continually adapt new avionics and weaponry has led to an incredible service record, including 65 aerial dog-fight victories, with no losses.



F-16 (Night Attack) Cockpit

The F-16 was the work-horse of Desert Storm. It flew

13,500 missions and had the highest readiness rate of any fighter in theater.

With LANTIRN and GPS, F-16s were the premiere scud hunters.

fighter engines manufactured by Pratt & Whitney and General Electric.

We've added beyond-visual-range firepower with Sparrow and AMRAAM radar missiles, night/all weather attack and autonomous

precision attack

with LANTIRN, IIR Mavericks, and laser guided bombs; anti-radar attack with HARM; and anti-ship with Penguin.

While the

The F-16 we're building today incorporates literally hundreds of new state-of-

F-16's combat capability has been significantly enhanced, it was not done at the expense of operation and support costs. In terms of reliability, maintainability, readiness and lifecycle cost, the F-16 remains the best frontline fighter in the world.

And that's something we never intend to change.



Pratt & Whitney F100-PW-229

the-art technologies. The entire cockpit has been modernized. Engine thrust has been increased 25%, and there is a choice of the world's two best



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Letters

Like Lockheed, my company is zero for two in recent competitions against the depots. Contrary to General Yates's statement that none of the work put up for grabs had been done by industry before, my company lost a contract it had been performing for years.

In 1966, the Office of Management and Budget issued Circular A-76, which established federal policy regarding commercial performance. It states: "In the process of governing, the Government should not compete with its citizens. . . . It has been, and continues to be, the general policy of the Government to rely on commercial sources to supply the products and services the Government needs."

In the early 1980s, savings in DoD alone under A-76 were estimated at more than \$2 billion per year. These savings were realized because contractors could perform more efficiently than the government. Now, in the name of competition, government is miraculously more efficient than ever. Unfortunately, no balance sheet measures its success.

This raises some interesting questions: Who will audit the depots to ensure that they are performing services within the contracted price? What will happen if they are unable to perform within budget?

Without question, DoD requires an industrial base, but, rather than compete against industry, DoD should determine the size of the industrial base required and what work can be accomplished within this base and should contract the remainder.

Contractors for DoD should be considered part of the team, not competitors. Contractors and DoD should be able to share information in the interest of efficiency and national defense. Competition between contractors and depots creates unnecessary friction, destroys any notion of teamwork, and impedes communication. I was once able to discuss technical problems freely with depot experts. Now they are reluctant to talk or are careful what they say because "we're competitors." The depot-contractor competition scheme is a giant step backward for industry and DoD.

David F. Mitchell
Pemco Aeroplex, Inc.
Austin, Tex.

Unending Mismanagement

John Correll's editorial "Blood on the Rock" [July 1993, p. 2] exemplifies a brand of journalism that appears all too frequently. The strident attack on authority (Secretary of Defense Les Aspin, the Inspector Gen-

eral, and Rep. John Conyers, Jr.) is poorly placed in AIR FORCE Magazine.

We are not told who "thoroughly discredited the Inspector General's report." Why was "the IG case a total bust"? What would have caused a congressman to ask the IG to look into the cash flow of the contractor? Throughout the editorial we learn that whatever the IG and Secretary Aspin did or said, they were wrong or, by the author's standards, improper.

I also read in "Aerospace World" on p. 18 that "John M. Deutch, the new under secretary of Defense for Acquisition, warned McDonnell Douglas to improve its management of the C-17 program or risk its termination." This mentioned the people in the editorial and for further information referred to "The C-17 Fights the Headwinds." The opening paragraph of that article states, "By now, the litany of problems is familiar—McDonnell Douglas is \$1.2 billion over budget on development of the aircraft and more than one year behind schedule."

After studying the article, I concluded that unending mismanagement and coverups are connected with the program. I am glad that someone in Congress had the courage to insist on in-depth accounting on this costly, plague-ridden project. The high performance we expect and get from aircrews and flight-line personnel should serve as an example to all: Competence is a bare minimum. Obviously, and in spite of Mr. Correll's editorial, we are not getting it.

The article tells us, "If you cancel the C-17 and come in with a new aircraft, it'd be a mirror image of the C-17." I'll buy that. Now let's build a team that will bring it in on time and under budget.

Lt. Col. Ralph L. Dorff,
USAF (Ret.)
Farmington Hills, Mich.

■ Mr. Correll replies:

As the editorial said, the wild-swinging IG report was refuted thoroughly by a detailed Air Force rebuttal submitted a week before Secretary Aspin took action against the accused. The IG was not conducting a general review of the C-17 program. This was a specific inquiry about specific circumstances. The case was a total bust because it fell apart, line by line, under examination. The report was sloppy, subjective, and inaccurate. The IG did not substantiate the charges against the accused. Before writing "Blood on the Rock," I studied hundreds of pages of documentation, and I'll stand by what I said.

Government Gobbledygook

The purpose of this letter is to commend you on "Blood on the Rock."

It is difficult to believe that Secretary Aspin would take such stern action on the basis of incorrect data and innuendo in the IG's report on the C-17 program when the consequences have such a devastating effect on the lives of four, maybe five, individuals.

When bureaucrats can play hardball with our defense programs the way they play political hardball, the system must be radically changed. . . .

Nearly all of my career has been spent on the contractor's side of the house, poring over thousands of words in hundreds of letters attempting to decipher the government gobbledygook that never defines specifics or answers contractors' questions. In my experience, a simple "yes" or "no" is extinct in DoD and DoE letters.

Finding scapegoats to cover up the shortcomings of a bureaucratic monstrosity is going to force good people to avoid procurement assignments. God help us when we need DoD to defend us in the future.

We owe Mr. Correll a vote of thanks for airing these items rather than having them swept under the rugs in the hallowed halls of Washington.

Harlan H. Yost
Santa Maria, Calif.

Long Shot Details

On p. 19 of the July issue, you included a photo and caption regarding ACC's first Long Shot competition. I believe many of your readers would be interested in a more detailed description of this important event.

The winning team included Luke AFB, Ariz., F-15Es; Fairchild AFB, Wash., B-52s; Davis-Monthan AFB, Ariz., A-10s; and air-superiority F-15As from the 131st Fighter Wing (Air National Guard), St. Louis, Mo. (not F-15Cs as your caption said). To the best of our knowledge, the 131st FW's success in Long Shot was the first time an ANG F-15 air-superiority unit has won a major USAF competition.

AIR FORCE Magazine should also recognize some genuine heroes from our Long Shot team. During the competition, 131st crew chiefs' prompt fire-fighting actions were credited with saving a valuable aircraft when another unit's F-15 burst into flames after landing.

We are extremely proud of Missouri ANG's performance in Long Shot.

Col. George D. Graves,
Missouri ANG
St. Louis, Mo.

Another Refueling Pioneer

Capt. Mike Scherer, USAF (Ret.),

noted that "Tankers at the Rendezvous" [June 1993, p. 54] failed to mention the KC-97 [*"Air Refueling Pioneers," September 1993 "Letters," p. 8*]. The KC-97 was a great airplane and did its job well, but it was not the first production refueling boom system aircraft. It was preceded by the KB-29P. I was a flight chief on these airplanes in Roswell, N. M., in 1951, and we were refueling mostly jet fighters.

Our squadron took part in the "Fox Peter One" project, the first overwater flight by jet fighters of the 31st Fighter Wing, and our tankers were credited with eight saves. In 1952, we were stationed on Kwajalein for "Project Ivy," the testing of the H-bomb. We refueled jet fighters protecting the target area. In 1954, we refueled B-50s on Guam. The reliable KB-29 boom tanker did a great job in its time.

MSgt. Andrew J. Vangalis,
USAF (Ret.)
Longmont, Colo.

The Dangerous KC-97

Captain Scherer has a point regarding the KC-97, but he credits the old clunker with more than it deserves. The maximum offload, as I recall, was 40,000 pounds, not fifty, and to achieve 40,000 required transfer of some of the tanker's own 115/145 fuel in addition to its JP-4 offload. This was an unloved and dangerous procedure. A misstep with the interconnecting valves could contaminate the tanker's avgas. Jet engines can run on virtually any burnable liquid, but contaminate avgas with jet fuel, and you create a rather deadly silence in a piston engine. . . .

About 3,300 of my 8,032 hours as a pilot were flown as pilot in command, instructor pilot, or flight examiner in C-97As and Ds, KC-97Es, Fs, and Gs, and, at the end of the -97's days in the inventory, in those castrated ex-tankers SAC chose to call the C-97K. The bird had much to recommend it as a transport, regardless of its overcomplication and consequently miserable availability figures. As a tanker, it was overloaded, overstressed (ask anybody who went through the era of failing propeller blades), and a tribute to the aircrews and maintenance crews who flogged it into doing a job it was never designed to do.

It also separated the men from the boys. Some airplanes will make any incompoop of a pilot look good (the T-39 comes immediately to mind), but the old -97 wasn't one of them.

Col. Robert J. Powers,
USAF (Ret.)
Shreveport, La.



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By Brian Green, Congressional Editor

Rx for Military Health Care

The Administration wants to create a network of military and civilian providers for military health-care beneficiaries.

PRESIDENT Clinton's health-care reform plan, now before Congress, could have a far-reaching impact on how medical benefits are provided to US military dependents, retirees, veterans, and civilian workers.

The proposal generally aims to provide universal health-care coverage and to slow rising costs. Civilian employers would be required to pay eighty percent of a per-worker premium. Coverage would be provided through large insurance purchasing cooperatives called health alliances. Each would offer three coverage options—two types of managed care and a "fee-for-service" plan. These plans would provide standard benefits packages.

The Clinton plan would encompass the military health-care system. In 1992, the services spent \$15 billion on health care, with \$3.7 billion going to CHAMPUS (Civilian Health and Medical Program of the Uniformed Services) to cover those using private medical professionals. The Department of Veterans Affairs (VA) spent \$11 billion, \$1 billion of this going to private professionals.

Medical benefits for active-duty servicemen and -women and all overseas beneficiaries would remain as they are today. In recent years, however, military family members and retirees in the US have suffered from fast-rising health-care costs, lack of access to proper doctors or facilities, and great swings in out-of-pocket expenses based on area of residence.

The Clinton plan calls for addressing these problems by creating Military Health Plans (MHPs), managed-care systems using integrated networks of military facilities and contracted civilian hospitals and doctors.

Military retirees and dependents under the age of sixty-five who are eligible for CHAMPUS would have the option of joining an MHP or civilian health plan. Families joining an MHP would pay a \$100 annual enrollment

fee; an individual would pay \$50. Beneficiaries would have to make modest copayments for services, but there would be no deductible. They would pay far less than they now do under CHAMPUS.

Military families could also join a civilian managed-care plan or a fee-for-service plan. The Defense Department would pay eighty percent of the premium. In areas not covered by an MHP, beneficiaries would be offered a civilian fee-for-service plan or one of two civilian managed-care plans. The Pentagon would pay up to 100 percent of the premium for a low-cost managed-care plan.

Military retirees aged sixty-five and older could join an MHP or take coverage from Medicare. The Clinton package includes an outpatient prescription drug benefit for Medicare recipients: For senior citizens enrolling in an MHP, the annual fee would be \$100 per family and \$50 per individual, with modest copayments. Costs absorbed by beneficiaries under the MHP are expected to be much lower than those under Medicare.

CHAMPUS would eventually be abolished. Current military health-care benefit options would stay in place until DoD sets up MHPs. The transition to the new system is expected to take up to seven years.

Veterans would do well under the Clinton reform proposals. The Department of Veterans Affairs would continue to administer an independent health-care system to meet the medical needs of veterans. However, it would substantially reorganize and manage VA health plans within health alliances to provide comprehensive benefits to vets. VA health plans would be similar to MHPs, providing managed care through networks of VA facilities and contracted civilians.

Veterans with any service-related disability and low-income vets who choose a VA health plan would receive care provided in the standard benefits package with no premium, copayment, or deductible. They would remain eligible for extra VA services, such as long-term care and custom prosthetics, not covered in the stan-

dard benefits package. Higher-income veterans selecting a VA plan would be responsible for copayments and deductibles and would have to pay a share of the premiums.

The Department of Veterans Affairs is considering options to allow veterans' dependents to sign up for VA health plans and receive in-house care at VA facilities. Employers of veterans or DoD would pay eighty percent of dependents' premiums.

Defense civilians and civil servants have less reason to like the Clinton plan. They are now covered under the highly regarded Federal Employees Health Benefits Program (FEHBP), which offers a wide range of health-care options from a large number of providers and has done a good job at controlling costs. FEHBP would be abolished under the Clinton plan, with federal employees guaranteed standard health benefits through the regional health alliances. The government would pay eighty percent of the average premium.

Reaction to the overall plan is mixed. The Joint Chiefs of Staff support the President's reform of the military health-care system, and Air Force Surgeon General Lt. Gen. Alexander M. Sloan believes that "the health benefit we offer will be secured throughout this [reform] process." Republican Minority Leader Sen. Robert Dole (R-Kan.) commended the President's effort as "a beginning of a dialogue."

Other members of Congress criticized various aspects of the Clinton proposal. Several have proposed alternative health-care reform plans that vary considerably from the President's package. Sen. Daniel P. Moynihan (D-N. Y.), chairman of the Senate Finance Committee, declared the plan's financing mechanism "a fantasy." Rep. Dick Armey (R-Tex.) argued that "the government is overloading itself, biting off more than it can chew." Sen. Phil Gramm (R-Tex.) said that his alternative would "give more people more choices, promote price competition, and make free enterprise work in medicine. The President wants to collectivize medicine. And that's really the choice." ■

The Chart Page

By Tamar A. Mehuron, Associate Editor

The Global Race in Satellite Technology

US Scorecard in Advanced Satellite Communications Technologies

US Technology Lead

High-data-rate satellite communications
 USATs and personal communications transceivers
 Small satellites
 Space applications for high-temperature superconductivity
 On-board processing

US Technology Tie

With

Traveling wave tubes Europe
 Electric propulsion Japan and Russia
 Spacecraft antennas Japan and Europe
 Intersatellite links Japan
 Autonomous control systems Japan and Europe

US Technology Lag

Leader

Free space optical communications Japan and Europe
 Advanced batteries Japan
 Solar array systems Japan
 Solid-state power amplifiers Japan
 Pointing and positioning systems Japan
 Large-scale deployable antenna systems Japan and Russia
 Advanced system design and long-range planning concepts Japan
 New application development Japan

Comparison of Government Roles

Area	Europe	Japan	US
Policy	Strong	Strong	Moderate
Planning	Moderate	Strong	Weak
Advanced development	Strong	Strong	Moderate
Support of industry	Strong	Strong	Weak
Support of international systems	Strong	Strong	Weak

Source: "Satellite Communications Systems and Technology," International Technology Research Institute, Loyola College, Baltimore, Md., July 1993.

Hughes Aircraft Company has developed a steam injection technology that can uniquely treat diesel fuel, jet fuel, kerosene, and other heavy hydrocarbons in place. At the right temperatures and pressures, it forces hydrocarbons to migrate to extraction wells, where they are safely extracted for treatment. This in-place method of removing and treating hydrocarbons without excavating the soil is nonobtrusive, and saves both time and money.

Four major airports in the Ukraine may be completely modernized, with advanced technology and systems built by Hughes. The plan, which would focus on airports at Kiev, Odessa, Lviv, and Symferopol, is designed to automate these airports through electronic data interchange. Its objective is to integrate aircraft operations, passenger handling, air traffic control, security, and administration into one highly efficient unit. Using computer technology can dramatically enhance an airport's efficiency and service, and help it increase revenues and adhere to more stringent regulations.

The problem of viewing instrument information in the bright sunlight of military aircraft cockpits can be eliminated with a new full-color display system being developed by Hughes. The Highbright™ display provides high brightness, high color contrast, sunlight rejection, high color saturation and high color stability; and it offers the widest range of colors currently available in an avionics display. It features Hughes' patented liquid crystal projection technology, which dramatically improves reading displays in sunlight over other display technologies. In addition to standard cockpit displays, liquid crystal projection technology can be used to create panoramic displays that will enhance situation awareness for pilots.

A new and better way of testing missile target seekers is possible, now that an Air Force laboratory simulation system will use an advanced infrared image projector. Developed by Hughes, this tactical infrared projection system (TIPS) is based on Hughes' liquid crystal light valve technology. TIPS projects TV-like images of changing infrared scenes, testing the target detection and tracking performance of seeker sensor systems. The high spatial and temperature resolution of these images provides capabilities not possible with current simulation systems. Using laboratory simulations rather than launching test missiles to test target seekers is expected to save the Air Force considerable money.

More than 100 million households in the United States and Canada will soon have access to direct-broadcast satellite television. This service, called DirecTv™, will offer approximately 150 channels of entertainment and information programming to homes equipped with compact 18 inch satellite dishes provided by Hughes. This service, which is scheduled to begin in early 1994, is especially attractive to rural households that would otherwise have to pay nearly four times as much for large satellite dishes.

For more information write to: P.O. Box 80032, Los Angeles, CA 90080-0032

HUGHES

Aerospace World

By Frank Oliveri, Associate Editor

F-22 Completes Wing Tests

Aeronautical Systems Center's F-22 System Program Office, headquartered at Wright-Patterson AFB, Ohio, completed the fourth live-fire test on the aircraft's wing design. The August test took place at Boeing's Tulalip Test Site in Seattle, Wash.

The testing program is designed to ensure that the aircraft can withstand battle damage and return safely. Reducing the vulnerability of the F-22 to gunfire complements its reduced susceptibility to attack, which will stem from advanced avionics, supercruise capabilities, and stealthiness.

Testing involves shooting a ballistic weapon at a wing box test article. This allows engineers to simulate combat gunfire and its effects.

Imminent Danger Pay Policy Shifts

Because of a change in Pentagon policy effective August 31, 1993, service members in some parts of southwest Asia are no longer eligible for imminent danger pay or hostile fire pay, both \$150 per month. Such pay is also awarded to some airmen flying through the airspace of an imminent danger or hostile fire location.

Locations struck from the list include the Red Sea, Gulf of Oman, Gulf of Aden, Oman, Bahrain, United Arab Emirates, Qatar, and the Arabian Sea north of 10° north latitude and west of 80° east longitude.

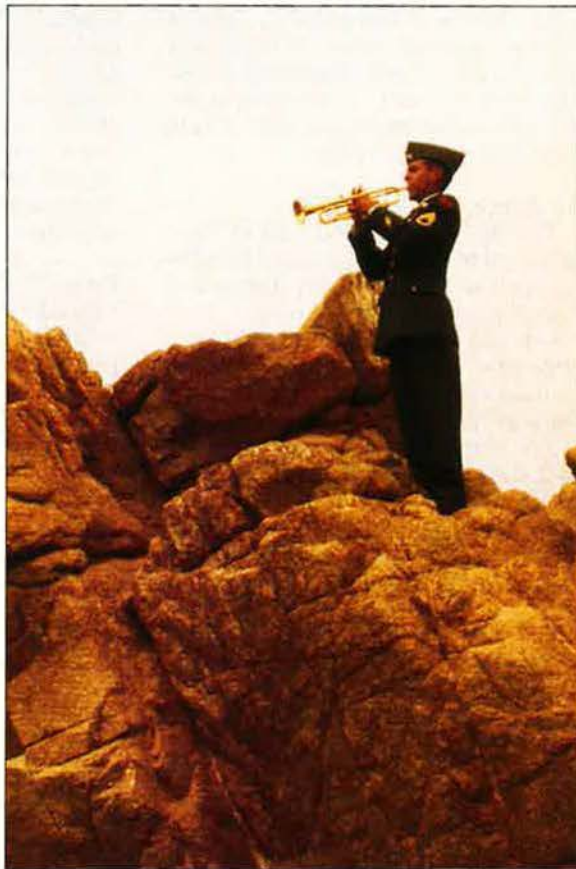
Those assigned to or overflying the Persian Gulf, Saudi Arabia, Yemen, Kuwait, Iraq, or eastern Turkey are still eligible for the pay.

Although some areas no longer qualify for hostile fire or imminent danger pay, they are still considered combat zones and qualify for the combat zone tax exclusion. All compensation earned by enlisted people while in a designated combat zone is exempt from income tax. The first \$500 per month of an officer's pay is exempt.

Widnall Seeks Space-Launch Cooperation

Closer cooperation among Air Force and commercial space agencies will be required for future success in space

Army SSgt. Chris Lopez, from Fort Ord, Calif., sounds "Taps" at a ceremony near the home of Gen. James H. Doolittle, USAF (Ret.), in Pebble Beach, Calif. General Doolittle, respected throughout the armed services, was laid to rest at Arlington Cemetery on October 1, 1993.



AP photo by Joe Pugliese

launches, Air Force Secretary Dr. Sheila Widnall said in September.

"More collaboration will contribute directly to the nation's economic security," she said. Rather than funding competing agencies, "we should be asking which infrastructure satisfies multiple needs, then cut out duplication."

In a speech before the Aerospace Corp.'s Women's Week program in California, Secretary Widnall said that the military may not need to own all the space vehicles it uses, so long as national security and warfighting needs are not compromised.

"There's a place for more dual use of satellites, too—weather, navigation, warning, communications, multi-spectral, and the like," she said.

The Secretary pointed out that the US produces seventy percent of the

world's commercial spacecraft. She also noted a decline in the US share of world commercial space launches—from eighty percent ten years ago to only thirty percent today.

When military, civil, and commercial categories are combined, the US produces seventy-five percent of the world's spacecraft but launches only fifty percent.

C-17 Wing Gets Another Exam

In September, the Air Force embarked on another detailed technical analysis of the C-17 airlifter's wing to determine if it needed redesigning or retesting. The move resulted from a September test in which a full-scale model of a C-17 wing was ground-tested for maximum upward bending. The left outer wing suffered structural damage about halfway between

wingtip and outer engine pylon. It was not immediately clear whether the damage occurred above or below the threshold of 150 percent of the required load.

The Air Force stated, "While initial analysis indicates the failure area may have been experiencing a stress level of 150 percent or greater, it is not clear that the wing meets the contractually required strength."

The Air Force was awaiting a report from an outside panel of nationally recognized experts convened to assess whether the C-17 program's design and engineering process meets Air Force requirements.

Air Force Cancels SERB

The Air Force announced in September that it had canceled a lieutenant colonel Selective Early Retirement Board scheduled for January.

Officials said that using SERBs year after year was not desirable so long as reasonable, voluntary alternatives were available.

The drawdown program approved by the Air Force Chief of Staff and Air Force Secretary emphasizes their desire to use voluntary reduction measures whenever possible and involuntary measures only as a last resort.

Lt. Gen. Billy J. Boles, deputy chief of staff for Personnel, said the Air Force is trying to get out of the SERB business: "We are very much concerned with the impact SERBs have on our people, particularly when an officer would be vulnerable annually."

B-1B Upgrade Study Begins

The Air Force awarded Rockwell International the first increment—\$15.4 million—of a \$65.2 million contract to carry out trade studies, analyses, and planning for B-1B upgrades. The twelve-month study will provide the groundwork for a follow-on engineering and manufacturing development contract for upgrading the bomber's conventional capability.

The contract is the first step in implementing the B-1B Conventional Mission Upgrade Program, which was part of the Air Force's bomber roadmap presented to Congress in June 1992.

Rockwell will conduct a comprehensive study to evaluate candidate systems for improving B-1B electronic countermeasures capability against conventional threats.

C-17 Sets Five More Records

During routine August flight testing at Edwards AFB, Calif., the C-17 transport set five more world records. The

new lifter had already held fourteen of them.

The first of the recent batch was a payload/altitude record set by aircraft "P-4" while flying the first C-17 night paratroop drop. The aircraft weighed 380,000 pounds at takeoff; it set the record by flying a 4,400-pound payload to an altitude of 35,000 feet.

During another paratroop drop at night, the plane carried an 11,000-pound payload to an altitude of 40,500 feet, establishing another payload-to-altitude record. That flight led to three additional records, all in the "time-to-climb" category: climb to 9,843 feet in three minutes, fifty-five seconds; to 19,686 feet in seven minutes, thirty-one seconds; and 29,529 feet in fourteen minutes, thirty-two seconds.

Powell Says US Can Accept "Murky" Goals

Gen. Colin L. Powell, the recently retired Chairman of the Joint Chiefs of Staff, maintained that the United States need not always have a precise military objective in mind before sending combat troops into action. In a farewell session with defense writers in September, General Powell said "murky" objectives can be tolerated and do not necessarily make an operation untenable.

The statement was something of a surprise coming from General Powell, who has long demanded clear objectives, realistic schedules, and decisive amounts of force before sending American forces into action. He spoke in response to a question about continuing US involvement in Somalia and the prospect of engagement in the Balkans.

After US forces arrived in Somalia, he said, the widespread starvation ended promptly and order was quickly restored in that country's outlying areas. However, trying to restore order in the city of Mogadishu became a serious problem, he said, especially after most US ground forces left. He conceded that the objectives there no longer were clear.

"It doesn't always have to be a totally clear situation for US forces to get involved," General Powell said. "There will be murkiness, and we are in a murky area now. We have to stay the course."

SFW Purchases Begin

The Air Force has begun purchasing the Textron-developed CBU-97B Sensor-Fuzed Weapon (SFW). About \$93 million is set aside in the Fiscal Year 1994 budget for 110 units. In Fiscal 1995, the service will purchase

228 units, followed by 369 in Fiscal 1996. Current plans call for procuring 5,000 units.

Textron said that, in testing, the SFW is achieving hits and kills at 125 percent of Air Force requirements.

The SFW could be deployed in the Joint Direct Attack Munition and the Triservice Standoff Attack Missile. Textron said the SFW could also be deployed in the Tomahawk cruise missile, the Multiple Launch Rocket System, and the conventional Air-Launched Cruise Missile.

Textron is currently working on new requirements cited in a Defense Acquisition Board order in December 1991. The changes would make the SFW usable from all altitudes.

The SFW, in its current form, may be carried on F-16s (four CBUs maximum), F-15Es (six CBUs), F-111s (six CBUs), A-10s (four CBUs), A-6s (eight CBUs), F/A-18s (five CBUs), and AV-8Bs (four CBUs). The B-1B, using three bays, could carry up to thirty CBUs, while the B-2, using two bays, could carry thirty-six units.

One CBU-97/B dispenser releases ten submunitions, each carrying four Skeet smart projectile warheads. The Skeets spin free from the submunition, and an infrared sensor searches and finds a target vehicle. When the charge explodes, the Skeet forms a projectile and strikes the target at a speed of more than one mile per second.

Air Force Promotes 598 to Colonel

In September, the Air Force selected 598 lieutenant colonels for promotion. The selection board considered 5,043 officers for elevation to full colonel. Officers selected from within the promotion zone include 458 line officers (from a pool of 1,102), ten judge advocates (of twenty), eleven medical service corps officers (of twenty-four), and twenty biomedical science corps officers (of forty-one).

From above the promotion zone, eleven line officers (of 247), two judge advocates (of forty-nine), two medical service corps officers (of twenty-six), and no biomedical science corps officers (of thirty-nine) were selected. From below the promotion zone, eighty-two line officers (of 3,305), no judge advocates (of sixty-one), one medical service corps officer (of fifty-four), and one biomedical science officer (of seventy-five) were selected.

Air Force Starts Shaping JAST

The Air Force is already hard at work on concepts for the Joint Advanced Strike Technology program.

The Pentagon's Bottom-Up Review

of defense requirements led to creation of the JAST effort as a replacement for the Air Force Multirole Fighter and Navy A/F-X programs. The JAST program will focus on common engines, avionics, ground support, mission planning, and training equipment.

The Air Force version of the JAST, say senior officers, will likely develop three methods of weapon carriage: internal, standard external, and some conformal means.

"We'll pursue those three modules," said one USAF official, "and you will see an airplane . . . sitting on an Air Force ramp. It may not look exactly like an airplane on a Navy carrier deck, but it will have seventy percent or more commonality." A major feature will be that JAST aircraft will carry weapons in different ways. "In fact, you may even see two squadrons sitting on an Air Force ramp, with one having the bombs loaded one way and another the other way," said the official.

Pentagon Lists Top Contractors

The Pentagon released figures on the top 100 defense contractors in September. McDonnell Douglas again topped the annual list with \$5.589 billion in contracts.

Northrop Corp. was second with \$4.8 billion, and Lockheed was a close third with \$4.65 billion. General Motors was fourth with \$4.55 billion and General Electric fifth with \$4.1 billion in contracts. General Dynamics, United Technologies, Raytheon, Boeing, and Martin Marietta rounded out the top ten.

ACC Matching Strategy to Task

The Air Force has launched a new process that will permit Air Combat Command to match the national strategy to its wartime tasks. The new strategy-to-task process starts with DoD's strategy for supporting national policy. Then ACC examines overseas theaters to which it might have to deploy with fighting forces.

"This new process has been a long time in coming," said Brig. Gen. George K. Muellner, ACC's deputy chief of staff for Requirements. "It will allow us to clearly articulate what we need to support our warfighting commanders in various theaters around the world. We can no longer just match plane for plane with the Soviets as we did in the past."

After determining what it needs to support air operations in different theaters, ACC studies various mis-

sions, such as air superiority or close air support, to see where the command is deficient and needs to modernize. It could choose to procure new systems, upgrade existing systems, or change procedures and tactics. Gen. John Michael Loh, ACC's commander, said the first, low-cost step would be to examine the efficacy of changed procedures and tactics.

AFMC Sets Future "Investments"

Air Force Materiel Command is increasing its investment in three technology areas in hopes of improving its performance over the long term. The focus is on integrating new technologies into weapon system roadmaps, emphasizing environmental protection, and reducing the requirement for logistics support to operators.

AFMC's director of Plans and Programs, Maj. Gen. Stephen P. Condon, said work in these areas will offer high return on modernization dollars. In analyzing the weapon system roadmaps, he said, scientists and engineers work with state-of-the-art design, test, and war-gaming computer software to identify high-payoff options. By investing in environmental programs up front, the Air Force avoids high-cost long-term environmental



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cleanups. Finally, reassessment of logistics practices will reduce the amount of spare parts and support equipment needed.

Newer logistics computer systems will give the command tighter control over spare parts as they flow through the logistics pipeline to the combat units. The practice of inserting new technologies into older weapon systems will improve the systems' reliability and maintainability and reduce costs.

Time to Refinance?

The Department of Veterans Affairs said that 880,000 veterans are holding VA-guaranteed loans with interest rates of nine to 9.99 percent and that another 700,000 have loans at interest rates of ten percent or more. The VA said that, by refinancing their VA home loans at lower interest rates, these veterans can increase their net monthly income.

Jesse Brown, Secretary of Veterans Affairs, said, "It's a win-win-win situation for veterans, the economy, and lenders. Veterans increase their ready cash to use to improve their home or start a college fund, for example. The lender gets a loan of

greater quality with less risk of default and new income from fees for originating new loans."

The monthly payment on a standard VA thirty-year loan of \$90,000 at a ten percent interest rate is \$790. At nine percent, the monthly payment on the same loan is \$724. At eight percent, the payment drops to \$660. At seven percent, it comes to only \$598 per month. Throughout the nation, interest rates have dropped to lows not seen in decades.

Veterans can refinance their VA-guaranteed loan in two ways: through regular refinancing or through an interest rate reduction refinancing loan. The latter is used strictly to reduce the interest rate on a loan and requires no property appraisal or credit underwriting and, therefore, no out-of-pocket expense to the veterans, said VA officials.

BAT Required for Pilot Candidates

All pilot training candidates will have to complete a basic attributes test (BAT) as part of the application process for undergraduate pilot training, the Air Force said. This affects candidates from all commissioning sources.

AFROTC cadets will be tested dur-

ing field training. Other applicants can take the test at one of 100 BAT sites worldwide. Active-duty applicants should contact their military personnel flight customer support section for more information.

The BAT can be taken only once. The computer-based test measures psychomotor skills, cognitive abilities, and motivation. These factors are highly predictive of success in pilot training. The BAT score will be combined with the pilot composite score on the Air Force Officer Qualifying Test and, if applicable, flying experience to develop a percentile score reflecting each applicant's ranking.

Ulchi Focus Lens '93

The Republic of Korea-United States Combined Forces Command completed the Ulchi Focus Lens '93 exercise in August.

Ulchi Focus Lens is the world's largest command post exercise, engaging about 12,000 participants and using powerful computer simulations. The simulations helped the nations avoid moving large numbers of troops and equipment to train high-ranking commanders and staffs from all branches of the US and Korean militaries.

Six major computer models linked all phases of the electronic battle.

The corps battle simulation portrayed ground combat activities, the air warfare simulation portrayed aerial combat, and the research, evaluation, and systems analysis system simulated naval warfare. Logistics functions were simulated in the theater transition and sustainment model, electronic warfare functions were shown in the joint electronic combat/electronic warfare simulation, and intelligence gathering was demonstrated in the tactical simulator.

The models were linked so that the effects of the air war on the ground were reflected in the ground simulation.

Badges for All Service Members

The elimination of some old specialty badges and the creation of a few new ones will result in badges for all service members regardless of career field, the Air Force said in September.

Under the current system, nearly a third of Air Force people are not entitled to any kind of occupational badge.

While reviewing the badges currently available, the study revealed that upgrade procedures were inconsistent. The criteria for adding a star or wreath varied widely by career field.

Senior Staff Changes

RETIREMENTS: L/G Gordon E. Fornell; M/G Dale C. Tabor.

PROMOTION: To be Lieutenant General: Richard B. Myers.

CHANGES: B/G James S. Childress, from Dep. Ass't Sec'y, Mgmt. Policy and Prgm. Integration, OSAF, Washington, D. C., to PEO, Tactical/Airlift Sys., AFPEO, Hq. USAF, Washington, D. C., replacing M/G (L/G selectee) Charles E. Franklin . . . L/G Richard E. Hawley, from Cmdr., US Forces Japan, and Cmdr., 5th AF, PACAF, Yokota AB, Japan, to Principal Dep. Ass't Sec'y, Acquisition, OSAF, Washington, D. C., replacing retired L/G John E. Jaquish . . . B/G William S. Hinton, Jr., from Spec. Ass't to the Cmdr., Hq. ACC, Langley AFB, Va., to Dir., Requirements, Hq. ACC, Langley AFB, Va., replacing B/G George K. Muellner . . . B/G Ronald T. Kadish, from Prgm. Dir., F-16, AFPEO, ASC, Hq. AFMC, Wright-Patterson AFB, Ohio, to Prgm. Dir., C-17, AFPEO, ASC, Hq. AFMC, Wright-Patterson AFB, Ohio, replacing B/G Kenneth G. Miller . . . B/G Kenneth G. Miller, from Prgm. Dir., C-17, AFPEO, ASC, Hq. AFMC, Wright-Patterson AFB, Ohio, to Dep. Ass't Sec'y, Mgmt. Policy and Prgm. Integration, OSAF, Washington, D. C., replacing B/G James S. Childress . . . B/G George K. Muellner, from Dir., Requirements, Hq. ACC, Langley AFB, Va., to Dir., Fighter, Command, Control, and Weapons Prgms., Ass't Sec'y of the Air Force for Acquisition, OSAF, Washington, D. C., replacing M/G (L/G selectee) Richard B. Myers . . . M/G (L/G selectee) Richard B. Myers, from Dir., Fighter, Command, Control, and Weapons Prgms., Ass't Sec'y of the Air Force for Acquisition, OSAF, Washington, D. C., to Cmdr., US Forces Japan, and Cmdr., 5th AF, PACAF, Yokota AB, Japan, replacing L/G Richard E. Hawley.

ANG CHANGE: B/G Donald W. Shepperd, from Dep. Dir., ANG, Hq. USAF, Washington, D. C., to Dir., ANG, Hq. USAF, Washington, D. C., replacing M/G Philip G. Killey.

SENIOR EXECUTIVE SERVICE (SES) RETIREMENT: P. L. Schittulli. ■

That will change under the new system, which will link enlisted badges to such "Year of Training" initiatives as skill level training and professional military education progression.

For example, a star will be added for seven-level upgrade training completion. The wreath will be added for completion of the Senior NCO Academy.

Occupational badge upgrade criteria will also be standardized for officers. The basic badge will be awarded after graduation from initial technical training, the same as for enlisted members. Officers will be upgraded based on attaining a fully qualified status and experience in a primary skill—seven years for the star and fifteen years for the wreath.

There will be three classes of badges under the new system: aeronautical, occupational, and duty.

Air Force to Study Housing

The Air Force would like to house unmarried young airmen in private rooms by 1996 and in efficiency apartments by 2020, the service said in September.

In its "Year of Equipping," USAF is looking not only at hardware but also at facility modernization. One such plan, "Vision 2020," would provide an unaccompanied service member an apartment with bedroom, living area, private bathroom, and in-house cooking and laundry facilities. Junior enlisted personnel would be housed on base through the first two years of service. Those in higher ranks would live off base.

Aerospace Trade Surplus Increases

The US aerospace industry posted a positive trade balance of \$7.5 billion in the second quarter of 1993, the Aerospace Industries Association said in September.

The trade surplus rose by \$784 million over 1993's first quarter largely as a result of higher exports of civil transport aircraft. Military exports increased by eight percent to \$1.8 billion in the second quarter of 1993.

Widnall Gets F-15D Ride

Most people start their first day on the job filling out forms and meeting fellow workers. Dr. Sheila Widnall began her tenure as Air Force Secretary with a ride in an F-15D fighter.

Secretary Widnall, following her white-water rafting vacation, flew out of Elmendorf AFB, Alaska, in the back seat of the fighter.

Someone asked her whether she was nervous before going aloft. "I think the flight part sounds okay," she re-

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plied. "The parachute-and-ejection part sounds a little problematic, but we don't think we're going to do that part."

AAFES to Carry New Uniform

The new Air Force dress uniform will go on sale to current members at Army and Air Force Exchange Service stores in May 1994 after nearly two years of evaluation, USAF said in September.

People now entering the service will not receive the new uniform until 1995. AAFES should have all items

relating to the new uniform—jacket, shirt, slacks, rank insignia—in stock by October 1995.

VGLI Changes

The Veterans' Group Life Insurance program now offers coverage up to \$200,000 and term policies that are renewable for life. The change results from the recent enactment of the Veterans' Benefits Act of 1992, Air Force personnel officials said. The new premiums will vary.

The new premiums took effect on September 1, but policyholders may

not notice a change until their current five-year term expires. Retirees and people who have separated from the military can choose one of four options when renewing VGLI coverage: cancel coverage, convert the coverage to a commercial insurance policy, convert the coverage to a level premium plan with a decreasing amount of insurance for people ages sixty to sixty-four, or continue coverage at the same level.

New Center Opens at Langley

The new Air Force Rescue Coordination Center began twenty-four-hour operations at Hq. ACC, Langley AFB, Va., in September. The rescue center moved from Scott AFB, Ill., as part of the transfer of the rescue mission to ACC from Air Mobility Command earlier this year.

The center coordinates search-and-rescue activities in the continental United States and provides US search-and-rescue assistance to Canada and Mexico. It employs twenty officers and eighteen enlisted members.

During wartime, the center will coordinate theater rescue operations. Day-to-day rescue teams are dispatched to aid seriously ill or injured people in remote or isolated areas, including aircraft crash victims and lost hunters or hikers. Since opening in 1974, the center has saved more than 11,000 lives, including 443 this year.

AMC Supports Nepalese

Air Mobility Command responded to an emergency in Nepal by airlifting

109 tons of transportable bridges to the capital, Katmandu, after heavy August flooding cut off access roads.

Three C-5s from Dover AFB, Del., transported the bridges from RAF Mildenhall, England, to Katmandu, where British and Royal Nepalese Army workers assembled them in only a few weeks.

Two C-5 crews from Travis AFB, Calif., also supported the mission by transporting an airlift control team from Kadena AB, Japan, to Nepal. The team set up the airfield for the follow-on shipments. McChord AFB, Wash., also sent a support group to Nepal, including aircraft loaders and rescue and crash recovery team members.

New Medical Course at Incirlik

Incirlik AB, Turkey, part of the basing system for US Air Forces in Europe, will be the first USAFE installation to take part in a new medical Red Flag training course. The course will test the unit's ability to set up an air-transportable hospital.

Four-day courses began in late September. They are taught by representatives of the 384th Medical Training Squadron, Sheppard AFB, Tex.

Air Education and Training Command created the course last year to standardize medical training throughout the Air Force. The curriculum includes the setup, inventory, operation, and repacking of an air-transportable hospital. Medical teams from Ramstein AB, Germany, Bitburg AB, Germany, and RAF Lakenheath, England, also participated in the exercises.

General Powell Honored

Gen. Colin L. Powell, during his last month as Chairman of the Joint Chiefs of Staff, was honored by enlisted members from all services. General Powell retired September 30.

In the ceremony, General Powell was made an honorary Air Force chief master sergeant, Army command sergeant major, Marine sergeant major, Navy master chief petty officer, and Coast Guard master chief petty officer. The General was given a crystal plaque mounted on onyx with the rank insignia engraved.

"I thought I had reached the top, but clearly I had not," remarked the four-star Army General.

Rome Develops Translation Technology

Rome Laboratory, Griffiss AFB, N. Y., has developed a new speech translation technology that may someday provide critical assistance to civilian law enforcement and medical communities around the world.

The Machine-Aided Voice Translation program at Rome Lab has already resulted in an early prototype of a system that translates a limited vocabulary and grammar between English and Spanish. The current prototype allows questions regarding biographical data and military missions to be asked in English. The question is then automatically translated into Spanish and spoken through a speech synthesizer. The Spanish response is then translated into English using the process in reverse.

The current system has a vocabulary of about 800 words in each language. A follow-on prototype will have an expanded vocabulary and allow translation using English, Spanish, Arabic, and Russian.

Milstar Clears Important Hurdle

The Milstar satellite program cleared a major hurdle in August when it completed program development reviews for the satellite's medium-data-rate and low-data-rate payloads.

The reviews aimed to examine the contractor's design and manufacturing processes to ensure that preliminary designs met the technical requirements.

With the reviews behind them, the systems contractors are free to proceed with the detailed design work that precedes actual production of the payloads.

News Notes

■ The 363d Fighter Wing at Shaw AFB, S. C., accepted delivery of its

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first Block 50 F-16 in August. The Block 50 has avionics and engine upgrades and will change the wing's mission. The former mission was ground attack using Low-Altitude Navigation and Targeting Infrared for Night. The new mission will be Suppression of Enemy Air Defenses.

■ In an effort to preserve one of the Air Force's oldest and most distinguished units, the service inactivated the 343d Wing at Eielson AFB, Alaska, in August and activated, in its place, the 354th Fighter Wing. The 354th FW was a World War II combat unit activated in 1942 as the 354th Fighter Group. It was inactivated March 31, 1993, with the closing of Myrtle Beach AFB, S. C.

■ The Pentagon's Advanced Research Projects Agency signed a \$98 million agreement with Optical Imaging Systems, Inc., in August to develop manufacturing technology and build a manufacturing demonstration facility based on active matrix liquid crystal display technology. This capability is essential to the F-22 and other high-priority programs. The agreement was a joint effort by ARPA and Wright-Patterson AFB, Ohio.

■ San Antonio Air Logistics Center's Propulsion Management directorate has been tasked by Portugal to overhaul and upgrade twenty-two F-16 fighter engines at a total projected cost of \$15 million. The directorate will overhaul the F100-PW-200A engines and upgrade them to the more advanced F100-PW-220E configuration.

■ Twentieth Air Force completed its transfer to Francis E. Warren AFB, Wyo., from Vandenberg AFB, Calif., in October. Twentieth Air Force is responsible for the day-to-day operations of the nation's ICBM force. It provides guidance and support for six operational missile wings.

■ The National Aerospace Plane Program Office said in September that it successfully completed the first series of full-scale scramjet engine tests at simulated Mach 12, 14, and 16 flight conditions. The test of the E21 configuration, in which both critical height and length dimensions are full-scale, was conducted at the sixteen-inch hypersonic shock tunnel located at NASA's Ames Research Center, Moffett Field, Calif.

■ A joint resolution by Congress designated September 17, 1993, "National POW/MIA Recognition Day" and authorized the display of the National League of Families POW/MIA flag.

■ A T-38 en route to Randolph AFB, Tex., crashed shortly after takeoff from Vance AFB, Okla., in September. The pilots, both assigned to Vance, ejected safely from the aircraft. Col. Milton E.

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Branch, Jr., of Macon, Ga., and Capt. Matthew Heuer of Colusa, Calif., were treated at the base clinic and released. After the crash nearly four acres of farmland were scorched. The accident is under investigation.

Purchases

The Air Force awarded Lockheed a \$37 million face-value increase to a fixed-price incentive firm contract for incorporation of Block 50 F-16C/D configuration changes in the F-16 aircraft. Expected completion: September 1993.

The Air Force awarded Northrop a \$56 million face-value increase to a fixed-price incentive firm contract to continue production of several B-2 components. The components include such items as KU- and X-band transponders, standby flight instrumentation sets, tactical air navigation radar, power control units, energy reference monitors, air turbine starters, door actuators, power transmission shafts, the ZSR-63 system, and the multipurpose display unit. Expected completion: January 1998. ■

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Few ever took larger gambles, with higher payoffs or with more spectacular success, than Jimmy Doolittle, a one-of-a-kind aviation pioneer.

An American Hero

OF THE world's renowned pilots, one always stood out above the others: James H. "Jimmy" Doolittle—boxing champion, racing and stunt pilot, aviation record-setter, scientist, Air Force general, outdoorsman, and advisor to Presidents. Unusual accomplishments were the hallmark of his life, which ended September 27 at his home in Pebble Beach, Calif. General Doolittle was ninety-six years old.

His life intersected with many of the most critical moments in the history of aviation and airpower. One of his accomplishments proved to be an aviation milestone—his 1929 demonstration that pilots could fly their aircraft at night and through bad weather without ever seeing the ground, using instruments only. [See "Flying Blind," September 1989, p. 138.] It was not the first nor last time that he would prove himself a master of the calculated risk.

Highly Competitive

Jimmy Doolittle was born in Alameda, Calif., on December 14, 1896, and spent his early years in Nome, Alaska, where his father was a carpenter and his mother a seamstress. Those were the Gold Rush days, when thousands of people followed their dreams of quick wealth to the edge of the Bering Sea.

Young Jimmy was shorter than his playmates and was continually forced to defend himself against older and bigger boys. Wiry, tough, and highly competitive, he learned to take care of himself and sought to excel in everything he attempted. Jimmy's mother, convinced that there was a better life for her son in the States, returned with him to California when he was twelve. His father remained in Alaska and never lived with the family again.

Like so many lads in those days after the Wright brothers proved that heavier-than-air flight was possible, Jimmy tried to build a glider and crashed several times. He took up boxing and, at age fifteen, became amateur bantamweight champion of the west coast. He liked acrobatics and practiced handstands and tumbling by the hour.

He attended Los Angeles Manual Arts High School, where he learned carpentry, metalworking, and mechanical drawing. From there he entered the University of California, where he studied mineral engineering and continued, against his mother's wishes, to box. She needn't have worried. Doolittle was so aggressive that he held the intercollegiate lightweight and middleweight championships simultaneously.



By C. V. Glines





In 1925, Jimmy Doolittle won the Schneider Trophy in a Curtiss R3C-2 (above), setting a new world speed record. At right is Doolittle with the Laird Super Solution, which he belly-landed after the landing gear failed in a test flight.

When the US entered World War I, Doolittle enlisted as a private in the US Army's flying training program. He completed ground school and flight training and was commissioned as a second lieutenant in March 1918. He had hoped to fly combat missions in France, but the war ended before he could get there.

Doolittle decided to remain in uniform. During the next few years, he served as a gunnery and flight instructor and became widely known for his daring low-altitude aerobatics at air shows. He was assigned to the Air Service Mechanical School in San Antonio, Tex., and became intensely interested in aircraft engines, structures, fuels, and lubricants. He then decided to continue his military career because he felt he would have the opportunity to combine his flying skill, his interest in science, and his inclination for tinkering with mechanical things.

In the early 1920s, US Army pilots were encouraged to keep aviation in the news and make the public aware of what airplanes promised for the future. To do his part, Doolittle conceived the idea of setting a coast-to-coast speed record. He modified a de Havilland DH-4 two-seat training plane, adding extra gas tanks so he could make the 2,200-mile flight with only one fuel stop. In September 1922, he flew from Pablo Beach, Fla., to San Diego, Calif., becoming the first pilot to fly across the continent in less than a day. Several years later, this feat brought him the Distinguished Flying Cross.

Doolittle subsequently was assigned to McCook Field in Dayton, Ohio, where he quickly established a reputation as a fearless pilot and repeatedly risked his life to test the flight characteristics and limitations of experimental aircraft. At McCook he carried out what were later described officially as "extremely valuable aircraft acceleration tests." These later earned him a second Distinguished Flying Cross.

Ever on the lookout for more flying experiences, Doolittle volunteered for special training with the Navy, flying high-speed seaplanes. In 1925, he won the Schneider Trophy, piloting a pontoon-equipped Curtiss R3C-2 to a new world speed record. To increase his value to the Army, he requested the opportunity to attend Massachusetts Institute of Technology. There he received a master's

degree in aeronautical engineering and a doctorate in aeronautical science, the latter being one of the first granted in the United States.

At age twenty-eight, he completed his academic work. He returned to McCook Field and flight testing. By this time, he had become well known throughout the military services. It fascinated newspaper reporters that a daring test and stunt pilot could earn the highest academic degree from a prestigious university.

His fame led Curtiss Aircraft in 1926 to borrow Doolittle to demonstrate the company's new P-1 Hawk fighter in South America. The trip would add considerably to the Doolittle legend.



Night of the Pisco Sours

Jimmy Doolittle didn't know what to expect when he stepped off the boat in Santiago, Chile. He imagined he would be expected to put on a one-man aerobatic show for Chilean officials. However, he found that he was only one of several salesman-pilots there. German and Italian firms had sent their best flying machines and pilots. The Chileans wanted pilots and planes to compete in order to determine which aircraft to buy for Chile's Air Force.

Several nights before the competition, Chilean Air Force pilots held a cocktail party in the officers' club, where they introduced Doolittle to a delicious and powerful drink called a "pisco sour." During the evening, conversation turned to Douglas Fairbanks, the famous actor of silent films whose legendary balcony-leaping and sword-fighting antics captivated huge and enthusiastic South American audiences.

Doolittle could not speak Spanish, but he sensed the admiration that his hosts had for the handsome American actor. In a moment of puckishness, Doolittle declared to his amazed hosts that, in his view, Fairbanks was not an especially talented acrobat and that "all American kids can do those things."

To the Chilean pilots, this statement needed proving. Doolittle now had to demonstrate that *he* could tumble, leap, and do handstands as easily as Fairbanks. He bent down, rose into a handstand, and began walking on his hands through the club lounge. When he stood up to polite applause, he thought he should do more. He did a couple of backflips, then walked over to a balcony overlooking a courtyard and eased up into a handstand on the railing. Again he received applause, but Doolittle wasn't through

yet. He grasped the narrow stone ledge of the balcony with one hand and extended his body parallel to the ground—a feat requiring strong arms and a knowledge of body leverage.

There were shouts of “Bravo!” and “Olé!” as the daring American seemed suspended in space. Then Doolittle felt something give way. The ledge, made of sandstone, crumbled, and he plunged to the courtyard two floors below as the onlookers screamed.

Doolittle was rushed to the hospital, where X-rays showed he had broken both ankles. There was no doubt that he should not fly in the competition, but there were no other US pilots to fill in.

Doolittle was furious at himself. He knew that, when his friends in the US found out about his foolishness, he’d be the laughingstock of the Air Corps. As doctors put casts on both legs, they told him he would have to remain in bed for several weeks and wear the casts for at least two months. The pilots from the other countries would be able to demonstrate their planes without facing an American challenge.

A German ace, Karl A. von Schoenebeck, was scheduled to show off a new Dornier fighter, which many believed to be the best in the competition. Doolittle, however, was certain that the P-1 Hawk was better and intended to prove it. He asked his mechanic to get the plane ready for flight and install some clips on his flight boots to keep his feet from slipping off the rudder pedals.

A few days later, as the President of Chile and hundreds of cheering spectators watched von Schoenebeck put the Dornier through an aerobatic routine of loops, rolls, and inverted flight, Doolittle painfully climbed into the Hawk’s cockpit.

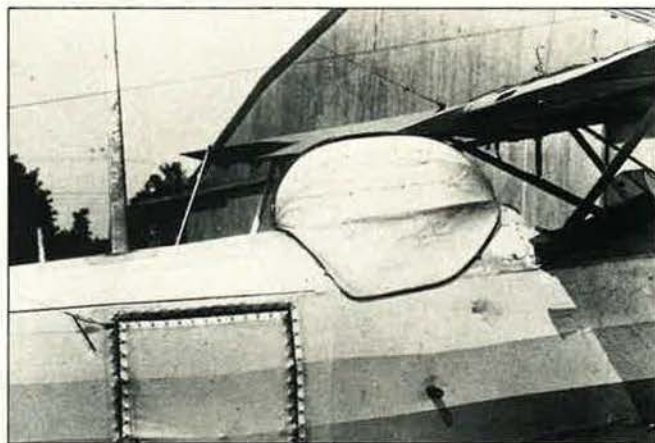
Doolittle started up the Hawk’s engine and roared into the air. The American fighter climbed to the German’s altitude and then roared by him in a pursuit pass. Von Schoenebeck, sensing the challenge of a dogfight, zoomed after the P-1. He found that Doolittle was always on his tail and couldn’t be shaken. The speedy American fighter badly outclassed the Dornier, which by comparison suddenly seemed clumsy.

The German pilot broke off the engagement and headed back for the airport. Fabric had begun to tear away from the Dornier’s top wing; the plane had exceeded its limitations and was in danger of coming apart. As his adversary landed, Doolittle circled and then roared inverted across the breadth of the field only a few feet off the ground, drawing wild cheers from the crowd. When he landed and slowly extracted himself from the cockpit, it finally hit the audience that not only had the American beaten the German but had done so with both legs in casts!

With his legs in splints, Doolittle continued his demonstrations in other South American countries. When he returned to the US, doctors had to reset his ankles, requiring a hospital recovery period of six weeks.

“Spur of the Moment”

Though his body was inactive, his mind wasn’t. He wanted to do something with an airplane that no one else had ever done—fly an outside loop. He had always wondered if a human being could survive this maneuver, which subjects both pilot and plane to severe strain. One might build an aircraft strong enough to hold up under the stress, but what about a man’s body? The centrifugal



Above is the Consolidated NY-2 in which Doolittle in 1929 became the first pilot to fly “blind.” He considered this his finest contribution to aviation.

force might be strong enough to burst the blood vessels in the human head.

Doolittle calculated the degree of strain that would be placed on an aircraft and concluded that the Curtiss Hawk could take the pressure. He wasn’t sure that he could say the same thing about his body.

Once he was out of the hospital and flying again, Doolittle spent many hours practicing dives, tucking under, and attempting to climb back on top of the loop. He found the physical discomfort severe but bearable. On May 25, 1927, he completed the world’s first outside loop, a feat witnessed by other pilots at McCook Field.

When the press asked why he did it, Doolittle grinned and replied, “Don’t know why I did it. Just thought of it on the spur of the moment.”

Doolittle began looking for tougher challenges and more durable contributions to the advancement of aviation. At about that time, Daniel Guggenheim, a wealthy industrialist and philanthropist, established a \$2.5 million fund to promote “the art, science, and business of aviation.” His son Harry, a former Navy flyer, served as president of the fund.

In one phase of its work, the fund was to be used to study



Doolittle (in civilian hat) toured Europe in the 1930s for Shell Oil Co. and Curtiss-Wright to promote aviation. He was assisted by Capt. John K. “Joe” Cannon (at right, with helmet and goggles).



The General and AFA

In the immediate post-World War II years, Jimmy Doolittle was a forceful figure in the fight for a separate Air Force and for the establishment of a strong and independent Air Force Association. The two endeavors were inextricably linked.

Doolittle had long believed that the US should create an aviation service equal to the Army and Navy, but this task became urgent after the war. He and Gen. H. H. "Hap" Arnold, Chief of Staff of Army Air Forces, took immediate steps to create the vehicle to promote the Air Force and airpower.

To this end, the two senior generals arranged a meeting of ten top wartime USAAF leaders, who met on October 12, 1945, at the University Club in New York, N. Y. Their purpose was to lay the foundation for an AAF veterans organization that would push to make the Air Force a reality and that also would be the civilian vanguard for military airpower.

In the next several months, General Doolittle played a direct and energetic role in organizing AFA. During this time, the Association set up headquarters in Washington, D. C., determined its structure and mission, and drafted a constitution and bylaws. In January 1946, General Doolittle became AFA's first president. He also directed the creation of AFA units around the country, and, in the organization's first year, its membership swelled to more than 126,000.

General Doolittle presided over AFA's first National Convention, held September 15-16, 1947, in Columbus, Ohio, and on September 17 became the Association's first elected chairman. The next day—September 18, 1947—President Truman signed the legislation that created a separate Department of the Air Force.

Though AFA's principal goal had been achieved, General Doolittle continued to take an active part in Association business. Seldom in the early years did he miss an AFA Board meeting or National Convention. He participated in numerous AFA national defense symposiums and seminars, often serving as moderator. Even after relinquishing his formal positions, he continued to attend AFA functions around the country.

In 1974, at the request of AFA, the General lent his illustrious name to a scholarship effort managed by AFA's Aerospace Education Foundation—the Doolittle Fellows Program. He served as keynote speaker at the 1978 National Convention. In 1984, he was on hand for the dedication of AFA's new National Headquarters Building in Arlington, Va., just across the Potomac River from the nation's capital. In 1986, at the age of eighty-nine, General Doolittle and many of his Tokyo Raiders came to AFA's "Gathering of Eagles" in Las Vegas.

AFA officials last paid a formal call in August 1990, when four senior leaders met the General in his home in Pebble Beach, Calif. Those present remember that, though he was almost ninety-four, General Doolittle was as vigorous and friendly as ever.

—John O. Gray

ways to ensure safe and reliable flight even in poor weather conditions. A Full Flight Laboratory was set up at Mitchel Field on Long Island, N. Y., in late 1928. The laboratory's officials borrowed Doolittle from the Army to take charge of a broad range of flight experiments, one of which was flying "under the hood," or without being able to see where one was flying. Lt. Ben Kelsey joined him to fly as safety pilot while Doolittle was flying under the hood. Two aircraft—a Vought O2U-1 Navy observation plane and a sturdy Consolidated NY-2 Navy/Army trainer—were purchased for the tests.

Researchers began to test various cockpit instruments and radio navigation aids. Doolittle flew hundreds of flights in the NY-2, testing foreign-made instruments. The artificial horizon and directional instruments invented by Elmer Sperry



Above left, Doolittle discusses the organization of AFA with actor Jimmy Stewart and Gen. Carl A. Spaatz. Above, he talks with Gen. Dwight D. Eisenhower at an AFA function.

and the sensitive altimeter perfected by Paul Kollsman proved to be the right combination for totally "blind" flight.

Doolittle described his blind landing technique:

"The plane was put into a glide at 60 mph, with some power on, and flown directly into the ground. Although this was about 15 mph above stalling speed, the landing gear absorbed the shock of landing and, if the angle of glide was just right, the airplane didn't even bounce. Actually, after a while, it was possible to make consistently perfect landings by this method."

Experiments were also conducted using ground and airborne radio navigation aids then being perfected so that pilots could navigate from point to point by "homing" in on radio transmitters.

By the fall of 1929, Doolittle had made more than 100 flights in the NY-2 under the hood with Kelsey as safety pilot. Harry Guggenheim planned to observe such a flight, but Doolittle was ready to demonstrate that he could successfully fly blind solo. On September 24, 1929, fog enshrouded Mitchel Field. It was an ideal time for a blind flight. Ground radios were manned, the plane was readied, and Doolittle eased into the cockpit.

A "Sloppy" Landing

"I taxied out and took off," he explained later. "I came through the fog [on top] at about 500 feet and made a wide swing coming around into landing position. By the time I landed ten minutes after takeoff, the fog had just started to

lift. About this time, Mr. Guggenheim arrived, so we decided to do an 'official' under-the-hood flight. I'd just made a real flight in the fog so I wanted to go alone, but Mr. Guggenheim insisted that Ben Kelsey be taken along as safety pilot.

"We both got into the plane, and the hood over my cockpit was tightly closed. I taxied out and took off toward the west in a gradual climb. At about 1,000 feet, I leveled off and made a 180-degree turn to the left, flew several miles, then made another left turn. The airplane was now properly lined up on the west leg of the Mitchel range, so I started a gradual descent. I leveled off at 200 feet and flew level until I passed the fan marker on the east side of the field. From this point, I flew the plane down to the ground using the instrument landing procedure we had developed. Despite all my previous practice, however, the approach and landing were sloppy."

The approach and landing may have been sloppy by Doolittle's standards, but it was a safe landing, and Ben Kelsey never touched the controls. The flight marked the beginning of the end of the "seat-of-the-pants" era of aviation. The achievement did not completely solve the problems of instrument flying, but it was a significant start. It was Doolittle's finest contribution to aviation.

When the instrument flying experiments ended, Doolittle began to take stock. He believed he could not support his mother, mother-in-law, wife, and two sons on the low pay of a lieutenant. He resigned his regular commission in 1930 and accepted a commission in the Air Corps Reserve as a major. He was hired by Shell Oil Co. to head its newly established aviation department. His job was to demonstrate the capabilities of the airplane, keep aviation in the public eye, and thereby advance the development and use of Shell aviation gas, oil, and lubricants. He decided to spend the next three years setting point-to-point speed records and entering air races.

The Mystery Ship

Though Shell gave Doolittle a Lockheed Vega to fly on company business, he bought a damaged Beech Travelair monoplane with his own money because he didn't want the company to take a financial hit if he should crash in the upcoming Bendix Race, an annual near-transcontinental dash from Burbank, Calif., to Cleveland, Ohio. He had the plane's fuselage and controls modified, hoping to make it the world's fastest plane. The press dubbed the result "The Mystery Ship."

Doolittle took the plane for a test flight. After putting it through some routine aerobatics, he made a speed run across the field and watched the airspeed indicator climb to nearly 300 mph. Pleased with this performance, he leveled off, then suddenly heard the ominous sound of bending metal. The plane began to vibrate, and Doolittle knew his prized possession was falling apart. The wings began to disintegrate.

There was only one thing to do. He unfastened his safety belt and bailed out. Once before, in warm-up flights for a demonstration at the 1929 Cleveland Air Race, an airplane had lost a wing and Doolittle had jumped, so this was the second time a parachute had saved his life. This time, the plane was his, and he could ill afford its loss.

Saddened but undaunted, Doolittle borrowed a plane built by E. M. "Matty" Laird, the "Super Solution," and entered the 1931 Bendix Race. He won the Bendix Trophy



Shell Oil gave Doolittle a Lockheed Vega to fly on company business, but he bought a Beech Travelair for air races. He modified its fuselage and controls, trying to make it the world's fastest plane, but it crashed on a test flight.

but, to the amazement of the crowd in Cleveland, quickly gassed up the plane and took off for Newark, N. J. He was trying to break the coast-to-coast record set by Frank Hawks the year before. Even though he had to fly through a line of strong thunderstorms, Doolittle set a new record, becoming the first pilot to cross the continent in less than twelve hours.

Doolittle planned to enter the 1932 Bendix Race with the Super Solution. On a test flight in Kansas, however, the landing gear failed and Doolittle had to bring it down with one gear up, damaging the plane so extensively that it could not be repaired in time for the race.

Several aircraft manufacturers offered replacements. One of these, Zantford D. Granville, offered Doolittle his "Gee Bee" R-1 racer, considered by many to be the most dangerous plane ever built. The stubby racer seemed to have no wings or tail, only a powerful engine. Doolittle was intrigued by the plane but, since it had little fuel capacity, he decided to skip the long-distance Bendix race and instead compete against the world's best sprint aircraft in the closed-course Thompson Trophy Race. In a test flight of the Gee Bee, he found it extremely unstable and so sensitive on the controls that he inadvertently snap-rolled twice while making his first flight.

In a preliminary run with the Gee Bee, Doolittle broke the existing speed record with an average of 296.287 mph and won a prize of \$1,575. Two days later, he won the Thompson Trophy Race and its \$4,500 prize by beating the fastest pilots in the world.

No More Races

His hair-raising experiences with the Gee Bee caused Doolittle to wonder if racing, with its many accidents and deaths, really advanced the cause of aviation. He had had his share of crashes and mishaps and twice narrowly escaped death. A few weeks after the Thompson Race, he announced to a surprised public that he was through racing. He never raced again.

Between 1932 and 1940, Doolittle devoted his time to promoting the development of 100-octane gasoline. In those days, large aircraft engines used 91-octane fuel. Larger engines could be designed to propel an aircraft faster and higher and carry heavier loads, but their in-



Above, a B-25 heads to Eglin Field, Fla., to train for the Tokyo Raid. Below, right, is Doolittle's B-25 crew: (left to right) Lt. Henry A. Potter, Colonel Doolittle, SSgt. Fred A. Braemer, Lt. Richard E. Cole, and SSgt. Paul J. Leonard.

creased compression required a higher rating for smoother burning and decreased detonation. If larger and faster aircraft were to be built, higher-octane fuels would have to be developed.

At Doolittle's urging, Shell assumed the financial risk on the venture, even though there were no engines capable of using such fuel at that time. Doolittle then convinced engine manufacturers to build more powerful engines, which later contributed to the Allied victory in World War II. He never received sufficient credit for this contribution to aviation, though it was surpassed in importance only by his blind-flying experiments.

In 1933, Doolittle and his wife Joe went on a five-month world tour. He put the Curtiss Hawk through its awe-inspiring paces at each stop and was always invited to visit the host nation's commercial and military aviation facilities. These visits gave Doolittle unusually sharp insight into local thinking and planning with respect to aviation.

What he saw alarmed him. The US, he concluded, was falling behind in aviation, especially military aviation. He began to speak out about his concerns. The Depression had generated severe cutbacks in US military appropriations, but other nations, such as Japan and Germany, were forging ahead with new planes and armament.

In 1937, Doolittle visited Germany. He was appalled to discover that Germany, which under the terms of the Treaty of Versailles was not even supposed to have an air force, was in fact building hundreds of planes and readying itself for war. He visited again in 1939 and came away even more concerned. He rushed home to report what he saw to Maj. Gen. Henry H. "Hap" Arnold, Chief of the Air Corps, and was so sure that war was inevitable that he left his lucrative job with Shell to return to the Air Corps as a major at one-third of his civilian salary. He reported for active duty on July 1, 1940.

Because of his experience in industry and his "can-do" spirit, Doolittle was assigned to General Motors' Allison engine plant at Indianapolis, Ind., and then to Detroit, Mich., to assist in converting the American automobile industry to mass production of warplanes. After the attack on Pearl Harbor, he was ordered to Washington, promoted to lieutenant colonel, and put in charge of several special projects.

Shock Value

One of these was to plan a surprise air attack on Japan. [See "The Doolittle Raid," April 1992, p. 54.] In its final form, it called for launching normally landbased B-25 medium bombers from the deck of an aircraft carrier, a feat most thought impossible. Volunteer crews were selected, and Doolittle supervised their training at Eglin Field, Fla., where Lt. Henry L. Miller, a Navy pilot instructor, taught the pilots how to take off in short distances with heavy loads. On April 1, 1942, at Alameda, Calif., the Navy embarked sixteen bombers aboard the carrier *Hornet*. The mission plan called for the *Hornet* battle group to draw within 450 miles of Japan and launch



its aircraft, which would then bomb five major cities. US planners hoped that, though the actual damage would not be great, the shock of coming under attack would deal a serious psychological blow to Tokyo and boost American and Allied morale.

As the task force steamed westward, Japan suspected an attack. When it didn't come as expected, Japanese fear subsided. However, when the task force was within 650 miles of the home islands on April 18, 1942, it was detected by a Japanese fishing boat serving as a picket ship. At that point, Doolittle decided the mission should begin earlier than planned.

All aircraft took off successfully and flew at wave-top level toward their targets. Japanese fighters fired on several, inflicting only minimal damage and preventing none from dropping their bombs and escaping. After the raid, fifteen of the B-25s headed for China; one, low on fuel, headed for Russia, which was still neutral in the Pacific War. Soviet authorities seized this plane; its crew members were interned for more than a year but eventually escaped to Iran. They returned to the US in May 1943.

As a result of their earlier takeoff, the remaining B-25s arrived over the Chinese mountains after dark in stormy weather with gas running low. It was raining hard, and the airfield beacon at their destination airfield had not been set up. None of the crew members knew exactly where they were. Three of the planes had ditched. The crews of the other twelve planes—including the one carrying Doolittle—bailed out. It was the third (and last) time Doolittle relied on a parachute to escape a plane and save his life.

One Raider died on bailout; two more drowned trying to swim to shore. Eight were captured by Japanese troops,

given a mock trial, and sentenced to death. Of those eight, three were executed by a Japanese firing squad and one died of malnutrition. The other four, their sentences commuted to life imprisonment without hope of parole, survived forty months of torture, beatings, and starvation. They were released after Japan agreed to an unconditional surrender in August 1945.

Doolittle thought his first combat mission was a complete failure. He had lost all of his planes. He thought he might be court-martialed, but he had seriously misread the situation in Japan and the United States. The Japanese people were shocked at this surprise intrusion into their homeland. They had been told their country could never be attacked by a foreign nation. What made the shock more profound was that it had been launched from a carrier, precisely as the Japanese had done at Pearl Harbor only a few months earlier. For the US, which had suffered one defeat after another to the Imperial Japanese forces, the raid provided a great morale boost. As for Doolittle, he skipped the rank of colonel entirely and was promoted to brigadier general. When he returned to the US, President Franklin Roosevelt gave him the Medal of Honor.

In time, Doolittle was promoted to major general and assigned to head Twelfth Air Force in North Africa after the Allied invasion. The going was not easy. German defense forces put up heavy flak over every target, and the toll on American planes was high. But Doolittle's personality and presence built a contagious *esprit de corps*. German and Italian defenses were overcome, and US aircraft pounded enemy supply lines. Doolittle headed Fifteenth Air Force briefly, then was promoted to lieutenant general and ordered to England in 1944 to take command of Eighth Air Force.

Under New Management

Soon after arriving in England, Doolittle changed the tactics of fighters that were used mostly to escort and protect American bombers against enemy fighter planes during raids over Germany. He had noticed a sign over the doorway of a fighter group commander's office which read, "The first duty of Eighth Air Force fighters is to bring the bombers back alive." Doolittle ordered the sign removed. "From now on," he said, "the first duty of our fighters is to destroy German fighters!"

From that time on, US fighter pilots took the offensive and went after German interceptors with a vengeance. Germany's surrender on May 7, 1945, was partly attributable to this important change of tactics at a critical time. In later years, Doolittle remembered it as the most important decision he made during the war.

Doolittle returned to civilian life with Shell but was frequently called on to head scientific and military boards, commissions, and task forces. He advocated the creation of a separate air force and was active in the 1947 effort to establish the Department of Defense with three separate military services. He was one of the founders of the Air Force Association and became its first president [see box, p. 22].



Doolittle chose to fly the first B-25 from the deck of the carrier Hornet toward Tokyo, assuming the most dangerous assignment (due to the short takeoff distance).

As a senior Shell executive, Doolittle flew the company plane, a North American B-25, but realized he couldn't stay as proficient as he should. He decided to quit piloting in 1951. "My office was in New York then," he said, "so, to get rid of the temptation, I had the plane transferred to the West Coast. I never flew as pilot in command again."

In 1959, Doolittle retired from the Air Force Reserve as a lieutenant general, becoming the only Reserve officer ever to retire at that rank. In 1985, he was promoted to full general; his fourth star was pinned on by President Ronald Reagan and Sen. Barry Goldwater. He served on the boards of several large corporations until his late eighties.

During his busy years as a military and racing pilot, scientist, and military leader, he formed a personal philosophy, which he once described in these words:

"I believe every person has been put on this Earth for just one purpose—to serve his fellow man. It doesn't matter how he does this. He can build a bridge, paint a picture, invent a labor-saving gadget, or run a gas station. The point is, he should try to leave the Earth a better place than he found it. If he does, his life will have been worthwhile. If he doesn't do what he can within his own limitations, he is destined to be unhappy."

In his final years, General Doolittle became an elder statesman whose wise counsel and guidance were sought in every phase of aviation and aerospace science. He always thought he had been extremely lucky and never thought of himself as a bold, superbrave pilot. He laughed when he was reminded that he was known as the "master of the calculated risk."

"I have always tried to be conservative," he told me. "I've always tried to do something new, but before exhibiting that new thing to the public, I practiced it again and again to be sure the hazard was minimized as much as possible. My calculations didn't always work out precisely. Otherwise, I wouldn't have had to jump out of an airplane three times to save my neck." ■

C. V. Glines is the author of four books about the life of Gen. Jimmy Doolittle: Doolittle's Tokyo Raiders, Four Came Home, The Doolittle Raid, and Jimmy Doolittle: Master of the Calculated Risk. He also assisted the General in the writing of his memoirs, I Could Never Be So Lucky Again, published in 1991.

The new team must confront a force drawdown, diminishing budgets, micromanagement, and an “extremely antagonistic acquisition environment.”

Materiel Command Faces Uncertainty

By James W. Canan, Senior Editor

THE AIR FORCE is fast becoming a US-based expeditionary force heavily reliant on three new major commands—Air Combat Command and Air Mobility Command for combat operations and Air Force Materiel Command for the weapons and logistics that make them possible.

AFMC's importance to USAF is beyond question. For example, roughly two-thirds of all Air Force personnel in Operation Desert Storm were logisticians. The loggies supported the flying squadrons in fine style. Warplanes and other equipment held up remarkably well under tough conditions. Their high reliability and maintainability were a tribute to the acquisition and logistics worlds, since combined in AFMC.

There was a down side, however, to the disproportionately high number of Air Force logisticians in the Persian Gulf War. USAF obviously had a long way to go in becoming the lean, rapid-reaction force of its best-laid plans. Squadrons deployed to the theater of operations had to take along a lot of logistical baggage, even though an extensive support infrastructure awaited them in Saudi Arabia. They will not find the likes of it anywhere else the next time around.



Photos by Ross Harrison Koly

Concern for AFMC's five Air Logistics Centers (ALCs) runs high, though they received an eleventh-hour reprieve from the Base Realignment and Closure Commission this year. Above, a C-130 prepares for maintenance at Ogden ALC at Hill AFB, Utah. Opposite, an aircraft small-parts repair mechanic at Ogden guides C-5 landing gear wheels from stripping tanks to prepare them for plastic blasting.





Though its importance to the Air Force is beyond question, Materiel Command has vulnerable points. Its laboratories and depots, like San Antonio ALC, Kelly AFB, Tex., where this C-5 is undergoing maintenance, may be slated to close.

This is why the Air Force is switching to two-level maintenance of engines and avionics on flight lines and in depots, doing away with many base intermediate-level (I-level) avionics and engine shops that greatly lengthen the logistics tails of the flying squadrons.

"Two-level maintenance is the most important task in AFMC today," declared AFMC's commander, Gen. Ronald W. Yates, at a recent gathering of the command's top officers.

AFMC's contributions to the Air Force in this and other endeavors are rock-solid, yet the command faces a number of uncertainties.

AFMC came into being on July 1, 1992, as an amalgam of Air Force Systems Command and Air Force Logistics Command, with headquarters at Wright-Patterson AFB, Ohio. The merger was meant to integrate and streamline the vast, complex Air Force acquisition and logistics arenas more fully than would otherwise have been possible.

So far, so good. In a recent interview, General Yates cited "many dramatic improvements to the acquisition and logistics processes" since AFMC was formed, notably the introduction of Integrated Weapon System Management (IWSM) and two-level maintenance.

Vulnerable in Vital Spots

AFMC looks vulnerable in vital spots, however. At issue are its labora-

tories, which are seedbeds of acquisition, and depots, the hubs of logistics. Should some depots and laboratories be closed or consolidated? Should defense contractors do more of the work now done in the depots and labs? Such questions nag Congress, the Defense Department, and the Air Force itself.

General Yates claimed that "today's extremely antagonistic acquisition environment" is the root cause of AFMC's difficulties. "It is marked," he said, "by unimaginable micro-management, both from OSD [the Office of the Secretary of Defense] and Capitol Hill." This, he said, is the natural result of "more budget instability than we've ever seen before" at a time of "deep defense drawdown and change in national priorities."

The acquisition environment gives rise to scapegoating, the AFMC commander claimed, as in the Defense Department's punishment of Air Force officers for alleged wrongdoing in the C-17 program. Without referring to that case in particular, General Yates declared, "There is a very unhealthy overlay of accusations in the environment, some of which seem to be free-flowing, and none of which has been proven to have any merit whatsoever."

He acknowledged that "much of this goes with the territory. We spend a lot of the taxpayers' money. They and their elected representatives have every right to oversee and criticize what we do. It's up to us to deal with that."

General Yates said it is "not possible" for AFMC to escape criticism, no matter how well it performs, "but it is possible for the command to do a lot better. We cannot hope to be good enough, but we have to keep trying—to ameliorate the impact of the negative environment. We are doing that. We are paying tremendous attention, and devoting tremendous effort, to continuously improving and to making the command extremely effective.

"There will be less carping—not zero, but less—when we show that we can consistently deliver the goods, that we can do what we say we'll do, and for the money we say we'll do it for."

General Yates sees AFMC's situation as straightforward enough: "If our test facilities, laboratories, product centers, and logistics centers are the best in DoD, they should prosper. If they are not, they will be endangered."

Dodging Bullets

AFMC's depots—its Air Logistics Centers (ALCs)—dodged a bullet this year. The Base Realignment and Closure (BRAC) Commission initially targeted all five ALCs but decided at the eleventh hour to leave them alone for the time being. The commission noted, recalled General Yates with satisfaction, that the ALCs are "national assets."

They may not fare so well the next time around. The BRAC Commission is scheduled to strike again in 1995. "Our bases, including the logistics centers, will once again be under careful scrutiny" and will have to prove themselves all over again, said General Yates. They will have to show, he said, that they can "compete successfully" with defense industry maintenance facilities and with depots of the other services for the billions of dollars of maintenance projects that the Defense Department annually makes available.

The commander of AFMC believes that the Air Force should permit the defense industry to compete for its annual \$4 billion maintenance projects but should also make sure that the depots get their fair share of the work. Industry wants wide-open competition, even if this results in little or no work for the service depots. This laissez-faire position appears to have high-level Air Force backing, as expressed by Gen. Michael P. C. Carns, Air Force Vice Chief of Staff.

The debate goes on. General Yates has been accused in some circles of proposing to “nationalize” maintenance projects. He said he has made available to industry \$800 million worth of maintenance work that industry “never had the opportunity to compete for before.” This is “just the opposite of nationalization,” he asserted.

The last thing AFMC’s depots should do is compete with one another for maintenance projects, said General Yates. He noted that such internecine competition, once commonplace, is deadly evidence of duplication—“depots wouldn’t be in position to bid for the same jobs if they didn’t have duplicative facilities.” This is also the case with AFMC’s test centers, he said.

Concern for the ALCs runs high in AFMC. “The depots do a tremendous job,” said Brig. Gen. Ronald T. Kadish, the former F-16 system program director and currently the C-17 program director. “If they go, we’ll be worse off than we were before [AFMC was formed].”

Duplication is a danger for AFMC’s laboratories, too. Brig. Gen. Richard R. Paul, AFMC’s director of science and technology, acknowledged that “the laboratories need to operate more efficiently—not just in each lab itself, but in the labs as a community.” He noted, for example, that AFMC does its best to distinguish between—and avoid duplication in—electronics research at Aeronautical Systems Center’s Wright Laboratory and Electronic



Photos by Ross Harrison Koly

ALCs must continue to prove themselves, says AFMC’s commander, Gen. Ronald W. Yates. Clyde Myers, a technician at Ogden ALC, examines an F-16C/D radar antenna, preparing it for testing.

Systems Center’s Rome Laboratory. Today, that research is jointly planned and highly complementary, he claimed.

There is considerable sentiment in the upper reaches of the Defense Department for consolidating laboratories within and across the services and for giving private-sector labs a much bigger say in the management of defense research and technology programs.

In the name of efficiency, the services jointly plan many technology projects and team up on some research

that they have in common. They assign such research to the labs—of whichever service—best equipped to carry it out. For example, the Army and the Navy have agreed to do in-house research on fuels and lubricants at a modern Wright Laboratory facility built for just such research. Likewise, the Air Force has transferred some research to Army and Navy labs. DoD’s Defense Nuclear Agency, Advanced Research Projects Agency, and Ballistic Missile Defense Organization are now joining in.

The cooperative research enterprise, called Project Reliance, is “clearly the right thing to do, with resources scarce,” General Paul declared. He cautioned, though, against carrying it too far, with wholesale consolidation of the service labs under the Defense Department. His “biggest concern,” he said, “is preserving the integrity of our [Air Force] labs while working aggressively with the others to improve efficiency throughout. . . . The service labs have a special role, and if they go, the country will lose something very valuable.”

AFMC includes four “superlaboratories” in its vast domain, which unfolds fourteen air bases. AFMC assets also include five depots, four product centers, three test centers, and several other specialized centers, and it manages ninety-seven percent of all US foreign military sales. AFMC’s operations—pegged to the development, production, and worldwide support



Using a large internal grinder at Ogden ALC, landing gear machinist Dean Tipets grinds the upper bore of a C-141’s main outer cylinder. AFMC operations support all Air Force weapon systems and consume half of USAF’s budget.



The ten major aircraft programs under Integrated Weapon System Management include the F-16. Above, SSGT. Keith Wolters tests an F-16 head-up display component at Ogden ALC, while co-workers perform F-16 maintenance, below.

fighter began in the late 1970s. The Air Force F-16 line is scheduled to shut down in 1995 unless Congress keeps it open, but production will keep going for such nations as Greece, Turkey, Taiwan, and perhaps Israel and Pakistan until at least the turn of the century. Several hundred more F-16s are in store, with extensive upgrading scheduled for those now flown by the air forces of Belgium, Denmark, Norway, and the Netherlands.

F-16C fighters and two-seat F-16D trainers began coming off the Fort Worth, Tex., production line in mid-1984, supplanting F-16A/B models transferred to Air Force Reserve and Air National Guard squadrons. The F-16C/Ds were wired from the beginning for both the LANTIRN (Low-Altitude Navigation and Targeting Infrared for Night) system and the Advanced Medium-Range Air-to-Air

of all Air Force systems—consume half the total Air Force budget.

IWSM Is the Cornerstone

General Yates calls IWSM “the cornerstone” of his command. It covers the life cycle of each weapon, from the technology stage to operational service.

Prior to their merger, Air Force Systems Command and Air Force Logistics Command tried IWSM in a few select programs, with mixed results. Cross-command leadership focus was lacking. Now it is there.

Each IWSM program is run by one boss—the system program director (SPD)—who directs all phases of system development, production, and operational support and all dealings with contractors, user commands, and Program Executive Officers at the Pentagon. PEOs oversee all major Air Force programs on behalf of the Assistant Secretary of the Air Force for Acquisition. The Air Force transferred top-level acquisition authority from AFSC to the newly established PEOs three years ago.

AFSC retained—and AFMC inherited—responsibility for systems development and production, plus control of the science and technology programs constituting USAF’s highly important technology base.

AFMC entered its second year with twenty-one programs under IWSM, including nine major aircraft programs: F-22, F-15, F-111, F-117, F-16,



B-1, B-2, E-3 Airborne Warning and Control System, and E-8 Joint Surveillance and Target Attack Radar System. Of these, the F-16 program is a prime example of how IWSM spans the acquisition-logistics spectrum.

Said General Kadish, “The F-16 program covers every phase of acquisition and logistics. It has one foot in advanced technology and the other foot in the grave.”

General Dynamics and, lately, Lockheed have produced more than 4,000 F-16s for the Air Force and many other customers around the world. F-16 engines have evolved through six configurations since production of the

Missile (AMRAAM) system, neither of which was ready for production. In the beginning, the Air Force earmarked a future production block of F-16Cs—Block 40—to receive LANTIRN, which it has. Block 50 F-16s—those now in production—were designated as the first to receive AMRAAM and the new Pratt & Whitney Increased Performance Engine.

Now AFMC and Lockheed are preparing to equip all 229 Block 50 F-16Cs—those in operational service and those yet to be produced—with a Texas Instruments modular mission computer, a central processing unit that integrates fire control, naviga-

tion, and stores management avionics. Ogden ALC at Hill AFB, Utah, "is working up what's involved in the retrofit and how we should go about doing it," General Kadish explained. The computer was developed under the auspices of AFMC's Electronic Systems Center at Hanscom AFB, Mass.

Once all the upgrading is done, "those 229 Block 50 F-16s will be the most capable ever," General Kadish claimed. They will also incorporate—in production or via retrofitting—Global Positioning System satellite-navigation terminals. AFMC's Space and Missile Systems Center at Los Angeles AFB, Calif., runs that program.

"All four [AFMC] product centers and all five Air Logistics Centers are involved in the F-16 program," said General Kadish. "They are cooperating very effectively," to a degree that "would not have been possible" under the old two-command setup.

General Kadish should know. He was the F-15E program manager at Air Force Systems Command's Aeronautical Systems Division (now Aeronautical Systems Center) when the two commands first tried out IWSM for that program in 1991, prior to their consolidation. The F-15E IWSM program director was a loggie brigadier general from AFLC and not, as might have been expected, an acquisition officer from AFSC.

The logisticians have their say in the combined command. Former AFLC



Photo by Ross Harrison Koly

At Ogden ALC, aircraft electrician Lowell Stevens replaces panel fasteners on an F-4's electronics compartment. Careful maintenance is one reason for the long service life of these aircraft.

officers run several programs and are heavily represented among product group managers and materiel group managers directly accountable to the SPDs. Product group managers are responsible for all the engine acquisition and support activity in a given aircraft program, for example, while materiel group managers have charge of such things as landing gear, wheels, and struts.

"The command merger made IWSM legitimate," General Kadish said. "As a veteran of the IWSM wars, I can tell you that we could not have established

IWSM easily under two separate commands. We wouldn't be talking to each other nearly as well as we do now."

The jury is still out on IWSM. "We won't know for another year how well it really works," one official said.

Shaping Up

The making of the new command has been anything but smooth and painless. Many AFSC and AFLC employees in and out of uniform resisted the consolidation of their commands, seeing it as a threat to their jobs. Turf battles still rage here and there, from the clerk level to that of program directors. There seems to be general agreement, though, that things are rounding into shape.

Maj. Gen. Roy D. Bridges, Jr., AFMC's director of Requirements, claimed that "reduction of complexity is a big, early payoff" from the merger of the commands and the introduction of IWSM. The combined command began with "800 programs in little pieces throughout the product centers and logistics centers," set out to integrate them under single managers, and succeeded in cutting the number to ninety-eight by late summer.

All those programs will have come under IWSM by next March, if everything goes as planned. Newer programs are more readily adaptable to IWSM than are old ones, which carry forward considerable momentum from earlier phases and previous organizational alignments.

USAF photo by Ken Hackman



Chemists at Oklahoma City ALC at Tinker AFB, Okla., research new compounds with which to clean and plate engine parts. This ALC furnishes logistics support for bombers, jet engines, instruments, and electronics.



A robotic arm inspects an F-15 (one of the major aircraft programs under IWSM) at Sacramento ALC, McClellan AFB, Calif., scanning the aircraft to detect early signs of cracks and corrosion.

“We’re only about a fourth of the way there on IWSM,” General Yates declared. “We’re still in the stage of discovering the dramatic improvements that can be made.”

The same goes for AFMC’s move to two-level maintenance, which the AFMC commander called “more important than ever—overwhelmingly important” to an Air Force intent on exercising global reach and global power. “It will dramatically reduce our deployment footprint, and it will cut costs because there will be less equipment in the pipeline,” he asserted.

“Desert Storm was a dramatic lesson to us,” the AFMC commander continued. “We didn’t have two-level maintenance then, and we had to carry a huge support tail to war. We saw what an enormous burden it was. We concluded that we can’t afford to do it this way the next time. Logisticians and their equipment have to be airlifted. They have to be housed. Each one is a potential casualty. We have to cut their numbers way down.”

Two-level maintenance dispenses with intermediate-level repair shops and the base maintenance squadrons that operate them. This makes it much easier for combat wings and squadrons to deploy on short notice, travel light, and be self-sufficient—ready to fight—on or soon after arrival. This is why two-level maintenance is seen as a must for Air Combat Command’s composite 366th Wing, a quick-reaction “air-intervention” wing, at Mountain Home

AFB, Idaho. The 366th contains many different types of combat and support aircraft with widely varied logistical requirements. Fortunately, all of its varied fighters share common, or nearly common, engines and avionics.

AFMC’s two-level maintenance project now focuses on engines and avionics. Base I-level specialty shops, such as those for welding and sheet metal work, will remain in place for the time being. Modern engines and avionics are naturals for two-level maintenance because they are modular, built around line replaceable units (LRUs), or modules, that technicians and mechanics can readily remove and replace.

The former AFLC made the first move toward two-level avionics maintenance in 1991 with its Coronet Deuce program for F-16s at Hill AFB, Utah. That program proved highly successful. AFMC has expanded it to encompass 460 F-16s and sixty A-10s at bases in the United States and in the European and Pacific theaters.

Results thus far promise “tremendous savings for our operating forces,” said General Yates. AFMC claims that two-level maintenance has reduced F-16 avionics support equipment by more than seventy percent, from 137 tons to thirty-seven tons at a given base. Turnaround time for F-16 LRUs in the maintenance pipeline has been cut from forty-seven days to nine days on the average.

AFMC set up a second two-level avionics maintenance program at Tinker

AFB, Okla., home of Oklahoma City ALC. In it, about 400 LRUs from B-1 and B-52 bombers, KC-135 tankers, and E-3 AWACS planes are repaired each month. Tinker AFB is also the site of a prototype two-level maintenance program for C-141 and B-52H engines. F-15E and F-16 engines are now being repaired in a two-level maintenance test program at Kelly AFB, Tex., home of San Antonio ALC.

Strong Resistance

The Air Force’s switch to two-level maintenance met with strong resistance in the loggie world. Its service-wide implementation will eliminate thousands of maintenance, supply, and transportation jobs.

Some skeptics claim that operational squadrons will never really have confidence in a maintenance setup that lacks I-level engine and avionics shops to keep their planes in fighting trim.

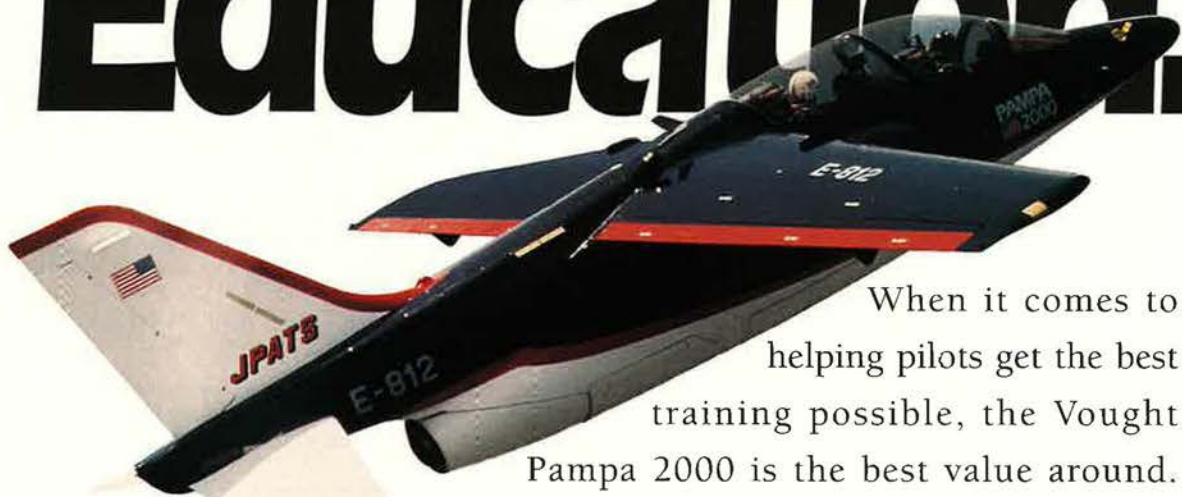
The evidence thus far is to the contrary, AFMC officials claim. “ACC and AMC commanders are very supportive,” said Thomas Miner, AFMC’s deputy director of Logistics. “Their mobility load is tremendous, and they see two-level maintenance as a great advantage. They can concentrate on their warfighting mission, and they don’t have to worry about a huge logistics tail following them around.”

Mr. Miner claimed that the command has come along fast and is “almost there” with two-level avionics maintenance.

SPDs hold sway over two-level maintenance programs as well as IWSM for their particular systems. General Bridges noted that the SPDs are in position to “refocus the design” of systems to make them more reliable and also to “refocus money—when they see that parts [for their systems] are not as reliable as they should be—to support our [two-level] maintenance concept.”

AFMC officials note that the built-in reliability and maintainability of today’s digital avionics and heat-resistant high-performance engines make it possible to dispense with I-level maintenance. They also stress the importance of test equipment to the success of two-level maintenance. Avionics and engine testers must find and diagnose problems well enough to show flight line mechanics which LRUs and engine modules can be fixed on the spot and which should be sent back to depots. ■

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The Air Force expects proposals from seven contractors with very different trainer aircraft.

The JPATS Race Gathers Speed

By Frank Oliveri, Associate Editor

CAPT. Peter Kanikula, an instructor pilot with the 64th Flying Training Wing at Reese AFB, Tex., teaches the basics of aviation to student flyers. He uses the T-37 Tweet, a venerable airplane (thousands of hours flown since 1958) soon to be replaced by a new Joint Primary Aircraft Training System (JPATS).

As Captain Kanikula tells it, his basic training program is as plain as the flat Texas landscape. It's vitally important, but nothing fancy.

"It teaches them pretty much how to get the plane into the air, back on to the ground, aerobatics, some advanced aerobatics, emergency procedures flying, and simulated single-engine stuff," he said. "The next phase is navigation and instrument flying and formation flying. It teaches them to stay in formation, and [it teaches] three-dimensional maneuvering, including inverted flight."

It's not surprising, then, that the Air Force and Navy (USAF's partner in JPATS acquisition) are looking for something other than an ultrahigh-performance plane to replace USAF T-37s and Navy T-34Cs, two trainers nearing the end of their service lives. The new plane must be able to per-

After the Prize

The USAF-Navy JPATS program represents the largest procurement prize that the trainer aircraft industry will see for many years, if not decades.

With the Air Force and Navy set to buy a total of 766 airplanes—418 for the Air Force and 348 for the Navy—USAF and Navy officers estimate that the total value of the program will settle in between \$6 billion and \$7 billion.

Maj. Gen. Patrick P. Caruana was until recently USAF's director of Long-Range Power Projection, Special Operations Forces, and Airlift and Training Programs. He was also in charge of JPATS requirements. He said that, given the uncertainty in current defense programming, "the Air Force and the Navy, jointly, will be looking at the [JPATS] requirement year by year." The initial numbers could be refined, "which is prudent because our requirements have changed."

For the worldwide trainer industry, the significance of the JPATS program goes far beyond the US market. Industry officials say that export sales could produce orders for up to 800 airplanes.

The US has a good track record for follow-on support of overseas customers. The logistics supply line is stable. Foreign buyers would benefit from the economies of scale.

"Several countries have declared that they'll wait for the JPATS acquisition before they buy their next trainer," one industry official said. "Israel is one, but there are a lot of countries around the world waiting for a JPATS winner."



The Beech/Pilatus PC-9 Mk. II is one of two turboprops in the competition. Beech will rely heavily on its trainer experience and aircraft maintainability to gain the upper hand in the JPATS competition.

form certain maneuvers: aileron roll, loop, split S, barrel roll, lazy eight, chandelle, Immelmann, Cuban eight, and cloverleaf. However, officers say it is more important that the JPATS has a "forgiving" nature.

"One of the big things [in the USAF-Navy Joint Requirements Document] has been the requirement for tolerance to common student errors—common student errors being defined mainly as vertical-recovery stalls," said one industry official. "Tolerance is a big requirement. It implies that it must be a very safe airplane."

Many airplane manufacturers are convinced that they have just the right plane—with just the right amount of tolerance in its makeup. The Air Force expects to receive proposals from seven contractor teams. The service will evaluate a host of distinctive airplanes covering the spectrum of performance. For example, four contenders have maximum speeds of 270 knots, but three have sizzling top speeds of more than 400 knots. Propulsion systems also show diversity; of seven contenders, one is a turbojet, two are turboprops, and four are turboprops. There will be one dual-engine entry and six with single engines.

What follows are detailed sketches (in alphabetical order by name of lead contractor) of the seven prospective candidates for JPATS, with contractors pointing out what they view as strengths.

Beech/Pilatus

Beech has teamed with Pilatus to propose the PC-9 Mk. II turboprop trainer aircraft. In its non-JPATS form, the PC-9 has logged 61,000 flight hours as a basic trainer for several national air forces. Plans call for US industry to produce slightly more than seventy percent of the Beech/Pilatus airplane in domestic plants. This would satisfy the informal understanding between the government and the contracting teams on the amount of local content in the winning airplane.

The PC-9 will sport the Pratt & Whitney PT6A-68 turboprop engine, which will be flat rated at 1,250 shaft horsepower. The PC-9 has a maximum speed of 271 knots, surpassing the minimum JPATS requirement of 250 knots at an altitude of 1,000 feet.

Dave Reimer, the Beech JPATS program manager, said the key to victory in the competition will be the government's perception of best value. The team that provides the system with the best overall performance for the lowest cost will win. To Beech, that standard is just fine.

"We've built 11,000 aircraft in the history of the company," said Mr. Reimer. "We know how to build training systems. If you look through the competition, there aren't many of them that build this class of airplane [the PC-9 Mk. II]. Our strength is our experience in doing that. We've done the T-34C for the Navy, so we know what is needed."

"Our goal from day one was to [accentuate] maintainability. We made a number of changes to the aircraft from the basic PC-9—solely for maintainability. Some of those changes have been in the avionics area. It's something we've focused on from the very early stages."

Cessna

Cessna is proposing what several competing contractors called the "all-American" aircraft. Virtually every component of the Cessna JPATS



The Cessna JPATS CitationJet is the only twin-engine aircraft in the competition. One of the last competitors to enter the fray, Cessna says its aircraft will be ready on time.



The Grumman/Agusta S.211A trainer is the smallest aircraft in the JPATS competition, but it is a high-performance plane. Grumman officials said the powerful aircraft will not be too much for new pilots to handle.

CitationJet is made in the United States—a potentially large political dividend, given the preferences of the Clinton Administration.

The twin-engine JPATS CitationJet has been derived from Cessna's commercial CitationJet. Jon Huffman, Cessna's director of JPATS program management, said his aircraft in its

modified form will meet all JPATS requirements.

"We've designed the airplane to be a basic trainer," he said. "It is not an advanced basic trainer but a basic trainer. We are not trying to make it go super fast. We are trying to provide an airplane that does what the government asks for in a basic trainer."

Modifications for Female Pilots

Significant changes have occurred in recent months in JPATS requirements, training strategy, and acquisition strategy.

The most significant change in requirements concerns the need to provide for female pilots. In the wake of the Pentagon's move to permit women to serve on combat aircraft, the services were instructed to design the JPATS cockpit in a way that would accommodate eighty percent of the US female population.

"That's the biggest change we see [in the program]," said Maj. Gen. Patrick P. Caruana, USAF's former director of Long-Range Power Projection, Special Operations Forces, and Airlift and Training Programs. "That's why we wanted to get the request for proposal out, so that [the contractors] can start looking at . . . the implications."

Contractors indicated that meeting the requirement would not be a great problem but would require some changes to the ejection seats and rudder pedals.

In April, Defense Secretary Les Aspin ordered the services to consolidate flight training. The Air Force and Navy will be required to train pilots together for the first time. The Air Force submitted a draft of the new trainer master plan, which incorporates the change, to the Pentagon in July.

Lt. Cmdr. Clay Umbach, the Navy's JPATS requirements officer, said that, as a result of the order, "the Navy may accelerate [its] part of the program. We were originally going to buy our first airplane in 2000 and start from there. Now we have to do it together, train students together at the same bases, with the same syllabus, same mix of instructors. It will be a big 'purple suit' thing. As a result of that, the Navy is stepping up [its buy]."

On the acquisition side, the Air Force and Navy decided to issue two separate requests for proposal for the air vehicle and the ground-based training system, which will include a stationary trainer with an elementary visual system. There will be computer-aided instruction and an automated training management system. Students will be able to perform normal and emergency procedures, instrument procedures, and fidelity instrument procedures, General Caruana said.

Mr. Huffman said the aircraft is "docile" and will handle spin training well by spinning nose-down, which is most desirable and provides predictability when the airplane is coming out of a spin.

As Cessna sees it, the plane will benefit from having two engines, though the requirement permits single-engine entries and all other contenders have one engine.

"With the twin engines," Mr. Huffman said, "we will be able to provide engine-out positive climb even at the highest-altitude airfields, and that is a safety issue with the student pilot. That is the big issue with the T-37. Although it has a good engine-out climb at sea level on a standard day, when you get to high altitudes and hot [weather], well, the T-37 sank like a rock. This airplane will not do that."

The aircraft uses the Williams F129 engine, a missionized version of the commercial FJ44. It has been derated from 1,900 to 1,500 pounds of thrust, which allows it to run cooler. "That allows you to do these throttle excursions that you need to do in a military training engine without wearing the engine out," Mr. Huffman said.

Grumman/Agusta

Grumman and Agusta have entered the contest with their S.211A turbofan jet, a plane originally built to meet requirements for a primary trainer program in the 1970s that evolved into the T-46 program. The ill-fated T-46 was canceled in 1986.

The basic S.211, which has racked up about 70,000 hours of operational experience as a trainer in foreign air forces, has now been missionized to meet JPATS requirements.

With a length of only thirty-one feet, two inches, and a wingspan of only twenty-seven feet, it is the smallest of the competing aircraft. Its Pratt & Whitney JT15D-5C engine with 3,200 pounds of thrust gives it a maximum speed of 400 knots.

Though the plane is small, powerful, and fleet, Grumman officials maintain that the S.211A, like its less muscular rivals, will respond smoothly and easily in the hands of a student pilot.

According to Grumman's S.211A international business development manager, Phil Murphy, "In the S.211 we have an airplane that can be flown at virtually any attitude, any airspeed, any power setting, and the airplane

will not do anything to cause the student to lose the airplane. It doesn't exhibit any wing drop when it stalls, which is one of those problems that you don't want to see in a primary trainer. You want it to stall straight ahead, with just the nose dropping as it stalls. That's what this airplane does."

Mr. Murphy reported that the plane is built with a supercritical wing and is engineered to maintain a laminar flow that will enable the plane to fly at very low airspeeds at high angles of attack while maintaining stability.

Lockheed/Aermacchi

The Lockheed/Aermacchi T-Bird II turbojet aircraft is a high-performance trainer aircraft with a maximum speed of 475 knots—fastest of the group—along with a +8G/-4G capability.

T-Bird II Program Manager Joe Tew said the manufactured content of this aircraft is eighty percent American. The T-Bird is a derivative of the MB-339A, which first flew in the late 1970s. More than 1,500 foreign pilots have been trained in that airplane.

The plane's Rolls-Royce RB582-01 engine puts out 4,000 pounds of thrust, and the aircraft can operate well at altitudes exceeding 40,000 feet.

The airplane isn't too hot for the mission, Lockheed is quick to argue. "This is a sheep in wolf's clothing," said Joe Maston, the T-Bird II business development manager. "It was designed with the student in mind.



The Lockheed/Aermacchi T-Bird II is the fastest aircraft in the competition, with a top speed of 475 knots. Although it is a high-performance trainer, Lockheed officials say it is a very stable platform.

We're over-powered, and that allows you to have the response time, but, at the same time, it's not going to completely intimidate the student or put the student someplace he doesn't want to be."

Mr. Maston continued, "It's a very stable platform. For example, take spins. It's a perfect spin platform, both upright and inverted. If I put in a stick control correction, I'm out of the spin in about half the turn. If I just neutralize the control, I'm out in about one turn. If the student just throws up

his hands, he's out in about a turn and a half." In an inverted spin, the aircraft "just comes out nose low and flat. You can take this thing and put it at any attitude and do throttle slams, and the engine just says, 'What do you want to do?'"

Northrop/Embraer

Northrop and Embraer have come in with a JPATS entry based on the EMB-312 Tucano H turboprop trainer, an airplane with a 270-knot maximum speed produced by a 1,600-horsepower Pratt & Whitney PT6A-68 engine.

Northrop Tucano Program Manager Mike Major said, "It's a very honest airplane, a very safe airplane, and it's got a history of reliability and maintainability."

Additionally, said Mr. Major, the plane promises to be a low-cost performer, in terms of both initial acquisition and overall life cycle, as a result of lower turboprop operation and maintenance costs.

"The other thing to realize here is that this is a primary training aircraft," said Tucano Deputy Program Manager John Bovin. "In this case, more is not necessarily better. Our objective is to teach a student with no previous flying experience the basic airmanship skills that he needs to go on to the next phase. So the training requirement is really the driver."

According to Mr. Major, the Tucano H can get out of some very



The Northrop/Embraer EMB-312 Tucano H will be a low-cost performer in terms of initial acquisition and life cycle. While less powerful than some of the jets in the competition, the turboprop costs less to operate.

difficult situations almost on its own by virtue of its unique aerodynamic design.

The plane, he said, has "excellent repeatability" and strong throttle response, which, with the airplane's overall strength, "will allow you to power out of certain situations. In an out-of-control situation, you let the plane go and it recovers itself. It's smarter than we are sometimes."

Rockwell/Deutsche Aerospace-MBB

For the JPATS contest, Rockwell International and Deutsche Aerospace-MBB have teamed up to produce the Fan Ranger 2000 JPATS aircraft.

The Fan Ranger 2000, a derivative of the existing Fantrainer, is expected to meet all JPATS requirements. Its powerplant will be the Pratt & Whitney JT15D turbofan engine with some 2,500 pounds of thrust.

In terms of speed, the Rockwell entry stands in the middle of the JPATS pack with a rated speed of 300 knots.

Earlier this year, a test pilot was killed in an accident during flight testing of the Fan Ranger 2000. With the accident still under investigation and no firm conclusions yet available, Rockwell officials were reluctant to discuss details of their program. Other industry officials, however, said they expected the Fan Ranger to continue to be a strong entry.



The Rockwell/Deutsche Aerospace-MBB Fan Ranger 2000 is in the middle of the pack in terms of performance, but a fatal accident has placed the future of the program in doubt. The accident is being investigated.

Vought/FMA

The Vought/FMA Pampa 2000 turbofan aircraft has a maximum speed of 450 knots and an operating ceiling higher than 40,000 feet. The Garrett TFE731-2 engine puts out 3,500 pounds of thrust.

The Pampa is a variant of the IA 63 jet trainer. The contractor team says that ninety percent of the content will be US-made. It already has accumulated about 1,000 hours of flight time.

Vought officials say that this aircraft was designed to cover a broad

portion of the training spectrum—from that of a basic primary trainer through the world of advanced training.

Said Pampa Program Manager Steve Yarborough, "It has to be an aircraft that is capable of training that very beginning pilot in a very safe manner so that he can quickly learn how to fly an airplane and, at the same time, steadily progress through the entire program, and there is continuous learning." The goal is that, "at the end of your training, you can step right into the next aircraft and be very proficient without having to relearn to fly.

"You are able to step into [the Pampa] and really do a takeoff in your first try," he declared. "If a student makes a mistake, it's forgiving. It is self-recovering."

Vought officials point out that the Pampa has a fully powered hydraulic control system, unlike other JPATS contenders. They claim that the feel is more like that of flying an advanced fighter. "That's how they're designed, so you will train on an aircraft that is like the aircraft you will fly in the future," said Mr. Yarborough.

The Pampa 2000 program also was hit with an accident late last year. Two Argentine pilots perished. The post-crash investigation, however, turned up no technical or mechanical failure in the aircraft. Investigators concluded that the pilot controlling the aircraft attempted a maneuver for which he was ill-prepared. ■



The Vought/FMA Pampa 2000 can cover the full spectrum of training from basic primary to advanced training. Pampa officials said a student who trains in the Pampa will be better prepared to fly current operational aircraft.



Our trainer has already earned its wings.

The T-Bird II Team

Lockheed Aeronautical
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Rolls-Royce plc

Textron Aerostructures

The Lockheed/Aermacchi/Rolls Royce MB-339A is the best plane for the job of America's next primary trainer.

It's a low-risk, operationally proven aircraft that has trained more than 1,500 pilots in eight nations. It's designed to the exacting military standards demanded by the U.S. Air Force/Navy Joint Primary Aircraft Training System.

The MB-339A's superior performance, forgiving nature and accommodating design enable it to meet the rigors of student flight like no other aircraft. It is also the airborne element of the team's Total Training System.

Together, these attributes make the MB-339A the ideal JPATS solution.

 **Lockheed**
Aeronautical Systems Company

When the squadron goes, it takes a lot more than the airplanes. The people who go first keep a "mobag" packed and ready.

Deployment

By Peter Grier

AT SHAW AFB, S. C., a squadron of F-16s was busy preparing to depart for a training mission somewhere in southwest Asia. The hard-edged crackle of fighter take-offs echoed off base buildings. Sgt. Patrick Vance of the 363d Fighter Wing prowled through a cavernous supply warehouse, explaining in detail the proper way for a squadron to pack its bags.

As noncommissioned officer in charge of F-16 parts, Sergeant Vance was responsible for transporting all the spares overseas when the squadron deployed. He had to assemble five huge pallets loaded with everything from a bulky extra cockpit canopy to the tiny nuts and bolts of bench stock.

Loading a pallet, the Sergeant made clear, is an art far more difficult than one might think. The basic unit of assembly is a simple carrying device—a 108 inch by eighty-eight inch metal plate designed to fit into the standardized roller-and-rail system on Air Force airlifters. Yet piling equipment on the pallet is a bit like putting together a puzzle, with ironclad rules about what goes where and how to distribute weight properly.

Heavy items go on the bottom, to-



The 363d Fighter Wing's F-16s (opposite) were among the first aircraft to deploy for Operation Desert Shield. In case of another short-notice assignment, personnel with deployment priority (above) must have their mobility bags packed and their paperwork in order.

ward the center. The identification tag of each equipment "increment" must be turned to the outside, so pallet contents can be read at a glance. The rules prohibit any "metal-to-metal" contact, lest a spark start a midair, on-board fire.

Packing the squadron's bags has become old hat for Sergeant Vance. At the beginning of Operation Desert Shield in the summer of 1990, F-16s from Shaw were among the first combat jets hurried to the Persian Gulf



region, and he had a big role in getting them there and keeping them supplied. He learned that small parts—signal processors, for example—are hugely important to combat readiness. “The quick-fix items—we carry more of them than we did before the Gulf War,” he said.

Rising Demand

The need to increase the fighting force’s rapid deployability is getting lots of attention these days—at the 363d Fighter Wing no less than within the Air Force as a whole. The service continues to shrink, flying units are closing, and forward-based presence overseas is being reduced. However, as operations in Iraq, Somalia, and the Balkans have shown, the global demand for US airpower is as strong as ever.

That means overseas assignments for US-based units are sure to increase. Such movements are not exactly novel, said many officers. The Air Force has long prided itself on being able to move its forces quickly to where they are needed. “We have never been a fight-in-place force,” said Col. Donald G. Searles, commander of the 363d Logistics Group.

“The first order of business is getting to the war.”

Signs of this attitude are everywhere. At the 363d’s maintenance warehouse, two pallets packed high with gear stand ready to accompany the deploying squadron on its overseas training mission. Among the items in the stacks are oil analysis machines, ground power units, tool boxes, and tripod jacks.

As the bag-packers tell it, Operation Desert Storm taught the Air Force many “pallet lessons.” One was, don’t count on sending all of your cargo on military airlifters. Count on having to send lots of it on civilian airlifters (which are supposed to haul only passengers). When that happens, you had better have packed all toxic materials properly to conform to the guidelines of the International Air Traffic Association.

The desert war drove home other truths. Packing pallets for different planes requires different shapes, MSgt. Tim Knopp observed. He said that a C-141 accommodates a loaded pallet up to ninety-six inches in height. On the other hand, much of the cargo space in a KC-10 tanker is filled with fuel tanks. Pallets used on this aircraft

must taper down to fifty-six inches on the low side.

Pallets are not the only things in the 363d’s warehouse. Behind them stand rows of carts draped with green shrouds against the day they too will be called out on deployment. Racks of tires hang overhead, reflecting a deployed unit’s need for replacements when operating thousands of miles from well-stocked home bases. “There are days you can drop \$150,000 on blown tires,” said Sergeant Knopp.

Deployment demands are escalating and are sure to have an impact on the fighter force structure. In assessing the implications of the service’s new mobility demands, the 363d is a good place to start. Southwest Asia is the primary area of interest and orientation for the wing’s three squadrons—the 17th and 19th Fighter Squadrons, which are equipped with F-16s, and the 21st FS, which has A-10s. The region has diminished little in importance for the Air Force since the massive deployment of the Gulf War.

One Out of Fifteen

Staying up to speed is a struggle. During the course of the war, Shaw’s 363d FW sent fifteen F-16 parts spe-

cialists to the Persian Gulf region, but that pool of experience has rapidly dispersed. The force drawdown has caused some to leave the service, while others have moved to other installations. Of the fifteen who went overseas, only Sergeant Vance remains at Shaw. "We've lost most of those with that personal knowledge," he said.

Col. David J. Morrow, the 363d's acting wing commander, observed that his organization faces widely differing deployment assignments. First are the "real-world" rotational assignments. Second are training exercises. Assignment to either or both depends on various factors. For example, the wing's F-16s were undergoing a mission change in late summer and early fall, shifting to Suppression of Enemy Air Defenses. Faced with a need to absorb new equipment as well as an increased requirement for mission training, the wing was not likely to be tapped for an operational deployment to the Gulf until mid-1994.

Colonel Morrow pointed out that, in combat rotations, specialized fighter units—such as those fielding F-15E fighters or F-117 Stealth fighters—tend to be more in demand than those with F-16C/Ds.

Still, there are indications that the rotational work load will increase across the board for active-duty units. One reason is a shift in the active-reserve force mix. More and more Air Force power is being shifted to the Air Force Reserve and Air National Guard,

yet it is difficult to send Guard and Reserve units away for the ninety days required in a typical overseas rotation. This forces active-duty units to take on a disproportionate share of overseas assignments. Finessing this problem sometimes taxes the ingenuity of active-duty units to the limit.

Also increasing are the dangers and problems confronting Air Force units once they arrive overseas, reflecting the disorders of the post-Cold War world. Overseas assignments used to mean travel to Europe or perhaps South Korea. Now the need to enforce "no-fly zones" around the world is pulling the Air Force to operational locations that seldom would have seen large US deployments in the past. "All of a sudden," said Colonel Morrow, "there are lots of different places we could go."

Overseas training, at least for the 363d, is already on the rise. Until recently, said Colonel Morrow, a three-squadron US fighter wing would typically send only one of its squadrons on one overseas deployment exercise each year. In late summer, however, the 363d was preparing to send all three of its squadrons overseas in the course of a three-month period. This means that the troops will have to spend more time away from their families. However, said the wing's officers, most Air Force pilots look forward to overseas exercises as a break from the usual State-side flying routine.

Deployments to southwest Asia typically are undertaken for one of two reasons. The first is to make a political statement. The armed and ready presence of twenty-four high-performance US fighters on foreign soil is a potent symbol of American commitment. The second reason is, of course, to prepare for possible combat operations. For pilots, that means getting used to strange and possibly unique terrain and learning how to operate in tandem with foreign air forces.

New Terrain, New Partners

Practicing air-to-ground operations over a desert is much different from operating over a verdant, populated area like South Carolina. "Your depth perception becomes a problem," said Col. Kees Rietsema, commander of the 363d Operations Group. "You've got visibility problems at low altitude."

Acquiring the target is easier on the desert—so long as the target is not hidden or obstructed from view. Recognizing desert camouflage or dummies is most difficult, according to Colonel Rietsema.

The most important thing to learn about a foreign allied air force is the way it communicates with and commands and controls its units. US pilots have to understand the details of their partners' tactics and operations—even their formations—if they are to fly in close contact with each other.

In almost all cases, the designated language of air control is English, but differing accents can still make communications problematic. "I've flown with guys who claimed they spoke English, but they could have fooled me," said Colonel Rietsema.

Perhaps the most important training aspect of overseas deployments involves not flying but mobility. For the personnel who deploy aircraft and supporting equipment and then keep units up and running, a set-piece US exercise, such as Red Flag at Nellis AFB, Nev., is the equivalent of an open-book college exam. An overseas deployment, on the other hand, is a "graduate-level exercise," said Colonel Searles of the 363d Logistics Group.

At present, the mobility of the 363d is quite good, maintained Colonel Searles. In August, the wing ran a complicated base-level exercise, simu-



Loading pallets is as much an art as it is a science. The 363d learned many "pallet lessons" during the Persian Gulf War, including how to meet International Air Traffic Association requirements when transporting materiel aboard civilian airlifters.

lating a simultaneous deployment of fighters to two widely separated locations. When the wing had completed the deployment of forty-seven plane-loads of personnel and equipment, officers learned that only three had arrived late. One of those was late on purpose; the wing gave different crews a shot at rolling pallets onto a C-5 Galaxy brought in for the test.

Colonel Searles said he wanted to get more flexibility into mobility exercises. This stems from the Desert Storm experience, he said, during which only a few fighter units ended up actually executing their canned, prewar mobility plans.

Fluctuating Airlift

During the war mobilization and deployment, Colonel Searles had been assigned to an F-4 squadron. He said that plans called for his particular squadron to be able to fully deploy using the equivalent of thirty-eight sorties of fully loaded C-141 cargo planes.

However, in the hours before the squadron was to depart, the amount of airlift on which they could depend kept bouncing up and down, from four C-141s to sixteen to twelve, and so forth. Senior officers constantly reviewed and revised the transport priority list. It made sense to them, but it drove others crazy.

At the 363d, the keeper of the mobility plans is Lt. Tom Rogers, the installation mobility officer. Lieutenant Rogers is responsible for training mobility personnel, overseeing any actual deployment, and maintaining massive computer printouts that set movement priorities for just about everything a fighter squadron could need.

Air Force units keep two kinds of deployment plans, said Lieutenant Rogers. First, and most detailed, are what he calls the "deliberate plans." These reflect the role the units would play in any operation for which the Joint Chiefs of Staff have drawn up contingency plans. Many of these deliberate plans were oriented toward fighting the Soviet Union in Europe. "Right now, the whole deliberate planning world is in flux," noted Lieutenant Rogers.



Though the C-5 Galaxy (above) can hold up to 261,000 pounds, its size bars it from many runways around the world. The 363d FW takes its 500,000 pounds of equipment in 12.5 C-141 loads when it deploys.

The second category encompasses contingency plans. These are less detailed, especially when it comes to who goes where, using what types of transportation assets. In deliberate plans, the units of the 363d FW go to assigned bases at forward locations, but "in a contingency plan," said Lieutenant Rogers, "you sometimes won't know that information until the C-141s are halfway there."

The basic building block of all these plans is something known, prosaically, as a UTC (Unit Type Code). The UTC refers to a package of Air Force equipment and personnel that can fulfill one mission. Each UTC is a unique alphanumeric code for ready identification.

A twenty-four-plane F-16 unit, for instance, is labeled "UTC 3FKM1." This unit would be supported by maintenance UTCs, warehousing UTCs, dining facility UTCs, and so forth. The 363d is made up of approximately 180 different UTC groups.

Yellow Pages

The computer printout of the contingency plan for deploying 3FKM1 is easily as thick as a big city's "Yellow Pages." Its several hundred pages list all 439 persons assigned to the twenty-four-plane group, as well as

the details of 500,000 pounds of equipment that travels with them. At about 40,000 pounds per C-141, moving an F-16 squadron takes at least 12.5 airlifter loads.

The plans account for everything down to the smallest item that can be stuffed in a cargo bin. "We're talking about stuff like communications cords, a bale of rags, headsets, spray bottles," said Lieutenant Rogers.

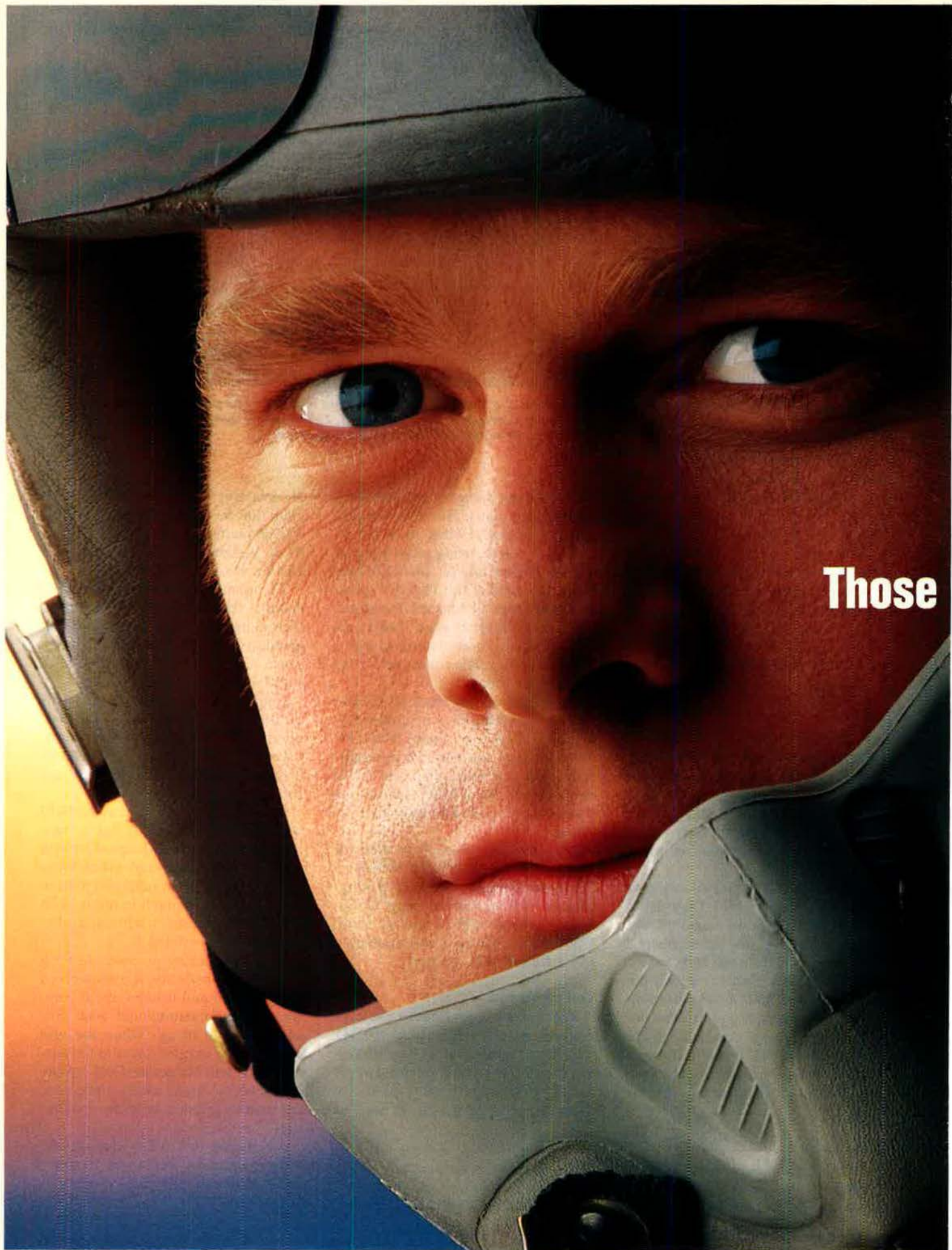
Equipment, of course, is only half the deployability story. The other half covers the movement of the troops. Like their equipment, people must be properly prepared before they are shipped overseas.

Theoretically, everyone at the 363d with deployment priority has a "mobag" (mobility bag)—prepacked with clothing, toiletries, and other basic needs. They are also supposed to have their lives pretty much in order, with proper ID cards, shots, wills, and other paperwork completed.

Prior to training missions in their area of responsibility, those involved are gathered and briefed about local weather and customs and what personal gear to bring. When the unit prepared for a deployment to the austere, puritanical Persian Gulf region, it planned to bring along equipment not strictly related to sortie generation.

According to Lt. Tim Hanlon, the wing's chief of Personnel Systems and Readiness, "they took along volleyball sets." ■

Peter Grier is the Washington, D. C., defense correspondent for the Christian Science Monitor and a regular contributor to AIR FORCE Magazine. His most recent article, "The Fog of Procurement," appeared in the October 1993 issue.



Those

**who give their best for America
deserve to have only the best.**



**PRATT & WHITNEY
FOR JPATS**



The most popular piece of equipment in the desert was a GPS receiver.

How Navstar Became Indispensable

By Michael R. Rip

THE PERSIAN Gulf War took place in a region nearly devoid of topographical features, with few paved highways, in the grip of the murkiest weather in recent memory. In addition, the war theater was huge. Because it would have been so easy to get lost, everyone understood the requirement for accurate navigation.

Fortunately for the coalition, a new satellite navigation system was available: the Navstar Global Positioning System (GPS), a spacebased, radio-positioning network able to supply groundbased and airborne users with precise information on position, velocity, and time.

In January 1991, during the runup to war, coalition forces seeking such information could call on sixteen GPS satellites, an on-orbit constellation that each day provided 22.5 hours of two-dimensional and 16.75 hours of three-dimensional position time.

Using military-grade GPS receivers, ground troops and pilots acquired position-location data accurate to within ten meters. These military receivers were in short supply; most receivers in theater were commercial handheld units—the small, lightweight, GPS receivers known as “sluggers.”

US Aircraft with GPS			
Air Force	Army	Marines	Navy
B-52G	AH-1F	AH-1	A-6
C-130	AH-64A	CH-46D	E-2C
C-141B	CH-47D	CH-53E	EP-3E
E-3B/C	EH-60A	UH-1N	H-3
E-8A	OH-58A/C/D		HH-60H
EC-130H	RU-21H		MH-53E
EF-111A	UH-1H/V		MH-60A
F-15E	UH-60A/L		P-3
F-16			SH-60B/F
F-111F			UH-1
MC-130E			UH-60A
MH-53J			
MH-60			
RC-135			
TR-1/U-2R			

The Global Positioning System is especially valuable in terrain with few natural or man-made reference points, like the Iraqi desert (opposite). All four services now employ the system in a variety of aircraft (above).

Military users were attracted not only to the precision of the GPS information but also to the passive way in which it was dispensed. The use of a continuously beamed signal did not risk disclosing the position of the user's receiver. The ability of military units to move to a specified position at a precise time without revealing their locations through telltale emissions is unique to the system.

For these reasons, Lt. Gen. J. H. Binford Peay, wartime commander of the Army's 101st Airborne Division, called the sluggers “the most

popular new piece of equipment in the desert.”

Redrawing the Map

Long before the war, Air Force planners grasped the importance of GPS, mainly as a result of limited use of the system during Operation Just Cause, the 1989 US intervention in Panama. There, USAF used GPS to overcome the deficiencies of local maps, which showed key bridges in the wrong places.

Moreover, a GPS-equipped RC-135 intelligence-gathering plane won



Strategic Air Command's bombing and navigation competition in 1989 by arriving at every checkpoint within three seconds of the target time. Its navigation was so accurate that SAC would not permit more GPS-fitted airplanes to compete until all their competitors were similarly equipped.

In the desert war, GPS came into its own. Precision bombing, artillery fire support, repositioning of maneuvering troop formations, and certain Special Forces operations were made possible or greatly enhanced by GPS. A partial list of US fixed-wing and rotary-wing aircraft using GPS can be found in the table on the facing page.

GPS satellites became indispensable in guiding coalition aircraft to their targets with a high degree of precision, particularly during the first week of the air campaign, when allied air operations were hampered by poor weather over much of Iraq and Kuwait.

The campaign required hundreds of precise reference points to calibrate the inertial navigation systems (INS) of aviation units. These points were established by differential GPS (DGPS) methods undertaken in Saudi Arabia and possibly in southern Iraq.

DGPS methods use a reference receiver located at a known, surveyed site to measure errors and compute corrections for remote receivers at unknown positions. Using differential techniques, commercial receivers are capable of horizontal accuracies of between one and ten meters.

LANTIRN Leads the Way

During the war, the Air Force dispatched seventy-two GPS-equipped F-16 fighters. Pilots said they were consistently able to navigate to their targets with a high degree of precision, even during poor weather.

From August 1990 until the start of the coalition air campaign on January 17, 1991, F-16C squadrons created tactics that integrated GPS with the Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) system. The GPS/LANTIRN F-16s of the 69th Tactical Fighter Squadron were used extensively in the ground-attack role against mobile missile launchers. In the fast forward air controller role, F-16s used GPS receivers to locate targets and pass precise coordinates to strike aircraft that lacked GPS.

Improved navigational accuracies

were obtained by integrating a GPS receiver's position and velocity data with an aircraft's INS. Air Force F-111F deep interdiction jets updated their bombing and navigation systems so that GPS receivers could provide location data. Navy A-6 medium bombers did the same. Navstar allowed aircrews to navigate to new targets at short notice without time-consuming mission planning.

Aircraft fitted with GPS multi-channel receivers could rendezvous with aerial tankers during night missions over Saudi Arabia, with neither plane compelled to transmit a guidance signal that could have revealed its position to Iraqi electronic intelligence units.

The Air Force deployed thirty-seven B-52G bombers to bases well away from the combat zone—in western Saudi Arabia, Spain, Britain, and Diego Garcia in the Indian Ocean. Cairo West Airport in Egypt and Mont de Marsan AB in southwestern France also supported B-52 missions. All B-52s relied on GPS for navigation over the vast distances from base to Iraq and back.

Tests conducted prior to Desert Storm showed that GPS-integrated

navigation systems on B-52 bombers yielded accuracies of position within ten meters of perfect. On the first night of the war, thirteen B-52 bombers equipped with forward-looking infrared sensors and GPS receivers flew across Iraq at altitudes lower than 400 feet to strike five forward operating airfields. Each crew member carried a commercial GPS slugger in his survival gear.

The Allies Add GPS

When France discovered that the navigation system aboard its Jaguar fighter-bombers could not provide the required accuracy, the French Air Force modified them to accept GPS receivers. Pilots of British Jaguars were likewise provided with GPS, and handheld sluggers were attached inside the cockpit with strips of Velcro. British RAF Tornado GR. Mk. 1/1A multirole aircraft, which flew numerous ground-attack missions, were retrofitted with GPS sets.

The first air attacks on downtown Baghdad, which commenced around 3:00 a.m. local time on January 17, were carried out by F-117A Stealth fighters, which, despite occasional suggestions to the contrary, were not equipped with GPS receivers. These planes, however, are scheduled to receive a GPS capability as part of a major upgrade.

In 1986, the Air Force secretly began modifying about 100 of its nuclear-armed Air-Launched Cruise Missiles (ALCM-Bs). Their nuclear warheads were replaced with 1,000-pound conventional explosives. More important, these missiles were fitted with a modified guidance package with a GPS receiver embedded into the Terrain Contour Matching system. These new ALCM-Cs (AGM-86Cs) entered service in 1988 and, three years later, were in flight toward Iraqi targets.

Thirty-five ALCM-Cs were launched by B-52Gs against eight high-priority targets in Iraq, including military communications sites, power generation and transmission facilities, and an airfield in northern Iraq south of Mosul.

Prior to the activation of terminal guidance, these missiles were directed by GPS signals to positions within twenty meters of the target. The missiles arrived in coordinated fashion at preselected targets. Postwar analyses indicated that thirty-one of the thirty-five GPS-assisted ALCMs struck their targets.

On the same night, autonomous US Navy Tomahawk land-attack missiles, launched from surface ships and submarines in the Persian Gulf and the Red Sea, struck Baghdad. While the Tomahawks themselves did not use Navstar signals for in-flight navigation, their launch platforms used GPS to obtain accurate firing positions.

B-52G bombers operating from Diego Garcia dropped a relatively small number of Israeli-produced Have Nap (AGM-142A) standoff, rocket-powered, air-to-surface missiles with a range of up to sixty-eight miles, twice that of powered glide bombs. These missiles were used to destroy underground military bunkers in Iraq. The Have Nap guidance is believed to be based on GPS inputs, with target latitude and longitude coordinates entered by the B-52's Weapon System Officer.

As illustrated by these examples, GPS is likely to become an important navigational feature of future tactical missiles. This development would give USAF the power to launch conventional attacks against targets practically anywhere in the world without using overseas bases.

Throughout the Gulf War, airborne radar surveillance was maintained by Air Force E-3B Sentry Airborne Warning and Control System (AWACS) aircraft. AWACS planes with GPS-assisted INS provided timely position information and warnings to airborne fighter and ground-attack aircraft. They controlled more than 3,000 coalition sorties per day, detecting threats and pairing targets with strike aircraft. GPS provided a uniform coordinate measuring system accurate enough to eliminate misalignment resulting from differences in tactical displays aboard separate AWACS planes and "drift" in existing inertial navigation systems.

Locating Radar

Seven USAF RC-135V/W Rivet Joint aircraft based in Riyadh, Saudi Arabia, and TR-1A high-altitude strategic reconnaissance aircraft were central in identifying Iraq's wartime communications frequencies and precisely locating communication and early warning radar antennas along the southern border and deeper within Iraq. GPS not only assisted in navigation but also allowed on-board electronic intelligence and communications intelligence sensors to accurately

"georeference" emitters, transmitters, and other sources of intelligence.

Two US Air Force E-8A Joint Surveillance and Target Attack Radar System (Joint STARS) aircraft flew forty-nine combat sorties in the war. The E-8 has a dual GPS/INS. GPS is integrated with the synthetic aperture radar and digital maps for acquiring and locating targets, as well as with a jam-resistant, high-capacity digital data and voice information system.

The radar aboard the E-8 detected and tracked (but could not identify) individual vehicles on the ground. The radar's ability to depict large sections of terrain deep in Iraqi territory from along the Saudi border proved valuable. The position of the Joint STARS aircraft was provided by GPS satellites. GPS velocity information helped stabilize the E-8's Norden AN/APY-3 phased-array radar, providing a marking error of no more than one meter per second. Every thirty-five seconds, the AN/APY-3 radar searched an area of 100 miles by 110 miles from an altitude of 35,000 to 40,000 feet.

GPS signals also proved critical to support of ground forces. With the aid of GPS navigation equipment, fuel and food were air-dropped to armored units that had advanced deep into southern Iraqi territory during the ground phase of the conflict. These armored forces had outrun their logistical supply due, in part, to their own use of GPS receivers as a way of finding the most direct route to the desired site.

All 2,200 forward air controllers used GPS receivers to coordinate air support operations stemming from the ground war. The system enabled these airborne spotters to find their way, confirm their location, and accurately direct air strikes in trackless desert.

During the Iraqi attack on Khafji early in the war, Saudi forces received close air support from aircraft that had received the exact location of Saudi positions from US Marine Corps Air Naval Gunfire Liaison Company (ANGLICO) teams equipped with GPS. ANGLICO teams also used GPS to determine the position of the PPN-19 beacons they had placed within a few kilometers of target areas. These beacons emit signals that guide bombers to a target. Knowing the exact location of the beacons, bomber crews were able to remove the largest source of error in the targeting process—something not possible before the advent of GPS.

Launch History of Navstar GPS Satellites

Launch	Satellite Designation ^a	Flight #	Date of Launch
Block I			
1-01 ^b	1978-20	1	February 22, 1978
1-02 ^b	1978-47	2	May 13, 1978
1-03	1978-93	3	October 6, 1978
1-04 ^b	1978-112	4	December 11, 1978
1-05 ^b	1980-11	5	February 9, 1980
1-06	1980-32	6	April 26, 1980
1-07	lost during launch failure	7	December 18, 1980
1-08	1983-72	8	July 14, 1983
1-09	1984-59	9	June 13, 1984
1-10	1984-97	10	September 8, 1984
1-11	1985-93	11	October 9, 1985
Block II			
2-01	1989-13	12	February 14, 1989
2-02	1989-44	13	June 10, 1989
2-03	1989-64	14	August 18, 1989
2-04	1989-85	15	October 21, 1989
2-05	1989-97	16	December 11, 1989
2-06	1990-08	17	January 24, 1990
2-07	1990-25	18	March 24, 1990
2-08	1990-68	19	August 2, 1990
2-09	1990-88	20	October 1, 1990
2A-01	1990-103	21	November 26, 1990

^aYear of launch, followed by its position in the sequence of launches for that year

^bHad become inactive by the start of Operation Desert Shield

GPS-Equipped Helicopters

Helicopter operations were enhanced by input from Navstar satellites. In the opening attack of the war, four GPS-equipped USAF MH-53J Pave Low helicopters from the 20th Special Operations Squadron served as nighttime pathfinders for a force of Army AH-64 attack helicopters equipped with Hellfire missiles. In two separate raids, which took fifteen hours and covered more than 1,000 miles round-trip, the Pave Low helicopter crews updated their Doppler radar navigation system with GPS reference points, accurate to about ten meters. The Apaches could thus eliminate virtually all of the cumulative navigation errors of the flight and calibrate their fire-control computers accordingly. The GPS-equipped Pave Lows were also used to infiltrate and exfiltrate special operations troops throughout Iraq and Kuwait.

For the successful execution of the US Army's westward flanking operation at the start of the ground war, establishment of forward logistics

bases about seventy-five miles inside Iraq was deemed critical. Elements of the 101st Airborne Division using UH-60 Black Hawk helicopters played a major role in this task. At specific waypoints established using GPS, beacons were placed by reconnaissance teams the night before the Black Hawk assaults. Both GPS coordinates and these beacons enabled the helicopter pilots to navigate to their initial objectives.

Flying without GPS assistance proved difficult because of the lack of contrast and distinguishable navigation points in the desert. During the conflict, US Marine AH-1W SuperCobra helicopters were fitted with hand-held GPS receivers that were used with the SuperCobra's Doppler system. US

Army UH-60 Black Hawk helicopters and older UH-1 Iroquois helicopters with commercial GPS receiving equipment were used extensively to transport troops and equipment.

The importance of accurate navigation devices was shown by French Gazelle helicopter pilots, who discovered that the Saudi Arabia-Iraq frontier shown on their paper maps did not match up with the actual border on the ground. Lack of GPS for accurate navigation caused the 1st and 3d Régiments d'Hélicoptère de Combat to alter their strategy and deploy their Gazelles as single units immediately behind the lead elements of the French Daguet Division. These helicopters were equipped with the Nadir Doppler system that, unlike Navstar, requires presurveyed waypoints to determine position. In fact, these waypoints were established using GPS during Operation Desert Shield.

Days before the start of the war, GPS receivers were added to French Puma helicopters assigned to fly combat search-and-rescue missions from Al Ahsa in Saudi Arabia. The use of GPS enabled US Navy mine countermeasure helicopters (MH-53E Sea Dragons) to operate at night for the first time in the northern Persian Gulf. GPS also assisted them during daylight hours, as nearly half of their missions had to be conducted under Instrument Flight Rules because of bad weather.

When it is fully operational, the planned constellation of twenty-four Block II satellites will provide GPS services globally and continuously under all weather conditions. [For a history of GPS launches, see the table on this page.] Using GPS, aircraft can estimate their speed to within one-tenth of one mile per hour and receive absolute time data accurate to a few billionths of a second.

During Operation Desert Storm, GPS was of such high value that the impact of this single technology cannot easily be overstated. Satellites are no longer viewed as intelligence-gathering systems orbiting passively above the battlefield but rather as integral tools for conducting warfare. ■

Michael R. Rip, Ph.D., is an assistant professor at Michigan State University whose research topics include satellite remote sensing and geographic factors in contemporary military conflict. This article is adapted from a longer academic research paper due for publication in the British journal Intelligence and National Security early next year.

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Directory of Wing Commanders

(As of October 1, 1993)

By Tamar A. Mehuron, Associate Editor

THE WING has always been the building block of the US Air Force. It is also the focal point for ongoing changes in force structure. The Air Force is committed to preserving its historic wings. These include the original thirteen wings plus such others as the 23d of Flying Tiger fame.

Air Force historians developed a rank order system for the remaining wings, using such historical elements as years of active service, aerial victories, and decorations.

In recognition of the wings' special importance, AIR FORCE Magazine, with the assistance of the Pentagon and commands in the field, compiled this directory.

Air Combat Command

1st Air Force

35th Wing
Col. Brandford J. McAllister
NAS Keflavik, Iceland

8th Air Force

2d Wing
Brig. Gen. George P. Cole, Jr.
Barksdale AFB, La.

5th Bomb Wing
Col. Ralph Pasini
Minot AFB, N. D.

7th Wing
Brig. Gen. Jerrold P. Allen
Dyess AFB, Tex.

27th Fighter Wing
Brig. Gen. (selectee) William M. Goth
Cannon AFB, N. M.

28th Bomb Wing
Brig. Gen. Joseph C. Wilson, Jr.
Ellsworth AFB, S. D.

314th Airlift Wing
Brig. Gen. Fredric N. Buckingham
Little Rock AFB, Ark.

384th Bomb Wing
Brig. Gen. Charles R. Henderson
McConnell AFB, Kan.

410th Bomb Wing
Brig. Gen. Rudolf F. Peksens
K. I. Sawyer AFB, Mich.

509th Bomb Wing
Brig. Gen. Ronald C. Marcotte
Whiteman AFB, Mo.

9th Air Force

1st Fighter Wing
Brig. Gen. Gregory S. Martin
Langley AFB, Va.

4th Wing
Brig. Gen. Jeffrey R. Grime
Seymour Johnson AFB, N. C.

23d Wing
Brig. Gen. Bobby O. Floyd
Pope AFB, N. C.

31st Fighter Wing
Col. Rodney L. Bates
Homestead AFB, Fla.

33d Fighter Wing
Col. William R. Looney III
Eglin AFB, Fla.

42d Bomb Wing
Col. Robert J. Pavelko
Loring AFB, Me. (base closes October 1994)

56th Fighter Wing (inactivates September 1994)
Col. Charles T. Ohlinger
MacDill AFB, Fla.

347th Fighter Wing
Brig. Gen. James I. Mathers
Moody AFB, Ga.

363d Fighter Wing
Brig. Gen. John B. Hall, Jr.
Shaw AFB, S. C.

416th Bomb Wing
Col. Michael S. Kudlacz
Griffiss AFB, N. Y.

12th Air Force

9th Reconnaissance Wing
Col. Larry W. Tieman
Beale AFB, Calif.

24th Wing
Brig. Gen. David A. Sawyer
Howard AFB, Panama

49th Fighter Wing
Brig. Gen. John F. Miller, Jr.
Holloman AFB, N. M.

55th Wing
Brig. Gen. Thomas J. Keck
Offutt AFB, Neb.

92d Bomb Wing
Col. William C. Brooks
Fairchild AFB, Wash.

93d Bomb Wing
Col. Silas R. Johnson, Jr.
Castle AFB, Calif.

355th Wing
Brig. Gen. Lansford E. Trapp, Jr.
Davis-Monthan AFB, Ariz.

366th Wing
Brig. Gen. David J. McCloud
Mountain Home AFB, Idaho

388th Fighter Wing
Col. James E. Sandstrom
Hill AFB, Utah

552d Air Control Wing
Brig. Gen. David Oakes
Tinker AFB, Okla.

USAF Weapons and Tactics Center

57th Wing
Brig. Gen. John L. Welde
Nellis AFB, Nev.

99th Wing
Col. John E. Wilcox
Ellsworth AFB, S. D.

Air Education and Training Command

59th Medical Wing
Maj. Gen. (Dr.) Edgar R. Anderson, Jr.
Lackland AFB, Tex.

2d Air Force

17th Training Wing
Col. Joseph H. Wehrle, Jr.
Goodfellow AFB, Tex.

37th Training Wing
Brig. Gen. Henry M. Hobgood
Lackland AFB, Tex.

81st Training Wing
Brig. Gen. Karen S. Rankin
Keesler AFB, Miss.

82d Training Wing
Brig. Gen. William L. Worthington, Jr.
Sheppard AFB, Tex.

19th Air Force

12th Flying Training Wing
Brig. Gen. Robert E. Gatliff
Randolph AFB, Tex.

14th Flying Training Wing
Col. Robert H. Foglesong
Columbus AFB, Miss.

47th Flying Training Wing
Col. Kenneth W. Hess
Laughlin AFB, Tex.

58th Fighter Wing
Brig. Gen. Stephen B. Plummer
Luke AFB, Ariz.

64th Flying Training Wing
Col. Roger A. Brady
Reese AFB, Tex.

71st Flying Training Wing
Col. Samuel J. Bole
Vance AFB, Okla.

80th Flying Training Wing
Col. William J. Lake
Sheppard AFB, Tex.

97th Air Mobility Wing
Brig. Gen. Edward F. Grillo, Jr.
Altus AFB, Okla.

325th Fighter Wing
Brig. Gen. Clinton V. Horn
Tyndall AFB, Fla.

542d Crew Training Wing
Col. Richard T. Jeffreys
Kirtland AFB, N. M.

Air University

502d Air Base Wing
Brig. Gen. Albert D. Jensen
Maxwell AFB, Ala.

Air Force Intelligence Command

67th Intelligence Wing
Col. James R. O'Brien
Kelly AFB, Tex.

Air Force Materiel Command

46th Test Wing
Col. Elton T. Pollock
Eglin AFB, Fla.

377th Air Base Wing
Brig. Gen. James L. Higham
Kirtland AFB, N. M.

412th Test Wing
Col. Ted M. McFarland
Edwards AFB, Calif.

645th Air Base Wing
Col. William B. Orellana
Wright-Patterson AFB, Ohio

646th Air Base Wing
Col. Douglas L. Hardin
Eglin AFB, Fla.

650th Air Base Wing
Col. Charles B. DeBelleuve
Edwards AFB, Calif.

Air Force Space Command

14th Air Force

21st Space Wing
Brig. Gen. Donald Cook
Peterson AFB, Colo.

30th Space Wing
Brig. Gen. Lance W. Lord
Vandenberg AFB, Calif.

45th Space Wing
Brig. Gen. Robert S. Dickman
Patrick AFB, Fla.

50th Space Wing
Col. Greg Gilles
Falcon AFB, Colo.

20th Air Force

44th Missile Wing
Col. Roscoe Moulthrop
Ellsworth AFB, S. D.

90th Missile Wing
Brig. Gen. Thomas H. Neary
F. E. Warren AFB, Wyo.

91st Missile Wing
Col. Jerry Perryman
Minot AFB, N. D.

321st Missile Wing
Col. John Gibeau
Grand Forks AFB, N. D.

341st Missile Wing
Col. Don Pettit
Malmstrom AFB, Mont.

351st Missile Wing
Col. John Sutter
Whiteman AFB, Mo.

Air Force Special Operations Command

16th Special Operations Wing
Brig. Gen. Maxwell C. Bailey
Hurlburt Field, Fla.

Air Mobility Command

15th Air Force

22d Air Refueling Wing
Col. Stephen R. Lorenz
March AFB, Calif.

43d Air Refueling Wing
Brig. Gen. Gary A. Voellger
Malmstrom AFB, Mont.

60th Airlift Wing
Brig. Gen. Howard J. Ingersoll, Jr.
Travis AFB, Calif.

62d Airlift Wing
Brig. Gen. (selectee) Richard C. Marr
McChord AFB, Wash.

63d Airlift Wing
Col. John D. Hopper, Jr.
Norton AFB, Calif. (base closes March 1994)

375th Airlift Wing
Brig. Gen. Charles H. Coolidge, Jr.
Scott AFB, Ill.

21st Air Force

19th Air Refueling Wing
Col. Tome H. Walters, Jr.
Robins AFB, Ga.

65th Support Wing
Col. Brian A. Arnold
Lajes Field, Azores

89th Airlift Wing
Brig. Gen. Monroe S. Sams, Jr.
Andrews AFB, Md.

305th Air Refueling Wing
Col. Marc L. Drinkhahn
Grissom AFB, Ind. (base closes October 1994)

319th Air Refueling Wing
Col. James E. Andrews
Grand Forks AFB, N. D.

380th Air Refueling Wing
Col. Robert E. Dawson
Plattsburgh AFB, N. Y.

436th Airlift Wing
Col. William Welsler III
Dover AFB, Del.

437th Airlift Wing
Brig. Gen. Thomas R. Mikolajcik
Charleston AFB, S. C.

438th Airlift Wing
Brig. Gen. George A. Gray III
McGuire AFB, N. J.

Pacific Air Forces

15th Air Base Wing
Brig. Gen. Dwight M. Kealoha
Hickam AFB, Hawaii

5th Air Force

18th Wing
Brig. Gen. Jeffrey G. Cliver
Kadena AB, Japan

374th Airlift Wing
Brig. Gen. Michael J. McCarthy
Yokota AB, Japan

432d Fighter Wing
Brig. Gen. George W. Norwood
Misawa AB, Japan

7th Air Force

8th Fighter Wing
Col. Stephen E. Trent
Kunsan AB, South Korea

51st Wing
Brig. Gen. Robert G. Jenkins
Osan AB, South Korea

11th Air Force

3d Wing
Brig. Gen. Thomas R. Case
Elmendorf AFB, Alaska

11th Air Control Wing
Col. Harry J. Kieling, Jr.
Elmendorf AFB, Alaska

354th Wing
Col. Thomas O. Fleming, Jr.
Eielson AFB, Alaska

13th Air Force

633d Air Base Wing
Col. Dennis R. Larsen
Andersen AFB, Guam

US Air Forces in Europe

3d Air Force

10th Air Base Wing
Col. Peter W. Tkacs
RAF Alconbury, UK

20th Fighter Wing
Col. Randall M. Schmidt
RAF Upper Heyford, UK

48th Fighter Wing
Brig. Gen. Kurt B. Anderson
RAF Lakenheath, UK

100th Air Refueling Wing
Col. David E. Pope
RAF Mildenhall, UK

16th Air Force

39th Air Base Wing
Col. Curtis H. Emery
Incirlik AB, Turkey

401st Fighter Wing
Col. John H. Campbell
Aviano AB, Italy

17th Air Force

36th Fighter Wing
Brig. Gen. Roger E. Carleton
Bitburg AB, Germany

52d Fighter Wing
Brig. Gen. John W. Hawley
Spangdahlem AB, Germany

86th Wing
Brig. Gen. Jeffrey S. Pilkington
Ramstein AB, Germany

435th Airlift Wing
Brig. Gen. Donald E. Loranger, Jr.
Rhein-Main AB, Germany

601st Support Wing
Col. Joseph D. Ferris
Sembach AB, Germany

Air Force Reserve

4th Air Force

302d Airlift Wing

Col. Walter T. Hatcher III
Peterson AFB, Colo.

349th Airlift Wing (Associate)

Brig. Gen. Keith T. Reiling
Travis AFB, Calif.

433d Airlift Wing

Brig. Gen. Michael J. Quarnaccio
Kelly AFB, Tex.

440th Airlift Wing

Brig. Gen. Michael R. Lee
General Mitchell International Airport/ARS,
Wis.

445th Airlift Wing

Col. Warren D. Snyder
March AFB, Calif.

446th Airlift Wing (Associate)

Col. Jon S. Gingerich
McChord AFB, Wash.

919th Special Operations Wing

Col. Ernest R. Webster
Eglin AFB, Fla.

939th Rescue Wing

Col. Anthony Tassone, Jr.
Portland International Airport, Ore.

10th Air Force

301st Fighter Wing

Brig. Gen. William H. Lawson
Carswell AFB, Tex.

419th Fighter Wing

Col. David E. Tanzi
Hill AFB, Utah

434th Wing

Col. John J. Batbie, Jr.
Grissom AFB, Ind. (base closes October
1994)

442d Fighter Wing

Col. Bobby L. Efferson
Richards-Gebaur AFB, Mo.

452d Air Refueling Wing

Brig. Gen. Michael J. Peters
March AFB, Calif.

482d Fighter Wing

Brig. Gen. James L. Turner
MacDill AFB, Fla.

917th Fighter Wing

Brig. Gen. William D. Tracy
Barksdale AFB, La.

22d Air Force

94th Airlift Wing

Brig. Gen. Terry G. Whitnell
Dobbins ARB, Ga.

315th Airlift Wing (Associate)

Col. James D. Bankers
Charleston AFB, S. C.

403d Airlift Wing

Brig. Gen. Joe L. Campbell
Keesler AFB, Miss.

439th Airlift Wing

Col. James P. Czekanski
Westover ARB, Mass.

459th Airlift Wing

Col. Clayton T. Gadd
Andrews AFB, Md.

512th Airlift Wing (Associate)

Col. David J. Stanley
Dover AFB, Del.

514th Airlift Wing (Associate)

Brig. Gen. Robert J. Winner
McGuire AFB, N. J.

Air National Guard

101st Air Refueling Wing

Col. Wilfred Hessert
Bangor, Me.

102d Fighter Wing

Brig. Gen. John R. Haack
Otis ANGB, Mass.

108th Air Refueling Wing

Brig. Gen. Richard C. Cosgrave
McGuire AFB, N. J.

113th Fighter Wing

Brig. Gen. Paul A. Pochmara
Andrews AFB, Md.

116th Fighter Wing

Col. Stephen G. Kearney
Dobbins ARB, Ga.

117th Reconnaissance Wing

Brig. Gen. James F. Brown
Birmingham, Ala.

118th Airlift Wing

Col. Guy S. Tallent
Nashville, Tenn.

121st Air Refueling Wing

Brig. Gen. John H. Smith
Rickenbacker ANGB, Ohio

122d Fighter Wing

Brig. Gen. Herbert J. Spier, Jr.
Fort Wayne, Ind.

123d Airlift Wing

Brig. Gen. Stewart R. Byrne
Louisville, Ky.

126th Air Refueling Wing

Brig. Gen. Harold C. Keistler
Chicago, Ill.

127th Fighter Wing

Brig. Gen. David T. Arendts
Selfridge ANGB, Mich.

128th Fighter Wing

Col. Fred R. Sloan
Madison, Wis.

131st Fighter Wing

Col. Greg D. Davis
St. Louis, Mo.

132d Fighter Wing

Col. Donald W. Armington
Des Moines, Iowa

133d Airlift Wing

Brig. Gen. John D. Broman
Minneapolis-St. Paul, Minn.

136th Airlift Wing

Col. William M. Guy
NAS Dallas, Tex.

137th Airlift Wing

Brig. Gen. Jerry W. Whitman
Oklahoma City, Okla.

140th Fighter Wing

Brig. Gen. Mason C. Whitney
Buckley ANGB, Colo.

141st Air Refueling Wing

Col. Donald L. Powell
Fairchild AFB, Wash.

144th Fighter Wing

Col. Allen W. Boone
Fresno, Calif.

146th Airlift Wing

Col. Daniel H. Pemberton
Channel Islands, Calif.

171st Air Refueling Wing

Col. William B. Lynch
Pittsburgh, Pa.

174th Fighter Wing

Lt. Col. David Hamlin, Jr.
Syracuse, N. Y.



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A supportable fighter with greatly reduced maintenance demands. A deployable fighter with greatly reduced tanker and airlift requirements. A robust and reliable fighter built to last.

The F-22 program is on track—which means American air superiority will exist tomorrow and well into the future.



F-22
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By 1997, USAFE will probably be down to 30,000 troops and fewer than 200 fighters.

What's Left in Europe?

By Bruce D. Auster

IN 1990, maps of Europe carried the symbols of twenty-five major US Air Force facilities, including such familiar names as Torrejon in Spain, Bentwaters in Britain, and Hahn in Germany. Then USAF began to reduce, reorganize, and retrench.

The service left Torrejon in 1992. It vacated Bentwaters and Hahn in 1993. Since 1990, it has halted or greatly reduced operations at nine other sites, in locations from the North Sea to Greece. Not included in this count is the closure of three USAF cruise missile bases under terms of the 1987 superpower agreement eliminating intermediate-range nuclear forces in Europe.

The downsizing isn't over. Under current plans, the Air Force in 1994 will clear out of two of its longtime fighter bases—RAF Upper Heyford, UK, and Soesterberg AB, the Netherlands. At that point, only eleven major European installations (including Incirlik AB, Turkey, and Lajes Field, Azores) will remain in service.

The Air Force pullback from the front lines of the Cold War may be global—witness the exodus from Clark AB in the Philippines—but in Europe the pain has been intense.

Major cutbacks have torn large

chunks from US Air Forces in Europe (USAFE). The Air Force has slashed USAFE's end strength to about 40,000 active-duty airmen. That represents a reduction of more than a third from the command's Cold War peak of about 65,000 in the late 1980s, when it stood guard against the threat of a Warsaw Pact invasion of western Europe.

USAFE has sustained savage cuts in its fighter force structure. Today, the command is down to about four fighter wing equivalents, which deploy anywhere from 250 to 300 aircraft of all types. As recently as the late 1980s, before the collapse of the Soviet Union removed the principal threat to peace in Europe, USAFE put into the field 8.8 fighter wing equivalents, which could deploy some 600 tactical fighter aircraft.

Pacific Air Forces, which is responsible for the other major overseas deployment of Air Force assets, has seen nothing to compare with this kind of force reduction. Moreover, no one believes USAFE's reorganization has run its course.

Still Dropping

The active-duty strength of USAFE is still dropping; it probably will fall



Major European Bases

Active

Aviano AB, Italy
Bitburg AB, Germany
Incirlik AB, Turkey
Lajes Field, Azores
RAF Alconbury, UK
RAF Lakenheath, UK
RAF Mildenhall, UK
RAF Upper Heyford, UK (closes 1994)
Ramstein AB, Germany
Rhein-Main AB, Germany
Sembach AB, Germany
Soesterberg AB, the Netherlands (closes 1994)
Spangdahlem AB, Germany

Vacated or Changed to Minor Base Since 1990

Hahn AB, Germany
Hellenikon AB, Greece
Iraklion AB, Greece
Lindsey AS, Germany
RAF Bentwaters, UK
RAF Chicksands, UK
RAF Fairford, UK
RAF Woodbridge, UK
San Vito dei Normanni AS, Italy
Torrejon AB, Spain
Zaragoza AB, Spain
Zweibrücken AB, Germany

to slightly more than 30,000 troops by 1997. Air Force officers say that in 1995 the command may have at its disposal only about three fighter wings, perhaps with fewer than 200 fighters. According to the plans of Pentagon officials, USAFE will reduce operations at three more major European installations. Even this planned base structure may be shaky because it assumes that the US presence in Europe will stabilize at roughly 100,000 troops. The Air Force's complement would account for about a third of that, but, if the overall force level sinks again, more USAFE bases—and personnel—may also vanish.

For USAFE, headquartered at Ramstein AB, Germany, under the command of Gen. Robert C. Oaks, making do with such a deeply cut number of troops, wings, and forward bases has been difficult. The downsizing did not reduce USAFE's responsibilities. Business has been booming, the end of the Cold War notwithstanding.

In 1993, USAFE fighters flew hundreds of combat air patrol sorties over the Balkans, providing the main US contribution to Operation Deny Flight. Ramp space at Aviano AB, Italy, filled up with US ground-attack jets mov-

ing into striking range of Bosnia, across the Adriatic Sea, ready to support the blue-helmeted troops of the United Nations. USAFE fighter units also deployed from European bases to take a big share of the sorties flown from Turkey over northern Iraq.

USAFE C-130 cargo planes, operating out of Rhein-Main AB, Germany, flew over Sarajevo every day, dropping packaged meals to a besieged citizenry. Rhein-Main is not playing host to American planes alone; German and French cargo aircraft also stage out of that huge US base in the heart of Europe.

"We're doing all this from USAFE bases," said Maj. Gen. Carl E. Franklin, USAFE's head of Plans and Programs. "Bosnia is a good example of a situation where it is difficult to respond from bases in the continental US. The initial response had to come from theater-based forces. It is kind of like having the fire station in the next block, instead of across town."

Through the years, the basing system in Europe has been a critical US resource whose value reached well beyond the defense of Europe to encompass operations in the Middle East (for example, the 1973 Arab-Israeli

war and Operations Desert Shield and Desert Storm), North Africa (the Operation Eldorado Canyon raid on Libya in 1986), and now the lands of the old Soviet empire, into which the US has flown humanitarian missions. As a component of US European Command, USAFE backs up American military plans and operations in the Mediterranean and Africa.

Gaining Access

As its European presence shrinks, the Air Force needs to be more creative about maintaining its access abroad and getting forces to hot spots with sufficient dispatch.

"We really are required to think harder about how we're going to continue relationships [with allies and friends]," said Robert D. Bauerlein, the deputy under secretary of the Air Force for International Affairs. "It was easy when you had 10,000 Americans [at an overseas base] and you could put on air shows and operate in the communities. We don't have that now, so we're really going to have to find ways to maintain the relationships, which are in America's interest."

In Europe, as elsewhere, the challenge is twofold. First, said Air Force

officers, USAFE must find new ways to perform operational missions that once called for use of a forward base. Second, it must continue to maintain "presence" without necessarily deploying active combat forces.

In the first case, the Air Force is responding with some innovative moves. The first real test of new USAF ways to operate overseas was Operation Restore Hope, when 28,000 American troops established a semblance of order in Somalia and helped provide vital shipments of food to the starving. Senior leaders at US Transportation Command and Air Mobility Command (AMC) saw Somalia as an opportunity to make do with a shrunken overseas base structure.

"We [deliberately] tried to avoid going through Europe," said Maj. Gen. Phillip Ford, AMC's chief of Plans and Programs, who suggests that the command largely achieved its goal.

In the past, this type of airlift mission would have made the most of America's basing infrastructure in Europe. Troops would have been flown by C-141s to bases in England, Spain, or Germany, where the aircrews could rest before heading on to Cairo and from there to the austere airport at Mogadishu.

Operation Restore Hope was different. Marines from Camp Pendleton, Calif., were flown east out of March AFB, Calif., on C-141 and C-5 airlifters. Off the northeast coast of the United States, each transport hit the tanker and refueled, then repeated the process off the coast of Spain. They then flew to Cairo West Airport in Egypt, changed crews, and staged from there into Mogadishu.

Troops from the Army's 10th Mountain Division, flown out of Griffiss AFB, N. Y., took a more southerly route but also arrived in Cairo without ever touching down in Europe.

"This was a radical change that demonstrates that we have a global reach capability," said one Air Mobility Command officer. "It was very effective; we proved we can get there, and fast," without having to rely on way stations in Europe.

What About the Tankers?

Even the Somalia operation, however, which demonstrated AMC's talent for moving troops nonstop from the US west coast to the Horn of Africa, required the participation of USAF aerial tankers based in and op-

erating from European locations. Air Force tankers supporting the Somali airlift flew some 1,200 sorties, all of which began and ended at a base in Europe.

Sixteen KC-135 tankers used to refuel the transports were based at Lajes Field, a major AMC base. Four more aerial refuelers mounted sorties out of the Souda Bay area in Greece, and sixteen more flew out of Morón AB, Spain. Neither of the latter two facilities is US-operated, but the host countries provided access for this specific mission.

While midair refueling enabled US airlifters to avoid the wear and tear of takeoffs and landings in Europe, these operations cost much more than they would have if the planes had gassed up on the ground.

The US received political approval to deploy its tankers to Europe and stage from bases there mainly because of USAFE's large and long-standing presence on the Continent. "Access to host nation installations is more probable than if we were not in theater," said General Franklin. "Our [permanent] presence here enhances that access because it allows us to gain the trust and confidence of our allies."

Sometimes these arrangements have low profiles. At Morón, for instance, the US has no large permanent combat force but does carry out a day-to-day base maintenance contract. The US keeps a small force at Morón and relies on a civilian contractor to maintain the base, the ramp, and the fuel systems.

Faced with a dwindling permanent presence, USAFE officers have declared that the command will concentrate on maintaining "core capabilities." The list is short, comprising capabilities for long-range strike, air superiority, close air support, and aerial refueling.

No one regards these as sufficient for sustained, high-tempo combat operations. For certain missions, said officers, the smaller USAFE will have to rely on significant reinforcement from combat units stationed in the US.

"We can't maintain the full range of across-the-board capabilities," said General Franklin. "We will retain air-to-air fighters, tankers, interdiction

aircraft, and theater airlift. We will have to be augmented for reconnaissance and SEAD [Suppression of Enemy Air Defenses] missions." That means, among other things, that F-4G "Wild Weasels" and RF-4 tactical reconnaissance planes will not be seen in Europe full-time, but there will be lots of F-15s, F-16s, and A-10s.

Moving Out

They will be pursuing radically different missions, in very different ways. Once, the US air contingent in Europe was a fixed, fight-in-place outfit, planning to take on the Soviet and Warsaw Pact forces solely from its own bases. All that has changed. European squadrons train routinely for rapid deployment halfway around the world.

USAFE is adapting its plans for prepositioning equipment as well. In particular, the Air Force will preposition a greater share of its equipment in fewer places, the better to load the equipment on transport planes quickly and get moving. "In the crisis of tomorrow, we don't know where the flashpoint will be," said General Franklin. "We intend to retain some prepositioned materials [in former sites], but not at the same levels."

In addition to fighter forces, USAFE will maintain electronic security, air refueling, tactical airlift, special operations, communications, and other support units in Europe. Beyond its chain of major bases, the Air Force also will keep a small presence in minor installations, including facilities in Greece, Italy, Turkey, and Germany.

Meanwhile, the Air Force is establishing military-to-military contacts in some interesting places. Among these are six newly receptive central and eastern European countries—Poland, the Czech Republic, Hungary, Slovakia, Bulgaria, and Romania—and a big one far to the east, Russia. This fall, the Air Force is working out an arrangement with Ukraine.

Current plans call for USAFE to send teams to these countries to discuss safety and basic management, help establish personnel systems, and develop a system of ranks based strictly on performance. It will even help establish a chaplain corps. ■

Bruce D. Auster is the defense correspondent in Washington, D. C., for US News & World Report. His most recent article for AIR FORCE Magazine was "A Few Swords Along With the Plowshares," which appeared in the March 1993 issue.

The Advanced Research Projects Agency identifies seven priorities for emphasis in military applications.

The Pentagon's Technology Targets

THE ADVANCED Research Projects Agency is the central research and development organization of the Defense Department, having primary responsibility to maintain US technological superiority over potential adversaries.

ARPA pursues R&D projects that have significant potential for military and commercial applications. The Fiscal 1994 program includes initiatives it calls "Innovative Technology Development" and "Military Applications," among other ventures.

Under "Innovative Technology Development," ARPA lists projects in semiconductor manufacturing, microwave and millimeter wave monolithic integrated circuits, electronics design and manufacturing, high-definition systems, high-performance computing and communications, software engineering, materials and portable energy, and microelectromechanical systems.

What follows is a condensed version of "Military Applications," as spelled out in an official presentation by ARPA's director, Gary L. Denman.

▶ **Advanced Short Takeoff, Vertical Landing Aircraft** ◀

The ASTOVL/Conventional Takeoff and Landing, Common Affordable Lightweight Fighter Program has two primary goals.

The first is to demonstrate, through actual flight testing of full-scale aircraft, that a common replacement for the F/A-18, F-16, and AV-8 fighter/attack aircraft is feasible. The Navy and Marine Corps variant of the aircraft will include a propulsive lift system permitting operations from ships and austere fields.

The Air Force variant will have the same airframe, avionics, and engine as the Navy version but will have the propulsive lift system replaced by additional fuel capacity.

The second major goal of this program is to show that military aircraft can be made more affordable. ARPA intends to explore and demonstrate that innovative design, development, manufacturing, and management techniques can dramatically reduce the cost of aircraft. Among the processes

being explored are inexpensive "soft" throwaway tooling and the lean production techniques successfully employed by the automobile industry.

The emphasis in Fiscal 1994 will be to validate critical technologies, perform manufacturability demonstrations, and bring to maturity a demonstrator aircraft design. The commitment is only to this risk-reduction phase. ARPA will not commit to a technology demonstrator until Fiscal 1995 or Fiscal 1996.

Contingency Mission Programs

The emergence of regional conflicts that threaten US vital interests highlights the need for a survivable US force that can deploy quickly anywhere on the globe. Contingency mission technology programs focus on easing deployment burdens and making US forces more survivable.

The centerpiece contingency mission effort is the Light Contingency Vehicle technology program. The lightweight, easily deployed LCV will form the basis for a variety of mis-

sion variant (scout or target acquisition roles) platforms in the next century.

The LCV will protect soldiers from the most likely threats by using advanced, lightweight, innovative, integrated survivability measures, such as signature management technologies and an advanced structure that will resist penetration by small-arms fire and artillery and mine fragments. The LCV will also have active countermeasures to disrupt attacks by rocket-

propelled grenades and smart weapons.

The Land Warrior Program, a separate ARPA contingency mission technology program, will use hands-free personal communications (based on equipment from the commercial personal communications industry), combined with position location and digital assistant technology, to enhance the effectiveness of dismounted soldiers for fast mission planning and situational awareness.

War Breaker Program

The War Breaker Program aims to develop and demonstrate technologies and systems to create a fully integrated, end-to-end system capable of targeting and neutralizing time-critical targets within enemy strike cycle times.

With War Breaker, ARPA is focusing on its high-leverage initiatives, integrating them with ongoing developments and existing systems within the services.

Specifically, the War Breaker Program will exploit electronics and information technologies, including advanced sensors, computing systems, automated intelligence correlation and processing, and distributed simulation.

The project is divided into three efforts: Surveillance and Targeting, Intelligence and Planning, and Systems Engineering and Evaluation. Each effort is based on multiple demonstrations of increasing complexity

and integration. Overall system demonstrations will take place in Fiscal 1999. In Fiscal 1994, ARPA will spend about \$140 million across the three areas.

The Surveillance and Targeting effort will develop and integrate technologies and systems yielding wide-area and focused surveillance, target detection and recognition, and precision target acquisition capabilities. Technologies being investigated include advanced 3-D and polarimetric synthetic aperture radar, multispectral electro-optical/infrared, foliage penetration technologies, internetworked unattended ground sensors, and robust automatic target detection and recognition algorithms.

The Intelligence and Planning effort will develop technologies and systems to provide a continuous update of enemy force status and allow a commander to nominate targets of

interest rapidly. Efforts are under way to develop algorithms and software to automate intelligence processing and data correlation, strike planning, decision aids, and terrain data generation and to support distributed dynamic databases enabling theater-wide sharing of information.

The Systems Engineering and Evaluation effort will develop the War Breaker system architecture, integrate all War Breaker elements, and evaluate system performance. This effort uses simulation, system engineering tools, and the communications infrastructure necessary to conduct rapid prototyping for concept and architecture evaluation.

This distributed simulation environment will provide a method of assessing existing and future system capabilities while allowing early user participation to facilitate eventual technology transition.

Nuclear Monitoring

ARPA has the primary responsibility within the Department of Defense for developing the technologies needed to verify nuclear test ban treaties.

ARPA is pursuing and demonstrating innovative technologies that will be available as the negotiations on such a treaty progress. These efforts are a key part of the Clinton Administration's approach to verification of this treaty.

The ARPA technologies focus on separation of background noise and detection of small explosions detonated under evasive conditions. For example, seismic array technologies have set the standard for ultrasensitivity; by using

advanced electronics, ARPA has significantly reduced the costs of these systems.

The processing of data from seismic arrays is a complex problem that ARPA is solving with advanced artificial intelligence (AI) methodologies and distributed signal processing knowledge acquisition tools.

ARPA is providing technical support toward the development and demonstration of a cooperative international monitoring system under the auspices of the Conference on Disarmament group of scientific experts. The conference has agreed to use the ARPA-developed facilities as the

prototype International Data Center in large-scale experiments to begin next year.

The key elements of the system have been developed and tested. Additional research is needed in seismic signal processing methods, signal identification techniques, and integration of advanced methods of radionuclide detection.

ARPA is also developing innovative technologies that can contribute to US counterproliferation efforts. A prototype Nonproliferation Monitoring System is being developed to be deployed worldwide to collect unique data on nuclear activities.

Simulation Programs

Advanced Distributed Simulation (ADS), a major investment area for ARPA over the past several years, has become a pervasive tool for evaluating technology impact and providing a military context for new concepts, as well as a highly effective training tool.

The Fiscal 1994 program continues to demonstrate the commitment to develop and apply this technology to a number of technology demonstration programs. The ADS demonstrations defined by ARPA will push the frontier of simulation technologies while providing an effective transition to the user.

One of the more focused ADS programs is the Army National Guard

ADS. This program will revolutionize the way reserve component units and individuals are trained. Because the reserve components provide nearly half of US land combat power, the readiness of these forces is critical. As was apparent during Operation Desert Storm, insufficient training can prevent deployment of these forces.

New, low-cost, scalable devices and simulations (individual soldier through brigade; novice through expert), distributed communications, and advanced information processing capabilities enable the development of this revolutionary, next-generation representation of a robust and relevant synthetic battle space.

It is expected that employment of the Army National Guard ADS training system will double or even triple the number of ready forces prepared for a crisis. In addition to the actual training system development, an integral part of this effort is the development of an ADS environment that will foster breakthroughs in training methodologies and tools to exploit emerging information technologies.

In the Fiscal 1994 program, ARPA will outfit two experimental brigades with prototype technology-based training systems connected through the Defense Simulation Internet. ARPA will also begin development of AI-assisted individual teaming systems.

Space Technology

The key issue determining future Defense Department and civil space capability, US competitiveness, and world leadership position is affordability. Since 1988, at the urging of Congress, ARPA has pursued more than fifty space technology programs to reduce the size, weight, power needs, and cost of space systems.

Early successes in quickly developing, launching, and operating ten small satellites and two new launch boosters have paved the way for proving that fundamental change is possible.

A simple, commonsense strategy has been conceived. The strategic vision calls for selective use of smaller, capable satellites as operational adjuncts to simultaneously permit low-cost technology insertion and backbone capability.

The strategy also seeks to use common bus satellites with "bolt-on" payload interface to support a wide spectrum of missions across multiple

satellite constellations. This approach may save billions in life-cycle costs by minimizing the cost of customization and dramatically shortening production time.

The \$30 million FY 1994 program includes several pivotal Advanced Technology Demonstrations involving joint participation of the services, civil agencies, and the commercial sector. The ATDs will address capability shortfalls in Defense Department MILSATCOM and remote sensing space systems. These efforts are inherently dual-use and will contribute directly to cost breakthroughs for commercial satellite production and operation.

The centerpiece for improving affordability is the Advanced Technology Standard Satellite Bus (ATSSB) Program. The program will prove that satellites can combine high performance with common industry standards to allow for bolt-on payloads. This common bus will be capable of

supporting a variety of operationally useful payloads in a wide range of orbits and at very low recurring cost.

The Collaboration of Advanced Multispectral Earth Observation Program will demonstrate a critical, dual-use multispectral payload hosted on ATSSB in low-Earth orbit to support future Defense Department and civil remote sensing satellite modernization and to stimulate growth in the commercial remote sensing market.

The Advanced Satellite Technology and EHF Communications Programs will demonstrate advanced EHF payload technologies.

The MILSATCOM Terminal Technology Program will demonstrate improvements in future MILSATCOM terminal affordability, interoperability, and mobility. Together with other systems, the program will demonstrate the means to connect theater-based warfighters with a commercial global fiber grid.

Maritime Systems

ARPA's traditional development of signal processing and sensor technologies has been broadened to include a larger spectrum of technologies related to maritime systems. ARPA is pursuing programs to help solve technology shortfalls and affordability issues in maritime applications.

The Simulation-Based Design Program focuses on reducing the cost of the ship design and acquisition process through the use of simulation in all

phases of a ship's life cycle—from initial concept through service life. Virtual prototyping will be used to produce designs that are optimized at the system level, rather than the traditional method of design in which optimized subsystems are integrated into a whole.

The overriding goal is to reduce the cost of large, complex vehicles by reducing design time and the number of design changes from initial concept through manufacture.

Complementing the Simulation-Based Design Program is the Ship Systems Automation Program. Automation technologies and distributed virtual environments to promote integrated product and process development will pave the way for quicker, more affordable development of ship systems. Systems being pursued include both combat and platform systems that show promise in reducing manning requirements while improving ship performance. ■



State of the Aerospace Art

By Ramon L. Lopez

THE Air Force Association's 1993 Aerospace Technology Exposition, held September 13-15 in Washington, D. C., opened just days after the conclusion of the Pentagon's wide-ranging Bottom-Up Review of defense, and it mirrored the study's austere outlook on future systems and programs.

Even so, interest was up—and by a significant margin. Attendance at the three-day exhibition at the Sheraton Washington Hotel soared thirty-eight percent over last year, when the event was called “Aerospace Briefings and Displays.”

Exhibits reflected a pervasive, post-Cold War belt-tightening in the aerospace industry. The show featured sixty-nine industry exhibitors. Their displays seemed to demonstrate decisions to sharpen their focus on industrial opportunities that survived the review and on new ones that might appear.

Defense Secretary Les Aspin commissioned the recent study to get a fresh look at US defense needs “from the bottom up.” The results, unveiled in early September, were widely reflected in the exhibition halls.

Gone were big displays featuring



Photo by Paul Kennedy

Air Force Secretary Dr. Sheila E. Widnall looks over new cockpit technology during a tour of AFA's 1993 Aerospace Technology Exposition. At the three-day event, industry and DoD exhibitors promoted their products, which ranged from aircraft to weapon systems to communications systems to aircraft components.

an Air Force Multirole Fighter (MRF) and the joint-service A/F-X attack aircraft. (Both were eliminated in the review.) Lockheed showed that it was scrambling for F-16 export sales in the wake of the Pentagon's decision to terminate F-16 production for USAF after Fiscal Year 1994.

On the more positive side, McDonnell Douglas promoted its C-17 Globemaster III transport plane, and Lockheed did the same with its F-22 fighter, which emerged from the Pentagon's

study with glowing reviews and a new mission: ground attack.

The Secretary Speaks

Global reach—a critical element of the Clinton Administration's evolving military blueprint—will require more airlift and sealift as US military forces are pulled back. Secretary of the Air Force Sheila E. Widnall, who visited the show, said, "The new defense strategy calls for airlift capability of at least the same level of Desert Shield and Desert Storm and a substantial fleet of air refuelers to extend the global reach and power in joint and combined operations."

The new Air Force Secretary backed the USAF-Navy Joint Primary Aircraft Training System. The JPATS would replace aging in-service USAF T-37B trainers made by Cessna and Navy T-34C aircraft provided by Beech. Interest in the US military trainer sweepstakes is high, since it is reported to be worth \$6 billion to the winning team. [See "The JPATS Race Gathers Speed," p. 34.]

At the show, JPATS contenders said that release of the formal request for proposal (RFP) now set for distribution in February 1994 may be delayed two to three months. Company officials expressed concern that a move to make the JPATS project a "best value" procurement may slow the program. It would take several months to rewrite the RFP specifications to meet streamlined acquisition initiatives.

The Bottom-Up Review called for greater conventional bombing capability for the B-1, B-2, and B-52 bombers. Boeing Defense & Space Group officials at the exposition said that the Seattle-based firm has completed modifications of the first B-52H to adapt it for conventional warfare missions. The Air Force will now conduct flight testing of the modified bomber.

The modification program calls for transferring conventional weapon capability from B-52Gs, which are being retired, to the newer B-52Hs. The modification accommodates AGM-142 Have Nap and AGM-84A Harpoon air-to-surface missiles and the universal bomb bay adapter, as well as the integrated conventional stores management system and Global Positioning System (GPS). Boeing is pursuing additional modification contracts.

The Pentagon review led to the creation of the Joint Advanced Strike



Photo by Paul Kennedy

The Exposition welcomed many foreign visitors, including this Royal Air Force attaché, here talking to a representative of McDonnell Douglas. Among the foreign attendees were 100 members of the Inter-American Defense College.

Technology (JAST) program for the Air Force and Navy to replace the A/F-X and MRF programs. JAST will be a technology research and development (R&D) program to include development of common components, including engines, training equipment, avionics, ground support, and mission planning equipment. The JAST effort will produce flying prototypes.

In the wake of the Pentagon review, the Lockheed F-22 is cast in a starring role as a multirole fighter. The planned \$16 billion engineering and manufacturing development program will now be modified to give the air-superiority fighter added ground-attack capability. It will be equipped to carry two Joint Direct Attack Munitions (JDAMs) internally and two Triservice Standoff Attack Missiles (TSSAMs) under the wing.

Northrop's stealthy AGM-137 TSSAM is used to dispense infrared and acoustically guided submunitions. Lockheed is already under contract to add air-to-ground capability to the aircraft.

Options for the F-16

The decision to halt USAF's F-16 procurement after Fiscal 1994 focuses Lockheed's Fort Worth, Tex., facility on F-16 upgrades and foreign military sales marketing efforts. More than 900 F-16s are potential candidates for the latest Block 50 upgrade. Candidate Block 50 systems include the Texas Instruments Midlife Update modular mission computer and a syn-

thetic aperture radar for delivery of JDAM.

Raytheon, along with other firms, is awaiting the Air Force's RFP for development and validation of a new guidance set for the heat-seeking Sidewinder air-to-air missile.

Raytheon's entry in the AIM-9X competition will be a tail-controlled Sidewinder dubbed "Boxoffice." The Boxoffice technology demonstration program involved a Sidewinder with an electromechanical control actuation system and four independently actuated tailfins, plus other refinements. Raytheon says its Boxoffice missile achieved eight successful test flights.

British Aerospace and its US partner, Hughes Aircraft, continue their efforts to generate USAF interest in the advanced short-range air-to-air missile (ASRAAM), which remains a potential weapon for the F-22. ASRAAM continues in full-scale development, and project officials said it is meeting all its milestones.

Martin Marietta has received a \$270 million contract to build Low-Altitude Navigation and Targeting Infrared for Night systems and support gear for Saudi Arabia, Greece, and Bahrain. The full value of the contract will be defined later. Saudi Arabia has ordered forty-eight sets of navigation and targeting pods, while Greece will receive twenty-four navigation and sixteen targeting pods. Bahrain's order is for three targeting pods. Initial

deliveries are set for early 1995 and will continue through 1996.

The expectation at the show was that the Air Force will award two contracts early next year for eighteen-month design studies of the JDAM. The JDAM RFP for Phase 1 of the engineering and manufacturing development program was released in late August, and the deadline for industry responses was mid-October. Following evaluation of the JDAM designs, the Air Force will select a contractor team to finish JDAM development over thirty-six months.

JDAM involves attachment of an inertial guidance kit in a modified tailcone to the 1,000-pound Mk. 83, the 2,000-pound Mk. 84, and the BLU-109 tactical munitions dispenser. The kit transforms unguided bombs into all-weather, precision-strike weapons. As many as 74,000 JDAM kits could be required over the next fifteen years. While still aboard the launcher aircraft, JDAM is continually updated with target information through the aircraft's avionics system. Upon bomb release, the inertial guidance kit takes over, guiding the weapon to the target.

Texas Instruments is leading a team that wants to finish development of the next-generation standoff weapon system for USAF and USN, the Joint Standoff Weapon (JSOW) system. It will share components with JDAM, including the integrated inertial navigation system and Global Positioning System (INS/GPS).



Photos by Paul Kennedy

A Lockheed representative explains his company's entry in the Joint Primary Aircraft: Training System competition to some AFROTC cadets. Seven contractor teams are bidding to provide the new USAF-Navy aircraft trainer.

Big Casino

JDAM is considered "the biggest game in town" by one industry official, and eight contractor teams are pursuing the major contract, including a Rockwell and Boeing team and a venture consisting of Hughes, Litton, and Cellins. Martin Marietta and McDonnell Douglas have also announced JDAM bids, and others expected to seek JDAM work are Northrop, Lockheed, and Raytheon.

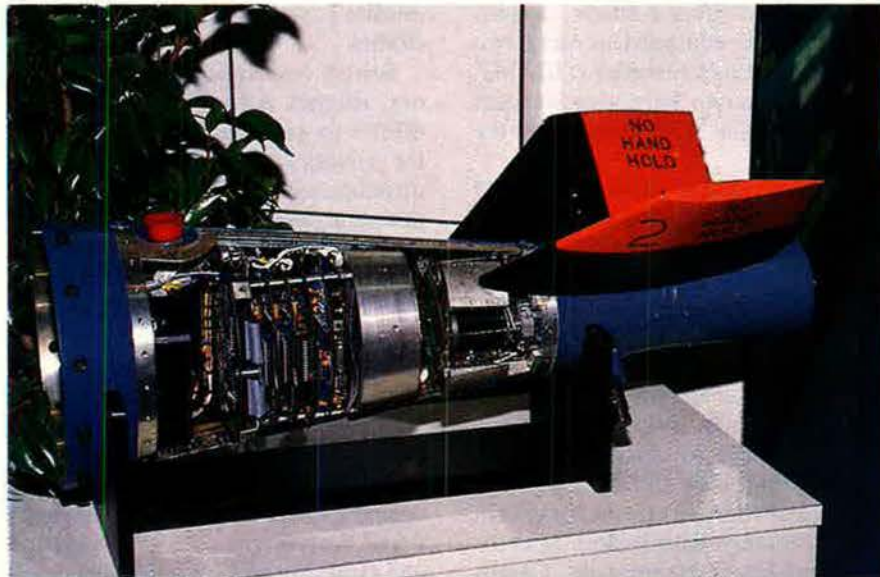
The JDAM program is being conducted in three phases. Motorola has

won a contract to develop a joint programmable fuze for JDAM Phase 2, which also includes development of a 500-pound close air support, unitary insensitive munition for the USN.

JDAM Phase 3 was to involve only development of an advanced seeker for the terminal phase of flight of both JDAM and JSOW. The Air Force now says that additional terminal accuracy may be achieved with aircraft systems. One candidate is the GPS Advanced Targeting System (GATS), which involves an aircraft-mounted synthetic aperture radar aided by GPS. JDAM Phase 3 would begin in Fiscal Year 1995.

Early this year, JSOW passed its preliminary design review, and the Air Force has Texas Instruments under contract for integration of JSOW with the BLU-108B Sensor-Fuzed Weapon. The critical design review is scheduled for January 1995. Procurement would begin in FY 1995. JSOW product improvements will include a terminal seeker and a unitary warhead. A propulsion system is being evaluated for JSOW, currently a glide weapon.

Boeing, meanwhile, is offering the Air Force both short-term and long-term solutions to theater ballistic missile threats. It proposes to build a 747-mounted airborne laser weapon able to knock out Scud missiles. It is already testing a "Scud-buster" developed from an obsolete attack weapon.



Above is the tailcone from the Joint Direct Attack Munition (JDAM) proposed by Rockwell International/Boeing. Eight contractor teams are developing JDAM guidance kits, which transform conventional bombs into precision guided weapons.



The Aerospace Technology Exposition was not just about aerospace. Above, two Air Force attendees look over the Harley-Davidson MT500 Military Motorcycle, the only motorcycle built purposely to military specifications.

The Airborne Laser Systems Program Office and the Phillips Laboratory at Kirtland AFB, N. M., are jointly exploring the concept of an accurate, aircraft-mounted, high-energy laser that could destroy tactical ballistic missiles, such as the Scud, while they are still in their boost phase.

Two contracts for development of an airborne laser system are expected to be awarded by early January 1994. Each is expected to be worth \$15 million to \$18 million. After an eighteen-to twenty-four-month concept definition R&D effort, the Air Force plans to select a single design in 1996 for further development.

Boeing, TRW, and Lockheed have teamed to compete against a joint bid from Rockwell International, Hughes Aircraft, and E-Systems. The winning team will enter a demonstration and validation phase, during which an airborne laser system would be designed, developed, integrated, and tested. Engineering and manufacturing development would begin in the late 1990s, followed by production.

Boeing Military Airplanes Division is responsible for the overall weapon system design and integration and aircraft modification. TRW Space & Electronics Group's Applied Technology Division is in charge of the high-energy laser subsystem, while Lockheed Missiles & Space Co. is responsible for the beam-control subsystem.

Recycling

Success in conducting three anti-ballistic short-range attack missile (SRAM-A) demonstration flights is expected to lead to missile intercept tests as early as December 1994.

The concept, originating from Boeing, would allow the US to field a near-term Theater Missile Defense system using obsolete equipment. About 1,500 SRAM-A attack missiles, which carried nuclear weapons, have been taken out of the operational inventory. SRAM-A boosters would be combined with the Boeing Lightweight Exoatmospheric Projectile (LEAP) intercept/guidance system, with intercepts occurring in the upper atmosphere.

The latest demonstration of a SRAM-A modified to intercept enemy missiles took place at Point Mugu Missile Range, Calif., in August. In a test conducted by the Ballistic Missile Defense Organization and USAF's Phillips Laboratory, the missile was launched from a Boeing B-52H rotary launcher and boosted to an undisclosed altitude. The August evaluation followed test flights in October 1992 and February 1993 using B-52 and B-1 aircraft.

Testing to date has been funded by Boeing, with USAF providing test

aircraft and associated equipment. The Air Force is said to be interested in a near-term demonstration program, but funding will have to be found for intercept tests.

The system consists of the SRAM-A booster, an advanced solid axial stage (ASAS), which uses solid propellant, an interstage module for flight control, and the LEAP system. The SRAM-A motor takes the payload to the exoatmosphere (more than 200 miles above the Earth). After the booster separates, the ASAS kicks in to accelerate the LEAP to the target before dropping off. Terminal homing of the hit-to-kill device is accomplished by an infrared sensor. One target update is made after launch and before the weapon enters the exoatmosphere.

The system would weigh between 2,200 and 2,400 pounds, and launching aircraft could include tactical aircraft, such as the McDonnell Douglas F-15.

Boeing continues to advocate procurement of 747-400s or 767-300s as a supplement or alternative to the McDonnell Douglas C-17. Boeing has offered a choice of fifty-eight 767-300 freighters or thirty-three freighter versions of its 747-400. The aircraft, which cost between \$4 million and \$5 million, would be delivered over five years beginning in 1995.

Pentagon deliberation over the fate of the C-17 included consideration of replacement of its four Pratt & Whitney F117-100 turbofan engines with Rolls-Royce RB211-535E4 powerplants.

In late July, Rolls-Royce submitted an unsolicited proposal to USAF for a C-17 engine competition. The British engine-maker promised significant acquisition and support cost savings with a new engine. The plan was that the selection of the RB211 engine to power the C-17 could lead to establishment of a US facility for final assembly, test, and maintenance of the powerplant. Construction of such an engine plant in the US was one option that Rolls-Royce was considering as part of its offer for contractor logistic support for the RB211 engine. Another option was a partnership with a US engine-maker. ■

Ramon L. Lopez, Washington correspondent for Flight International, has covered aerospace and defense for nearly twenty years. His most recent article for Air Force Magazine, "Industry's New 'High-Low Mix,'" appeared in the November 1992 issue.



A Week of Firsts

By Tamar A. Mehuron, Associate Editor

THOUSANDS of civilian and military attendees thronged the Air Force Association's forty-seventh National Convention, which also marked the official debut of the new Secretary of the Air Force, Dr. Sheila E. Widnall.

The Convention, held September 13–15 at the Sheraton Washington Hotel in Washington, D. C., also featured more than eighty defense industry and Department of Defense exhibits at the Aerospace Technology Exposition [see "State of the Aerospace Art," p. 62].

Secretary Widnall provided the Convention's keynote address at a September 14 luncheon, which for many was their first exposure to the Air Force's new civilian leader. She received a standing ovation for her remarks, which dwelled on the need to provide for the readiness and welfare of the troops.

The Convention was the scene of addresses from Les Aspin, the Secretary of Defense; John M. Deutch, the under secretary of Defense for Acquisition; and Gen. Merrill A. McPeak, the Air Force Chief of Staff. All three focused on defense budgets and acquisition problems.



Photo by Paul Kennedy

Defense Secretary Les Aspin, flanked by AFA President James M. McCoy (right) and AFA Chairman of the Board O. R. Crawford, discusses the results of the Defense Department's Bottom-Up Review at the 1993 AFA National Convention.

At the Aerospace Technology Exposition, three-day attendance was up significantly over last year. Those attending included such distinguished visitors as George R. Abrahamson, the Air Force's chief scientist; Carroll Jones, deputy director, Air Force Test and Evaluation Office; Richard M. McCormick, Air Force deputy assistant secretary, Space Plans and Policy; and Kent Stansberry, director of Space Policy for DoD/OSD. Also on hand were Gen. John Michael Loh, com-

mander of Air Combat Command; Gen. Ronald R. Fogleman, commander of Air Mobility Command; and Gen. Ronald W. Yates, commander of Air Force Materiel Command.

Other distinguished visitors included Edward C. Aldridge, Jr., former Secretary of the Air Force and now president and CEO of The Aerospace Corp.; retired Gens. Charles A. Gabriel and David C. Jones, former Air Force Chiefs of Staff; and Medal of Honor recipients John L. Levitow and Bernie Fisher. Seventy-one generals also attended the Convention and the Aerospace Technology Exposition.

Election of Officers

James M. McCoy of Omaha, Neb., was reelected President of the Air Force Association for a second term. O. R. Crawford of Austin, Tex., was reelected Chairman of the Board for a second term. Mary Ann Seibel of St. Louis, Mo., was reelected National Secretary, and William N. Webb of Midwest City, Okla., was reelected National Treasurer.

More than 6,000 people took part in Convention-related activities. The 379 registered delegates, representing forty-six states and Guam, were joined by senior military and government officials for the Aerospace Technology Exposition, which featured speeches, and for social events. On hand to cover the Convention were 188 reporters and other news media representatives.

Meeting concurrently with the Convention were trustees of the Aerospace Education Foundation and Air Force command Senior Enlisted Advisors, as well as AFA's Air National Guard Council, Civilian Personnel Council, Enlisted Council, Junior Officer Advisory Council, Reserve Council, and Veterans/Retirees Council.

Resolutions and Changes

An amendment to the National Constitution authorizes the Chairman of the Board to appoint up to three additional voting members whose particular expertise will enhance the overall effectiveness of the Board. The appointments are for one-year or shorter terms, following the adjournment of each National Convention.

Convention delegates also passed a resolution commending National Guard units' superb humanitarian assistance to victims of Hurricane An-

drew, the 1993 Mississippi River floods, and other natural disasters.

Congressional Activity

Thirty-four state delegations sponsored twenty-one congressional breakfasts on Tuesday and Wednesday of Convention week. Fifty-three members of Congress participated. Among them were Sens. J. James Exon (D-Neb.) and Kay Bailey Hutchison (R-Tex.) of the Senate Armed Services Committee. Sen. Slade Gorton (R-Wash.), from the Senate Appropriations Committee, and Sen. Ted Stevens (R-Alaska), from the Senate Appropriations Defense Subcommittee, also attended. Attending from the House Armed Services Committee were Reps. Herbert H. Bateman (R-Va.), Pete Geren (D-Tex.), Earl Hutto (D-Fla.), Jon Kyl (R-Ariz.), H. Martin Lancaster (D-N. C.), Owen B. Pickett (D-Va.), Ike Skelton (D-Mo.), and Peter G. Torkildsen (R-Mass.). Attending from the House Appropriations Defense Subcommittee were Reps. Bob Livingston (R-La.) and John P. Murtha (D-Pa.).

The Colorado state delegation met with House Armed Services Committee member Patricia Schroeder (D-Colo.).

Secretary Widnall visited the Massachusetts congressional breakfast. General McPeak attended eight breakfasts hosted by AFA's North Central and Northwest Regions and state delegations of California, Georgia, Missouri, New York, North Carolina, and Texas.

Sen. John McCain (R-Ariz.) received the W. Stuart Symington Award, AFA's highest honor for contributions to national security by a civilian, at the Anniversary Dinner on September 14.

Other Elections

Six new National Vice Presidents were elected: Dr. Dan Callahan of the Southeast Region, William D. Croom of the Rocky Mountain Region, Joseph R. Falcone of the New England Region, Samuel M. Gardner of the Midwest Region, John W. Lynch of the Far West Region, and J. Robin Wohnsigl of the North Central Region.

Charles G. Durazo of McLean, Va.; Doyle E. Larson of Burnsville, Minn.; Robert N. McChesney of Barrington, N. H.; Craig R. McKinley of Jacksonville, Fla.; H. A. Strack of Incline Village, Nev.; and Maj. Paul Adams Willard II, of Beavercreek, Ohio, were

elected to the Board of Directors for three-year terms. Gerald S. Chapman of the Far West Region was elected for a two-year term, filling out the remainder of Robert A. Munn's term.

Three new Under-Forty Directors joining the AFA Board are Capt. David A. Brescia of Peterson AFB, Colo., Capt. Kevin Chambers of Pope AFB, N. C., and Capt. John B. Steele of Fairborn, Ohio.

For a complete list of National Vice Presidents and Directors, including those reelected, see "This Is AFA," p. 84.

Aerospace Education Foundation

A video on "Our Best Community Service Project" won the Foundation's annual contest for presentations by Air Force Junior ROTC cadets. The winning entry came from Coatesville Area High School in Coatesville, Pa. For next year's contest, cadets will submit a video on the same topic. Dr. Joseph Edmond Ciotti of Honolulu, Hawaii, won the Christa McAuliffe Memorial Award as the year's outstanding aerospace science, mathematics, and computer science teacher. The Pope Chapter of Fayetteville, N. C., received the Sam E. Keith, Jr., Aerospace Education Award of Excellence, named in honor of the late AFA leader and former National President and Board Chairman from Fort Worth, Tex.

Acknowledgments

Parliamentarian for the AFA National Convention was Martin H. Harris. David L. Blankenship was Sergeant at Arms. Inspectors of Elections were R. L. Devoucoux (Chairman), Jesse D. Kinghorn, Jr., and James E. Smith. Charles H. Church, Jr., chaired the Credentials Committee, serving with Harold F. Henneke and M. Elisabeth Root.

The Association is particularly grateful to the corps of volunteers who assisted the staff in Convention support: Norm Aubuchon, 1st Lt. Scott Boyd, Cecil Brendle, Cadet Thomas M. Cooper, Evie Dunn, Charles and Mary Lucas, 2d Lt. Jenifer Petrina, 1st Lt. Julie Petrina, Glenda R. Shepela, Debbie and Gregg Snyder, Dana Steinhauer, Janet Voltz, and John Zipp.

The 1994 Convention will be held at the Sheraton Washington Hotel, Washington, D. C., on September 12-14. ■



Special Citations and Crew Awards

Award	Recipient(s)	Achievement	Accepted by
Gen. Curtis E. LeMay Award	Crew IT-01, Castle AFB, Calif.	Best bomber aircrew	Maj. James L. Bowles, Jr., aircraft commander
Gen. Thomas S. Power Award	Crew S-210, 351st Missile Wing, Whiteman AFB, Mo.	Best missile crew	Capt. Steven A. Coker, crew commander
Lt. Gen. William H. Tunner Award	A crew of the 314th Airlift Wing, Little Rock AFB, Ark.	Best air mobility aircrew	Capt. Steven W. Powell, aircraft commander
Lt. Gen. Claire Lee Chennault Award	Capt. Michael C. Wilson, 7440th Composite Wing (Provisional), Incirlik AB, Turkey	Best aerial warfare tactician	
Gen. Jerome F. O'Malley Award	An ACC/AFIC RC-135 Rivet Joint crew from the 1700th Reconnaissance Squadron and 6975th Electronic Security Squadron (Provisional), Offutt AFB, Neb.	Best reconnaissance crew	Capt. Paul C. Hughes, aircraft commander
Best Space Operations Crew	Delta Crew, 20th Space Surveillance Squadron, Eglin AFB, Fla.	Best space operations crew	2d Lt. Wendy Hacker, commander
Verne Orr Award	Chanute Technical Training Center, Chanute AFB, Ill.	Most effective use of human resources within USAF	Col. James Cavanaugh, commander



Photo by Paul Kennedy

Maj. James L. Bowles, Jr., Longshot '93 flight commander, accepts the LeMay Award on behalf of his crew, Maj. Scott Franks, Capt. Timothy Malinski, Capt. Anthony Siler, and Capt. Cleophas Hockaday, from Board Chairman O. R. Crawford as National President James M. McCoy leads the applause.

National Aerospace Awards

Award	Recipient(s)	Achievement	Accepted by
H. H. Arnold Award (AFA's highest honor in National Security to a member of the armed forces)	Gen. Merrill A. McPeak, USAF Chief of Staff	Outstanding vision and leadership as Air Force Chief of Staff; guidance of the most comprehensive changes in organization, training, and leadership since the inception of USAF; reconstruction of the force to meet post-Cold War needs; and forceful support of airpower's flexibility and decisiveness	
W. Stuart Symington Award (AFA's highest honor in National Security to a civilian)	Sen. John McCain (R-Ariz.)	Sustained support of strong national security policy, inspirational leadership in the effort to establish a rational and responsible basis for defense funding, and advocacy of programs important to the men and women of the armed forces	
John R. Alison Award (AFA's highest honor for industrial leadership)	Daniel M. Tellep, Lockheed Corp.	Leadership in the defense community, fostering an appreciation of the contributions of industry to national security; numerous efforts to sustain industrial capacity and expand technological horizons	
David C. Schilling Award (outstanding contribution in Flight)	Maj. Murrell F. Stinnette, USAF, Rhein-Main AB, Germany	Brilliant innovation as the 435th Airlift Wing's chief tactician for Operation Provide Promise, developing procedures for humanitarian airlift and airdrop over Bosnia and exhibiting outstanding operational expertise	
Theodore von Kármán Award (outstanding contribution in Science and Engineering)	Gen. Robert T. Marsh, USAF (Ret.), AFA Science and Technology Committee	Lifetime contributions to advances in science and military technology through service in USAF, innovative leadership in private industry, and dedicated service as AFA's S&T Committee chairman	
Gill Robb Wilson Award (outstanding contribution in Arts and Letters)	<i>Current News</i> , Washington, D. C.	Highlighting important national security news, opinion, and analysis from the nation's media for the attention of key USAF, DoD, and other government officials; forty years of enhancing the ability of national leaders to make critical decisions	Herbert J. Coleman, chief
Hoyt S. Vandenberg Award (outstanding contribution in Aerospace Education)	Lt. Gen. Bradley C. Hosmer, USAF, USAF Academy, Colo.	Exemplification of USAF Academy ideals during his distinguished Air Force career, from graduating first in his Academy class, earning a Rhodes Scholarship, through a distinguished tenure as president of the National Defense University to his current post as the first Academy graduate to serve as Superintendent	
Thomas P. Gerrity Award (outstanding contribution in Logistics)	Lt. Col. Kenneth V. Feaster, USAF, Andersen AFB, Guam	Volunteering to take charge of the closure of Clark AB, the Philippines, in the wake of the eruption of Mount Pinatubo. His motivational skills, awareness of political sensitivities, and decision-making abilities ensured high morale, maintained a proper audit trail (recovering \$235 million), and helped complete the task	
Department of Veterans Affairs Employee of the Year	Leonard P. Mullins, VA Regional Office, Louisville, Ky.	Consummate professional assistance as a vocational rehabilitation and counseling officer, achieving singular success in securing meaningful employment and independent housing for war-disabled veterans	

Citations of Honor

Recipient(s)	Achievement	Accepted by
MSgt. Steven C. Bradburn, Ramstein AB, Germany	Excellent innovative management of DoD's first state-of-the-art nuclear storage security installation at a main operating base	
SrA. Heather M. Graham, Noervenich AB, Germany	Outstanding performance and dedication as an information manager for the Base Maintenance Branch, Noervenich AB, Germany	
Capt. Kenneth A. Lillie, USAF Academy, Colo.	Innovative and imaginative use of art to teach mathematics at the Academy	
Lt. Col. John D. O'Malley, Randolph AFB, Tex.	Outstanding performance as operations officer for T-1A Flying Training Squadron (Provisional). He was its first instructor, flight examiner, instructor trainer, and information source for the media and community leaders	
SMSgt. Larry A. Stover, Elmendorf AFB, Alaska	Efficient management of munitions stockpiles, improving munitions flow and increasing effectiveness and accountability	
Col. James K. Wansak, Wright-Patterson AFB, Ohio	Dynamic leadership of an acquisition team of more than 2,500 business, engineering, contracting, logistics, and operations personnel as program director for the Joint Primary Aircraft Training System and T-1A Training System programs	
Capt. David D. Watt, Langley AFB, Va.	Focused leadership as project manager for F-16 Low-Altitude Navigation and Targeting Infrared for Night Tactics Development and Evaluation, improving the night combat capability of the F-16C	
C-130 operations USAF-wide	Exceptionally meritorious service in support of diverse missions throughout the world from January 1, 1992, to May 31, 1993, airlifting tons of supplies to Kenya, Somalia, Bosnia, and the former Soviet Union; transporting 9,000 demobilized Angolan troops; and providing humanitarian assistance to victims of Hurricanes Andrew and Iniki	Gen. Merrill A. McPeak, USAF Chief of Staff
Courseware Process Team of the Training Systems Branch, AFMC, Wright-Patterson AFB, Ohio	Prolific efforts in addressing processes for the integrated and concurrent development of training with weapon systems, improving the quality of aircrew and maintenance training throughout the Air Force	Bill Curtice, branch chief
Microelectronics Design Branch, Wright-Patterson AFB, Ohio	Pioneering work in the development of very-high-speed integrated circuits hardware-description language, increasing performance in Air Force systems and saving millions of dollars	Dr. John W. Hines
Tanker Airlift Control Center, Scott AFB, Ill.	Ground-breaking organizational efforts that dramatically improved efficiency of air mobility forces and their ability to support high-tempo military and humanitarian operations	Brig. Gen. John B. Sams, Jr., commander
Warrior Preparation Center, Einsiedlerhof AS, Germany	Providing effective, previously unavailable, highly realistic training to senior commanders and battle staffs	Col. Glen W. Moorehead II, commander
46th Bomb Squadron, ACC, Grand Forks AFB, N. D.	Meticulous planning and unparalleled achievement in setting twelve time-to-climb world records in the B-1B bomber	Lt. Col. Jack A. Wylie, commander
301st Rescue Squadron (AFRES), Homestead AFB, Fla.	Life-saving efforts under arduous conditions during and after Hurricane Andrew—despite destruction of their base and loss of their homes—operating helicopters around-the-clock, saving 137 lives, delivering vital food and water, and providing medical help to ravaged areas of Florida	Capt. Antonio Cunha, rescue pilot

In addition to receiving the H. H. Arnold Award, AFA's highest honor in National Security to a member of the armed forces, Gen. Merrill A. McPeak also accepted a Citation of Honor recognizing C-130 operations worldwide (right) from Chairman Crawford and President McCoy.



Photo by Paul Kennedy

Professional, Civilian, and Educational Awards

Award

Stuart R. Reichart Award for Lawyers
 Paul W. Myers Award for Physicians
 Personnel Manager of the Year
 Crew Chief of the Year
 Civilian Wage Employee of the Year
 Civilian Program Specialist of the Year
 Civilian Program Manager of the Year
 Civilian Senior Manager of the Year
 Joan Orr Air Force Spouse of the Year
 AFROTC Cadet of the Year
 CAP Aerospace Education Cadet of the Year
 Diane O'Malley Angel of the Year
 Juanita Redmond Award for Nursing

Recipient

Col. Richard A. McDonald, Kadena AB, Japan
 Lt. Col. Frank J. Criddle, Lackland AFB, Tex.
 Capt. Glenn S. Gilbert, Scott AFB, Ill.
 TSgt. Scott Womack, Pope AFB, N. C.
 Thomas E. McElhinney, McChord AFB, Wash.
 Carol A. Meyer, Offutt AFB, Neb.
 Jean Wandrei, Hanscom AFB, Mass.
 Edward J. Panzarella, Washington, D. C.
 Loretta J. Lindsey, Misawa AB, Japan
 Cecelia E. Schmalbach, University of Notre Dame, Ind.
 Gordon D. Wilkie, New Castle, Del.
 Lori Ann Vilgats, University of Central Florida, Fla.
 Capt. Julie M. Stola, Wiesbaden, Germany

Sen. John McCain (R-Ariz.), who won the W. Stuart Symington Award for his sustained support of strong national security policy, addresses the Air Force Anniversary Dinner.

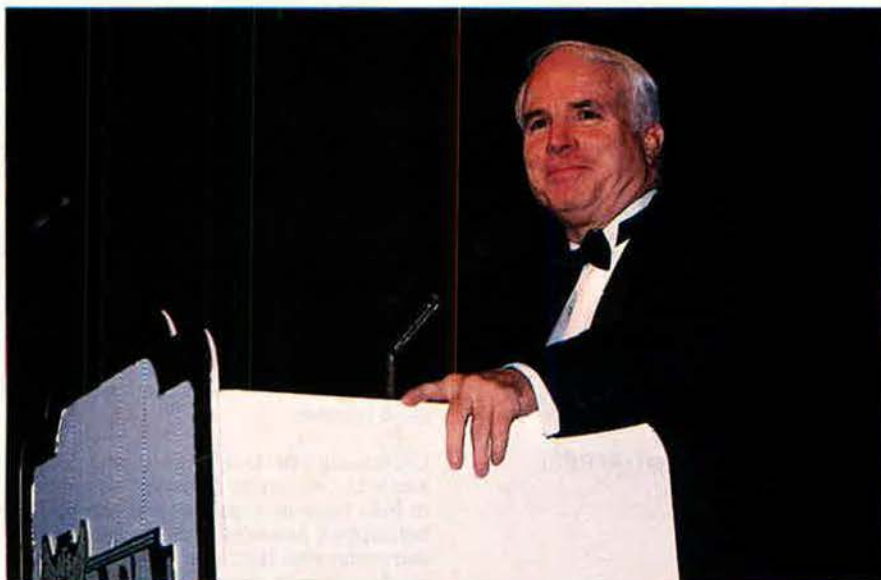


Photo by Paul Kennedy

1993 Unit Activity Awards

Donald W. Steele, Sr., Memorial Award: AFA Unit of the Year
Green Valley Chapter, Ariz.

Outstanding State Organization
Texas State AFA

Outstanding Chapters
Ak-Sar-Ben Chapter, Neb.
(more than 900 members)
Salt Lake City Chapter, Utah
(401-900 members)
Mercer County Chapter, N. J.
(151-400 members)
Peace River Chapter, Fla.
(20-150 members)

Exceptional Service Awards
Fort Worth Chapter, Tex.
(Aerospace Education)
High Desert Chapter, Calif.
(Best Single Program)
Wright Memorial Chapter, Ohio
(Communications)
Cape Canaveral Chapter, Fla.
(Community Relations)
Central Florida Chapter, Fla.
(Overall Programming)
Paul Revere Chapter, Mass.
(Veterans Affairs)

Aerospace Education Fellowships

Presented at September 13, 1993, luncheon

Barry Goldwater Fellows

Recognizes \$5,000 contribution

Gen. John Michael Loh, USAF
USAF Thunderbirds

Individual Jimmy Doolittle Fellows

Recognizes \$1,000 contribution

Tom Eden (*in memoriam*)
MSgt. Samuel M. Gardner, Jr. (*in memoriam*)
Ethel M. Mattson
William W. Michael
George E. Nicklaus (*in memoriam*)
Michael L. Salis
Nuel Sanders
Patricia and Edward Stearn

Individual Ira C. Eaker Fellows

Recognizes \$1,000 contribution

Lt. Gen. Benjamin O. Davis, Jr., USAF (Ret.)
Roy Denney
George "Pete" Peterson

Mary Anne Thompson

Sponsors

Langley Chapter
Mrs. H. H. Timken, Jr.

Sponsors

Albuquerque Chapter
Kansas State AFA and Chapters
Thomas B. McGuire, Jr., Chapter
Pope Chapter
Chicagoland-O'Hare Chapter
Paul Revere Chapter
Ogden Chapter
California State AFA

Sponsors

Tuskegee Airmen, Inc.
Riverside Chapter
Nevada State AFA and Thunderbird
and Dale O. Smith Chapters
Virginia State AFA

This is the Aerospace Education Foundation

As of September 15, 1993

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B. Robin Stoddard
H. A. Strack
Kenneth O. Wofford
Harry Wugalter

Attendance was up at this year's Convention as more than 6,000 people toured the Aerospace Technology Exposition and 379 registered delegates elected a slate of national officers.



Photo by Paul Kennedy

Arthur C. Storz, Sr., Membership Awards

AFA's most prestigious awards are named for Arthur C. Storz, Sr., a former permanent AFA National Director, a Life Member, and principal founder of the Ak-Sar-Ben Chapter. The Storz Membership Award, made possible through a generous endowment to the Association by his son Art Storz, Jr., has been awarded for membership excellence based on criteria approved by AFA's Board of Directors for the year ending March 31, 1993.

Chapter Award

Presented to the AFA chapter that produces the greatest number of new members during the twelve-month period ending March 31, 1993, as a percentage of total chapter membership as of March 31, 1992.

Del Rio, Tex.

Individual Award

Presented to the AFA member or members who have done the most to promote AFA membership during 1992-93

Oscar Curtis

1993 Community Partner Membership Awards

These awards are presented to chapters with a significant outreach into the community and are based on March 31, 1993, chapter membership totals.

President's Award

This award recognizes the chapter that has recruited the greatest percentage of Community Partners (in terms of chapter membership). Chapters must have a minimum of fifteen Community Partners to qualify.

Lloyd R. Leavitt, Jr., Mch.

Gold Awards

These awards recognize chapters that have a total number of Community Partners equal to or greater than two percent of their overall chapter membership. Chapters must have a minimum of ten Community Partners to qualify.

Altus, Okla.
Anchorage, Alaska
Ark-La-Tex, La.
Barry Goldwater, Ariz.
Cape Canaveral, Fla.
Carl Vinson Memorial, Ga.
Cheyenne Cowboy, Wyo.
Colin P. Kelly, N. Y.
Dacotah, S. D.
David D. Terry, Jr., Ark.
Del Rio, Tex.
Eagle, Pa.
Enid, Okla.
Fairbanks Midnight Sun, Alaska
Florida Highlands, Fla.
General David C. Jones, N. D.
Green Valley, Ariz.
Grissom Memorial, Inc.
Guam-Arc Light, Guam
Inland Empire, Wash.
John C. Stennis, Miss.
Langley, Va.
Llano Estacado, N. M.
Lloyd R. Leavitt, Jr., Mich.
Lubbock, Tex.
Morgan S. Tyler, Fla.
Panhandle, Tex.
Pope, N. C.
Roanoke, Va.
Robert H. Goddard, Calif.
Scott Berkeley, N. C.
South Georgia, Ga.
Swamp Fox, S. C.
Tidewater, Va.

Total Force, Pa.
Tucson, Ariz.
Wasatch, Utah
Wichita Falls, Tex.

Achievement Awards

These awards recognize chapters that have a total number of Community Partners equal to or greater than one percent of their overall chapter membership. Chapters must have a minimum of five Community Partners to qualify.

Albuquerque, N. M.
Ak-Sar-Ben, Neb.
Cape Fear, N. C.
Central Florida, Fla.
Central Oklahoma (Gerrity), Okla.
Cleveland, Ohio
Cochise, Ariz.
Col. H. M. "Bud" West, Fla.
Contrails, Kan.
Dallas, Tex.
Delaware Galaxy, Del.
Fran Parker, N. M.
General E. W. Rawlings, Minn.
General James R. McCarthy, Fla.
General Nathan F. Twining, Fla.
Golden Triangle, Miss.
H. H. Arnold Memorial, Tenn.
Joe Walker-Mon Valley, Pa.
Maj. Gen. Charles I. Bennett, Jr., Calif.
Mobile, Ala.
Ogden, Utah
Paul Revere, Mass.
Salt Lake City, Utah
Southwest Florida, Fla.
Tacoma, Wash.
Thomas B. McGuire, Jr., N. J.
Thunderbird, Nev.
Wright Memorial, Ohio

Named in Memorial Tribute

USAF and AFA leaders and supporters and aviation pioneers who died during the past year

John V. Adams
 Lt. Gen. James H. Ahmann, USAF (Ret.)
 Col. Stratton M. Appleman, USAF (Ret.)
 Col. William Bruce Arnold, USAF (Ret.)
 Clower F. "Chick" Ashley
 Harold E. Bartlett
 Brig. Gen. Eugene H. Beebe, USAF (Ret.)
 Olive Ann Beech
 Brig. Gen. Fredrick Bell, USAF (Ret.)
 Col. Frank T. Birk, USAF (Ret.)
 Frederick B. Black, Jr.
 Lt. Gen. Richard L. Bohannon, USAF (Ret.)
 Beal Box
 Lt. Col. George W. Carpenter, Sr., USAF (Ret.)
 Lucy Carson
 Maj. Gen. Warren R. Carter, USAF (Ret.)
 Jalle Catlin
 Col. Joseph J. F. Clark, USAF (Ret.)
 Maj. Gen. Thomas G. Corbin, USAF (Ret.)
 Edward A. "Ted" Crouchley
 Marianne Cruze
 Brig. Gen. Buddy R. Daughtrey, USAF (Ret.)
 Spencer L. Davis, Sr.
 Col. Harry F. De Arment, USAF (Ret.)
 Gen. James H. Doolittle, USAF (Ret.)
 Maj. Gen. Robert E. L. Eaton, USAF (Ret.)
 Milton Feir
 Amb. Milton Frank
 Catherine Gabreski
 Dr. Paul E. Garber
 Brig. Gen. Ross C. Garlich, USAF (Ret.)
 Col. Marion B. Gibson, USAF (Ret.)
 Lt. Gen. Francis C. Gideon, USAF (Ret.)
 Frederick M. Glass
 Col. Thomas E. Gurnett, USAF (Ret.)
 Maj. Gen. Fred A. Haeffner, USAF (Ret.)
 Mary Hahn

Harold R. Hall
 Maj. Gen. Reginald C. Harmon, USAF (Ret.)
 Col. William M. Hart, USAF (Ret.)
 Robert F. Hazeleaf
 William Randolph Hearst, Jr.
 Col. Frank D. Henderson, USAF (Ret.)
 Paul E. Henninger, Sr.
 Col. George F. Hennrikus, USAF (Ret.)
 Lt. Gen. Richard M. Hoban, USAF (Ret.)
 Thomas H. Holland, Sr.
 Brig. Gen. Thomas C. Hruskocy, Jr., USAF (Ret.)
 Brig. Gen. Harris B. Hull, USAF (Ret.)
 Frank Gard Jameson
 CMSgt. Stanley R. Janesik, USAF (Ret.)
 Eliot Janeway
 Leonard Jossel
 Maj. Gen. George J. Keegan, USAF (Ret.)
 Lt. Col. Victor J. Kellner, USAF (Ret.)
 William C. Langley
 Col. Otto C. Ledford, USAF (Ret.)
 Col. John R. Levering, USAF (Ret.)
 Maj. Gen. Millard Lewis, USAF (Ret.)
 Col. Leonard W. Lilley, USAF (Ret.)
 Maj. Robert Lowry, USAF (Ret.)
 S. Wayne Lynch
 Roy E. McClendon
 Gen. Jack G. Merrell, USAF (Ret.)
 Brig. Gen. William L. Mitchell, Jr., USAF (Ret.)
 Wylder Modine
 Lt. Gen. George L. Monahan, Jr., USAF (Ret.)
 Joe D. Moody
 Patricia R. Muncy
 Robert A. Munn
 George E. Nicklaus
 William J. Niemann
 James F. O'Hagan
 Maj. Gen. Nils O. Ohman, USAF (Ret.)

Dr. William Oldendorf
 Dr. H. Glenn Overley
 Earle North Parker
 Irene M. Peterson
 William Pisaruck
 Joe Porter
 Gen. Elwood R. Quesada, USAF (Ret.)
 Willie T. Randolph
 Maj. Gen. Maurice R. Reilly, USAF (Ret.)
 Lt. Col. James M. Rhodes III, USAF (Ret.)
 Joseph T. Riccardi
 Maj. Gen. Robert A. Rushworth, USAF (Ret.)
 John Russo
 Col. Monroe B. Sams, USAF (Ret.)
 Martha Schiff
 Col. Robert J. Schissell, USAF (Ret.)
 Henry M. Scoonover
 C. W. Scott
 Kathleen Selander
 Maj. Gen. Wendell B. Sell, USAF (Ret.)
 Walter F. Sexauer
 Donald K. Slayton
 Lt. Gen. Joseph Smith, USAF (Ret.)
 CMSgt. Arthur A. Snow, USAF (Ret.)
 Maj. Gen. Lawrence W. Steinkraus, USAF (Ret.)
 Dr. Everett E. Stevenson
 Maj. Gen. Woodrow Swancutt, USAF (Ret.)
 John C. Talbott
 Milton O. Thompson
 Col. Cloyce J. Tippett, USAF (Ret.)
 Henry J. Tremont
 Virginia Vosler
 Philip C. Wallach
 John A. Watts
 Dorothy L. Welker
 Cornelius V. Whitney
 Col. Harold D. Woodruff, USAF (Ret.)
 Lt. Gen. Donald N. Yates, USAF (Ret.)
 Seymour L. Zeiberg

Photo by Paul Kennedy



The Tuskegee Airmen, most of whom fought in Europe and North Africa during World War II as members of the 99th, 100th, 301st, and 302d Fighter Squadrons (winners of a combined five Distinguished Unit Citations), were honored at this year's Convention with a Special Award.

1993 AFA Membership Awards

The following chapters have qualified for these awards based on their recruitment of new members during the twelve-month period ending March 31, 1993.

Diamond Award: 20% new members and 20% or greater net growth

Del Rio, Tex.
 Green Valley, Ariz.
 Richard D. Kisling, Iowa

Gold Award: 20% new members and net growth between 10% and 20%

Guam—Arc Light, Guam
 Total Force, Pa.

Membership Achievement Award: 20% new members and net growth between 1% and 5%

Eagle, Pa.
 Grissom Memorial, Ind.
 High Desert, Calif.
 Wasatch, Utah

1993 Individual Activity Awards

Member of the Year

Lt. Col. James G. Clark, USAF

Special Awards

Air Force Aid Society
Tuskegee Airmen
8th Air Force

Presidential Citations

Christopher G. Bailey
Thomas M. Churan
Raymond D. Chuvala
Tillie Metzger
Jean P. Schobert
Walter E. Scott
Dolores Vallone
Cheryl L. Waller
L. B. "Buck" Webber
Ken Wofford

Special Citations

Bruce F. Bauer
Carl E. Beck
Dr. Charles D. Bright
Paul G. Chace
Col. Laney K. Cormney, USAF
Milton Feir (*in memoriam*)
and Dorothy Feir
George C. "Buddy" Gilman
Lt. Col. Barry S. Glickman, USAF
Tommy G. Harrison
M. N. "Dan" Heth
Brig. Gen. Henry M. Hobgood, USAF
Stanley V. Hood
Cecil H. Hopper
William Lafferty
Kathleen L. Landis
Capt. Dennis M. Layendecker, USAF
Lt. Col. Fred Lynch, USAF
John T. McCarthy
Maj. Gen. Billy G. McCoy, USAF
Al Moorman

Michael J. O'Connor
Leora Ostrow
Nuel E. Sanders
David Sanderson III
R. E. "Gene" Smith
B. Robin Stoddard
Cornell G. Torgeson
Col. Malham M. Wakin, USAF
Emory S. "Scotty" Wetzell
James I. Wheeler
Guam-Arc Light Chapter
15th Air Force Band and
523d Air Force Band
36th Fighter Wing
45th Space Wing

Exceptional Service Awards

Michael P. "Rip" Blaisdell
Anton D. Brees
Eddie Brown
Dr. Dan Callahan
James E. Carl
Jane W. Channell
Carol A. Chrest
Peter P. Colerico
John C. Conley
Brig. Gen. Keith B. Connolly, USAF
(Ret.)
Bennie G. Drake
Joan Elliott
Edward Farrell
Phillip N. Francis
Joyce K. Frank
William E. Freeman, Jr.
Edmund J. Gagliardi
Sam M. Gardner
Frank S. Gentile
Jack A. Gilpin
David Graham
Chris N. Harlambakis
Andrew H. Heath
Steve Hester
Clarence N. "Buster" Horlen
Timothy H. Howard
Robert Keith

Robert E. Krumpe
Robert M. Kuhns
Alfred C. S. Malmsten
Paul Markgraf
Ethel Mattson
Brig. Gen. Bobbie L. Mitchell, USAF
(Ret.)
Thomas O. Moran
Joseph Musil
Peter K. Nicolos
Lee W. Niehaus
Ellis T. Nottingham
Alan K. Olsen
Richard A. Ortega
Sherry Ott
Robert H. Ottman
Maj. Gen. Donald L. Owens, USAF
(Ret.)
Joseph H. Pate
Cletus Pottebaum
Jess Ramirez
Paul K. Robinson, Jr.
Davis C. Rohr
Robert H. Russell
William H. Russell
Michael L. Salis
Keith N. Sawyer
Michael E. Sheehan
Larry A. Shellhammer
Juan B. Sotomayor
William R. Stroh
Holton D. Summers
William C. Vickrey
Lora Jean Villarreal
William M. Voigt
Cecil H. Wentzell
John H. Williams
Jule Zumwalt
Walter N. Zywan

Jack B. Flaig Communications Awards

Capt. Harriet "Denise" Camejo, USAF
Maj. Jarold B. "Jerry" Winans, USAF



Former National Vice President (European Region) Lt. Col. James G. "Snake" Clark picks up his Member of the Year Award from President McCoy and Chairman Crawford.

Photo by Paul Kennedy

Medal of Merit

D. K. "Denny" Acheson
Leland L. Adams
Betty M. Alverson
William Lee Anderson
Charles D. Armstrong
Bill Renwick Austin
Jeannie Austin
Robert M. Balch
Robert P. Balliett
Fred Bamberger, Jr.
A. B. Bates
Tom Bates
Kathryn S. Bauer
Edwin A. Beckcom III
Paul Bell
Anthony Bellavia, Jr.
Capt. Janet Bent, USAF
Robert C. Bienvenue
Dottie J. Bobo
Lt. Col. E. James Boyd, USAF
Harold M. Branton
Leonard Q. Brewer, Sr.
Ronald H. Byrd
James E. Callahan
William C. Carey
Robert E. Carlson
Paul S. Carter
Robert E. Ceruti
Jim Click, Jr.
Dorothy E. Coleman
Jeremiah J. Collins
James W. Council
Vaiden Q. Cox
Sandra W. Cristman
Michael L. Crump
David R. Cummock
Eldon H. Dahl
Raymond C. Davisson
Capt. Kathryn A. Day, USAF
William A. Dippel
William B. Divin
Albert S. "Sid" Dodd
F. Carol Dodd
Baldwin W. Domingo
William B. Draper
Donald Dressler
Thomas J. Ehrenberger
Almalinda Fairlie
Kenneth Frey
Mary E. Frey
Glenn L. Fuller
John P. Gaffney
Winston S. Gaskins

Capt. Todd A. Gaswick, USAF
Capt. Inge Gedo, USAF
Capt. Chris G. Geisel, USAF
Melvin H. Gerhold
Robert M. Gogal
Ralph Goss
MSGt. Robert N. Guttormsen, USAF
Steven Hanneman
Samuel J. Hardin
Frances L. Henneke
Roger R. Hesselbrock
Thomas J. Hickey
Henry Carl Hill
Ronald N. Hoelzer
Thomas A. Hohman
Raymond Holden
John M. Holley
Joyce M. Hons
Robert C. Hudson
Henry B. Hufnagel
John L. Huggins
Scott Hunter
Frank W. Huppert
Donald R. Jackson
Ron James
Edward A. Jerawski
Leo A. Johnson
Beth Ann Jones
Edward A. Kelly
Kenneth D. Kelly
David C. Kern
Capt. Brian T. Knauer, USAF
Lt. Col. Ronald Kornreich, USAF
Nina Kuberski
J. B. Kump
Sharon R. Kuzmiak
James T. Larkins
Ronald E. Lenz
Billy S. Linebaugh
Col. John C. Linn, USAF
Albert F. Litzler
Clifford Love, Jr.
Chester A. Lowe, Jr.
R. Howard Mahanes
CMSgt. Thomas Mahoney, USAF
Edward C. Marriott
David V. Massey
Douglas C. May
Col. Quentin J. McGregor, USAF
Ivan L. McKinney
Tillman R. Meetze, Jr.
Eugene A. Meiler
Emma Meister
Eugene A. Merrell
Phyllis Meyer
William W. Michael
Ivan G. Mieth
David Moore
Irma Moore
William P. Moore
Richard R. Neely
Grant G. Nicolai
Robert A. Nugent
James M. O'Brien
Capt. Mike O'Connor, USAF (Ret.)
Mike O'Grady
Zack Osborne
William "Bill" Packard
Lawrence N. Paper
Eugene A. Penfield
Wayne Penley

Donald Persinger
Richard F. Phillips
Glenn O. Plaumann
Bert Pratt
Jay J. Pribulsky
Coleman Rader, Jr.
John F. Ree
Jack E. Reed
Dianne D. Reeves
Charles R. Renfro
Harold Renner
Joseph T. Rinella
Lt. Col. Steven Rizzo, USAF
Brig. Gen. Charles T. Robertson, Jr., USAF
John A. Robertson
William C. "Bill" Robinson
M. Elisabeth Root
Robert S. Rowland
Lt. Col. Charles L. St. Sauver, USAF
Allison L. Scafuri
Stanley O. Schaetzle
Bernard Schumacher
Don L. Schwartz
Victor C. Seavers
Stanley E. Shapiro
William Shields
Phillip Siavelis
Richard E. Siner
Chester D. Smith
Jack H. Smith
Quentin C. Smith
R. E. "Gene" Smith
Jeanette M. Spearman
William T. Stanley
Jed Steber
Lt. Col. William G. Stratemeier, Jr., USAF
Capt. Frank M. Swords, USAF
Rich Taubinger
CMSgt. Gary L. Thomas, USAF
Gary L. Thompson
Edwin W. Thomson
Jacqueline C. Trotter
James O. Tyler
Carol Vallone
Dr. Josef Weiss
Col. William Welser III, USAF
William L. Wilhelm
Maj. Paul A. Willard II, USAF
Catherine Williams
Etta L. Williams
Maj. Gen. Gordon E. Williams, USAF (Ret.)
Larry D. Willingham
Col. John R. Wingfield III, USAF
Carl B. Zimmerman

Management, Environmental Achievement, and C⁴ Excellence Awards

Award

Recipient

AFMC Management

AFMC Executive Management Award
AFMC Middle Management Award
AFMC Junior Management Award

Col. Gary L. Henriksen, Brooks AFB, Tex.
Maj. Jeffrey M. Basile, Tinker AFB, Okla.
Capt. Robert L. Swale, McClellan AFB, Calif.

Environmental Achievement

Gen. Edwin W. Rawlings Award for Environmental Achievement (Manager)
Gen. Edwin W. Rawlings Award for Environmental Achievement (Technician)

Capt. Andrew Zaprzala, Spangdahlem AB, Germany
SSgt. Steven M. Brosche, Sheppard AFB, Tex.

C⁴ Excellence

Gen. Billy Mitchell Award

Eddie O. Reed, Tinker AFB, Okla.



Photo by Paul Kennedy

The Convention was the first chance for many in AFA to meet new Air Force Secretary Dr. Sheila E. Widnall, who attended many of the events. Here, she talks with Chief of Staff Gen. Merrill A. McPeak.

Air National Guard and Air Force Reserve Awards

Award

Recipient(s)

Achievement

Accepted by

Earl T. Ricks Award

A crew of the 113th Air-lift Wing, Tennessee ANG

Outstanding armanship in the Air National Guard

Capt. Donald F. Knox, aircraft commander

Air National Guard Outstanding Unit

193d Special Operations Group, Harrisburg, Pa.

Outstanding ANG unit of the year

Lt. Col. Thomas Kuhn, commander

Air Force Reserve Outstanding Unit

944th Fighter Group, Luke AFB, Ariz.

Outstanding Air Force Reserve Unit of the year

Col. Richard L. Hall, commander

President's Award for AFRES

A crew of the 916th Air Refueling Group, Seymour Johnson AFB, N. C.

Top flight crew in the Air Force Reserve

Lt. Col. Jay R. Mommelaar, aircraft commander

CMSgt. Dick Fed Award

CMSgt. William T. Youngworth, Maryland ANG

Outstanding aerospace maintenance by an enlisted member of ANG



An Airpower Prescription

By James W. Canan, Senior Editor

AIRPOWER is the key to victory in the regional wars that the US must be prepared to fight. The Defense Department is taking steps to "ensure that we retain the best air combat capability in the world" and to make it affordable as well.

Defense Secretary Les Aspin delivered this message at the Air Force Association's forty-seventh National Convention, held in Washington, D. C., last September. He claimed that the Defense Department's six-month-long Bottom-Up Review, completed in September, resulted in a mixture of short-term and long-term aircraft programs that "gives us what we must have—an affordable force to control the air into the next century."

US air strength in the twenty-first century may hinge on the new Joint Advanced Strike Technology (JAST) program, part of the overall Pentagon program for aircraft development and procurement in the years ahead. Mr. Aspin emphasized that JAST will result in airplanes that fly, not merely in their technological makings.

In the JAST program, the Pentagon "will build and fly research and development aircraft that demonstrate new technology," the Defense Secretary as-

serted. "We want our aircraft to be affordable, yet we also want to get the benefits of any new technology. We can do that by flying demonstration aircraft that will show us if a new technology works and the best way to use it."

Addressing the AFA Convention, Air Force Chief of Staff Gen. Merrill A. McPeak and Under Secretary of Defense for Acquisition John M. Deutch discussed the need for new approaches to defense acquisition. Air Force Secretary Sheila E. Widnall focused on quality-of-life and operational concerns, including the high operations tempo of many oft-deployed and overtaxed Air Force units.

A "Badly Broken" System

General McPeak said the military acquisition system has done "a fine job" of producing the world's best weapons and other equipment but has become "badly broken" under the weight of costs, red tape, and overregulation. "The Air Force will enthusiastically support any defense-wide effort aimed at reform or . . . radical change of the system," the Air Force Chief of Staff declared.

Secretary Aspin framed his discus-

sion of US airpower plans and prospects in the so-called "win-win" national military strategy. "We want our forces to be able to fight and win two major regional conflicts nearly simultaneously," he said. "We must have the air assets to help fight these two conflicts . . . to provide a solid defense capability for America in the new world."

In regional conflicts, "early commitment of airpower is vital for halting an enemy's advance," Mr. Aspin declared. "Air superiority is essential to success," and "aircraft survivability is central" to achieving such superiority. The keys to survivability, said the Secretary, are stealth, advanced munitions, and "modern battlefield surveillance, communications, and intelligence," which "make our airpower immensely more capable."

The Bottom-Up Review reaffirmed, among other things, the "need to [ensure] America's continued dominance in the air with stealthy, high-performance fighters," Mr. Aspin said. Thus it led to decisions to "proceed with the stealthy [Air Force] F-22" fighter and the Navy F/A-18E/F fighter and to use the F-22 and the Navy F-14 air-

combat fighters in the ground-attack mode as well.

The F-22, designed by the Air Force for both the air-combat and ground-attack roles, "will be essential to ensure dominance of the air in the face of improved surface-to-air missiles and long-range air-to-air missiles," Mr. Aspin explained, "but we'll produce it at a low rate because we don't foresee the types of threats that demand . . . large numbers of the aircraft." He said the F-22 will continue to incorporate advanced technology "as it becomes available" throughout the plane's production run.

The US is "a little weak in ground-attack capability," Mr. Aspin said, and "must do something right away" to strengthen it, with emphasis on providing "more early arriving ground-attack capability." This is why "we'll give the Air Force's B-1 and B-2 bombers the ability to hit ground targets with precision guided munitions," he said.

DoD undertook the Bottom-Up Review with an eye to cutting the number of US combat aircraft "to an affordable level" while maintaining sufficient airpower to wage and win two regional wars "nearly simultaneously," Mr. Aspin said. As a result of the review, he explained, DoD decided to end F-16 production in 1995 and scrap the Navy A/F-X and Air Force Multirole Fighter. Those programs are "just not necessary to meet our theater air requirements," the Defense Secretary asserted.

More Than Aircraft

Mr. Aspin said the newly proposed JAST initiative "could be the key to an affordable [US] airpower program in the future." JAST aims for advanced precision guided munitions (PGMs) along with advanced airplanes. "We need more aircraft carrying more PGMs," Mr. Aspin said. "That means looking at every part of the systems that make [PGMs] work—from the racks that hold them on the aircraft to the targeting systems that make them so accurate."

He predicted that JAST's "big payoff" will come from its accent on developing subsystems and components common to both Air Force and Navy combat aircraft. Commonality is a must, he said, because it will be "hard," and "maybe impossible," to develop affordable aircraft "as long as we continue to develop them for each service separately."

Mr. Aspin noted that "we've had a

few long-term fiascoes, trying to force [aircraft] commonality" on USAF and the Navy—notably the ill-fated TFX program of the 1960s—and acknowledged that commonality remains "a difficult goal."

In pursuit of it, the Pentagon will concentrate on coming up with "common subsystems—engines, avionics, materials"—and on "common components that designers can plug into their airframes." Common support equipment, training, and maintenance are also in the cards. "Future Navy and Air Force aircraft may look different on the outside, with different airframes and different silhouettes, but they'll be much the same on the inside." Those aircraft may have in common as much as seventy percent of their subsystems and components, and big savings should result, Mr. Aspin said.

General McPeak, addressing the AFA Convention, announced that 1994 will be the Air Force's "Year of Readiness," following the 1993 "Year of Equipping," now winding down, and the previous two years of organization and training in 1991 and 1992, respectively. This year has been "the toughest challenge of all," he said, "because the system we use to acquire hardware is much closer to total failure than was ever the case for organization and training. . . . The system is badly broken, and there is not much the Air Force, acting alone, can do about it."

He noted that "military procurement provides steady work for more than 25,000 auditors" and cited this as "compelling evidence of a widespread skepticism about the defense acquisition process."

A Clean Break?

General McPeak said the acquisition system has been "reformed to death" through the years. The best approach to fixing it, he said, may be that taken by the Carnegie Commission on Science, Technology, and Government, which recommended last year, in General McPeak's words, that the Pentagon "forget reform, make a clean break, and start over again."

"It is obvious that [acquisition] is a national problem requiring a national solution," he said. "There is not a lot the Air Force can do to fix the overall system." At the same time, "the Air Force does not want a free ride" and stands ready, as "a big cus-

tommer" of the acquisition system, to help repair it.

He claimed that the Air Force reorganization, begun in late 1991, has improved USAF's acquisition setup. As a prime example, he cited the creation of a requirements directorate at the Pentagon under the Air Force deputy chief of staff for Plans and Operations. This step makes the operational side of the Air Force, not the acquisition side, responsible for operational requirements, which is as it should be, said General McPeak.

In this "Year of Equipping," he continued, the Air Force leadership has "challenged our major commands to project their equipment modernization programs and [to] write acquisition plans" through the next twenty-five years. This will lead to "one integrated modernization plan for the whole Air Force," one that should "enhance our reliability and stability as a customer" of the defense acquisition system.

General McPeak said the coming "Year of Readiness" is "a logical continuation of our previous initiatives to organize, train, and equip. The end product, the sole reason the Air Force exists, is to put fire and steel on the target. That's what readiness is all about."

Secretary Widnall, who joined General McPeak in designating 1994 the "Year of Readiness," told the AFA Convention that major issues in today's Air Force are "job security" and "family concerns," caused by force cuts and heavy demands on operational forces.

"On the one hand," she said, "we're ramping down. On the other hand, hot spots are flaring around the globe, and the Air Force is on the front line. . . . Our commitments have shot up. Our combat forces [have] a staggering ops tempo."

Secretary Widnall noted that Air Mobility Command, in mid-September, had air and ground personnel in forty-two nations, supporting nine major operations, and that Air Combat Command "has 7,000 to 9,000 people deployed at any given time [in 1993]."

Operational demands are heavy "not just [on] aircrews" but also on the full range of support personnel. "You can't work twelve hours a day [during deployments] that last months on end without thinking hard about your quality of life, family, and whether you want to stay in [the Air Force] or not," Secretary Widnall declared. ■

Aerospace Education Foundation grants will help ten ROTC seniors pursue their educations.

The von Kármán Scholars

By Arthur C. Hyland

THE Aerospace Education Foundation announced its fourth group of winners of the Dr. Theodore von Kármán Graduate Scholarship. AEF awards each recipient \$5,000 for graduate-level academic work in aerospace fields.

The ten winners—eight men and two women—are the latest beneficiaries of a program AEF established in 1989. Competition is open to Air Force ROTC graduates pursuing advanced degrees in science, mathematics, physics, or engineering.

The scholarships commemorate Dr. Theodore von Kármán, science advisor to the Army Air Forces in World War II. Dr. von Kármán, at the urging of Gen. H. H. "Hap" Arnold, organized and chaired what later became the US Air Force Scientific Advisory Board.

The winners were selected from a pool of applicants. Selections were made by a group of judges chaired by Dr. John W. Williams, Embry-Riddle Aeronautical University's vice president for Academics and an AEF Trustee. Also serving on the panel were AEF Trustee Charles B. Jiggetts and AFA National Secretary Mary Ann Seibel.

The Foundation funds the program with proceeds from an initial sum placed in a scholarship fund and builds the endowment with contributions from AFA members, states, chapters, and corporate supporters.

The 1993 AEF Dr. Theodore von Kármán Graduate Scholarship winners:

Lisa D. Adams, St. Charles, Mich. B.S., industrial and operations engineering, University of Michigan. Graduate goal: M.S., industrial and operations engineering, University of Michigan.



Adams



Bowers



Bradt



Edwards



Hank



Head



Hoover



Johnson



Salasovich



Yurack

Matthew T. Bowers, Martinez, Ga. B.S., electrical engineering, Virginia Military Institute. Graduate goal: M.S., electrical engineering, Georgia Institute of Technology.

Mitchell M. Bradt, Verona, Wis. B.S., electrical engineering, Marquette University. Graduate goal: M.S., electrical engineering, University of Wisconsin-Madison.

Nathan J. Edwards, Evansville, Wis. B.S., electrical engineering, University of Wisconsin-Madison. Graduate goal: M.S., electrical engineering, University of Wisconsin-Madison.

Jeffrey D. Hank, Bartonville, Ill. B.S., aeronautical and astronautical engineering, University of Illinois at Urbana-Champaign. Graduate goal: M.S., aerospace education, University of Michigan.

Dean R. Head, Garnerville, N. Y. B.S., mechanical engineering, Cornell University. Graduate goal: M.S., aeronautical engineering, Rensselaer Polytechnic Institute.

Christopher L. Hoover, Cocoa Beach, Fla. B.S., computer science, University of North Carolina at Chapel Hill. Graduate goal: M.S., biomedical engineering, University of North Carolina at Chapel Hill.

Corinne H. Johnson, Bowie, Md. B.S., mechanical engineering, Rensselaer Polytechnic Institute. Graduate goal: M.S., mechanical engineering, Stanford University.

Richard M. Salasovich, Lorain, Ohio. B.S., mechanical and aerospace engineering, University of Dayton. Graduate goal: M.S., aerospace engineering, University of Cincinnati.

James Yurack, New Alexandria, Pa. B.S., electrical engineering, Pennsylvania State University. Graduate goal: M.S., electrical engineering, Pennsylvania State University. ■

By John L. Frisbee, Contributing Editor

Behind Enemy Lines

Escape and evasion in wartime Italy was pretty much a do-it-yourself proposition.

IN JULY 1942, a twenty-one-year-old Texan, SSgt. Herman Hochman, arrived in Palestine for duty with the 98th Bomb Group. Sergeant Hochman, who had fired a machine gun once in Florida—on the ground—became tailgunner on a B-24. In thirty-one missions during the next seven months, he shot down three enemy planes over North Africa and the eastern Mediterranean.

Another blank in Sergeant Hochman's training was the complete lack of instruction in escape and evasion, soon to be compensated for by his leadership, imagination, and daring.

The 98th deployed some of its B-24s to Tobruk on the coast of Libya for a February 9, 1943, strike against targets near Naples. Resisting heavy fighter attacks, the B-24s ran into violent thunderstorms short of the target. Only four of the twenty-two bombers, including Hochman's, penetrated the storm to drop their bombs. His damaged B-24 had to crash-land in Sicily, which, like the entire Italian peninsula, was still under Axis control. The crew was captured immediately. Its enlisted members were taken to an interrogation center and prison for enlisted men north of Rome. The prison was commanded by an Italian colonel, whom Hochman later was to meet again under very different circumstances.

The Italian government withdrew from the Axis on September 3, 1943, and joined the Allies. When the surrender was publicly announced on September 8, Hochman, the senior NCO in the prison, convinced the Italian guards that the Germans would kill them. The guards took off, and the POWs walked out.

Led by Hochman, they soon broke up into smaller groups. He and his friend, J. C. Moore, contacted Italian partisans, who gave them guns, grenades, and civilian clothes. The two headed for the mountains of central Italy, living off the land with frequent

help from friendly locals. Rather than avoiding the Germans they ran across, Hochman would ask for cigarettes in Italian, which he had learned in prison.

On November 28, while making their way through deep snow, the two were captured again just as they were about to enter a mine field. They were taken to another prison. At Christmas time, the POWs were driven to Rome and forced to march down the streets, singing carols to demonstrate the good will of the Germans. Taken to a sumptuous banquet attended by the German brass, Hochman was asked by German Field Marshal Albert Kesselring how he liked the food. Hochman replied that it was great but in the prison camps the POWs would starve without Red Cross packages. Kesselring grunted and walked away.

On the way back to prison, Hochman found a wire cutter in the driver's tool bag and hid it in the lining of his coat. Three days after Christmas, the POWs were told they were to be moved to Germany by train. Before being crammed into boxcars, they stood in the snow and were strip-searched. Hochman's wire cutters weren't discovered.

Near the roof of the boxcar was a small window covered with heavy wire. Hochman spent a day working on the wire. At nightfall, he and two others squeezed through the window and jumped from the moving train as the guards fired on them. Inadequately clothed for the bitter winter weather and often with no food, they crossed the mountains to Perugia in central Italy, where they were once more captured by die-hard Italian Fascists working for the Germans. A crowd of friendly Italians forced the Fascists to let them go and told Hochman of an American woman living in the city. She and her husband, the Italian colonel who had commanded Hochman's first prison, gave them food, maps, and advice.

In the next five months, Hochman and others who joined him worked their way across the mountains to the Adriatic coast near Ascoli. After several attempts to escape by boat, Hochman found a seaworthy sailboat



Maj. Gen. Nathan F. Twining presents SSgt. Herman Hochman with the Silver Star for extraordinary bravery during sixteen months behind enemy lines.

and, with the help of a hand grenade, persuaded the wealthy Italian owner not only to give it to them but also to accompany them in an escape attempt. Sailing all night and until sunset the next day, they moved south until crossfire on shore told them they were beyond the lines—in friendly territory.

On June 1, 1944, Hochman landed south of the Sangro River, bringing with him a South African pilot, four Yugoslavs from Tito's forces, six Italian partisans, and his old friend J. C. Moore. He also brought much military information of value to Allied forces.

For his "conspicuous gallantry, courage, and daring" during an extraordinary sixteen months behind enemy lines, SSgt. Herman Hochman was awarded the Silver Star, presented by Maj. Gen. Nathan F. Twining, commander of Fifteenth Air Force, later to become USAF Chief of Staff and chairman of the Joint Chiefs.

After the war, Herman Hochman became a stockbroker in Houston, Tex., where he now lives as the semi-retired president of his own brokerage firm. His stories about escape and survival in wartime Italy would fill a book. ■

Thanks to Abraham Friedman for putting us in touch with Herman Hochman, who shared with us his records and memories of a remarkable experience.



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Unit Reunions

Chambley AB

Veterans who served at Chambley AB, France, will hold a reunion April 26-29, 1994, at the Sands Hotel in Las Vegas, Nev. **Contact:** Charles R. Timms, P. O. Box 293, Fair Play, SC 29643. Phone: (803) 972-2020.

F-86 Sabre Pilots Ass'n

Members of the F-86 Sabre Pilots Association will hold a reunion April 24-27, 1994, in Las Vegas, Nev. **Contact:** Col. Charles C. Carr, USAF (Ret.), 4464 Rheims Pl., Dallas, TX 75205. Phone: (214) 526-4039.

Hawthorne Pilot Training Ass'n

Instructors, staff personnel, and aviation cadets who received primary flight training at Hawthorne School of Aeronautics between 1941 and 1945 are planning to hold a reunion in April 1994 in Orangeburg, S. C. **Contact:** Robert N. Stanley, 3411 Fox Hall Rd., Columbia, SC 29204. Phone: (803) 787-0845.

Iwo Jima Veterans

Veterans of any branch of the US armed forces who served at Iwo Jima will hold a reunion February 17-20, 1994, at the Landmark Hotel in Metairie, La. **Contact:** Jim Westbrook, 594 Old Hwy. 27, Vicksburg, MS 39180. Phone: (601) 636-1861.

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.

No. 3 British Flying Training School Ass'n

Members of No. 3 British Flying Training School based in Miami, Okla. (USAAF and RAF cadets and personnel staff), will hold a reunion May 5-7, 1994, in Peterborough, England. **Contact:** Harry Witt, 4207 Cliffwood Cove, Austin, TX 78759-7307. Phone: (512) 345-0005.

4th Ferrying Group Ass'n

Veterans of the 4th Ferrying Group, Ferrying Division, Air Transport Command (World War II), will hold a reunion May 12-14, 1994, in Memphis, Tenn. Members of other ferrying groups are also invited. **Contacts:** Robert P. Crow, 125 Valleywood Dr., Athens, GA 30606. Phone: (706) 543-5481. Raoul Castro, 911 Saint Andrews Dr., Up-land, CA 91786. Phone: (909) 985-9316.

5th Aircraft Repair Unit

Veterans of the 5th Aircraft Repair Unit (Floating) will hold a fiftieth-anniversary reunion January 24-27, 1994, at the Grand Hotel in Point Clear, Ala. Veterans of the 1st, 2d, 3d, 4th, and 6th ARUs are invited. **Contact:** Felix Kaplan, 7936 Mendoza Dr., Jacksonville, FL 32217. Phone: (904) 733-2201.

8th Air Force Historical Society

The Pennsylvania Chapter of the 8th Air Force Historical Society will hold a reunion June 17-19, 1994, at the Sheraton Hotel in Valley Forge, Pa. **Contact:** Dan Fisher, 7941 Langdon St., Philadelphia, PA 19111-2933. Phone: (215) 722-3527.

9th Air Force Ass'n

The 9th Air Force Association will hold a fiftieth

anniversary of D-Day convention/reunion May 31-June 8, 1994, aboard the *Queen Elizabeth II*. **Contacts:** 9th Air Force Association, Box 70, Valley Stream, NY 11582. Marvin Rosvold, 600 S. 13th, Ste. 1, Norfolk, NE 68701. Phone: (402) 371-6633.

26th Bomb Squadron

Veterans of the 26th Bomb Squadron who served at Altus AFB, Okla. (1957-68), will hold a reunion April 8-10, 1994, in Altus, Okla. **Contact:** Col. Herbert H. Kamm, USAF (Ret.), 1207 Rock Springs, Duncanville, TX 75137. Phone: (214) 296-0407.

Class 42-J

Members of Class 42-J (Randolph AFB, Tex.) are planning to hold a reunion in spring 1994 at the Sheraton Gunter Hotel in San Antonio, Tex. **Contact:** Thomas E. Yarbrough, 1764 Acorn Ln., Hurst, TX 76054-3702. Phone: (817) 282-0069.

Class 43-C

Members of Pilot Class 43-C are planning a reunion cruise May 1, 1994, from Cape Canaveral, Fla. **Contact:** Lt. Col. John E. Terrack, USAF (Ret.), 505 N. Miramar Ave., #402, Indialantic, FL 32903. Phone: (407) 951-2742.

Class 43-K

Members of Pilot Class 43-K (Moody Field, Ga.) will hold a fiftieth-anniversary reunion December 4-5, 1993, at the Omni Hotel in Orlando, Fla. **Contact:** Robert Dubowsky, 650 Grant Ct., Satellite Beach, FL 32937. Phone: (407) 773-6604.

Class 44-A

Members of Class 44-A (Luke Field, Ariz.) will hold a fiftieth-anniversary reunion January 7, 1994, at Luke AFB Officers Club in Arizona. **Contacts:** Gen. John W. Roberts, USAF (Ret.), 6122 Windy Knoll, San Antonio, TX 78239. Jack LaGrange, Jr., P. O. Box 783, Fall River, CA 96028.

Classes 44-E/44-F

Members of Classes 44-E and 44-F will hold a reunion in May 1994 in Colorado Springs, Colo. **Contact:** James E. Driscoll, 9323 Brambly Ln., Alexandria, VA 22309. Phone: (703) 780-8436.

Class 52-C

Members of Class 52-C are planning a reunion cruise from Miami, Fla., May 9, 1994. **Contacts:** Robert E. Hermann, 1 Woodside Pl., Carmel Valley, CA 93924. Phone: (408) 659-3305. Stewart M. Graham, 5402 Forest Springs Dr., Atlanta, GA 30338. Phone: (404) 394-6616.

Class 52-F

Members of Class 52-F will hold a reunion April 1994 in Tucson, Ariz. **Contact:** Gene Rocque, 220 Lee Ave., Satellite Beach, FL 32937. Phone: (407) 777-0716.

Class 54-F

Members of Class 54-F will hold a fortieth-anniversary reunion in the spring of 1994 in San Antonio, Tex. **Contact:** Paul E. Boehk, 121 Cedar Ridge, Rockport, TX 78382. Phone: (512) 729-1547.

Class 54-06

The Ellington navigators of Class 54-06 are planning a fortieth-anniversary reunion cruise from New Orleans, La., in the summer of 1994. **Contact:** Robert Walker, 3200 Copper Ridge Cir., Cantonment, FL 32533. Phone: (904) 484-9383.

55th Strategic Recon Wing Ass'n

Veterans of the 55th Strategic Reconnaissance Wing will hold a reunion April 21-24, 1994, in Hampton, Va. **Contact:** Lt. Col. Benjamin L. White, USAF (Ret.), P. O. Box 2406 Ocean Sands, Corolla, NC 27927. Phone: (919) 453-2876.

90th Air Refueling Squadron

Veterans of the 90th Air Refueling Squadron who served at Forbes AFB, Kan., between 1954 and 1963 will hold a reunion February 14, 1994, in Fort Worth, Tex. **Contacts:** R. D. Fellers, 7209 FM 51N, Weatherford, TX 76086. Phone: (817) 220-4408. Lt. Col. Paul J. Schad, USAF (Ret.), 923 Lindsay St., Gainesville, TX 76240. Phone: (817) 665-6714.

AFROTC Det. 158

Members of AFROTC Detachment 158 (University of South Florida) will hold a tenth-anniversary reunion for commissioning classes and cadre (1984-94) on April 2, 1994. **Contacts:** Capt. Jay Chambers or Capt. Jeff Plate, University of South Florida, AFROTC Det. 158, Tampa, FL 33620-8250. Phone: (813) 974-3367.

307th Bomb Wing Ass'n

Veterans of the 307th Bomb Wing (B-47/KC-97) will hold a reunion June 30-July 12, 1994, in Bellevue, Wash. **Contact:** Robert E. King, 420 W. Island View Dr., Camano Island, WA 98292. Phone: (206) 387-1258.

449th Bomb Group

The 449th Bomb Group "Flying Horsemen," 15th Air Force (World War II), will hold a fiftieth-anniversary reunion May 24-27, 1994, in Spokane, Wash. **Contact:** R. F. Downey, 4859 Stanhope Dr., Saint Louis, MO 63128-2848. Phone: (314) 892-4597.

556th Recon Squadron

Veterans of the 556th Reconnaissance Squadron (1968-72) will hold a reunion April 8-9, 1994, in Las Vegas, Nev. **Contact:** Donald J. Chase, 3923 N. 111th Plaza, Omaha, NE 68164. Phone: (402) 493-5612.

579th SAW Battalion

The 579th Signal Aircraft Warning Battalion will hold a reunion May 23-26, 1994, at Fort Mitchell, Ky. **Contact:** Thomas Stuart, 270 W. Commercial Ave., Lowell, IN 46356. Phone: (704) 256-6274.

3083d ADG/3096th ADS

Veterans of the 3083d Aviation Depot Group, 3096th Aviation Depot Squadron, will hold a reunion May 12-15, 1994, in Fort Walton Beach, Fla. **Contacts:** Reunion Committee, #501, 200 W. Miracle Strip Pkwy., Fort Walton Beach, FL 32548. John Boegeman, 24601 Chrisanta Dr., Mission Viejo, CA 92691. Phone: (714) 586-7761.

7102d Computer Services Squadron

Veterans of the 7102d Computer Services Squadron (Ramstein AB, Germany) are planning to hold a reunion May 28-30, 1994, in the Saint Louis, Mo., area. **Contacts:** P. A. Samuelson, 271 Eagle Ridge, O'Fallon, IL 62269. Phone: (618) 632-5339. John Hollmeyer, 2349 Rosedown Dr., Reston, VA 22091. Phone: (703) 264-1883.

Class 42-I

Seeking contact with members of Class 42-I for the purpose of compiling an address roster and organizing a reunion in October 1994. **Contacts:** Robert L. Ruse, 6624 E. Paseo Dorado, Tucson, AZ 85715. Phone: (602) 885-3650. Wesley Andrews, 1724 S. Berry Rd., Norman, OK 73072.

Class 43-H

For a reunion in summer 1994, I am seeking contact with graduates of Class 43-H of Aloe Field, Tex. **Contact:** Maj. Gen. Thomas A. Diab, USAF (Ret.), 22 Deer Run Rd., Lincoln, MA 01773. Phone: (617) 259-0471. ■

Bulletin Board

Collector seeking No. 9 of the **Fine Art Series**, Air Force Collection. **Contact:** Diane Kosloske, 3248 Independence Ave. N., New Hope, MN 55427.

Seeking the serial numbers and the corresponding four-digit codes of the following fighters and transport aircraft supplied to the **Republic of China Air Force:** the F-84, F-86, F-100, RF-101, F-5, F-104, C-123, C-119, RB-57D, and U-2. **Contact:** W. Yip, 535 Diana Pl., Arroyo Grande, CA 93420.

Seeking contact with the following persons who were stationed at Page AAF, Fla., in 1945: **1st Lt. John L. Redd; 2d Lts. Dale Hertel, Robert E. Hodson, and William A. Huggins;** and **Flight Officers Robert B. Millard and William H. Taft.** **Contact:** Maj. Angus Reid, 13726 Starshine Dr., Victorville, CA 92392.

Seeking information on **1st Lt. Leo M. Mayo**, of the 432d Fighter Squadron, 475th Fighter Group, and **1st Lt. Enrique Provencio**, of the 431st FS, 475th FG. Both were killed in action in late 1943—Mayo over Rabaul, New Guinea, and Provencio possibly near Clark Field, the Philippines. Also interested in any Mexican-Americans or Mexican nationals who served in the southwest Pacific area with the USAAF. **Contact:** Santiago A. Flores, P. O. Box 430910, San Ysidro, CA 92143-0910.

Collector seeks patches and other memorabilia related to the 351st Strategic Missile Wing,

Whiteman AFB, Mo., during 1972–76, or to the 1975–76 Olympic Arena competitions. **Contact:** Michael Fabbri, 77 Shore Rd., Ashland, MA 01721.

Seeking the whereabouts of **Clifford K. Emory (or Ennory)**, from Missouri, who was stationed at Camp Iha Gushikawa, Okinawa, Japan. He was attached to the 546th Supply Squadron, Kadena AFB, Japan, from 1951 to 1953. He had a sister named Judy, who attended Eugene Field School, and a brother. **Contact:** John S. Rhodes, 3628 350th Ave. W., Oak Harbor, WA 98277.

Collector seeks the following patches: 20th Tactical Fighter Wing, RAF Wethersfield, UK; 40th Tactical Group, Aviano AB, Italy; 98th Bomb Wing, Lincoln AFB, Neb.; 405th TFW, Clark AB, the Philippines; and 3d, 16th, and 17th Air Forces. **Contact:** Robert A. Hamby, 609 N. Division St., Salisbury, MD 21801-4119.

Seeking contact with members of the **424th Bomb Squadron**, 307th Bomb Group, 13th Air Force, who were stationed at Morotai, Indonesia, in July 1945 and then moved to Clark Field, the Philippines, after World War II. Also seeking a drawing and colors of the 424th and 307th insignia. Also seeking a photo of B-24J **Purple Heart** from that squadron. **Contact:** Walter H. Pierson, 717 Running Creek, Seguin, TX 78155.

Seeking contact with ground crews and aircrews of the **303d Air Refueling Squadron**, Davis-Monthan AFB, Ariz., from 1954 to 1956. Also seeking information or anecdotes about the B-17

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 reserve the right to condense them as necessary. We cannot acknowledge receipt of letters. Unsigned letters, items or services for sale or otherwise intended to bring in money, and photographs will not be used or returned.—THE EDITORS

Chow Hound assigned to the 322d Bomb Squadron, 91st Bomb Group, stationed at Bassingbourn, England, during World War II. **Contact:** Robert Smiley, 1057 W. Lacey Blvd., Hanford, CA 93230.

Researcher seeks information on **Al Deyarmond, "Red" Honnacker, Nick Post, and George Towles**, of the Air Technical Intelligence Center during the late 1940s. Also seeking contact with any other personnel who worked on ATIC's **Project Sign.** **Contact:** Hank Worbetz, 11308 N. E. 9th Ave., North Miami, FL 33181.

Seeking information about a **Chinese bank note** from World War II with a Christmas message printed on the back and signed by **John W. Welch, Jr.** **Contact:** J. R. Bailey, 1541 Eastwood Dr., Slidell, LA 70458.

Seeking information on **Col. James H. Howard**, a Flying Tiger, ace, and Congressional Medal of Honor recipient, and his P-51B Mustang #36374. **Contact:** David Wilson, 11516 W. Rosewood Dr., Avondale, AZ 85323.

Seeking contact with the following individuals who served in World War II: **Al Buckley, W. Eugene Eddy, Mary Lavarack, Gilbert Nichols, Charles Schoetzle, and Harold A. Wunnenberg.** **Contact:** R. C. Harris, Jr., 4813 Burton S. E., Albuquerque, NM 87108-3419.

Historian seeks contact with anyone who flew or maintained the **Douglas A-26B-30DL #41-39359**, which served in 9th Air Force from December 1944 to August 1945 and in the 3d Bomb Wing (Light) in Japan and Korea in 1953–56. Desire wartime squadron number, markings, and mission data. **Contact:** Thomas H. Lymburn, 1220 N. 11th Ave., Rte. 4, Princeton, MN 55371.

Seeking information on **Dale E. Martz**, Class 44-C, Douglas Field, Ariz., who was killed in World War II. **Contact:** S. R. Morrison, HCR 66, Box 38-D, West Plains, MO 65775.

Seeking the whereabouts of **SSgt. Jessie D. Mathews**, who served at Kadena AB, Japan, in 1978–80 and Williams AFB, Ariz., in 1980–82. Her last known assignment was Ellington ANGB, Tex., in 1987. She may have moved to Tennessee. **Contact:** MSgt. Bert D. Gardner, USAF (Ret.), 109 N. Sulleys Dr., Mesa, AZ 85205-8508.

Seeking patches from the **774th Tactical Control Squadron** during the Vietnam War. **Contact:** David C. Williams, 2237 Brookhollow Dr., Abilene, TX 79605.

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#A-8 **AFA Necktie.** Silk and polyester Schreter tie with full-color AFA logos. Specify color—navy or maroon. **\$15.75**

#A-9 **AFA Athletic Shoes.** Comfortable athletic shoes with Air Force seal in full color. Specify size—men's even and half sizes 7-11, plus 12 and 13; women's even and half sizes 5-13. **\$48.95**

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Seeking information on the **64th Fighter Wing** and its components, the 82d Fighter Control Squadron and the 582d Signal Air Warning Battalion, which served at Anzio, Foggia, Naples, and Rome in Italy, as well as southern and northern France. **Contact:** Col. Milton Turner, USAF (Ret.), 2603 Pecos, Austin, TX 78703.

Seeking information about **John Joseph Heffernan**, of New York, N. Y., who was stationed at the 47th and 105th General Hospitals during World War II and later served in New Guinea and the Philippines. **Contact:** Claire Heffernan, c/o AAMA, 1620 I St., N. W., Suite 1000, Washington, DC 20006.

Seeking information about **Richard Stone**, from New York, who was stationed at Kirknewton AB, Scotland, in 1953-54. He knew Sheila McLean of Edinburgh. **Contact:** Terry Dunbar, 34 Orchardhead Rd., Liberton, Edinburgh EH16 6HN, Scotland.

Seeking the whereabouts of **A1C Michael L. Lovette**, of Bethlehem, Pa., and **SSgt. James E. Roessler**, of Cincinnati, Ohio. Both served with Atlas F Launch Crew 47 of the 578th Strategic Missile Squadron, Dyess AFB, Tex., from 1961 to 1964. **Contact:** Col. Bernard A. Paul, USAF (Ret.), 514 S. Market St., Marion, IL 62959.

Seeking contact with **Allen Wallach**, born September 1934 in Brooklyn, N. Y. He served in the Air Force from 1955 to 1958, and his last known assignment was Charleston AFB, S. C. **Contact:** Beth G. Fleet, 4382 Spurline Dr., S., Jacksonville, FL 32257.

Historian seeks contact with **Col. Bart Krawetz**, **Lieutenant Colonel Terry**, **Col. Ken Belden**, **Maj. Pete W. Moates (or Coates)**, or any other personnel associated with **Operation Eagle Claw** or the **Credible Sport** program. Interested in photos, drawings, technical data, videotapes, manuals, and the like. **Contact:** Tim Rathbone, 9611 Del Mar Ave., Hesperia, CA 92345.

Seeking the whereabouts of **Joe Contreras**, born in 1917, who was stationed at Yuma AAF, Ariz., in the early 1940s. He may have been assigned to Det. 22, 858th Signal Service Company. **Contact:** Billie C. Evans, P. O. Box 2219, Athens, TX 75751.

Collector seeks **playing cards** with unit crests on the backs. **Contact:** Al Terek, Box 62, Glenview, IL 60025.

Historian seeks contact with personnel stationed at the **Pilot School at Fort Sumner, N. M.**, beginning in 1942. Interested in written accounts, photos, and memorabilia. **Contact:** Mary Ann West, P. O. Box 956, Fort Sumner, NM 88119.

Seeking information about **Lt. Robert E. English**, of the 425th Night Fighter Squadron, who was killed in action in France in August 1944. **Contact:** James D. English, 50 American St., Wellsboro, PA 16901.

Seeking information on the **435th Tactical Fighter Squadron**, 8th Tactical Fighter Wing, stationed at Ubon RTAFB, Thailand, during the Vietnam War. Specifically interested in the November 6, 1967, mission on which **Capt. Darrell D. Simmonds** and **1st Lt. George H. McKinney, Jr.**, were credited with two MiG-17 kills. **Contact:** MSgt. Anthony D. Sagun, USAF, 94-433 Alapine St., Waipahu, HI 96797-4504.

Historian seeks contact with **Richard Grassy, Dr. Germond**, or anyone who worked for the Deputy Director for Targets, Directorate of Intelligence, USAF, for information on the development of the physical vulnerability scale in the early 1950s. **Contact:** Lynn Eden, 320 Galvez St., Stanford University, Stanford, CA 94305-6165.

Seeking contact with **Capt. Lewis Stelljes**, **Francis F. Berard**, **Eddie J. Ginday**, **Richard H. Grant**, and **William Massey**, whose B-17 went down near Jauldes, Charente, France, in June 1944. They were rescued and hidden by the Beau family of Saint Adjutory. **Contact:** Lt. Col. Gregory M. Chase, USAF, American Embassy, Paris, France, APO AE 09777-5000.

Seeking information on **Andrew Nassamer**, a military aviator at McCook Field, Ohio, in the early 1920s. He lived near Dayton. **Contact:** Col. R. Monahan, 8216 Cooper St., Alexandria, VA 22309.

Collector seeks copies of **Battle Aces** from 1930 to 1932. **Contact:** Gil Burns, Box 2308, Framingham, MA 01701.

Seeking information on **Leo Fring, Jr.**, whose plane crashed in Belgium during World War II. **Contact:** Berwart Charles, rue du Warichet, 31, 1360 Perwez, Belgium.

Historian seeks information, photos, or stories about **aircraft mechanics** who worked with launch crews during the Vietnam War. **Contact:** Edward F. Kelly, 2247 Kingsbrook Dr., Richmond, VA 23233.

Seeking contact with **Donald D. Fraker**, of Pilot Class 56-K, Vance AFB, Okla. He flew KC-97s out of Lajes Field, Azores, in 1964. **Contact:** Ralph K. Baber, Rte. 1, Box 237, Tow, TX 78672.

Seeking information about an **American airman named McGlenn**, from New Orleans, La., who was killed in an accident in Gloucestershire, England, in 1944. He knew Joan Uren, a rigger's assistant from Gloucestershire. **Contact:** J. E. Boyd, 22 Derwent Grove, Blackbrook, Taunton TA1 2NJ, England.

Seeking the whereabouts of **John Boggs**, **Harold Choate**, **Penny Hill**, **Burns Lundgreen**, and **B. W. Ryan**, of the 465th Tactical Control Wing, as well as other personnel not on the 465th Association's current roster. **Contact:** Jim Strickland, 3218 Greenwood Ct., Fort Collins, CO 80525.

Writer seeks information on and photos or slides of **New York Air National Guard** activities, especially those after World War II and during the Korean War. **Contact:** Gilles Auliard, P. O. Box 31-0443, Newington, CT 06131-0443.

Seeking information on the **466th Bomb Group (Heavy)**, which was stationed at Attlebridge Airfield, England, in 1944-45. Interested in photographs, manuals, first-person narratives, and other information. Also seeking a patch from the **787th Bomb Squadron**. **Contact:** Richard B. Dondes, 21 Firethorn Ct., East Brunswick, NJ 08816.

Seeking contact with members of the **football teams** at Orly Field, France, in 1946 and Rhein-Main AB, West Germany, in 1947. **Contact:** Sherman C. Flanders, 1306 Lencoe Dr., Stockton, CA 95210-2136.

Collector seeks **CORE**, **TTB**, **IUNT**, and **EWOT patches** from the last class to complete navigator training at Mather AFB, Calif. **Contact:** Paul J. McPhee, 19 Bannehr St., Oakland, NJ 07436.

Seeking contact with graduates of **AFROTC Det. 845**, Texas Christian University, to form an alumni association. **Contact:** Michael A. Assid, Texas Christian University, P. O. Box 30784, Fort Worth, TX 76129.

F-4 fanatic seeks **F-4 patches**, including exercise and competition patches. Also seeking the patch from the **196th Tactical Reconnaissance Squadron**, California ANG. **Contact:** Kim Spicer, 63 Winchester Rd., Hanworth, Middlesex TW13 5JX, England. ■

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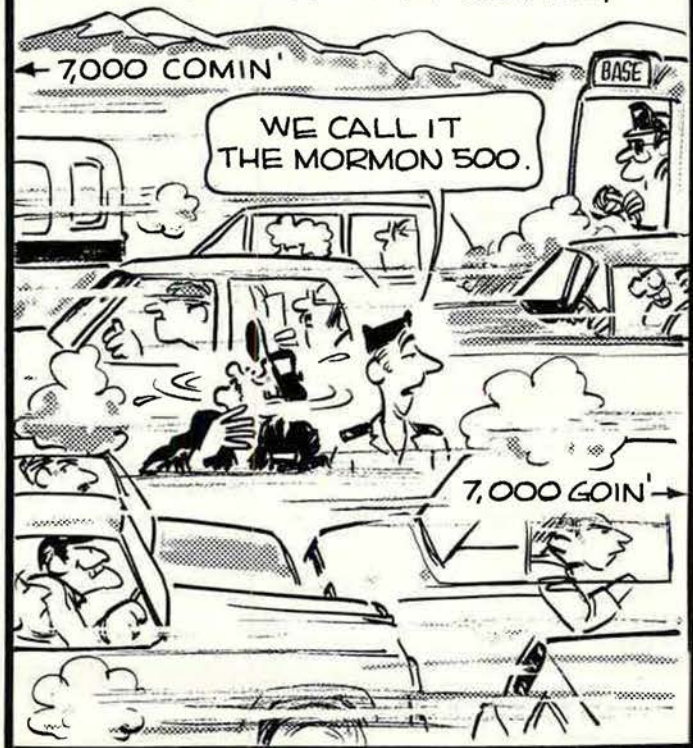


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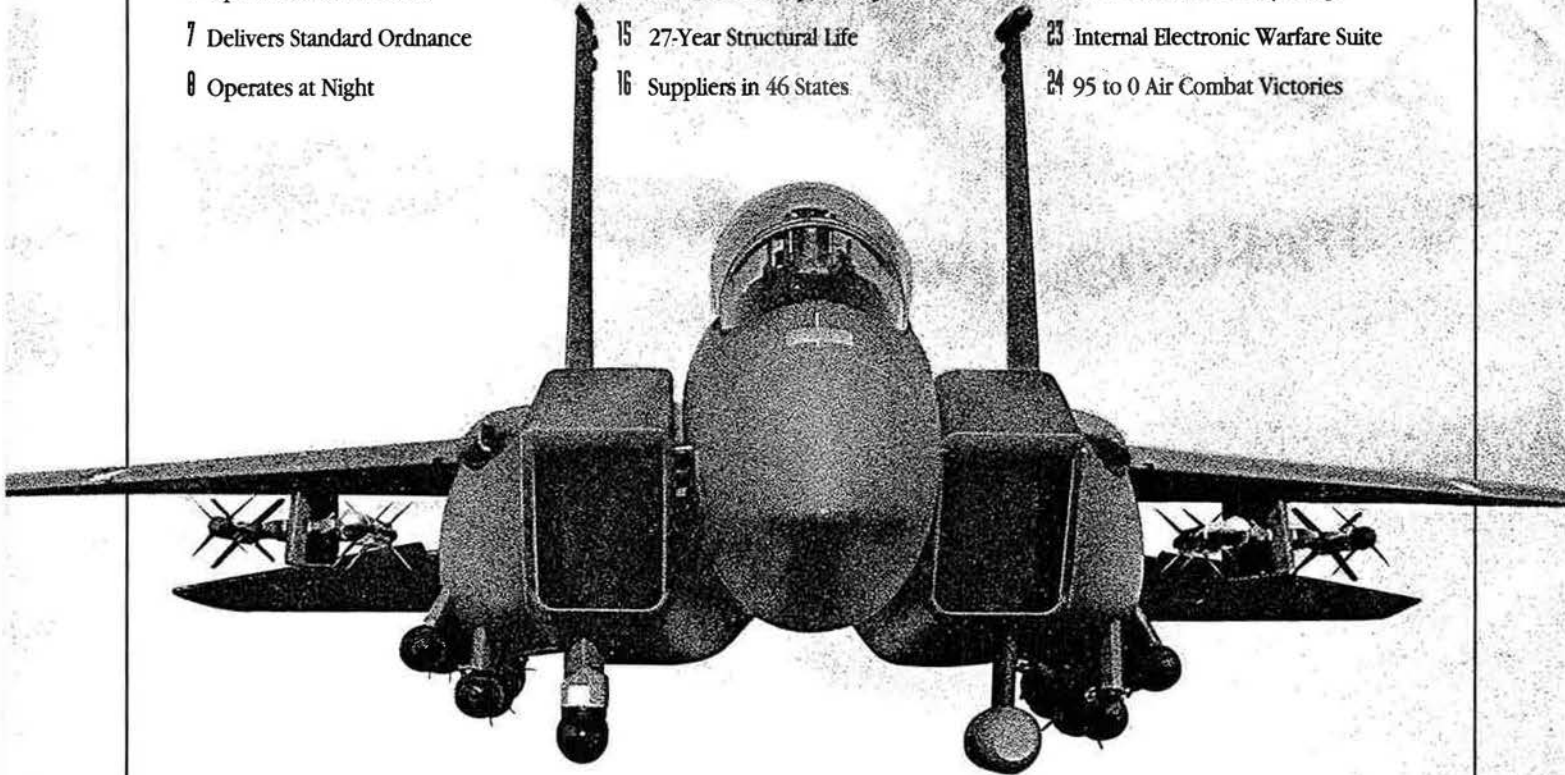
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