

FEBRUARY 1996/\$3

# AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

**Fifty Years of AFA**



Gen. James H. Doolittle, USAF





**It can win a war,  
or prevent one.**

WHEN THE FIRST F-22 ROLLS OFF THE ASSEMBLY LINE IT WILL SEND AN UNMISTAKABLE SIGNAL TO THE REST OF THE WORLD. AMERICA WILL NEVER RELINQUISH OUR DOMINANCE OF THE SKY. THAT SAME SIGNAL WAS HEARD LOUD AND CLEAR IN THE GULF WAR. SIMPLY BY FLEXING OUR MUSCLES, AMERICA FORCED THE IRAQI AIR FORCE TO TAKE COVER. AS A RESULT, THE WAR WAS SHORTENED AND ALLIED LIVES WERE SAVED. BUT THE AIR SUPERIORITY FIGHTER THAT FLEW IN IRAQ WILL BE 30 YEARS OLD BY THE TIME THE FIRST F-22 SQUADRON IS READY. WHICH IS WHY AMERICA NEEDS THE F-22 AS MUCH AS POTENTIAL ENEMIES FEAR IT.





# AIR FORCE

MAGAZINE

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PUBLISHED BY THE AIR FORCE ASSOCIATION

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**About the cover:** This bronze sculpture of AFA's first president, James H. Doolittle, was dedicated in September 1995 and stands in the lobby of the Association headquarters building. The sculptor was John Lajba. Photo by Paul Kennedy.

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# Editorial

By John T. Correll, Editor in Chief

## Anything, Anywhere, Anytime

**L**T. GEN. William H. Tunner, who commanded the airlift over the Himalayan Hump in World War II and the Berlin Airlift after the war, said in his memoirs that "I have been convinced that we can carry anything, anywhere, anytime." The force has borne out General Tunner's expectation for more than fifty years through an organizational evolution from Air Transport Command to Military Air Transport Service to Military Airlift Command to Air Mobility Command.

Indeed, so reliant have the armed forces become on Air Force transport of troops and cargo that it is the airlifters, not the shooters, that are the limiting factor in national military strategy. The demand for airlift never stops. In a typical peacetime week, Air Mobility Command operates 1,000 missions and more than 3,000 sorties into forty countries.

Airlift is not the only way to move troops and cargo, but it has certain advantages. Military Airlift Command flew more than 500 sorties to resupply Israel during the Yom Kippur War of 1973. The first flights landed within forty-eight hours of the US decision to act. The first sealift vessel to reach Israel carried more tonnage than all the airlift missions put together—but that ship did not arrive until twenty days after hostilities had begun and twelve days after the cease-fire.

Airlift is a primary element in the Air Force's operational concept of "Global Reach, Global Power." Airlift is more than support for other forces. It is an instrument of national power in its own right, providing aid, presence, and strength at pivotal moments in distant locations. The big airlifters with the Stars and Stripes on the tail deliver the clear message that the United States is there.

Two years ago, the outlook for airlift was grim. The core airlifter, the C-141 Starlifter, was in deep trouble, having been flown hard and held in service far beyond its intended retirement date. At one juncture, seventy percent of the C-141s

were either grounded or restricted. The proposed replacement, the C-17, was in danger of cancellation. In a dramatic statement to Congress in 1994, Gen. Joseph Hoar of US Central Command said that "airlift in this country is broken right now. I'm not sure it's workable for even one major regional contingency." Air Mobility Command said it could pro-

**Airlift is so effective  
that the demand  
always has—and  
probably always will—  
exceed the supply.**

vide the lift for one contingency—but not for the two prescribed by national defense strategy.

In an amazing reversal of fortunes, the C-17 overcame its performance, production, and cost problems. The program is splendidly back on track. In November, the Defense Department authorized the Air Force to proceed with a procurement that will eventually reach 120 aircraft. The decision on whether to also buy modified "nondevelopmental" commercial aircraft has been deferred until next summer. An "aggressively managed" modernization effort will keep the C-141 operating until it is phased out in 2006.

Estimating the airlift requirement is a controversial business. In an *Airpower Journal* article last year, Lt. Col. Robert C. Owen, former chief of the Joint Doctrine Branch at Hq. USAF, argued that the demand for airlift always has (and probably always will) exceed the supply and that "effective airlift policymaking involves asking for what one can get instead of what one actually needs."

In 1981, the Congressionally mandated Mobility Study set the official requirement for airlift at sixty-six mil-

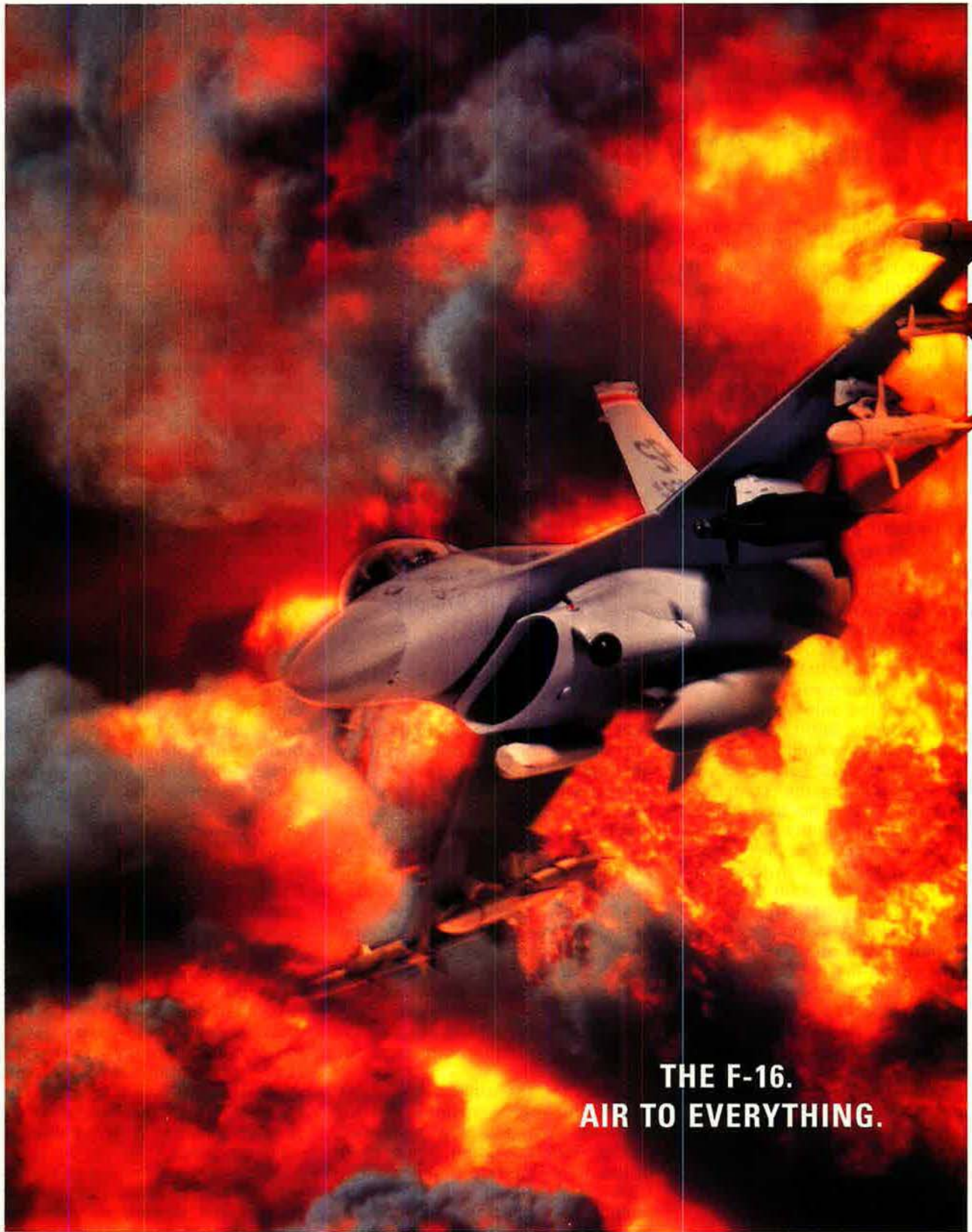
lion ton-miles per day. The computed requirement was understood to be higher, but that was essentially academic since the capability peaked below fifty million ton-miles per day. After the Cold War ended, a 1992 Mobility Requirements Study adjusted the goal downward to fifty-seven mtm/d. The current goal, set in 1995, is stated as a range: forty-nine to fifty-two mtm/d, depending on the stock of equipment and supplies prepositioned abroad. Present wartime airlift capability, counting activation of the Guard and Reserve and mobilization of the Civil Reserve Air Fleet, is approximately forty-nine mtm/d.

The Air Force will assign as much as it can of the routine airlift—especially bulk cargo that can be loaded onto standard freight pallets—to commercial carriers. Other parts of the mission, however, cannot be farmed out. Only the largest military airlifters carry outsize cargo, such as main battle tanks, armored fighting vehicles, and artillery. The Air Force would also use its own aircraft, probably the C-17s, for airdrop and forced entry operations. Civilian airliners would not normally be asked to fly into areas where there is appreciable risk of hostile fire. Power projection and crisis response are roles best suited to military airlifters.

No one seriously believes that an airlift capability of fifty million ton-miles per day is lavish. Nevertheless, airlift does not stir the passions and has traditionally had trouble holding its funding priority. There are already signs from some corners of the Pentagon of wobbling on the commitment to airlift modernization. The problem is financial competition with other programs.

This would be the wrong place to fall short for a nation with global interests and strategies and whose armed forces are largely based at home. Whatever lies ahead, airlift will be a first order requirement. This time, the priority should hold. The case for airlift is considerably more compelling than the requirement (for example) for more submarines. ■





**THE F-16.  
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# Letters

## False Economy

I am disturbed by the treatment of the Suppression of Enemy Air Defenses (SEAD) mission by the current Administration, as outlined recently in "Electronic Warfare, Economy Style" [November 1995, p. 24]. A number of inconsistencies become apparent in the strategies being taken.

The Clinton Administration claims that the military will continue to be able to fight two major regional conflicts despite drastic reductions in the number of ground divisions because air-delivered precision guided munitions (PGMs) will serve as a force-multiplier. At the same time, constraints forced by these budget cuts will severely impede accomplishment of the defense suppression mission. Dedicated F-4G "Wild Weasel" aircraft are being retired. Budget constraints are forcing the replacement of the EF-111 Raven with the slightly inferior EA-6 Prowler in the electronic countermeasures role. Replacements are promised, but research and procurement budgets are being hit hard.

I believe this will have an adverse effect on the ability of airpower to hit targets with those PGMs. The accuracy of bombing is certainly not helped when a pilot is forced to jink an aircraft around and concentrate on avoiding active defenses rather than keeping a laser on target.

A smaller force also makes losses more costly. Combat capability is degraded more by the loss of aircraft when fewer replacement aircraft and aircrews are available and each aircraft is needed for more targets. The whole deep-strike aspect of the strategy becomes suspect when the ability to penetrate defenses is compromised.

The suspect nature of current policy can be seen in the discussed plans to replace the F-4G with the F-16. The F-16 is a fine multirole aircraft, but as your article noted, the F-16 is a single-seat aircraft and the ability of a pilot to operate in a tricky SEAD environment without the assistance of a weapons officer is questionable. The Air Force has an outstanding two-seat

multirole fighter, the F-15E, that could be converted to the SEAD mission, much as its predecessor, the F-4, was. The best explanation I can see for not following this course is cost. The F-15E is more expensive than the F-16. Once again, capability is being sacrificed to save money.

The situation in the Clinton Defense Department unfortunately bears a strong resemblance to the "bean-counting" days of Defense Secretary Robert S. McNamara in the Johnson Administration. Even worse is the acquiescence, or silence, of the military staff and the Joint Chiefs. A key mistake in the Vietnam era was the reluctance of the military leadership to give good advice or speak out against the mistakes that were being made. Billy Mitchell's name is remembered by history, not those of the admirals and generals who opposed him. Honest disagreement is not disloyalty or mutiny.

George Avery  
Jacksonville, Ark.

As an electronic-countermeasures professional and charter member of the Association of Old Crows, I read "Electronic Warfare, Economy Style" with interest.

Just as we Crows brought the "Weasels" up to speed in Vietnam, I hope that some fledgling Crows will bridge the gap for the USAF-Navy transition from the EF-111 to the EA-6. The Old Crows, an association of military personnel, engineers, and others interested in electronic warfare dating back to the RAF

Ravens of World War II, have always produced.

Ken Dowling  
Santa Maria, Calif.

## Let the Enlisted Do It

I read two letters in the December 1995 issue that were somewhat off track. They were from Lt. Col. Thomas R. Forbes [*"Rewarding the Enlisted,"* p. 5] and Matt Dalrymple [*"Organizational Incongruity,"* p. 5]. Both gentlemen alluded to "supergrade" noncommissioned officers replacing commissioned officers.

From 1967 to 1969, I served in an officer's position on the staff of a Strategic Air Command wing commander. In 1973, I was assigned to a captain's slot, which I filled for more than three years. I left that position to become our unit's executive officer (replacing a lieutenant colonel).

These assignments led to my replacing a field grade officer as unit commander. During my two years in this command slot, I also served as a staff officer to a major general and a brigadier general. My Airman Performance Reports showed me as "commander," and all correspondence was signed with that duty title.

I assumed command of a well-managed organization. According to my superiors, it got better. My contemporaries and I (there were about twelve of us USAF-wide at that time) demonstrated that educated, experienced senior NCOs could perform admirably at that level.

I take exception to Colonel Forbes's position on resurrecting the warrant officer/limited-duty officer program. It was rewarding to have the opportunities the Air Force provided me as an enlisted member (it also saved money). In addressing Mr. Dalrymple's question regarding "smart and talented enlisted troops," it has been proven that educated senior NCOs, with experience well beyond that of junior officers, can function for the good of the service. . . .

To those senior NCOs being asked to move into positions currently filled by officers, I strongly recommend that you take advantage of the offer. The

**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**





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## Letters

rewards and gratifications will sustain you for a long time.

Arthur O. Johnson  
Marietta, Ga.

### The U-2's "Discoveries"

With regard to "The First Air Force Cross" [December 1995 "Valor," p. 73], I have several corrections. Major Anderson's flight was Mission 3102 over Cuba during the morning of October 15, and his film both confirmed and added to the evidence of the "Discovery" flight of Mission 3101, made by Steve Heyser the previous day. Both pilots made multiple flights in rapid succession and were then joined by Majors Brown, Emerling, Herman, and Qualls and Captains Bull, Kern, McIlmoyle, Primrose, and Schmarr.

Major Anderson was posthumously awarded the Distinguished Service Medal by President Kennedy on Monday, October 29, 1962. He would be posthumously awarded the Distinguished Flying Cross by Gen. Thomas S. Power at SAC headquarters, when the above-mentioned pilots received their DFCs. It was January 1964 when General Power presented the first Air Force Cross to Frances Jane Corbett Anderson in a simple ceremony at Turner AFB, Ga. Major Anderson was also honored posthumously with the Purple Heart and the Cheney Award at that time. . . .

Other Laughlin AFB, Tex., U-2 pilots joined in the reconnaissance over Cuba but received no accolades even though the SAM sites were apparently still active. All the 4028th Strategic Reconnaissance Weather Squadron pilots well deserve the honors bestowed on them. Some of us feel that Steve Heyser also deserved the Air Force Cross for his historic "Discovery" flight.

James S. Long  
Del Rio, Tex.

### Unacceptable Disrespect

With regard to the recent letters from Col. L. M. Tannenbaum and Lt. Col. John I. Jenkins ["A Not-So-Smart Salute," November 1995, p. 10], I strongly disagree with their contention that saluting the current President of the United States is optional for a member of the US military.

With all due respect to the two colonels, I'd like to refresh their memory that nowhere in their oath of commission did it give them the option to exercise their opinion regarding appropriate protocol with respect to a Constitutionally elected Commander in Chief. They, like me, swore

to support and defend that Constitution—not sometimes or when they felt like it—always, to their dying breath if necessary.

It makes no difference how any of us feels about Mr. Clinton, including his prior avoidance of military service during an armed conflict. That is an opinion we are free to act on in the privacy of the voting booth. In our capacity as members of the US military, we are bound by our oath to give due respect and obedience to our President. Anything less is a stain on the honor of all who have served before us and with us.

I have served under every President since Richard Nixon, going from E-1 to E-6 and from O-1 to (presently) O-4, and never has my political view clouded my sense of duty to my country and to my Commander in Chief. I find particularly distasteful Colonel Jenkins's thinly veiled comparison of the acts of Nazi war criminals to saluting the current President. I would hope that, on reflection, Colonel Jenkins recalls that our oath includes the admonition to only carry out lawful orders of our duly appointed superiors. I trust my fellow officers to know the difference between lawful and unlawful.

After the last presidential election, I was an instructor at the Air Force Academy, and if I had heard any of my cadets speak in the manner of Colonels Tannenbaum and Jenkins, they would be straightened out immediately. Before the election is one thing, but once the people have voted, we support the Constitution. The cadets seem well acquainted with that aspect of officership—which is more than I can say for the two colonels. As an officer, an AFA Life Member, and a citizen, I am appalled by the position advocated by Colonels Tannenbaum and Jenkins.

We salute and respect the office of the President, regardless of who holds it and regardless of our opinions. To do otherwise would be unprofessional, disrespectful, and a discredit to ourselves and the entire US military. That, Colonels Tannenbaum and Jenkins, is unacceptable.

Maj. Cameron H. G. Wright,  
USAF  
Randolph AFB, Tex.

### A True Heavyweight

"Heavyweights for the New Strategy" [October 1995, p. 24] was very informative. However, I would like to clarify the B-2 capabilities described in your article.

Block 10 is the initial fielded con-





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## Letters

figuration of the B-2 and carries up to sixteen Mk. 84 2,000-pound bombs on two bomb bay Rotary Launcher Assemblies. It also has the capability for both the B61 and B83 nuclear weapons.

Block 20 B-2s are equipped with the Global Positioning System-Aided Targeting System/GPS-Aided Munition (GATS/GAM) to permit "early, interim, near-precision" strike capability. The article incorrectly stated that Block 20 adds the B61 nuclear weapon, which was already incorporated in Block 10. Further, up to sixteen GAMs can be carried on two Rotary Launcher Assemblies.

The Block 30 aircraft will carry up to sixteen Joint Direct Attack Munitions on the Rotary Launcher Assemblies. Block 30 will have a Bomb Rack Assembly capable of carrying Mk. 82 bombs, cluster munitions (including Sensor-Fuzed Weapons), Mk. 62 mines, and M117 bombs. Block 30 capability does not include the Joint Standoff Weapon or the Joint Air-to-Surface Standoff Missile. These or similar weapons could be added in future weapon system upgrades.

Regarding the "Block 40" upgrades referred to in your article, we are not currently developing a Block 40 configuration. While there is potential for adding improvements, no plans for a "Block 40" B-2 exist. As for the third seat, the B-2A was designed with some basic provisions to add this capability. However, there is currently no plan to implement this enhancement, although initial costs associated with it have been assessed.

Col. Richard V. Reynolds, USAF  
Program Director, B-2 System  
Program Office  
Wright-Patterson AFB, Ohio

### Dialing Long Distance

Maj. James E. Rotramel hit the nail square on the head with his letter ["'Replacing' the F-111," *October 1995 "Letters," p. 6*]. The F-16 will never be able to effectively replace the F-111. Rather than dwell on the past, let's look toward the future, which our leadership tells us will possibly entail fighting two almost simultaneous major regional conflicts (MRCs) across the world from each other. Unlike during the Cold War, USAF will probably not be able to fight from established bases anywhere close to the conflict.

This makes deploying and fighting from long distances a very real possibility. What happens when the tanker assets are being used to support the first MRC when a second breaks out? Remember, the majority of the tanker

fleet was required to support Operation Desert Storm. In the face of this, we have decided to increase our dependence on our tanker fleet by replacing the long-range F-111 with the medium-range F-16, hoping that one of the MRCs will not require the tankers for support, or that, somehow, we can effectively divide up the tanker resources.

Don't get me wrong, I sweated long hours on and cursed F-111s for the nine years I had the privilege of maintaining them. I do not advocate keeping the F-111 for sentimental value. The point I believe Major Rotramel and I are making is that we are discarding a key capability just when we will depend on it the most. The F-16, while modern, sleek, and politically viable, simply cannot do the F-111's mission.

If a suitable replacement aircraft were in production, or even in the works, you would probably not have heard a word of protest. But no suitable replacement exists. The F-15E production line is closed, and not enough F-15Es are around to make up for the loss of the F-111. Making more F-16s may please Texas politicians and accountants, but it will not cut the mustard when trying to fight two MRCs, each a hemisphere apart. What's the telephone number of that Australian F-111C wing?

Maj. Douglas O. Fingles, Jr.,  
USAF  
San Antonio, Tex.

### Getting to Manila

The caption in "Flashback" on p. 33 of the October 1995 issue ["*Betty's Last Bow*"], concerning the photo of the Japanese "Betty," is not quite correct.

le Shima was not a preliminary stop for the Japanese "Betty" that carried the surrender team. On le Shima the Japanese delegates left their Betty and transferred to an Army Air Forces C-54 for the flight to Manila.

My brother, Capt. Henry J. Moses of the 132d Combat Engineer Regiment of the 77th Army Division, was a member of the honor guard observing the operation, and he told me the Japanese simply walked to the waiting USAAF plane, which carried them to Manila.

Henry also told me that the honor guard was forbidden to have any live ammunition in their weapons because the hatred for the Japanese was so intense that an unpleasant incident could have been triggered.

Warren G. Moses  
New Orleans, La.



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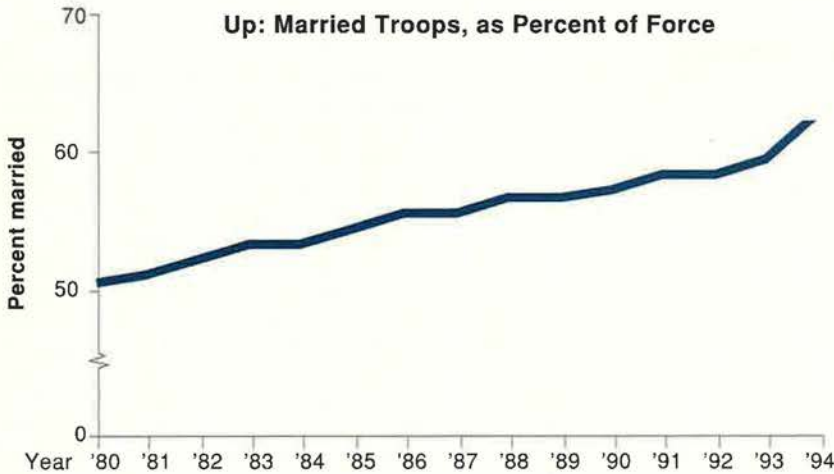
**North American Aircraft**



# The Chart Page

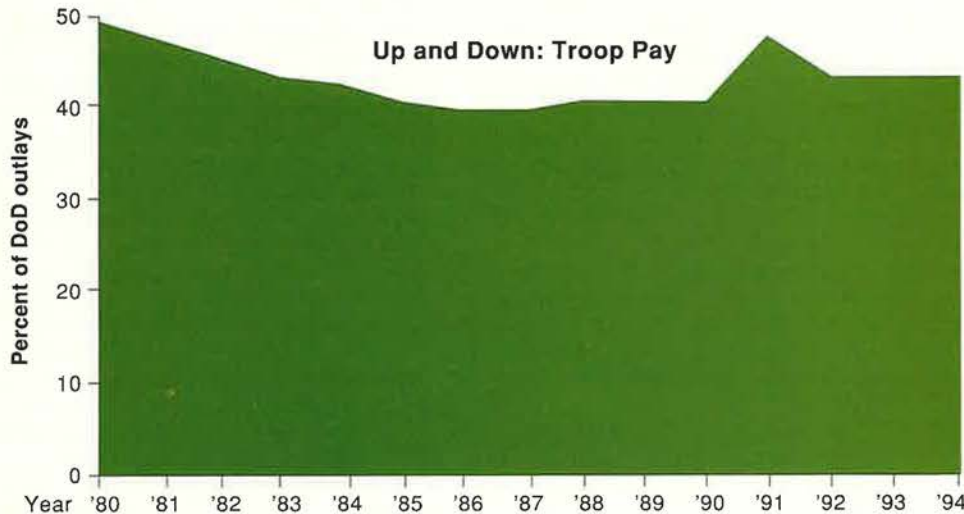
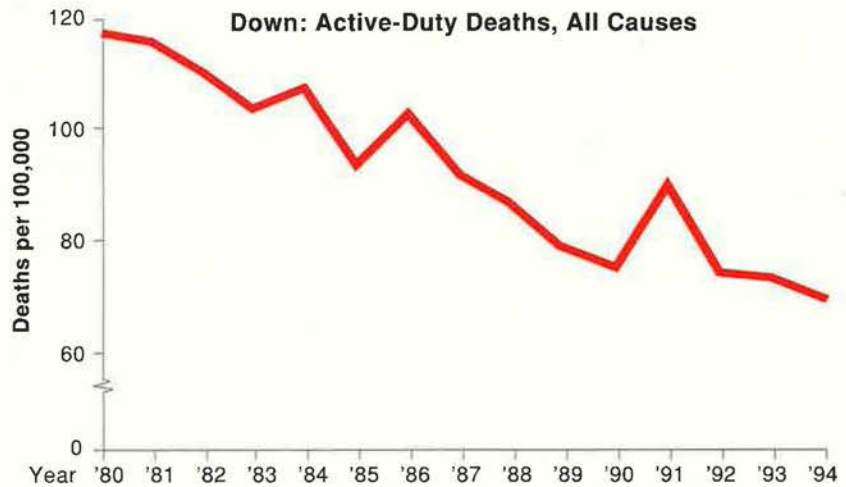
By Tamar A. Mehuron, Associate Editor

## Three Trends in the Force



*American troops are no longer predominantly single. The married segment of the All-Volunteer Force has grown by more than ten percentage points in just fifteen years.*

*Since Fiscal 1980, the active-duty death rate plunged forty percent because of a relative decline in aviation and traffic accidents. The rise in Fiscal 1984 stemmed from the October 1983 truck bombing of the Marine contingent in Beirut and the invasion of Grenada. In Fiscal 1986, an uptick was caused by a crash of a troop-carrying civil airliner. The Gulf War generated another one-year spike in Fiscal 1991.*



*Military pay, as a proportion of total Pentagon outlays, has varied significantly over the last decade and a half.*



By Brian Green, Congressional Editor

## \$7 Billion Up on Appropriations

Congress caps a tumultuous legislative year by approving more for defense—especially for force modernization—than the Administration requested.

**T**HE federal government finally produced a Fiscal 1996 defense appropriations bill, one that is nearly \$7 billion higher than the Clinton Administration's original request. Congress approved the measure late last year, and President Clinton, after issuing a veto threat, allowed the defense bill to become law.

The legislation funds projects, operations, and personnel for the year that began October 1. It took on new significance after Washington's failure, by year's end, to produce a policy-setting defense authorization bill.

Congress's \$7 billion add-on was heavily concentrated in modernization. The Administration sought only \$38.7 billion for new military equipment; the appropriations measure provides \$44.1 billion, a net gain of \$5.4 billion. Of the increase, only a net of about \$300 million goes to active-duty Air Force accounts.

The appropriators added \$2.1 billion to the Administration's \$34.3 billion research and development request. USAF R&D rose from a planned \$12.6 billion to \$13.1 billion.

In more detail:

**Pay.** The measure provides \$69.2 billion for military personnel, up about \$500 million from the Administration budget proposal. It supports an end strength of 1.45 million personnel. Basic allowance for quarters is funded at \$72 million, up from the \$41 million requested, an amount sufficient to provide a BAQ increase as of January 1. The measure fully provides for the proposed 2.4 percent pay raise.

**Fighters.** The act provides \$159 million for six new F-16 fighters and \$311 million for six new F-15E fighters. The Pentagon requested neither aircraft, but Air Force officials noted throughout the year that additional acquisition would be needed

to sustain twenty fighter wing equivalents into the next decade.

The appropriators added \$100 million to the \$2.1 billion request for the F-22 fighter, thus offsetting, to some degree, the earlier cuts imposed by lawmakers.

**JAST.** The Joint Advanced Strike Technology program, which seeks to develop a new fighter for the Air Force, Navy, and Marine Corps in the next decade, took a substantial cut. The lawmakers appropriated only \$200 million of the \$331 million requested. While some in Congress have expressed growing doubts about the program, the appropriators noted that the cut matched unobligated funds from previous years that could be used to make up the difference.

**Bombers.** The bill provides \$493 million more than the amount requested for the B-2 bomber, without specifying how the money should be spent. At present, Congress has authorized the production of twenty stealth bombers, but B-2 supporters said the addition could be the first step in acquiring more.

Upgrade funding for the B-1 and B-52 bombers was increased to speed integration with precision guided munitions.

**C-17.** Congress fully funded the C-17 program for the year, appropriating \$2.5 billion for eight aircraft.

**EF-111.** The appropriations report seconded the Senate's expression of "serious concerns" about DoD's plan to retire the Air Force's EF-111A Raven jammer aircraft and to rely on the Navy's EA-6B Prowler electronic warfare aircraft to meet the jamming needs of both services. The bill requires that the Air Force sustain a force of at least twelve EF-111s through 1999.

**Reconnaissance.** The Defense Airborne Reconnaissance Program was cut back slightly, but Congress provided additional funds to reengine two RC-135 electronic surveillance airplanes.

The E-8 Joint Surveillance and Target Attack Radar System was funded at \$377 million for two aircraft. Joint STARS R&D was in-

creased from the \$170 million requested to \$182 million.

**Guard and Reserve Equipment.** Congress approved \$777 million for Guard and Reserve equipment. Some \$400 million of that is for aircraft, including eight C-130H airlifters and two C-26 cargo/passenger aircraft.

**Missile Defense.** Included in the bill is \$3.4 billion for the development of defenses against ballistic missile attack, up \$500 million from the Administration request. The biggest increase went to national missile defense R&D. The conferees doubled the Administration request to \$746 million. Other significant increases went to the Spacebased Infrared program, up \$135 million to \$266 million, and the Navy's Upper Tier program, funded at \$200 million.

After Congress passed the defense bill, the President threatened to veto it. Congress had added \$7 billion while cutting domestic programs that Clinton wanted preserved. Congress, however, approved the bill at the same time the President was seeking support for troop deployments to Bosnia-Herzegovina. Ultimately, he neither signed nor vetoed the measure but permitted it to become law automatically ten days after passage.

Each year, Congress votes a separate appropriation for military construction. President Clinton signed the FY 1996 bill, which provides \$11.2 billion—\$500 million more than originally requested. Much of that will pay for key quality-of-life programs.

USAF will receive approximately \$1.2 billion for family housing. The military construction conferees also argued that "volume single-family home-builders that build moderate-size homes from standardized plans may provide a low-cost, efficient method of providing military family housing." They encouraged DoD to pursue a pilot project to test the concept.

USAF will also receive \$75 million for the Homeowners Assistance Program, which protects Air Force members from loss when they must sell their homes near closing bases.

Air Force Child Development Centers are funded at \$183 million. ■





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# Aerospace World

By Suzann Chapman, Associate Editor

## USAF's Bosnia Plans Unfold

US Air Forces in Europe and Air Mobility Command more than two years ago began planning for possible peace operations in the Balkans. In December, those plans were put into effect.

USAF troops at European and Stateside bases joined forces to reinvigorate two dilapidated Cold War airports in central Europe, reenergize Rhein-Main AB in western Germany, and establish the air link for Operation Joint Endeavor.

On November 28—the day after President Clinton's major address on the planned deployment of 20,000 US troops to support NATO's Joint Endeavor in Bosnia-Herzegovina—a USAF team led by Col. Neal Patton, 16th Air Force vice commander, was on its way to a former MiG fighter base at Tuzla, Bosnia, to survey the airfield.

Tuzla and Hungary's Taszar AB, an active MiG-21 fighter base, were selected to serve as the main forward airlift centers for the operation. A substantial force of USAF combat aircraft at Aviano AB, Italy, continued to provide the NATO force with control of the air. Air Force special operations units were based further south at Brindisi, Italy.

Throughout the next few weeks, USAF active-duty and reserve personnel and units supported the NATO operation in a variety of ways, from airlift operations to combat air patrol and from airborne surveillance and reconnaissance to aerial refueling and satellite communications.

Colonel Patton on December 6 returned to Tuzla as the commander of the 4100th Air Base Group (Provisional) aboard a C-130 from Ramstein AB's 86th Airlift Wing. He brought a team of USAF personnel, many from Ramstein's 1st Combat Communications Squadron, to prepare the airfield for round-the-clock operations.

## Joint STARS Ready for Balkan Duty

Some 450 members of a joint USAF-Army unit—the 4500th Joint STARS Squadron (Provisional)—arrived at

*An Army Humvee is unloaded from a US Air Force C-130 at Sarajevo Airport. Bad weather has been a challenge to the NATO peacekeeping mission in Bosnia-Herzegovina, and some flights scheduled to land in the northern town of Tuzla had to be diverted to the Bosnian capital.*



AP photo by Enric F. Marti

Rhein-Main AB on December 15 with two E-8 Joint STARS (Joint Surveillance and Target Attack Radar System) aircraft.

Though still in development, Joint STARS aircraft flew forty-nine combat missions in Operation Desert Storm in 1991, tracking Iraqi forces, vehicles, and fixed and mobile Scud missiles.

The system includes a modified Boeing 707, with a radar antenna housed under the fuselage, and mobile ground stations that forward the surveillance data to field units. Joint STARS has the ability to detect and track ground movements with such precision that the unit can distinguish between wheeled and tracked vehicles. It also provides ground-threat data to flying units, complementing Airborne Warning and Control System aircraft.

The Air Force expects delivery of the first production models this month. However, for Joint Endeavor, military crews will conduct all operations on the two preproduction models, with some seventy-five Northrop Grumman personnel providing technical backup, as needed, according to Air Force officials.

USAF Col. Robert DeBusk, 4500th JSS commander, said that the current Joint STARS aircraft are even more effective than those used in Desert Storm because of improved computer software and radar functions. He added that if any of the warring factions decide to break the Bosnia peace pact, "they can't hide."

Squadron Vice Commander Army Col. Jeff Wright called Joint STARS "one of the more sophisticated, complex, and revolutionary systems" providing support to all commanders.



## New Momentum for the B-2

The outlook for procurement of new B-2 bombers appeared to have brightened as a result of the words and deeds of Congress and the President.

Congress approved a Fiscal 1996 defense appropriations bill containing some \$500 million in B-2 funds that the Administration had not sought. The bill did not specify use of the money. House lawmakers said the ultimate goal was new procurement.

President Clinton accepted the bill, seeming to crack the door for more bombers. In a December 20 interview with the Los Angeles *Times*, he expressed a more favorable view of bomber purchases.

"You know I have mixed feelings about the B-2," he told *Times* reporter Ralph Vartabedian. "I think it's a good plane, but I don't think we need as many as the Congress wants to build."

The President then added, "I signed the bill; there are going to be more B-2s built."

Congress in 1992 capped procurement at twenty bombers, and the Clinton Administration has always resisted subsequent moves to increase that number. In the *Times* interview, he announced that "there are circumstances under which I could go along with building some more." He did not specify the circumstances and said procurement must be con-



*At Bell Helicopter Textron's Flight Research Center, Arlington, Tex., a crane moves the wing and nacelle structure of a V-22 Osprey into place on the aircraft's fuselage, signaling the start of final assembly. Bell Boeing officials say production of the tiltrotor aircraft is on schedule.*

sidered in light of overall defense needs and budget levels.

Defense Secretary William J. Perry in the past has said that he might want to tap the B-2 funds to finance US operations in Bosnia.

## One Plus One Approved

Those pre-All-Volunteer Force open-bay barracks and common la-

trines will pass into history now that DoD has approved the "one plus one" standard for single enlisted personnel. However, a DoD release cautioned that "transformation of old barracks into 1990s-style singles living will not happen overnight."

The Pentagon announced December 11 that Defense Secretary William J. Perry had "signed off" on the new housing standard on November 6. Just weeks before, the USAF-led push for the new department-wide standard seemingly had stalled, prompting Air Force officials to say the service would continue to pursue "one plus one" independently.

Recent studies, including the 1995 USAF Quality-of-Life survey, indicated that young recruits ranked gaining more privacy and space as top concerns.

Under the new standard, single enlisted members at permanent duty locations will live in mini-apartments with two individual sleeping rooms (each about 118 square feet), plus a kitchenette and bathroom shared with only one other person. According to DoD, the apartments will "normally accommodate two service members in the ranks of E-1 through E-4, or one person ranked E-5 or above."

Each service will implement the latest standard "wherever possible beginning with Fiscal Year 1996 construction." The DoD release stated that during the next twenty years, the number of E-1s to E-4s who will have "the opportunity" to live in the new-style rooms will increase from about 50,000 to more than 275,000. Additionally, the number of barracks spaces

## Everyday Heroes

Members of the Air Force occasionally find themselves in situations calling for quick reaction and calm thinking. In this, they often excel, as the following recent award and actions demonstrate.

SrA. Lisa Natola, who works in the Wilford Hall Medical Center's Human Resources Office, received the Airman's Medal on October 26 for heroism she displayed when she pulled an injured driver from a burning car in 1993.

A1C Kyle Clay, AFRES, a financial services specialist with the 94th Airlift Wing, Dobbins ARB, Ga., helped save the life of a pregnant Georgia woman who lost a leg in a traffic accident in November. He credited first-aid field training during a recent weekend drill with spurring his quick and successful reactions. The woman survived and gave birth to a four-pound baby. Both are OK, according to Airman Clay.

SSgts. Gary Duclou and Neri LaMadrid, on temporary duty in October in Japan from the 83d Aerial Port Squadron, Portland, Ore., rescued a six-year-old Japanese girl as she slid down a nearly vertical, fifty-foot rocky incline off a hiking trail on Mount Nokogiri. Sergeant LaMadrid brought the child back up the cliff. She spent seven days in the hospital and recovered fully.

In November, Capt. Timothy Finnegan, 353d Special Operations Group, Kadena AB, Japan, helped save an Okinawan boy who was trapped under a van that had flipped over. The Captain managed to pick up the van far enough to slip a rock underneath it to relieve some of the pressure on the child. When other men arrived, they righted the vehicle. The two-year-old boy was expected to remain in the hospital for at least two months.

AFRES TSgts. Ray J. Korizon and Paul W. Vojtech and SSgt. Vince Bobowski, from the 928th Maintenance Squadron, O'Hare IAP/ARS, Ill., helped contain a bus fire and save its passengers in October while on temporary duty at Hickam AFB, Hawaii. They were driving along a highway when they heard an explosion and saw smoke and flames from a tour bus in front of them. They borrowed a garden hose and several fire extinguishers to help put out the fire.





*The 552d Fighter Squadron, 27th Fighter Wing, Cannon AFB, N. M., recently accepted these F-16s, marking the beginning of Air Combat Command's movement of aircraft to streamline maintenance and logistics. The 27th FW will be retiring its F-111s throughout 1996.*

served by central latrines will fall from 116,000 to less than 1,000.

#### **Fighter Squadrons to Move**

Air Combat Command announced in December that it intends to shift more fighters among three ACC bases and cancel the move of additional aircraft to an Air Force Materiel Command base. The goal was to streamline maintenance and logistics for each system.

ACC officials said the moves, scheduled for mid-1996, will align similar aircraft, such as Block 40 F-16s with other Block 40s.

Eighteen Block 50 F-16C/D aircraft will move from Cannon AFB, N. M., to Shaw AFB, S. C., increasing Shaw's F-16 inventory to seventy-eight. Six Block 40 F-16C/D aircraft will move from Pope AFB, N. C., to Cannon, which will then have sixty F-16C/Ds. Eighteen A/OA-10 aircraft will move from Shaw to Pope, increasing its force of A/OA-10s to forty-two. The planned movement of six F-16C/Ds to Hill AFB, Utah, has been canceled.

As a result of these moves, the full-time military manpower authorizations at the three ACC bases also will change. Cannon's and Shaw's authorizations will increase by 104 and sixty-four, respectively. Pope will lose eighty-six.

#### **UAVs: Wave of the Future**

Air Force Chief of Staff Gen. Ronald R. Fogleman told defense reporters in November that the Air Force is

looking for a cost-effective way to bridge the gap between future unmanned aerial vehicle capability and today's tactical reconnaissance requirement—but he sees UAVs as “the wave of the future.”

General Fogleman stated that the Air Force is firmly committed to UAVs for near-real-time and real-time battlefield intelligence and reconnaissance. However, until UAVs really come on line, he said, the best way to find a cost-effective alternative is “to have a little competition.”

He would like to see the Air National Guard's reconnaissance pod being developed for the F-16 to compete with the Marine Corps' advanced tactical airborne reconnaissance system (ATARS) or another system. He emphasized competition to reduce the cost of the system ultimately procured, stating that the ATARS price had not changed until the ANG program began.

#### **Benefits to Low C-17 Buy Rates**

Addressing another area—airlift—General Fogleman told reporters that he saw advantages to buying C-17 airlifters at a low per-year rate.

The Chief of Staff's statement runs counter to conventional wisdom, which holds that only large-scale production of USAF's newest airlifter will produce significant economies of scale and therefore generate relatively large reductions in cost.

The General, however, suggested that advantages should be calculated

not only in terms of cost. For the Air Force, he said, slower production would keep the C-17 line open longer, “and that gives you some options in the outyears to look at . . . whether you need more [C-17s] or whether you start to use this basic airframe for other things.”

He added that buying C-17s at the maximum production rate—probably fifteen per year—would, “in theory,” produce efficiencies, but the savings would not be as dramatic as in the past when, for example, the service procured fighter aircraft at a rate of 180 per year. He said new “lean production” methods used by prime contractor McDonnell Douglas had already reduced costs.

#### **F-22 Threat Environment Tough to Test**

The concept for initial operational test and evaluation for the new F-22 fighter is still being developed, with first flight more than a year away, but USAF's lead F-22 tester knows he will face “severe limitations” testing the aircraft in a likely threat environment.

Lt. Col. Erwin C. Catts of the Air Force Operational Test and Evaluation Center, Kirtland AFB, N. M., spoke on December 6 at an industry conference on integrated avionics.

Colonel Catts said that evaluators will use modeling and simulation, hardware-in-the-loop testing, and open-air testing. He noted that the F-22's closely coupled avionics drive the need for the Air Force to test the fighter as an entire system and avoid separate assessments of subsystems.

Colonel Catts pointed out, however, that he does not have an actual adversary against which the F-22 may be tested, and there will be no live missile firings. Additionally, he said that test range infrastructure cannot accurately mirror the F-22's likely dense battlefield environment.

The Colonel said testers will conduct open-air tests to the extent possible and then put results in a full-mission simulator.

“Now, with a man in the loop and a dense environment [created in the simulator], I can get a prediction of what the likely performance of the F-22 will be against the then-current and -future threat,” he said. He also said that AFOTEC supports the acquisition of adversary aircraft and missiles.

#### **Satellites “Talking” to Satellites**

December 15 marked the start of “a new era for spacebased communi-



cation," according to a Pentagon release, which announced that two military satellites had "cross-linked" in space. That means two Milstar communications satellites "talked" to each other, transmitting messages between them without first sending the data through ground stations, thus providing more secure transmission.

Milstar was developed by USAF's Space and Missile Systems Center, Los Angeles AFB, Calif., to provide secure, jam-free communications and worldwide connectivity to authorized users, said the release. It added that Milstar's successful message transmission "represents a crucial step in the evolution of the program."

When completed in 2000, the Milstar constellation of four satellites in geosynchronous orbit will provide communications worldwide, relying on only one initiating ground station.

The ground station, located on friendly soil, would transmit a message to one Milstar, which would then use its intersatellite communication antenna—the "cross-link"—to route the message to other Milstars. The satellites would cross-link messages around the constellation, as needed, then downlink them to destination terminals, potentially on some future battlefield.

The first cross-linked message was a statement by Gen. John M. Shalikashvili, Chairman of the Joint Chiefs of Staff, praising this latest US command-and-control advantage.

#### F-117 Slated for Upgrades

A USAF official told reporters that



*Beginning this year, Rockwell International Corp.'s AGM-130s will incorporate the latest INS/GPS autonomous guidance and infrared technology. Above, Texas Instruments conducts an operations test on an AGM-130 with an F-15E from Seymour Johnson AFB, N. C.*

the service hopes to include in the 1998 program objective memorandum support for midlife improvements to the F-117 Stealth fighter.

The unnamed official, speaking in mid-December, would not reveal the specific recommendations of a study on F-117 upgrades. He did note that the study took more than a year to complete and focused on aircraft survivability and target-kill capability, using two combat scenarios. One featured Syria and another Iraq, he said, with both set in 2010.

Areas covered included radar cross section (RCS), electronic warfare countermeasures, weapons, targeting, information in the cockpit, communications, and antennas. In all, the study reviewed more than 100 different technologies, with thirty or forty related to RCS reduction.

The official emphasized that the study results were not final and that plans called for USAF officials to brief senior ACC officers later in December. The Air Force thinking today is that it will phase out the Nighthawks after 2018.

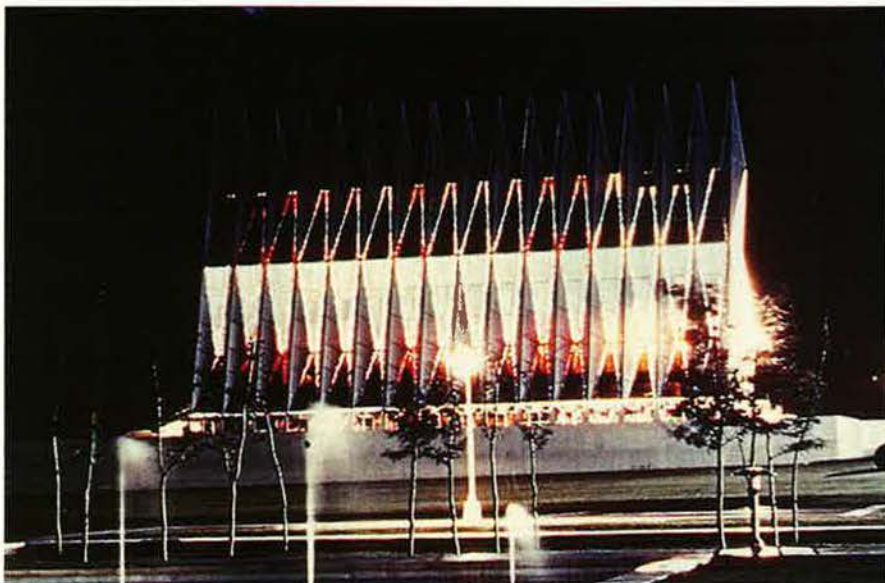
#### USAF Recruits Keep Quality High

The Pentagon announced that all of the services met their 1995 recruiting goals but that every service except the Air Force experienced a small decline in quality, as measured by the Armed Forces Qualification Test.

The Army, Navy, and Marine Corps showed "small decreases" in the percentage of enlistees scoring in the top four categories of the AFQT, said Fred Pang, assistant secretary of defense for Force Management Policy. By contrast, the percent of Air Force recruits in these categories rose between 1994 and 1995, he said.

The Pentagon official said the services recruited a total of 168,010 first-time enlistees in Fiscal 1995. Quality remains high, he said, noting that ninety-six percent were high school graduates and seventy-one percent scored above average on the AFQT (scoring in categories I to IIIA).

DoD goals for quality require ninety percent to have high school diplomas



*The US Air Force Academy Cadet Chapel at Colorado Springs, Colo., has won the 1996 American Institute of Architects' Twenty-Five Year Award—the first time a government project has earned the honor. The architecture firm of Skidmore, Owings, and Merrill designed the chapel. It was completed in 1962.*



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and sixty percent to score above average on the test. "High-quality" recruits, in DoD parlance, are those who meet both requirements. Sixty-seven percent of overall Fiscal 1995 recruits were in the high-quality category, compared to sixty-eight percent for Fiscal 1994.

**Full Accounting: 567 Lost Forever**

The Pentagon announced in mid-November the results of an "extensive analysis" of individual cases of Americans missing in action from the Vietnam War. Begun in 1994, the study groups the remaining 2,202 MIA cases into three broad categories. One category comprises 567 MIA cases that the Pentagon said "cannot be resolved."

The largest category comprises 1,476 cases that require further pursuit. A second category with 159 cases is on hold, pending "receipt of additional information to develop new leads."

The "cannot be resolved" category includes those service members lost at sea, buried on riverbanks that have since eroded, and killed in explosions that destroyed their remains. The DoD statement said that the analysis indicated that those individuals had perished and no future effort would lead to a return of their remains.

Fifty-eight analysts independently reviewed each of the 2,202 cases (the number of open cases as of July 21), then shared their views to reach



USAF photo by SrA. Greg Vaughan

*Lt. Col. Roger T. Turcotte, 391st Fighter Squadron commander at Mountain Home AFB, Idaho, passed the 2,000-hour mark in an F-15E in December. Colonel Turcotte has been flying the dual-role fighter since 1988 and now holds the record for the most flying time in that aircraft.*

a coordinated position that DoD said identifies "the best next steps to move cases toward resolution." Analysts were drawn from the Defense POW/MIA Office in Washington, D. C., and the Joint Task Force—Full Accounting and the Central Identification Laboratory, both in Hawaii.

They reviewed historical data of each loss; information collected by the US government; information gathered through joint investigations with

Vietnam, Laos, and Cambodia; and data turned over to the US by those governments. DoD said the analysis "represents the first time such an exhaustive assessment has been conducted since the end of the Vietnam War."

**Tricare Prime Reduces Cap**

The maximum annual total paid by non-active-duty enrollees in the DoD managed-care health plan, known as Tricare Prime, has dropped from \$7,500 per fiscal year to \$3,000 per twelve-month enrollment period, as of November 1, according to a December Air Force release.

Called a "catastrophic cap," the yearly total includes Tricare Prime enrollment fees, inpatient and outpatient cost shares, and copayments for such things as visits to civilian doctors. Once they reach the "cap" of \$3,000, enrollees owe nothing more for care received through the Prime network of providers until the next annual enrollment period.

Through December, Tricare services were active in five of the twelve health-service regions. The latest region to issue a Tricare contract, according to a December USAF statement, includes Mississippi, Florida, Georgia, Alabama, Tennessee, South Carolina, and the eastern third of Louisiana.

The award of this Tricare contract went to Humana Military Healthcare Services of Louisville, Ky., for \$3.78 billion, covering 5.5 years, including



*A Russian Strategic Rocket Forces delegation and Maj. Gen. David L. Vesely (second from right), commander of 14th Air Force, observe a Titan IV lifting off from Vandenberg AFB, Calif., in December. It was the first Titan IV launch for the 4th Space Launch Squadron since an unsuccessful attempt in August 1993.*



a six-month start-up period and five one-year options. Air Force officials said the original starting date might change from May 1 to July 1, since the contract award had been delayed.

**Splitting Command and Control**

As part of the trend toward streamlining, the Air Force created a "super" command-and-control officer out of three separate career fields—but the merger didn't take.

Two years into the attempted consolidation of the air traffic control, air weapons control, and operations management career fields, an Air Force review group found that the plan had not worked. The group determined that the service had never established a requirement for this type of multiquarified officer and that the specialties were too technically diverse.

The Air Force announced devolution of the "super" command-and-control career field into three separate fields. The service plans to:

- Reestablish the separate field of air traffic control.
- Restore air weapons control—now to be called "air battle management"—as a separate field.
- Create a new field, combat control.
- Eliminate operations management, more commonly known as the command post field.

The personnel manager of the "super," or 13BX, career field, Maj. Leah

Barrera, said that personnel officials will help the nearly 1,000 people in operations management find jobs in the "sister career fields that broke away." She added that others will fill shortage career fields. They will receive a list of potential career fields next month.

Major Barrera said, "In retrospect, there wasn't enough need for an officer with the breadth this field offered when weighed against the high technical skills needed for successful air traffic control, air battle management, and combat control demands in the next century."

**Spy Imagery Merger Proposed**

DoD and the Central Intelligence Agency proposed to Congress creation of a new National Imagery and Mapping Agency (NIMA) that would consolidate the resources responsible for imagery and mapping products taken largely from intelligence satellites into one organization under the Defense Department. The target date for NIMA stand-up is October 1, 1996.

The proposed concept would merge the Defense Mapping Agency, DoD's Central Imagery Office, CIA's National Photographic Intelligence Center, all imagery support resources of the Defense Intelligence Agency, and resources of the Defense Airborne Reconnaissance Office and National Reconnaissance Office associated with imagery exploitation and dissemination, according to a DoD statement. The new agency would employ about

9,000, with the majority—some 7,000 employees—coming from DMA alone.

Critics of the proposal believe that the merger might shift too much emphasis to military intelligence-gathering at the expense of political and diplomatic coverage. Proponents feel that the move will provide much-needed near-real-time intelligence to battlefield commanders, without sacrificing other requirements. A DoD statement said, "Specific details of the agency will be developed in close consultation with the Congress."

Navy Rear Adm. Joseph J. Dantone, Jr., currently NRO's deputy director for Military Support, was named director of the NIMA Implementation Team. Leo Hazlewood, the CIA's deputy director for Administration, and Dr. Annette J. Krygiel, director of the Central Imagery Office, were selected as deputy directors.

**DoD, CIA Cooperate on Space**

The Defense Department and Central Intelligence Agency announced on December 15 further collaboration with the creation of a Joint Space Management Board.

The JSMB, according to a DoD release, will integrate policy, requirements, architectures, acquisition, and funding for defense and intelligence space programs. The goals are to make joint use of available space resources and to use "integrated architectures [for future space systems] to the maximum extent possible."

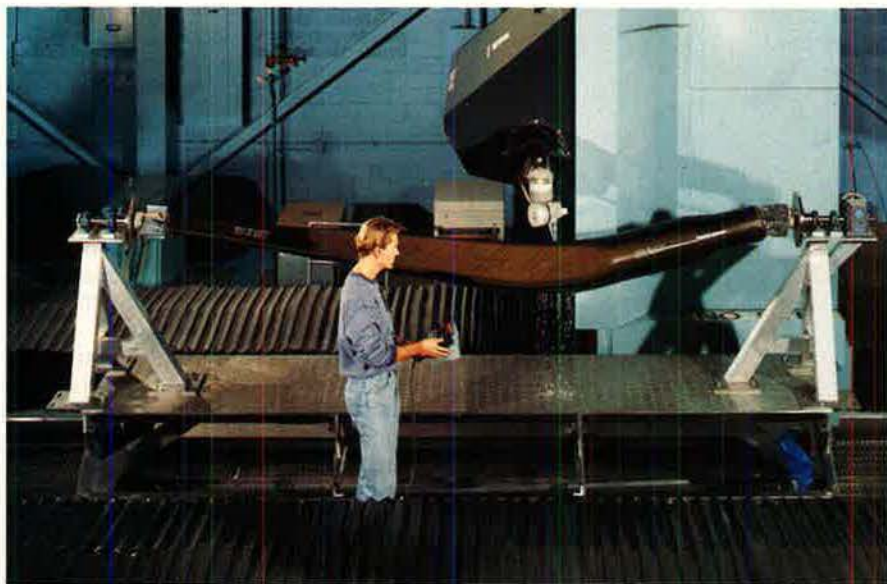
While providing executive management for DoD and CIA space programs, the board will oversee the National Security Space Architect. It will have co-chairs, the under secretary of defense for Acquisition and Technology and the deputy director of Central Intelligence. The co-chairs will oversee an executive committee that includes the vice chairman of the Joint Chiefs of Staff and the executive director, Intelligence Community Affairs.

**Newark AFB Privatizes**

The Air Force announced December 15 that maintenance activities performed at Newark AFB, Ohio, have been contracted to private industry.

Rockwell International has won a contract estimated at \$264 million for depot-level maintenance and repair activities. Wyle Laboratories won a cost-reimbursable contract estimated at \$19 million for selected metrology and calibration work. Both contracts cover a transition period plus four one-year options.

According to a USAF release, both contractors must extend the right of



*A Lockheed Martin Tactical Aircraft Systems employee monitors an ultrasonic scanner during inspection of a pivot shaft that will move an F-22's horizontal stabilizers. The scanner, linked to a computer-aided design file, allows single-sided inspection of the shaft while maintaining accuracy on three axes.*





*In October, the Delaware Aviation Memorial Foundation dedicated this statue to the Women's Airforce Service Pilots. It is located at the Greater Wilmington Airport, Del.—called New Castle AAB in World War II—where the first Women's Auxiliary Ferrying Squadron trained.*

Another boon to industry, according to the AIA president, will be continued internationalization, either through foreign acquisitions or teaming. He views this as a positive trend that offers cost- and technology-sharing benefits, as well as ready expansion into world markets.

However, he emphasized that the difficult period for industry is not over. The difficulties will end "only when there is in place a stable, adequately funded, defense modernization program and the advanced technology systems now languishing in R&D status become real, live, production projects," Mr. Fuqua said.

#### **The Art of Dropping Leaflets**

The Army and Air Force dropped more than ten million leaflets on the Iraqi army during Desert Storm—but they still have to practice.

"The ability to drop a desired number of leaflets onto a desired area requires a real joint effort," said Army Maj. Andy Eisemann of Alpha Company, 8th Psychological Operations Battalion (Deployed).

During the first leaflet drop since the beginning of Operation Southern Watch, C-130 crew members Capts.

first refusal for their employment openings to federal employees displaced by these contracts. Additionally, the base has employee-assistance programs to help employees with job searches.

Some employees have already taken advantage of a Job Training Partnership Act grant. The \$2.75 million grant has provided training in new or upgraded skills for hundreds of base employees, the release stated. Nearly 200 other employees were placed in DoD positions under the Priority Placement Program. [See "Civilian Drawdown, Hard and Fast," January 1996, p. 28.]

#### **A More Competitive Industry**

The post-drawdown US aerospace industry will be leaner, more efficient, and financially and technologically sound, stated Aerospace Industries Association President Don Fuqua at the AIA's thirty-first Annual Review and Forecast on December 13.

"From the technical standpoint, the aerospace industry of the new millennium will be more competitive than at any time in its history," he noted. The last ten years have produced flexible manufacturing approaches that will elevate competitiveness factors—such as cost, reliability, and reduced design-to-market time—to an equal status with performance.

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Pete Fry and Steve Hedden, serving with the 4410th Airlift Squadron in southwest Asia on their first flight over the region, noted the difficulty of spotting ground targets in the desert.

Throughout the flight, Sgt. Colin Sullivan continually updated weather conditions to pinpoint the precise location to drop the leaflets so that they would drift over the targeted troops.

During a drop, an Army or Air Force member tossed one or more boxes, each attached to a static line, out the aircraft's rear door. The static line "exploded" the box, creating a leaflet "cloud."

According to Major Eisemann, the Desert Storm leaflet drops contributed heavily to the surrender of tens of thousands of Iraqi troops.

### ESC Field Tests TASR

Electronic Systems Center at Hanscom AFB, Mass., field tested a prototype battlefield situational awareness receiver, called the Tactical Automated Situation Receiver (TASR), successfully relaying a missile warning to a "threatened unit" within two minutes at its most recent "Fort Franklin" field encampment.

The prototype TASR system includes a laptop computer base unit and portable remote receivers—all commercially available components. ESC officials said that production TASR units should cost less than \$5,000 per unit.

The computer generates warning messages and transmits them via modem to cellular paging transmitters. The remote receivers in the field pick up and filter the messages, displaying only the information the user needs, based on the receiver's location.

The receivers include a handheld Apple Newton portable processor, a Global Positioning System receiver, and an alphanumeric paging card packaged in a rugged platform.

Plans call for procurement of thousands of TASR systems. "Eventually, they will be carried by every maneuver unit, every ship, and every aircraft and will provide a common joint platform for battlefield situational awareness," said Capt. William J. Szarek, TASR program manager.

The demonstration took place during Fort Franklin IV, one of several ESC field encampments that demonstrated USAF's command, control, communications, computer, and intelligence systems' interplay with those of other services.

### Six Teams Net Quality Awards

The Air Force has recognized six USAF teams for helping to enhance USAF processes and products, according to USAF Chief of Staff Gen. Ronald R. Fogleman.

The six winners were selected from a field of twenty nominated for the Chief of Staff Team Quality Awards by the Air Staff, major commands, Air Force Reserve, and Air National Guard.

The following were winners:

- The 18th Wing team at Kadena AB, Japan, for introducing a new F-15 maintenance process and standardized pilot training and discrepancy reporting procedures.

- The 42d Air Base Wing's Logistics Supply Squadron team, including members from the 908th Airlift Wing, at Maxwell AFB, Ala., for reducing the unanticipated demands for C-130 aircraft parts from seventy percent to thirty-seven percent.

- The 34th Training Wing team at the US Air Force Academy, Colo., for identifying excess steps and reducing processing time for cadet disenrollment by seventy-nine percent.

- The 52d Security Police Squadron team at Spangdahlem AB, Germany, for using community-oriented policing methods to improve its security operations for entry to the flight line.

- A team from the 46th Component Repair Squadron at Eglin AFB,

Fla., for improving liquid nitrogen cart services to meet aircraft sortie generation needs.

- The 39th Security Police Squadron team at Incirlik AB, Turkey, for developing and implementing programs that helped reduce the base's crime rate, which was one of the highest in USAF.

### News Notes

- On December 15, the President nominated Gen. Joseph W. Ralston, Air Combat Command commander, to be vice chairman of the Joint Chiefs of Staff, replacing Adm. William A. Owens, who announced his retirement. At press time, Congress had not approved the nomination and the Air Force had not announced a replacement for the ACC post.

- Nominated for a fourth star, Lt. Gen. (Gen. selectee) Eugene E. Habiger, USAF's deputy chief of staff for Personnel, also had been tapped, pending Senate confirmation, as commander in chief of US Strategic Command at Offutt AFB, Neb., succeeding Adm. Henry G. Chiles, Jr., who will retire.

- The United Kingdom signed a memorandum of understanding with DoD in December to participate as a collaborative partner for the concept demonstration phase of the Joint Advanced Strike Technology (JAST) program. A proposed JAST short take-off and vertical landing aircraft offers

## Senior Staff Changes

**RETIREMENT:** M/G Nolan Sklute.

**PROMOTIONS:** To be **Major General:** Thomas R. Case, Donald G. Cook, Charles H. Coolidge, Jr., John R. Dallager, Richard L. Engel, Marvin R. Esmond, Bobby O. Floyd, Robert H. Foglesong, Jeffrey R. Grime, John W. Hawley, Michael V. Hayden, William T. Hobbins, John D. Hopper, Jr.

Raymond P. Huot, Timothy A. Kinnan, Michael C. Kostelnik, Lance W. Lord, Ronald C. Marcotte, Gregory S. Martin, Michael J. McCarthy, John F. Miller, Jr., Charles H. Perez, Stephen B. Plummer, David A. Sawyer, Terryl J. Schwalier, George T. Stringer, Gary A. Voellger.

**CHANGES:** B/G Orin L. Godsey, from Chief of Safety, Hq. USAF, Washington, D. C., to Chief of Safety, and Dir., Air Force Safety Center, Kirtland AFB, N. M., replacing Col. Bernard B. Burkland, Jr. . . . Col. (B/G selectee) Glen W. Moorhead II, from Spec. Ass't to Supreme Allied Cmdr., Europe, SHAPE, NATO, Mons, Belgium, to Cmdr., 50th Space Wing, Falcon AFB, Colo., replacing Col. Simon P. Worden.

**SENIOR ENLISTED ADVISOR (SEA) RETIREMENT:** CMSgt. Kenneth C. Maynard.

**SEA CHANGE:** CMSgt. David Hill, to SEA, Hq. AIA, Kelly AFB, Tex., replacing retired CMSgt. Kenneth C. Maynard.

**SENIOR EXECUTIVE SERVICE RETIREMENTS:** Renan del Villar, Linda I. Garmon, JoAnne L. Krus, Ida J. Newman, Bruce A. Thomson. ■



a potential supersonic future carrier-borne aircraft to replace the Royal Navy's Sea Harrier, said a Pentagon statement.

■ The 347th Transportation Squadron's Air Delivery Flight at Moody AFB, Ga., became the first Air Combat Command flight to air-drop loads from a C-5 aircraft when it supported Air Mobility Command's 436th Airlift Wing, Dover AFB, Del., by loading and successfully dropping ten pallets ranging in weight from 2,520 to 15,000 pounds. Moody's fifteen-person "rigger" team normally works with C-130s.

■ Air Force officials said that joint pilot training will transfer to Vance AFB, Okla., with activation of the 8th Flying Training Squadron on July 1. Navy instructor pilots currently at Reese AFB, Tex., which will close in 1997, will begin to transfer to Vance next month. The 8th FTS will fly T-37B Tweet trainers. Navy instructors for joint T-1 Jayhawk pilot training with the 32d FTS at Vance will begin transferring from Reese by April.

■ The 4th Space Launch Squadron, 30th Space Wing, Vandenberg AFB, Calif., successfully launched the first Titan IV from Vandenberg in more than two years, boosting a classified payload into polar orbit on December 5. A Titan IV launched from the base in August 1993 exploded a few minutes into the flight. Three of the nation's largest expendable boosters launched from Cape Canaveral AS, Fla., in 1995. Current plans call for five launches each in 1996 and 1997.

■ The recent chief master sergeant promotion list gave SMSgt. Elaine Taylor, of the 56th Transportation Squadron at Luke AFB, Ariz., the distinction of becoming the first woman to make chief in the transportation career field. Noting that her career had been difficult and challenging because it was not typical for a woman, she said, "I've had to prove myself on many occasions, but that makes reaching this milestone that much more gratifying."

■ The 1995 colonel's board selected 650 out of 5,061 eligible officers for promotion to O-6. The selection rate for in-the-promotion-zone line officers was forty-two percent; Judge Advocate and Medical Service Corps, each at fifty-three percent; Biomedical Science Corps, thirty-three percent; and Nurse Corps, thirty-nine percent.

■ A November Air Force Return-to-Fly board selected ninety-four bomber and fighter pilots to return to the cockpit.

■ An Officer Training School board

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reviewed 1,572 records, then chose eighty-eight active-duty enlisted members and 184 civilian applicants to enter OTS in 1996.

■ Military personnel serving in Operation Southern Watch stopped receiving the Southwest Asia and National Defense Service Medals on December 1. Instead, they will now receive the Armed Forces Expeditionary Medal.

■ Air Force members who participated in Operations Desert Shield

and Desert Storm from August 2, 1990, through August 31, 1993, may be eligible for the new Kuwait Liberation Medal, offered by the government of Kuwait.

■ Although program costs have risen, according to USAF education officials, tuition assistance rates will remain the same for most degrees to avoid any negative impact on recruiting and professional development. Officials noted they would soon an-



Photo by Nate Leong



*The 159th Fighter Squadron (ANG), 125th Fighter Group, at Jacksonville IAP, Fla., has begun a conversion from F-16s to F-15s. Nose art for the F-15B "Wing Bird" includes the logo for a National Football League team, the Jacksonville Jaguars, as well as a version of the squadron's lightning bolt logo.*

■ nounce changes that would make assistance for doctoral and duplicate degrees, such as a second master's degree, more strict.

■ Three Air Force Reserve installations officially have changed names. The Reserve portion of former Grissom AFB, Ind., has become Grissom ARB. Homestead ARB, Fla., became an Air Reserve Station when it gave up its airfield to Dade County as part of the 1993 base realignment and closure actions. The 301st Fighter Wing now resides at Carswell ARS, its portion of NAS/JRB Fort Worth, Tex.

■ Though the Air Force Suggestion Program saved the service about \$250 million in Fiscal 1995, program officials said that statistics show that only a minute portion of USAF personnel actively participated. Officials launched a reengineering effort in October 1995 to review commercial industry programs and "expectations at all levels, from wing commander to airmen." They expect to test a new program by July.

■ "Microtubes" technology developed by Phillips Laboratory researchers at Edwards AFB, Calif., and used for microminiature plumbing, filtration, and structural applications, recently became the focus of a cooperative research and development agreement signed by Environmental Robots, Inc., of Albuquerque, N. M. They will use the technology to develop and produce robots small enough to propel

themselves through the human bloodstream for microelectromechanical and medical applications.

■ At Vandenberg AFB, Calif., 14th Air Force activated a twenty-four-hour Space Operations Center on November 27 to provide continuous command and control of its globally based space units. According to a 14th Air Force release, the center is similar in design and function to Air Operations Centers and will enable the com-

mander to engage USAF space forces for real-world contingencies or exercises while simultaneously preparing to execute others.

■ At Andrews AFB, Md., in November, the Air Force Office of Special Investigations dedicated the building used to train AFOSI agents to Lt. Gen. Joseph F. Carroll, the agency's first director.

■ Maj. (Dr.) James R. Stewart, 366th Aerospace Medicine Squadron commander, was named one of America's fifty most positive physicians—the only military doctor chosen—by the Positive Medicine Project, based in Philadelphia, Pa., and supported by the American Hospital Association and the American Medical Association.

**Obituary**

Ruth A. Eaker, widow of Gen. Ira C. Eaker, the late aeronautical and Air Force pioneer, died at Malcolm Grow Medical Center, Andrews AFB, Md., on December 13 after a long illness. Born in 1908, she married then-Captain Eaker in 1931. During World War II, when General Eaker was in Europe, she remained in Washington, D. C., helping with bond rallies and official hosting duties. In later years, Mrs. Eaker continued to participate in civic and charitable activities, including serving on the board of trustees of the US Air Force Academy's Falcon Foundation and as a charter board member of the Air Force Retired Officers' Community. She was buried at Arlington National Cemetery. ■

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*General Ronald R. Fogleman, Air Force Chief of Staff*

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**The decision to build the full C-17 fleet boiled out of a host of studies—and views—about requirements, capabilities, and economics.**

# Airlift Moves Up and Out

By John A. Tirpak, Senior Editor

**J**OHAN F. McDonnell, the former CEO and current chairman of McDonnell Douglas Corp., once likened his company's new C-17 airlifter to a problem child who straightened himself out. "If a \$100 million write-off is like wrecking the family car, then the C-17 wrecked the car ten times," he joked. Then, after causing enormous grief, this child "surprised everyone by going on to graduate from college with highest honors," Mr. McDonnell added.

The C-17 has, in fact, won important trophies and accolades, but the recognition that really counted came last November in a statement from the Pentagon's Defense Acquisition Board (DAB). The panel, after a rigorous evaluation, concluded that the C-17 program had fully overcome serious delivery, quality, and cost problems.

The Air Force, it said, would be cleared to spend an estimated \$18 billion to purchase eighty more of the advanced C-17 transports, raising the projected fleet total to 120.

"This is a 'good news' story," said Deputy Secretary of Defense John P. White in announcing the panel's findings. "The C-17 program was in deep

trouble two years ago, and I would like to commend the Air Force—particularly the acquisition staff and field acquisition personnel—for creating strong airlift options for the department, options that we did not have two years ago."

The decision to press on with the C-17, however, was not made in a vacuum, focused solely on whether the program had been able to steer away from its troubled course. Rather, the choice to build the full C-17 fleet boiled out of a cauldron of studies, requirements, capabilities, missions, and economic realities affecting military airlift beyond the 1990s.

## More Decisions to Come

Though the future of the C-17 has been decided for now, the airlift debate is not yet over. Other decisions to be made in the next several months will also have significant implications for the long-term strength of Air Mobility Command's airlift force. That, in turn, will determine whether the Air Force will be able to provide the airlift required to carry out national strategy.

In 1993, problems with the C-17 had become the stuff of daily head-

*The Air Force and McDonnell Douglas are confident that the C-17 has pulled out of its nose dive of cost overruns and late deliveries that for a time caused recriminations between USAF and the contractor.*





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## C-17 Performance

Performance Category	Objective	Threshold (minimum)	Current Status
Payload (pounds over 3,200 nautical miles)	130,000	110,000	131,000
Landing distance (feet, maximum payload)	3,000	3,000	2,900
Backup capability (percent grade)	2	1.5	more than 3
Turns, unpaved area (feet for 180° turn)	96	—	96
Rolling stock capacity (number of vehicles)	15	15	15
Airdrop capability (number of paratroops)	102	102	102
Airdrop capability (pounds of bundles)	110,000	60,000	110,000

lines. Then Under Secretary of Defense for Acquisition John M. Deutch (now director of Central Intelligence) said that terminating the airplane was a "very tempting" option. However, everyone knew that the C-141 Starlifter fleet was deteriorating rapidly and had to be replaced soon. The C-17 was in trouble, but there was no guarantee that a new start would fare any better.

Even so, Secretary Deutch put McDonnell Douglas and USAF on notice that he would halt production at forty airplanes if the Globemaster III couldn't be "put right" within two years. He set the October 1995 DAB meeting as decision time.

Secretary Deutch presented McDonnell Douglas with a "nonnegotiable" omnibus settlement that required the company to drop \$1.2 billion in claims against the government and put up another \$456 million to improve management and quality on the program. In return, the Air Force had to find \$348 million to settle program-related claims and rigorously flight-test the airplane. It had to relax some of the most extreme performance requirements for the C-17, which were deemed unnecessary and expensive to attain.

There was a further catch: If the Air Force and McDonnell Douglas failed, USAF would have to buy an "alternative" airlifter to meet cargo requirements [see "Off-the-Shelf Airlift," February 1995, p. 32]. Secretary Deutch said the deal offered the Pentagon "the opportunity to fix the C-17 but does not hold us hostage."

For the company, this was a turning point. The omnibus agreement was "a major part of the turnaround," said McDonnell Douglas Vice Presi-



**A rigorous reliability, maintainability, and availability evaluation last summer showed that the C-17's growing pains are a thing of the past. It succeeded despite being judged by standards usually applied to mature weapon systems.**

dent and Deputy Program Manager George G. Field. "They told us, 'Clean up your act,'" he said, but the omnibus agreement "put a limit on it . . . and set parameters" for how the C-17 would be judged. He explained that the agreement "cleared the decks" for a change in the dealings between the Air Force and McDonnell Douglas, which had degenerated into a blame-and-counterblame, adversarial relationship.

Almost at once, the attitude between the two parties turned "very productive," Mr. Field reported. That led to the creation of Integrated Product Teams, in which service and company officials worked together at all levels, focusing on quality and meeting the schedule.

Well before the two years were

up, the C-17 program pulled out of its nose dive. The contractor began meeting—then beating—the delivery schedule. The aircraft itself was performing in the field "beyond our expectations," said Air Force Chief of Staff Gen. Ronald R. Fogleman.

Last summer—with press and various government agencies keeping a keen watch—the C-17 passed a grueling reliability, maintainability, and availability evaluation with ease. It was an acid test that judged the airplane by criteria usually applied to "a mature weapon system," General Fogleman said, but the C-17

exceeded requirements by a healthy margin in almost every category. During the review, the C-17 posted an overall launch reliability rate of ninety-nine percent. [See "The C-17 Makes Its Point," October 1995, p. 38.]

### Other Airlift Options

While all this was going on, however, credible alternatives to the C-17 were being readied by contractors Boeing and Lockheed Martin. Boeing offered the 747-400F heavy freighter (later to be called C-33 in Air Force parlance) that featured widened doors and hardened decks. Lockheed Martin offered the C-5D, an updated version of the venerable Galaxy, featuring improved materials, avionics, and engines. Other can-

USAF photo by SrA. Andrew N. Dunaway II



didates originally had taken part in the competition to provide this so-called Nondevelopmental Airlift Aircraft (NDAA), but they had either withdrawn or been ruled out for technical reasons.

In the runup to the November decision, Washington was plastered with white papers arguing for this or that mix of C-17s and NDAA. The regional commanders in chief recommended an all-C-17 buy, stating that it would offer them the most flexibility to deal with any contingency.

The Joint Chiefs of Staff, meanwhile, backed going with a mix of C-17s and 747-400s, seeing in this an adequate capability at a markedly lower cost than that of 120 C-17s. The savings, claimed the JCS, could be applied to other modernization efforts. In this, the chiefs drew the support of the Congressional Budget Office, which argued that a mix of seventy-two C-17s and thirty C-33s could provide adequate airlift with a life-cycle cost \$9 billion lower than that of an all-C-17 fleet.

The contractors and members of Congress also threw reams of paper on the pile.

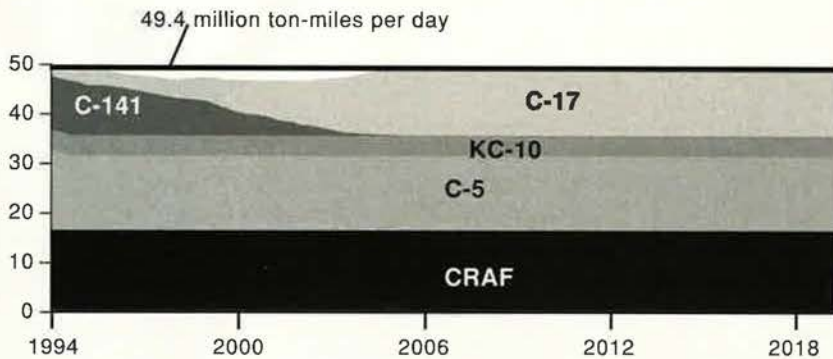
Once the decision had been made and announced, some critics returned to the CBO's figure of \$9 billion, maintaining that this cost differential is a "premium" the Defense Department will pay to get the advantages of an all-C-17 fleet. Secretary White, however, did not accept this assessment. "I don't think of it so much as a premium," he said. The all-C-17 purchase "was the lowest-cost option to meet the requirement."

At the heart of the C-17 debate during the last two years lay a fierce controversy over the true size and nature of the US military airlift requirement. Moreover, translating that specific requirement into numbers—and types—of airplanes was a complex process.

### Lowering the Bar

First, the Defense Department conducted an analysis to determine just how much lift would be required to carry out the post-Cold War national military strategy, that of supporting forces involved in two nearly simultaneous major regional conflicts. This analysis was called the Mobility Requirements Study/

## Strategic Airlift Requirements



*USAF draws on all its resources to meet the goal of 49.4 million ton-miles per day. Those resources include the Civil Reserve Air Fleet and USAF's KC-10s, each of which can carry more than eighty tons when operating as airlifters.*

Bottom-Up Review Update (MRS BURU). This study determined that the old objective of transporting sixty-six million ton-miles of cargo per day (mtm/d) could be safely reduced to 49.4 mtm/d.

The previous level of sixty-six mtm/d "was predicated on [moving] ten divisions to Europe in ten days," General Fogleman said. Since then, he added, "we've spent an awful lot of money on prepositioning" equipment aboard ships in the Middle East, "and we still have residual stuff in Europe." The factors in combination "allowed us to reduce this overall requirement," said the Chief of Staff. "Plus, the scenarios are just different."

Once MRS BURU lift requirements were set, the Air Force, working with the Institute for Defense Analyses and the Office of the Secretary of Defense's Program Analysis and Evaluation office, set out to make a more refined assessment. These organizations looked at how various mixes of aircraft would be able to handle this load and at what cost. This new study was called the Strategic Airlift Force-Mix Analysis (SAFMA).

"We then provided these results to industry for their review" and to help in the proposal process, said Gen. Robert L. Rutherford, commander in chief of US Transportation Command and commander of Air Mobility Command, Scott AFB, Ill. "Next we sat down with industry and negotiated ready-to-sign contracts for the C-17 and NDAA," using those costs to

compare the merits of each mix of airplanes.

Finally, officials conducted a Tactical Utility Analysis, "looking at the special features associated with short fields—the flexibility associated with intratheater kinds of operations and unit operations," said Paul G. Kaminski, under secretary of defense for Acquisition and Technology.

The total take of information from these studies was provided in October to the DAB, which reviewed it for two days, using a variety of measures. Taken into account, said Secretary Kaminski, was DoD's possession of "real . . . hard performance" data on the C-17 in tests and exercises, whereas it had only "performance predictions" for the C-5D and C-33. The C-17 at least reached the threshold—the bare minimum requirement—in all assessment categories and actually achieved the objective, or "desired" level of performance, in many of them.

Next to be looked at was the C-17 program's schedule and cost progress. Officials found that, about seven months after "probation" was imposed, the actual program results started to match up with Air Force target costs and delivery schedules. At the time of the DAB deliberations, "the last ten deliveries in the program [had been] . . . made ahead of schedule," Secretary Kaminski noted, adding, "We have a consistent and a predictable cost base now."

Thus, the C-17 earned its way off probation and won the right to com-





**Finding a replacement for the C-141 took on added urgency when parts of the Starlifter fleet were grounded for age-related maladies. After studying the options from numerous angles, USAF decided that the C-17 was its best bet.**

pete for the remaining lift requirement. The C-5D did not make the final cut because of its inability to operate from austere forward landing sites and short strips and other operational factors. Moreover, "It didn't end up being a cost-effective option in the analysis . . . to reopen the line," Secretary Kaminski said.

**C-33 Pluses and Minuses**

In the head-to-head C-17 vs. C-33 comparison, the C-33 enjoyed a number of advantages. It had a lower sticker price and needed no aerial refuelings to fly nonstop halfway around the world, whereas the C-17 needs several. The C-33 also had a major drawback: It could not operate from austere or short landing strips. In addition, it could not carry outsize cargo, such as tanks, Patriot missile systems, and other large items that would be critical in the early days of a war. The C-33 also lacked a roll-on/roll-off capability.

Finally, use of the C-33—which would mainly handle palletized cargo—could diminish the business available for the airlines participating in the Air Force's critical Civil Reserve Air Fleet program. That, in turn might have caused some CRAF participants to withdraw from the program, drastically cutting the overall lift available in wartime.

About "a third [of the 49.4 mtm/d requirement] is provided by [the CRAF] . . . at a cost of just slightly

**Airlifters and Their MOGs**

Aircraft	Standard Payload	Maximum on Ground	Cycles per Day	Throughput Tons/Day	Increase in Tons/Day
C-5	65.C	3	7.4	1,443	—
C-141	23.C	6	10.7	1,477	34
C-33	73.1	3	8.0	1,754	277
C-17	45.C	8	10.7	3,852	2,098

**One performance aspect was maximum aircraft on the ground (MOG)—the ability to get into an airfield, move in confined spaces, and quickly load or unload. With its smaller wingspan and ability to back up, the C-17 far outperformed its competitors. The throughput of the C-17 was more than double that of its nearest rival, the Boeing C-33 freighter.**

over \$200 million per year," Secretary Kaminski pointed out. Were the Pentagon to purchase eighteen new C-33 freighters, he added, they would deliver "about 3.7 million ton-miles a day—about a fifth of what we get from the CRAF force. But the annual operating cost would be comparable or, in fact, slightly more. So it illustrates about the five-to-one leverage we can get with CRAF. . . . It's something we want to maintain."

For each mix of aircraft the DAB considered, it weighed the "CRAF impact," and this factor was rated a "heavy" wherever a C-33 purchase was part of the mix.

"There are a number of CRAF carriers out there that perceive a commercial derivative airplane as

being a threat to the business base, which we offer them to get them to commit to the CRAF program," General Rutherford explained. Whether the threat is "real or not, they perceive that." As a result, he said, he would have flown C-33s only about 600 hours a year—enough to keep Reserve pilots proficient—rather than risk CRAF pullouts.

One performance aspect that Secretary Kaminski said was a "key" factor in the C-17 decision was maximum aircraft on the ground (MOG). This has to do with "the ability to get into and move in confined spaces, and quickly on- and offload an aircraft."

This ability to maneuver on a small ramp was one area in which the C-17 far outperformed its competitors, mainly because of its wingspan and

ability to back up. This, in turn, translates into increased "throughput"—the amount of material delivered in a given period, with the available parking space.

"One can fit—and onload and offload—eight C-17s in an area that only three C-5s or 747s could fit in," said Secretary Kaminski. In terms of throughput, there was a "slightly more than two-to-one advantage" for the C-17. He noted that CBO did not consider this MOG factor a major issue, though the SAFMA found it to be a highly telling discriminator.

**"Unique" Requirements**

The MOG and short/austere field capability are also vital in missions not covered in the lift study. General



Rutherford explained that USAF faces "unique military airlift requirements" growing out of lesser regional contingencies, small military operations, humanitarian relief, brigade-sized airdrops, special operations, and intratheater lift.

Such missions, he said, require the utmost "flexibility, [which] is hard to quantify and model."

Secretary Kaminski said that the defense acquisition panelists "very seriously" considered a mix of 100 C-17 and eighteen C-33 aircraft. Though the mix of C-17s and C-33s costs about one percent less in life-cycle costs than the all-C-17 buy, it brought far less flexibility with it, especially in light of the possibility that "we might lose some fields" to enemy seizure or chemical and nuclear weapons, he said.

In such cases, the C-5D and C-33 would be unable to operate close to the action, while the C-17 could. Korea is the hot spot with the most "sensitivity" to airfield loss, he added, and the all-C-17 buy offered "a more resilient force."

When it flashed the green light for the C-17, the DAB laid in a big piece of the airlift puzzle. However, many questions are still open.

**Purchase Rate.** One is the rate at which the Air Force will procure its additional C-17s. The November decision led only to a contract award for the next eight-aircraft lot of transports. Secretary Kaminski said he

## Wartime Capability

### CRAF

17.5 million ton-miles per day



### NDAAs

3.7 million ton-miles per day



*Eighteen Nondevelopmental Airlift Aircraft would deliver one-fifth of the cargo that CRAF delivers for about the same price, and an NDAAs buy might have caused friction with CRAF members who saw it as a threat to their share of government business.*

will withhold until this June any final decision on whether to commit to a multiyear buy or even a faster production rate. The goal is to give McDonnell Douglas a chance to find more costs to cut, should a large commitment be offered. Typically, multiyear contracts yield cost savings because the work can be more precisely planned and paced. Potential savings might be "three to five percent," Secretary Kaminski said. That would bring C-17s in for about

\$192 million apiece, compared to the early-lot cost of around \$350 million each.

Secretary Kaminski said he will consider buying C-17s at rates ranging from eight to fifteen per year. As many as forty-six could be bought under a single multiyear contract.

At fifteen C-17s per year—the upper limit, because McDonnell Douglas has the facility to build up to that number—"you finish buying them two years earlier," General Fogleman said. That, in turn, would diminish the duration of a gap in airlift capability now being felt because of the retirement of the C-141.

The "bottom out" point in airlift will come in about 2000, when airlift capability will dip to about forty-seven mtm/d.

**Going Beyond 120.** At some point, the Pentagon and the Air Force also will have to decide whether to increase C-17 purchases beyond the current level of 120 airplanes. Going beyond 120 would be "an outyear decision," said General Fogleman, meaning that it would take place beyond the planning horizon of the current six-year defense spending plan.

The decision does not have to be made soon, but clearly Air Force officials are not ruling out such a move. "The primary advantage of building them at eight per year is you keep it in production longer,"



*The C-17's ability to carry such outsize cargo as this M1A2 Abrams tank gave it the edge over the C-33, which also lacked roll-on/roll-off capability and could not operate on short or austere fields.*





**The C-17 still must receive an OK from Congress, which may continue to push for a C-17/NDAA mix. Meanwhile, USAF appears to be set with its tanker fleet, with KC-10s (above) and KC-135s soldiering on until 2020 and beyond.**

General Fogleman explained, "and that gives you some options in the outyears to look at . . . whether you need more of them, or whether you start to use this basic airframe for other things."

**C-5 Replacement.** Secretary Kaminski said the Pentagon has not yet decided whether a "stretched C-17" should be viewed as the front-running candidate to replace the C-5 Galaxy when early models of that airplane run out of useful service life in the next decade.

The Air Force took delivery of eighty-one basic C-5A aircraft between 1969 and 1973. A major modification of all the C-5As in the inventory took place in the mid-1980s, extending their service lives. In the late 1980s, the Air Force took delivery of an additional fifty C-5B aircraft. Today, the active and reserve components of the Air Force deploy 126 A and B models.

The oldest of these aircraft will begin to age out of the force not long after the turn of the century. One option would be to replace them with new-production C-5Ds. However, the C-5D's low ranking in cost-effectiveness in the recent SAFMA suggests it would not be a strong contender to replace the C-5A and B models.

The C-5s may also be certified for certain kinds of low-level cargo drops, a requirement that even a 120-C-17 buy doesn't cover. Should the

C-5 be used extensively in this role, its structural fatigue would tend to accelerate and move up the date of its necessary retirement.

**C-33s for CRAF?** Secretary Kaminski said that, even though the DAB did not believe it made sense to procure the Boeing C-33 for the Air Force inventory, "we do want to . . . incentivize and enhance CRAF."

Secretary Kaminski and General Fogleman ruled out buying CRAF-suitable aircraft for the airlines. The Air Force tried that before, with unpleasant results. USAF put money into specially modified 747s to be operated by Pan Am, with the proviso that they be available for CRAF in a call-up. However, when Pan Am went out of business, these aircraft were sold—many to overseas operators—and were lost to the program, although "we were able to recapture several of those," General Fogleman said.

Secretary Kaminski said there will be CRAF enhancement studies, to be concluded sometime this spring or summer. Late last year, the program was still being defined, but General Fogleman said that in concept, "we would essentially finance . . . the development cost for someone to produce an aircraft that would be more attractive for the kinds of people who participate in CRAF."

The money would go toward "making a more efficient 747 or MD-11," or other widebody, the General said,

such that there would be a smaller weight and cost penalty—or no penalty—for a carrier to buy airplanes with hard decks and other CRAF-suitable features.

But "we're not going to go back into the subsidy business" of day-to-day airline underwriting, General Fogleman asserted.

**The Tanker Fleet.** In comparison with the airlifter force, the USAF tanker fleet is in fairly good shape. The service's fifty-four KC-10s are expected to continue operating beyond 2020. Though the KC-135 airframe is chronologically old, it has relatively little wear, is still structurally sound, and could soldier on indefinitely.

The main obstacle to continued KC-135 service life is corrosion, the extent of which is extremely difficult to predict. Oklahoma City Air Logistics Center at Tinker AFB, Okla., is conducting an "Aging Aircraft Study" to determine what will become of such long-lived airframes as KC-135s, E-3 Airborne Warning and Control System aircraft, and B-52 bombers. It will yield initial results in 1997, and a definitive plan for managing the KC-135 fleet should be completed in 2000.

The first of the 500-odd KC-135 Stratotankers now in service should begin retiring in 2012, with a "KC-X" planned to reach service in 2013. Plans call for buying the new airplanes at a rate of fifteen per year—which some consider to be a highly optimistic assumption. Under this plan, 150 KC-Xs would be in service by 2021.

For now, Air Mobility Command is equipping KC-135s with rollers to give them a greater ability to deal with overflow lift requirements. They and the C-5s are receiving avionics upgrades and reliability improvements to make them more efficient and able to fly under automated civilian airspace management systems.

Defense officials caution that Congress has yet to weigh in on the new airlift plan. C-17 procurement could cost between \$2.5 billion and \$4 billion a year. Some lawmakers can be expected to push for a C-17/NDAA mix. Still, said Secretary Kaminski, the process provided "the most comprehensive analysis ever done on airlift requirements," and the C-17aced the test. ■





The F110 redefines the concept of long range planning.



*GE-F110 engines are combat proven in thousands of sorties worldwide.*

F110-powered fighters carry armament farther and faster than ever before. Ideally matched for today's fighters – and positioned for tomorrow – the F110-GE-129 offers significant range, thrust and fuel burn advantages on low-altitude strike engagements and other combat missions.

Building on its substantial operational experience in F-14s and F-16s, the F110 is currently completing USAF-sponsored integration qualification for the F-15E. After completing vigorous integration testing the F110 will be ready to maximize the growing list of Eagle missions well into the 21st century.

But the F110 offers more than low risk; it offers stall-free operation, maintenance flexibility, and a lower cost to let you lock in on your budget target.

Make sure your short range plans include the long range strike capabilities of F110-GE-129 power.



**GE Aircraft Engines**



The Air Force  
Association,  
incorporated  
February 4,  
1946, observes  
its Golden  
Anniversary.

**Fifty**





**I**n the summer of 1945, Gen. of the Army H. H. "Hap" Arnold was already thinking about the three million Army Air Forces veterans who would be returning to civilian life when World War II was over. What Arnold, Commanding General of the Army Air Forces, had in mind for departing veterans was an organization that would not only "keep the gang together" but also work effectively on behalf of airpower.

Arnold was the founding father of the new organization—which would be known as the Air Force Association—but the spiritual father was Billy Mitchell, who led the fight for an independent role for military aviation. In the 1920s, Arnold had put his own career on the line to back Mitchell,

who was court-martialed for his aggressive advocacy of airpower.

The key policy objective of the new Air Force Association would be the establishment of the Air Force as a separate military service. When that goal was realized in 1947, AFA's journal, *Air Force Magazine*, proclaimed it to be "The Day Billy Mitchell Dreamed Of."

An admirer aptly described Arnold as a "human bulldozer." The energy that he imparted to get AFA going was prodigious. In August 1945, Arnold asked Edward P. Curtis, an AAF veteran and an executive of the Eastman Kodak Co., to put the Association together. Curtis began with an organizational meeting in New York, N. Y., on October 12, 1945.

A consensus formed early that the Association's first president should be war hero James H. Doolittle (left).

# Years of AFA



From the beginning, AFA took airpower to the public. The biggest attraction at the National Air Fair of 1949 in Chicago was the biggest aircraft in the world, the B-36.



The twelve men who attended are recognized today as the founders of AFA. [See box, opposite.] They agreed on the basic direction the Association would take and that application should be made to the Internal Revenue Service for nonprofit, tax-exempt status.

Later on, leaders would be elected, but an initial group of officers would be appointed to get things under way and build membership for the organization. A consensus developed early that war hero Lt. Gen. James H. Doolittle, who had returned to civilian life as a vice president of Shell Oil, should be AFA's first president.

In January 1946, President Doolittle held a press conference to announce the establishment of AFA. He said that the organization would be based on a grass-roots structure, with local, state, and regional affiliates; that it would publish a national magazine; and that it would sponsor educational programs to keep its members and the public at large abreast of airpower developments.

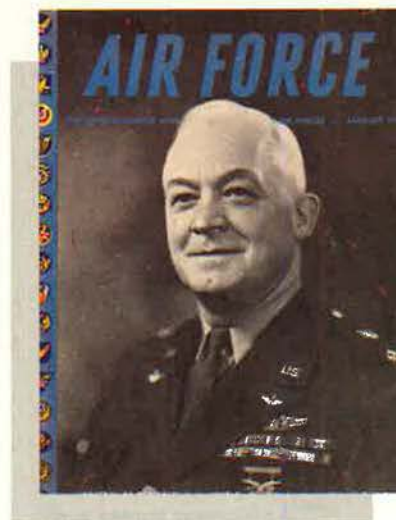
### Message and Momentum

On February 4, 1946, the Air Force Association was incorporated in Washington, D. C. This is the date traditionally observed as AFA's birthday. The new organization had a message and momentum. What it did not have was money. In that first critical year, members dug deep into their pockets and donated more than \$50,000 in addition to their dues to keep AFA alive.

The new organization might be strapped for cash, but its performance was top of the line. When AFA leaders spoke, the *New York Times* and other news media regarded it as newsworthy. In August 1946, the Association organized a coast-to-coast radio broadcast, featuring (among many others) two Hollywood stars, James M. Stewart, who was an AFA vice president, and Ronald W. Reagan, an ex-Air Force captain and a charter member of AFA.

In July 1946, another element of the plan for AFA fell into place when *Air Force Magazine*, "The Official Service Journal of the US Army Air Forces," became "The Official Journal of the Air Force Association." This, too, bore the mark of Arnold. Early in his career, Arnold had been Chief of Information for the Air Service and editor of the monthly news-

The *Air Force Magazine* cover for January 1946 was a classic. It pictured "Hap" Arnold, wartime leader of the Army Air Forces and founding father of AFA.



letter that was the direct forerunner of *Air Force Magazine*. As commander of the AAF, he ordered "a first-class, slick-paper magazine—highly readable—the best of its kind—with worldwide circulation." In 1946, the magazine was "bequeathed to the Association by the AAF in a kind of war-surplus status," as one of the editors put it.

At AFA's first National Convention, held in Columbus, Ohio, in 1947, Gen. Carl A. Spaatz, Air Force Chief

Six of the officers of the newly formed Air Force Association met with President Harry S. Truman at the White House in early 1946. From left: AFA President Jimmy Doolittle, Executive Director Willis S. Fitch, National Director Forrest Vosler, President Truman, Third Vice President Thomas G. Lanphier, Jr., Second Vice President Meryll M. Frost, and National Director James M. Stewart.





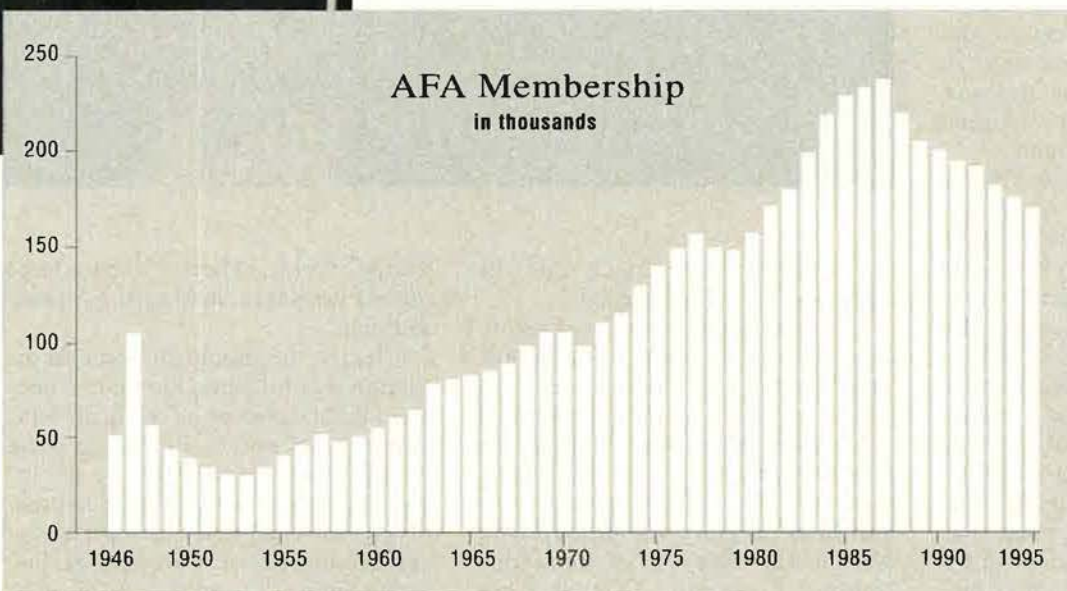
In Hollywood, AFA's observance of Air Force Day, August 1, 1946, was organized by former AAF Lt. Col. Jack L. Warner (second from left). A special coast-to-coast radio broadcast featured fighter ace Lt. Col. John C. Meyer, former AAF Capt. Ronald W. Reagan, and former AAF Col. Jimmy Stewart.



**Julian B. Rosenthal**, who wrote the original AFA Constitution and bylaws, lives in Durham, N. C., and continues to follow Association events with great interest.

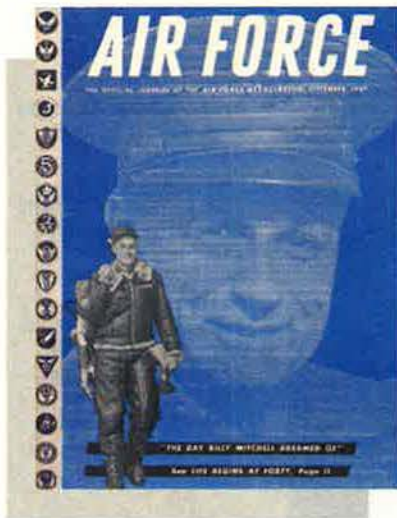
### The Twelve Founders

- John S. Allard**, Bronxville, N. Y.
- Everett R. Cook**, Memphis, Tenn.
- Edward P. Curtis**, Rochester, N. Y.
- James H. Doolittle**, Los Angeles, Calif.
- W. Deering Howe**, New York, N. Y.
- Rufus Rand**, Sarasota, Fla.
- Sol Rosenblatt**, New York, N. Y.
- Julian B. Rosenthal**, New York, N. Y.
- James M. Stewart**, Beverly Hills, Calif.
- Lowell P. Weicker**, New York, N. Y.
- Cornelius Vanderbilt Whitney**, New York, N. Y.
- John Hay Whitney**, New York, N. Y.



Membership shot over 100,000 during AFA's second full year of existence, but that level proved unsustainable, and the Association did not reach it again until the 1960s. Strong growth in the 1970s and 1980s reflects the remarkable success of the Base Drive membership program. Totals dropped in the 1990s, along with the size of the Air Force.





When the Air Force gained independence from the Army in 1947, AFA paid fitting tribute to Billy Mitchell, who had led the fight for airpower after World War I and who was court-martialed for his aggressive advocacy of the cause.

of Staff, told the delegates that “public support is as essential to effective airpower as industries, airplanes, and airmen.”

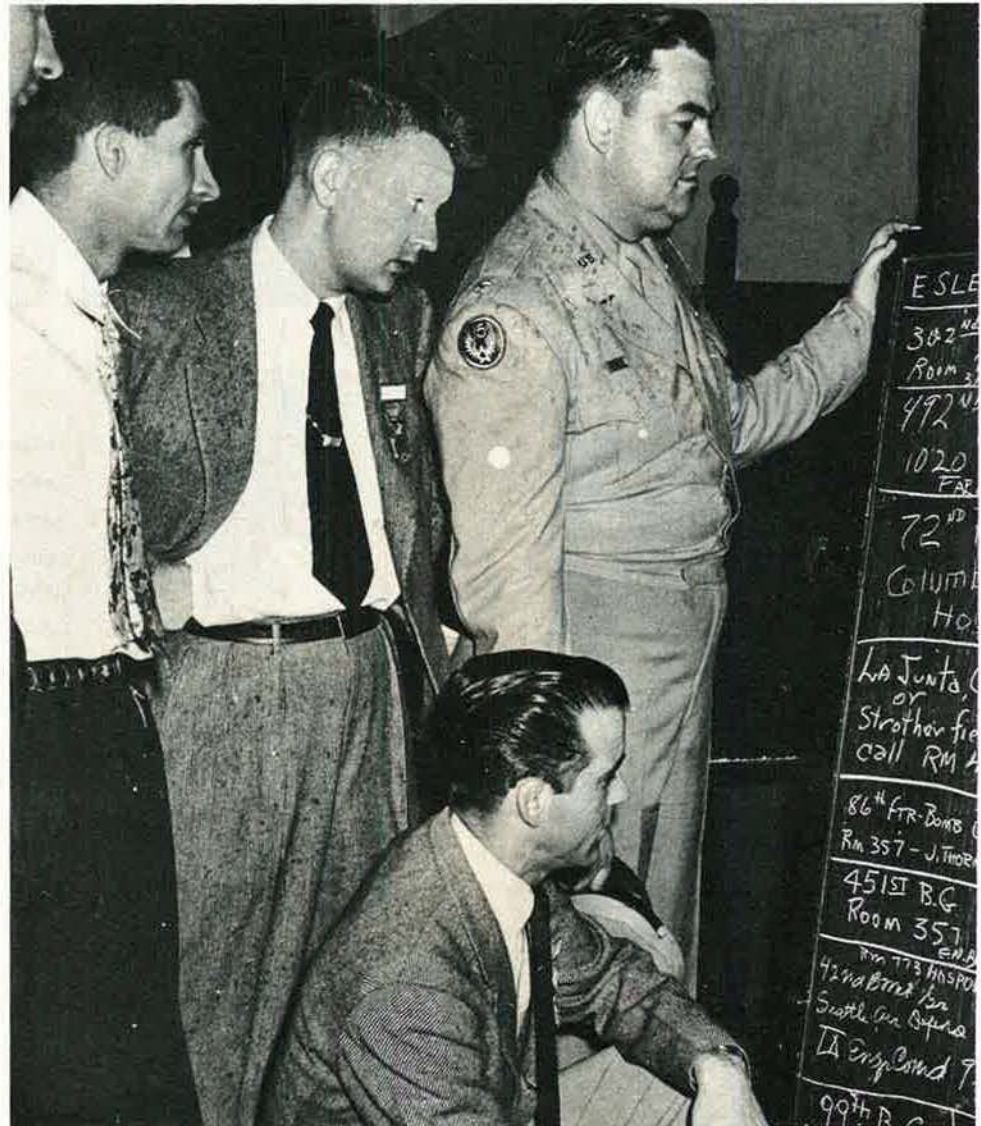
Informing the public and generating public support was something that AFA did well. At Columbus, citizens stood four abreast for blocks, waiting to walk through a B-29. President Doolittle and other Association leaders drew large crowds and press attention wherever they went. A critical connection to the public, however, was the 152 local squadrons—as chapters were called in those days—operating in forty-five states by the end of AFA’s first year.

President Doolittle in his remarks at Columbus was especially proud of the small squadrons, singling out the Beckley, W. Va., group for doing “as much to bring the message of ‘airpower is peace power’ to their fellow citizens as any community in the country.”

September 18, 1947, was a great day for AFA as the US Air Force took its place as a separate military service. The battles, however, were far from over. Postwar demobilization continued to draw down the strength of the armed forces. “While recognizing that peacetime airpower is expensive, we know that wartime airpower is far more costly,” AFA warned in its first Statement of Policy. In 1948, the Association campaigned for a seventy-group Air Force, which had been called for by a special Presidential Commission.

In 1949, AFA was in the forefront of support for the B-36 bomber, which was under attack by advocates of carrier-based airpower. The unsuccessful attempt by naval enthusiasts to kill the B-36 became known as the “Revolt of the Admirals” and was detailed in a special fifteen-page report in the December 1949 issue of *Air Force Magazine*. The B-36 went

taking part were Jimmy Stewart, Bob Hope, Marlene Dietrich, Lena Horne, Clark Gable, Dinah Shore, Jack Dempsey, Jerry Colonna, Jane Froman, Carmen Miranda, Margaret O’Brien, Walter Pidgeon, Herb Shriner, Gypsy Rose Lee, Joe E. Brown, Jinx Falkenberg, and the Radio City Music Hall Rockettes. John Reed Kilpatrick, president of the Madison Square



on to operational service, and the admirals’ revolt foundered.

Celebrity participation was a standard feature of early AFA events. The “Hollywood Connection” was never more in evidence than at “Operation Wing Ding” at Madison Square Garden in New York September 25, 1948. This four-and-one-half-hour program was produced by AFA as the highlight of its second National Convention. Among those

Garden Corp., called it “the greatest show ever put on in Madison Square Garden.”

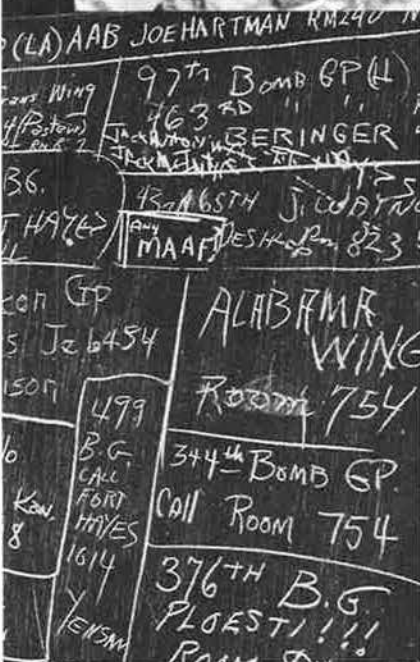
Clearly, the young Air Force Association was fulfilling the three objectives that Doolittle laid out in his February 1946 press conference. The “grass roots,” represented by the local squadrons, were thriving impressively. AFA had a spectacular national publication in *Air Force Magazine*. And keeping its members and the pub-





Principal speaker at AFA's first convention in Columbus, Ohio, in 1947 was Gen. of the Army Dwight D. Eisenhower, then Army Chief of Staff. Here he is flanked by AFA's first president, Jimmy Doolittle (left) and Edward P. "Ted" Curtis, the man chosen by "Hap" Arnold to put AFA together.

AFA's first elected president was World War II fighter pilot Thomas G. Lanphier, Jr. He led the Association's fight to achieve financial stability in the early days.



"Keeping the Gang Together" was something the early AFA did well. Here, members check the message board at the 1947 Convention in Columbus. Sometimes, Orville would be notified to call Wilbur at the bicycle factory.



In October 1945, Gen. of the Army H. H. "Hap" Arnold congratulates Lt. Col. James H. Straubel after awarding him the Legion of Merit for his work as editor and publisher of *Air Force Magazine*, the official journal of AAF during World War II. Straubel separated in February 1946 as a colonel, was called to join the AFA staff in July 1947 as editor of the magazine, became executive director in September 1948, and served in that capacity until his retirement in 1980. In the foreword to *Crusade for Airpower*, Doolittle said that Straubel, "more than any other, deserves credit for the success of this Association."





## Air Force Association National Presidents



**James H. Doolittle**  
1946-47



**Thomas G. Lanphier, Jr.**  
1947-48



**C. R. Smith**  
1948-49



**Robert S. Johnson**  
1949-51



**Harold C. Stuart**  
1951-52



**Arthur F. Kelly**  
1952-53



**George C. Kenney**  
1953-54



**John R. Alison**  
1954-55



**Gill Robb Wilson**  
1955-56



**John P. Henebry**  
1956-57



**Peter J. Schenk**  
1957-59



**Howard T. Markey**  
1959-60



**Thos. F. Stack**  
1960-61



**Joe Foss**  
1961-62



**John B. Montgomery**  
1962-63



**W. Randolph Lovelace II**  
1963-64



**Jess Larson**  
1964-67



**Robert W. Smart**  
1967-69



**George D. Hardy**  
1969-71



**Martin M. Ostrow**  
1971-73



**Joe L. Shosid**  
1973-75



**George M. Douglas**  
1975-77



**Gerald V. Hasler**  
1977-79



**Victor R. Kregel**  
1979-81



**John G. Brosky**  
1981-82



**David L. Blankenship**  
1982-84



**Martin H. Harris**  
1984-86



**Sam E. Keith, Jr.**  
1986-88



**Jack C. Price**  
1988-90



**O. R. Crawford**  
1990-92



**James M. McCoy**  
1992-94



**Gene Smith**  
1994-



## Air Force Association Chairmen of the Board



**Edward P. Curtis**  
1946-47



**James H. Doolittle**  
1947-49



**C. R. Smith**  
1949-50



**Carl A. Spaatz**  
1950-51



**Thomas G. Lanphier, Jr.**  
1951-52



**Harold C. Stuart**  
1952-53



**Arthur F. Kelly**  
1953-54



**George C. Kenney**  
1954-55



**John R. Alison**  
1955-56



**Gill Robb Wilson**  
1956-57



**John P. Henebry**  
1957-58



**James M. Trail**  
1958-59



**Julian B. Rosenthal**  
1959-60



**Howard T. Markey**  
1960-61



**Thos. F. Stack**  
1961-62



**Joe Foss**  
1962-63



**Jack B. Gross**  
1963-64



**W. Randolph Lovelace II**  
1964-65



**George D. Hardy**  
1966-67



**Jess Larson**  
1967-71



**George D. Hardy**  
1971-72



**Joe L. Shosid**  
1972-73



**Martin M. Ostrow**  
1973-75



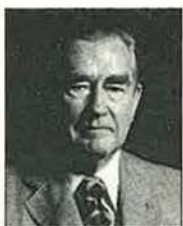
**Joe L. Shosid**  
1975-76



**Gerald V. Hasler**  
1976-77



**George M. Douglas**  
1977-79



**Daniel F. Callahan**  
1979-81



**Victor R. Kregel**  
1981-82



**John G. Brosky**  
1982-84



**David L. Blankenship**  
1984-85



**Edward A. Stearn**  
1985-86



**Martin H. Harris**  
1986-88



**Sam E. Keith, Jr.**  
1988-90



**Jack C. Price**  
1990-92



**D. R. Crawford**  
1992-94



**James M. McCoy**  
1994-



A highlight of AFA's 1957 National Convention in Washington, D. C., was this "anniversary portrait," featuring a group of men and women who represented a cross section of American history.

**From left to right (bottom row):**

Dr. Theodore von Kármán, famed aerospace scientist;  
 MSgt. Horst Tittle, then USAF's oldest noncommissioned officer;  
 Gen. Nathan F. Twining, then Chairman, Joint Chiefs of Staff;  
 Brig. Gen. Frank P. Lahm, first American military pilot;  
 Air Cadet Dennis LaFarlette, who received his pilot wings at the Convention from General Lahm;  
 Mrs. Henry H. Arnold, widow of Gen. of the Army "Hap" Arnold;  
 Gen. Carl A. Spaatz, first USAF Chief of Staff;  
 Maj. Charles E. Yeager, first man to break the sound barrier.

**Second row:**

Brig. Gen. Erik Nelson, who led the first round-the-world flight in 1924;  
 Col. James Jabara, first jet-to-jet ace;  
 Gen. George C. Kenney, top World War II air commander in the Pacific;  
 Jacqueline Cochran, world's greatest aviatrix;  
 Gen. Thomas D. White, then USAF Chief of Staff;  
 Capt. Eddie Rickenbacker, top American ace of World War I;  
 Cols. Oakley Kelly and John Macready, who made the first nonstop flight across the US in 1923.

**Third row:**

Col. Francis S. Gabreski, a leading World War II ace;  
 Edna M. Adkins, longtime secretary to USAF Chiefs of Staff;  
 Sen. Stuart Symington, the first Air Force Secretary;  
 James H. Douglas, Jr., then Air Force Secretary;  
 Maj. Gen. Claire Lee Chennault, World War II commander of the Flying Tigers;  
 Maj. James G. Gallagher, who led the first nonstop round-the-world flight in 1949.

**Top row:**

Col. Paul W. Tibbets, pilot of the B-29 *Enola Gay*, which dropped the first atomic bomb;  
 Col. Bernt Balchen, pioneer Arctic flyer;  
 Lt. Gen. William H. Tunner, future commander, Military Air Transport Service;  
 Brig. Gen. Thomas DeWitt Milling, one of the first military pilots;  
 J. H. "Dutch" Kindelberger, noted aerospace industry executive;  
 Gen. O. P. Weyland, top air commander in Korea;  
 Roscoe Turner, famous racing pilot of the 1920s and 1930s.

lic informed on airpower was what the Association did best.

**More Milestones**

**Sept. 15-16, 1947.** First AFA National Convention, in Columbus, Ohio. Several thousand AAF veterans attend. The principal speaker, Gen. of the Army Dwight D. Eisenhower, says, "The creation of the United States Air Force as an independent entity recognizes the special capabilities of airpower."

**Nov. 25, 1950.** Arnold Air Society, an organization of Air Force ROTC cadets, affiliates with AFA.

**Oct. 28, 1953.** Air Reserve Association merges with AFA.

**Feb. 3-4, 1956.** Jet Age Conferences begin. AFA sponsors, in Washington, D. C., the first of four national Jet Age Conferences. (The final Jet Age Conference was in Las Vegas, Nev., in conjunction with the World Congress of Flight in 1959.)

**April 1956.** An *Air Force Magazine* special issue on Strategic Air Command draws the attention of Arthur Godfrey, who tells a prime-time audience on the CBS-TV network to "get a copy and read it from cover to cover." The magazine is not available on newsstands, but Godfrey (with AFA permission) tells







This shot of AFA leaders was taken at a meeting of the Board of Directors in the 1960s. Front row, left to right: Thomas G. Lanphier, Jr., Robert S. Johnson, George C. Kenney, and John R. Alison. Back row: James H. Doolittle, Carl A. Spaatz, C. R. Smith, Gill Robb Wilson, John P. Henebry, and Peter J. Schenk. All were former presidents of AFA except for Spaatz, who had been chairman of the board.

the TV audience that several hundred copies are available on a first-come, first-served basis. Requests pour in, first by the bag and then by the truckload. The Association eventually condenses the Strategic Air Command articles into a twenty-four page reprint and distributes 160,000 free copies.

**May 1, 1956.** The Air Force Association Foundation—later the Aerospace Education Foundation—formally established.

**July 1956.** AFA, for the first time, gets into the insurance business by announcing its Flight Pay Protection Plan.

**Aug. 1-5, 1956.** At its National Convention in New Orleans, AFA inaugurates the Outstanding Airmen of the Air Force program.

**August 1957.** The biggest issue of *Air Force Magazine* ever printed—458 pages. It includes a history of the Air Force, edited by the USAF Historical Division, commemorating the “Golden Anniversary” of the Air Force. (The anniversary dates from August 1, 1907, when the Aeronautical Division of the Army Signal Corps began.)

**November 1958.** “Space Digest” begins as a special section in *Air Force Magazine*. It becomes part of the magazine’s title—*Air Force Magazine and Space Digest*—in June 1959. It ends in January 1971.

**Apr. 12-19, 1959.** AFA’s World Congress of Flight in Las Vegas. First international air show in US history. Fifty-one foreign nations participate. NBC-TV telecast an hour-long special, and *Life Magazine* gave it five pages of coverage.



At the AFA Honor Squadron Dinner at the Air Force Academy in 1961 are (from left) AFA President Thos. F. Stack, USAF Chief of Staff Gen. Curtis E. LeMay, Cadet Lt. Col. George L. Butler, commander of the Honor Squadron, who went on to become the last commander in chief of Strategic Air Command, radio-TV’s Arthur Godfrey, and AFA’s first president, Lt. Gen. James H. Doolittle.

**May 1959.** AFA sponsors its first Outstanding Squadron dinner at the Air Force Academy in Colorado Springs, Colo. This would become an annual event and a highlight of the AFA calendar.

**October 1960.** AFA life insurance program begins.

**Sept. 11, 1963.** The AFA National Convention adopts a Statement of Policy opposing the proposed Test Ban Treaty. This infuriates Secretary of Defense Robert S. McNamara. Under political pressure, Secretary of the Air Force Eugene M. Zuckert cancels his attendance at an AFA reception at the Convention, but Gen. Curtis E. LeMay, Air Force Chief of Staff, attends and stands alone as the guest of honor, greeting 2,000 people in the reception line.

**February 1964.** AFA’s New York, N. Y., Iron Gate Chapter sponsors the first of its annual Air Force Salutes. This becomes an event of national stature, drawing participation

by Air Force leaders, members of Congress, and others, and raising large amounts of money for USAF-oriented charities.

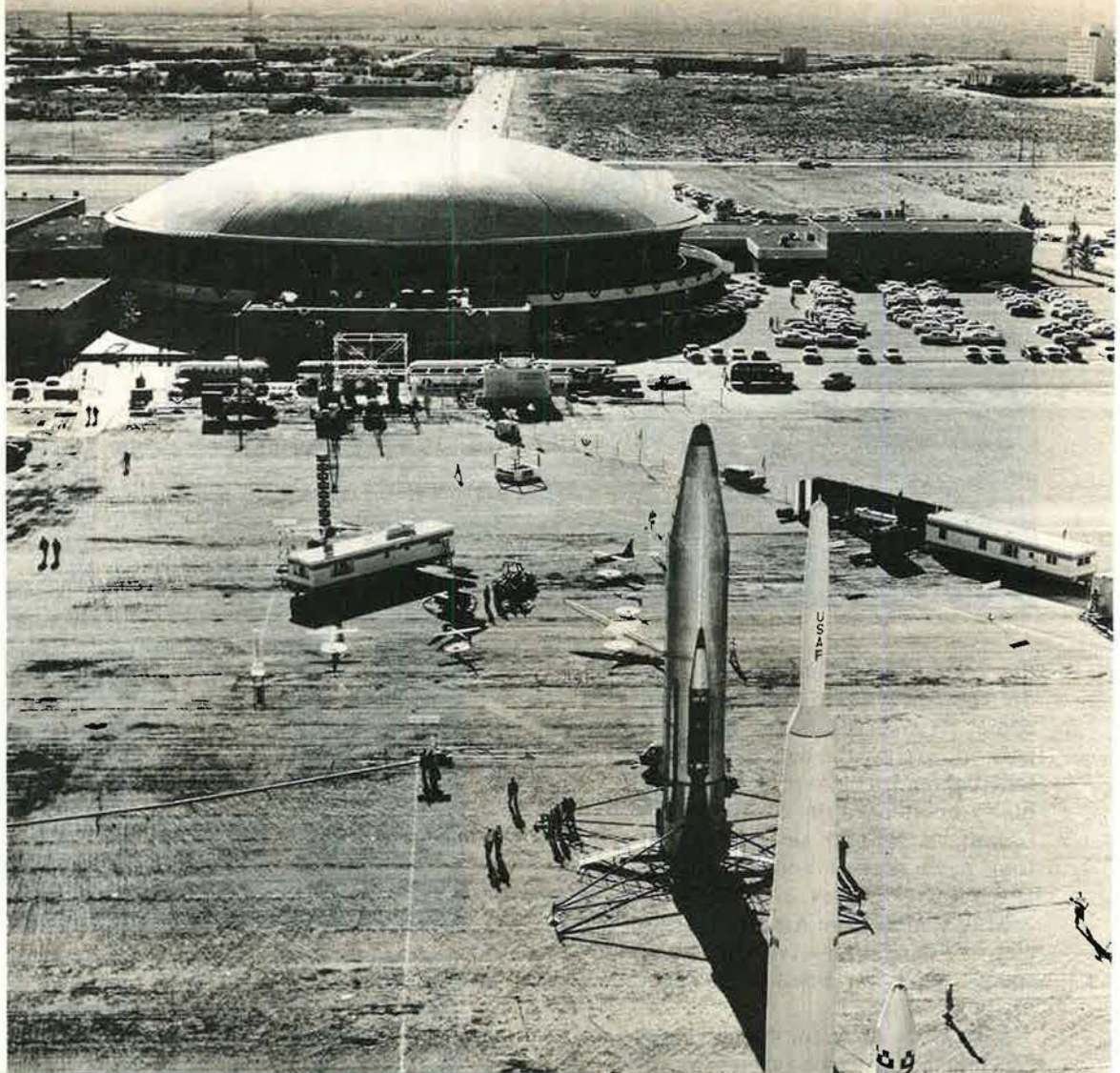
**March 1964.** AFA’s Airmen’s Council asks USAF to appoint a “Sergeant Major of the Air Force” through whom “enlisted personnel can freely express their opinions and recommendations on matters ranging from mission effectiveness to personal problems.” The proposal is turned down, but the idea lives on until 1967, when the first Chief Master Sergeant of the Air Force is appointed.

**September 1964.** AFA changes the designations of its field units: “Wings” become “state organizations,” and “squadrons” become “chapters.”

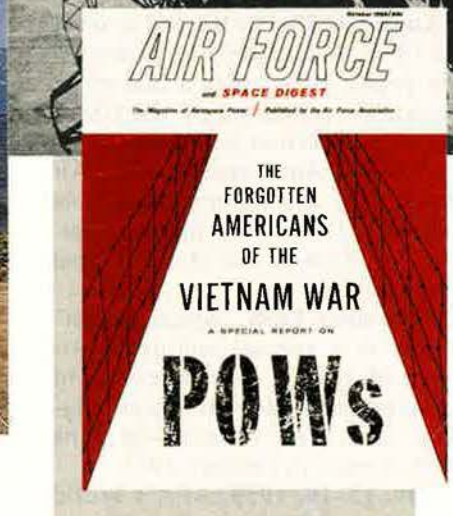
**Sept. 9-12, 1964.** AFA introduces Aerospace Development Briefings and Displays at its National Convention. This program complemented the defense industry exhibits at the Convention and drew large crowds



AFA's World Congress of Flight, 1959, in Las Vegas, Nev., judged to be the "world's biggest air and space show," with fifty-one nations represented, was televised for an estimated forty million viewers. This auditorium housed symposiums, plus equipment displays by eighty-five companies.



AFA's "Gathering of Eagles" at Las Vegas in 1986 was a week of spectaculars, indoors and outdoors. Here, elements of the Confederate Air Force, configured as Japanese fighter-bombers, approach the field to begin the "Tora, Tora, Tora" re-creation of the attack on Pearl Harbor.



This *Air Force* Magazine cover story in October 1969 was picked up by *Reader's Digest* and built from there into a massive wave of national support for the prisoners of war and missing in action in Vietnam.



to learn about the latest in systems and technology.

**March 17, 1967.** The Aerospace Education Foundation undertakes "Project Utah" in cooperation with the US Office of Education. It demonstrates the feasibility of using Air Force technical training courses in the Utah public school system. This award-winning project, significant in its own right, was given major credit for later helping secure accreditation for the Community College of the Air Force.

**Nov. 18–20, 1968.** First National Laboratory for the Advancement of Education, cosponsored by the Aerospace Education Foundation and the US Office of Education. Some 1,600 educators attend. A second National Laboratory, held in 1970, draws more than 3,000 educators.

**October 1969.** *Air Force Magazine* cover story, "The Forgotten Americans of the Vietnam War," ignites national concern for the prisoners of war and the missing in action. It is reprinted in condensed form as the lead article in the November 1969 issue of *Reader's Digest*, is read in its entirety on the floor of Congress, and is inserted into the *Congressional Record* on six different occasions. This article stirs the conscience of the nation and rallies millions to the cause of the POWs and MIAs. *Air Force Magazine* publishes an MIA/POW Action Report from June 1970 until September 1974.

**February 1971.** In conjunction with the celebration of its twenty-fifth anniversary, AFA redesigns its traditional "wee wings" logotype. The revision proves unpopular, and the traditional design is readopted in 1973.

**May 24, 1973.** AFA National President is special guest at a White House ceremony in tribute to returning POWs.

**Sept. 15–19, 1974.** AFA establishes a new event, "Salute to Congress"—forerunner of the Congressional Breakfast program—as part of the National Convention.

**February 1976.** First issue of *Cross-feed*, an internal AFA publication aimed at field units, is published.

**October 22–23, 1976.** AFA holds its first national symposium in Los Angeles, Calif. The twentieth symposium in this series was held in Los Angeles in October 1995.

**Aug. 4, 1984.** After thirty-eight years in the District of Columbia,

In 1971, AFA streamlined its "wee wings" insignia (below). Members, however, did not like the new version (right), so the traditional design was restored two years later.



The *Enola Gay*, the B-29 that dropped the atomic bomb on Hiroshima, was turned over to the Smithsonian Institution at the 1949 AFA National Convention in Chicago. Shown here are Carl Mitman, representing the Smithsonian; Col. Paul Tibbets, who flew the aircraft on its historic mission and brought it to Chicago in 1949; *Enola Gay* bombardier Maj. Thomas Ferebee; and Maj. Gen. Emmett "Rosy" O'Donnell. In 1994, AFA exposed plans by the Smithsonian to display the *Enola Gay* as a prop in a political horror show. The ensuing outrage from the public and Congress led to a complete change in the exhibition.



AFA National Headquarters moves into the Association's own building in Arlington, Va.

**November 1984.** AFA Visa Card program begins.

**January 17–18, 1985.** AFA's first Tactical Air Warfare Symposium is held in Orlando, Fla.

**April 27–May 1, 1986.** AFA's "Gathering of Eagles" in Las Vegas draws veterans of three wars to a five-day program on the heritage and capabilities of airpower.

**September 1988.** "Lifeline in Danger," a comprehensive white paper on the defense industrial base, is produced by the Air Force Association and published by the Aerospace Education Foundation. A follow-up report, "Lifeline Adrift," is published in September 1991. These works are

regarded as classic studies of the industrial base problem and continue to be cited for years afterward.

**January 1991.** The Aerospace Education Foundation joins AFA chapters and *USA Today* newspaper in the "Visions of Exploration" program, which provides public school students with materials to develop their interests in issues of the twenty-first century.

**September 1991.** AFA amends Constitution to give active-duty mem-

bers full membership privileges, including the right to vote and hold elective office in the Association.

**Jan. 30, 1992.** AFA leads the way in establishing the Air Force Memorial Foundation to build a national monument in the Washington, D. C., area to the Air Force and airmen.

**March 15, 1994.** An AFA Special Report, "The Smithsonian and the *Enola Gay*," exposes plans by the National Air and Space Museum to display the B-29 that dropped the atomic bomb on Hiroshima as a prop in a politically rigged exhibition lacking balance and historical context. Other groups, Congress, the news media, and the public pick up the issue and force the museum to change not only the plan for this program but also its approach to exhibition planning. ■



# More Highlights From the First Fifty Years

Aviation pioneer Maj. Gen. Benjamin D. Foulois holds the audience at the 1960 AFA Convention spellbound with an impromptu speech on the need for US military preparedness.



Vice President Hubert H. Humphrey (second from right) listened attentively to an AFA Aerospace Development Briefing in 1966. Shown with him left to right (front row) are AFA President Jess Larson, FAA Administrator Gen. William F. McKee, USAF (Ret.), Secretary of the Air Force Harold Brown, USAF Chief of Staff Gen. John P. McConnell, and Atomic Energy Commission Chairman Dr. Glenn T. Seaborg. In the second row are NASA Deputy Administrator Dr. Robert C. Seamans and Executive Secretary of the National Aeronautics and Space Council Dr. Edward C. Welsh.

## AFA National Conventions

- 1947 Columbus, Ohio
- 1948 New York City
- 1949 Chicago
- 1950 Boston
- 1951 Los Angeles
- 1952 Detroit
- 1953 Washington, D. C.
- 1954 Omaha, Neb.
- 1955 San Francisco
- 1956 New Orleans
- 1957 Washington, D. C.
- 1958 Dallas
- 1959 Miami Beach
- 1960 San Francisco
- 1961 Philadelphia
- 1962 Las Vegas
- 1963 Washington, D. C.
- 1964 Washington, D. C.
- 1965 No AFA National Convention (Fall meeting with Aerospace Development Briefings held in Washington, D. C.)
- 1966 Dallas
- 1967 San Francisco
- 1968 Atlanta
- 1969 Houston
- 1970-95 Washington, D. C.



### PROGRAM

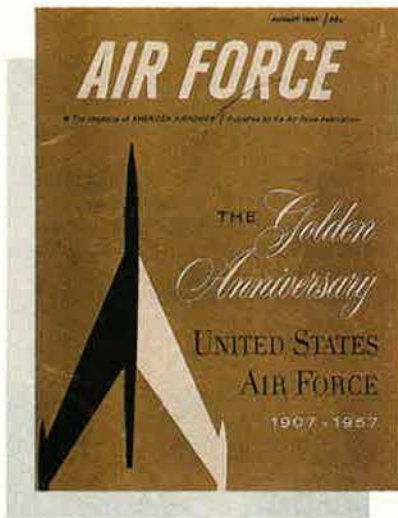
AIR FORCE ASSOCIATION  
21st ANNIVERSARY  
NATIONAL CONVENTION  
AND AIR FORCE REUNION  
March 14-17, 1967

**SAN FRANCISCO**  
EVERYBODY'S FAVORITE CITY



Arthur Godfrey was impressed with the April 1956 issue of *Air Force Magazine*, which featured the Strategic Air Command. He told his network television audience about it, generating 160,000 requests for copies.





In August 1957, fifty years after the start of the Aeronautical Division of the Army Signal Corps, *Air Force* Magazine published its largest issue ever. Most of the 458 pages were a "Golden Anniversary" retrospective prepared by the USAF Historical Division and later published separately as a book by the Van Nostrand Co.

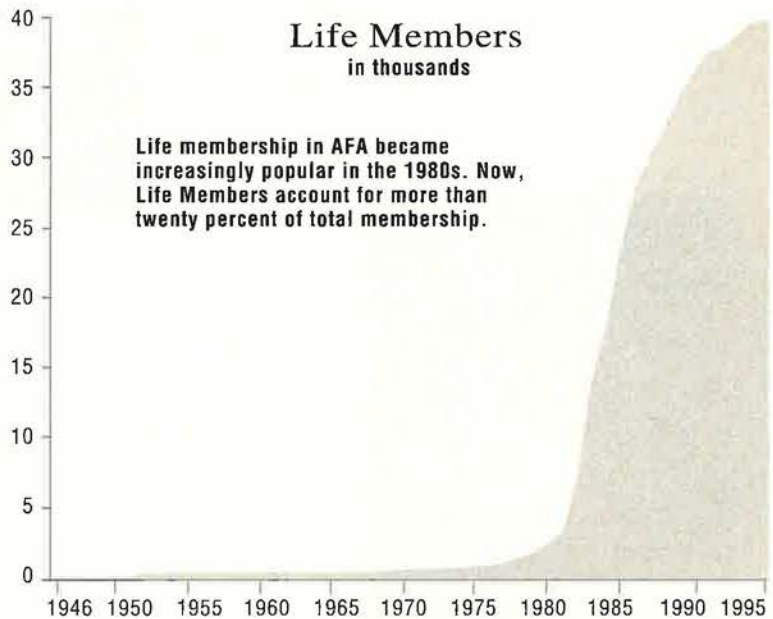


Gen. Carl A. Spaatz, wearing boots and tuxedo, didn't let a blizzard keep him from AFA's fifteenth-anniversary dinner in Washington, D. C., in 1961. (The photo made the national wires.)

### Gold Life Member Card Recipients

Awarded to members whose AFA record, production, and accomplishment on a national level have been outstanding over a period of years.

Name	Year	Card No.
Gill Robb Wilson	1957	1
Jimmy Doolittle	1959	2
Arthur C. Storz, Sr.	1961	3
Julian B. Rosenthal	1962	4
Jack B. Gross	1964	5
George D. Hardy	1965	6
Jess Larson	1967	7
Robert W. Smart	1968	8
Martin M. Ostrow	1973	9
James H. Straubel	1980	10
Martin H. Harris	1988	11
Sam E. Keith, Jr.	1990	12
Edward A. Stearn	1992	13
Dorothy L. Flanagan	1994	14



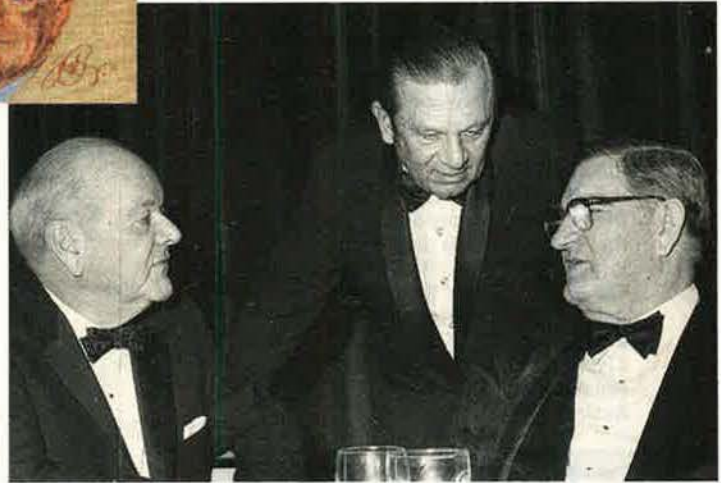
Speaker of the House Rep. Carl Albert (D-Okla.) signs up as a three-year member of AFA. Here, he tenders his check to AFA President Joe L. Shosid, left, at AFA's Salute to Congress in 1974.





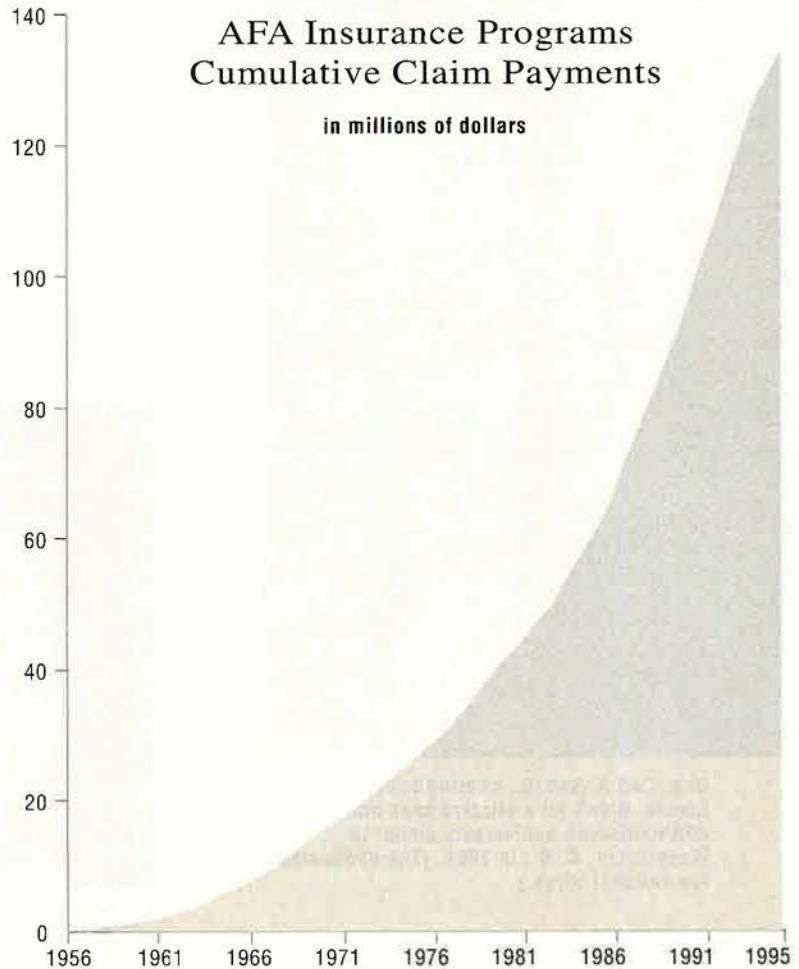
This 1984 publication honored the men who had served up to that time as Chief Master Sergeant of the Air Force: (left to right) Paul W. Airey, Donald L. Harlow, Richard D. Kisling, Thomas N. Barnes, Robert D. Gaylor, James M. McCoy, Arthur L. Andrews, and Sam E. Parish. *The Chiefs* was produced by the *Air Force Magazine* staff, published by the Aerospace Education Foundation, and presented by the Enlisted Council of the Air Force Association.

At AFA's Silver Anniversary banquet in 1971, Sen. Howard W. Cannon (D-Nev., standing) chats with former AFA President C. R. Smith (left) and AFA Chairman of the Board Jess Larson.



The October 1987 cover marked the passing of the legendary Ira Eaker, who stood close to Mitchell, Arnold, and Doolittle in AFA's hall of heroes.

AFA insurance programs have grown steadily from modest beginnings in the 1950s. Through 1995, cumulative claim payments totaled \$133,476,130.



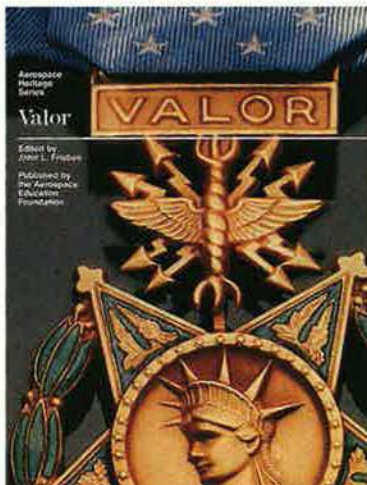


Some of USAF's Outstanding Airmen talk with Chief of Staff Gen. Thomas D. White at the AFA Convention in 1959. The Outstanding Airmen program had been started by AFA three years before. From left to right: SMSgt. James O. Simmons, Air Force Academy; MSgt. Perry Bishop, Air Research and Development Command; TSgt. Leonard T. Newton, Jr., Recruiting Service; General White; SMSgt. Anthony J. Baione, Headquarters Command; SMSgt. Robert T. Campbell, Jr., Continental Air Command; SMSgt. Dwight H. McCracken, Military Air Transport Service; and SMSgt. Clyde Ellison, Alaskan Air Command.



At Honors Night during AFA's 1962 National Convention, Bob Hope congratulates SMSgt. Arthur E. Cole of Headquarters Command—one of the Outstanding Airmen of the Year—and Mrs. Cole.

At the Wings Club in New York, N. Y., on August 1, 1947, AFA President Jimmy Doolittle is flanked by World War II bomber pilot James Stewart and Gen. Hoyt S. Vandenberg, who would later become the second Chief of Staff of the independent Air Force.



The monthly "Valor" page began running in *Air Force Magazine* in February 1983 and became an instant favorite with readers and members. In 1985, the Aerospace Education Foundation published this collection of "Valor" articles—most of them written by John L. Frisbee—and other accounts of heroism from past issues of the magazine.





## Aerospace Education Foundation Presidents



**John B. Montgomery**  
1963-64



**Dr. Lindley J. Stiles**  
1964-66



**Dr. B. Frank Brown**  
1966-67



**Dr. Leon M. Lessinger**  
1967-68



**Dr. L. V. Rasmussen**  
1968-71



**Dr. Leon M. Lessinger**  
1971-73



**Dr. Wayne O. Reed**  
1973-74



**Dr. William L. Ramsey**  
1975-81



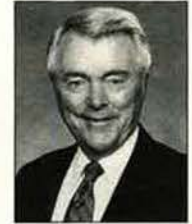
**Dr. Don C. Garrison**  
1981-84



**George D. Hardy**  
1984-86



**Eleanor P. Wynne**  
1986-87



**James M. Keck**  
1988-89



**Gerald V. Hasler**  
1989-94



**Thomas J. McKee**  
1994-

## Aerospace Education Foundation Chairmen of the Board



**Dr. W. Randolph  
Lovelace II**  
1963-64



**Gen. Laurence S. Kuter,  
USAF (Ret.)**  
1964-66



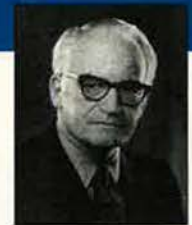
**Dr. Walter J. Hesse**  
1966-69



**J. Gilbert Nettleton, Jr.**  
1969-73



**George D. Hardy**  
1973-75



**Sen. Barry M. Goldwater**  
1975-86



**George D. Hardy**  
1986-89



**James M. Keck**  
1989-94



**Walter E. Scott**  
1994-



Here, from our July 1957 cover, are seventeen drawings by Milton Caniff, creator of "Terry and the Pirates" and "Steve Canyon," who based many of his characters on real people. From top, left to right: Poteet Canyon (based on Nancy O'Neal); Dude Hennick (Frank Higgs); Col. Flip Corkin (Philip Cochran); Lt. Upton Bucket (Bill Mauldin); Col. Vince Casey (C. D. Vincent); CAP Cadet Scooter McGruder (Margaret Kennefick); Allee McDean (Alice McDermott); Maj. Gen. Claire Chennault (himself); Steve Canyon ("a composite"); Gen. Joseph W. Stilwell (himself); Lt. Taffy Tucker (Bernice Taylor); Miss Lace (Dorothy Partington); Maj. Luke Adew (William Lookadoo); Col. Soup Davey (David F. McCallister); Lt. Peter Piper "the Piper" (John F. Kennedy); Brig. Gen. P. G. "Shanty" Town (also C. D. Vincent); and Miss Mizzou (Marilyn Monroe).



National President Victor R. Kregel, right, presents the 1980 AFA Man of the Year award to David C. Noerr of San Bernardino, Calif. The next year, Dave Noerr joined the AFA staff where he was to serve many years as director of Volunteer and Regional Activities.



Tennessee Ernie Ford, a former B-29 bombardier, was active in AFA for many years. Here, he performs with the Air Force Band at the 1981 National Convention.

## Twenty-One Names Not Chosen

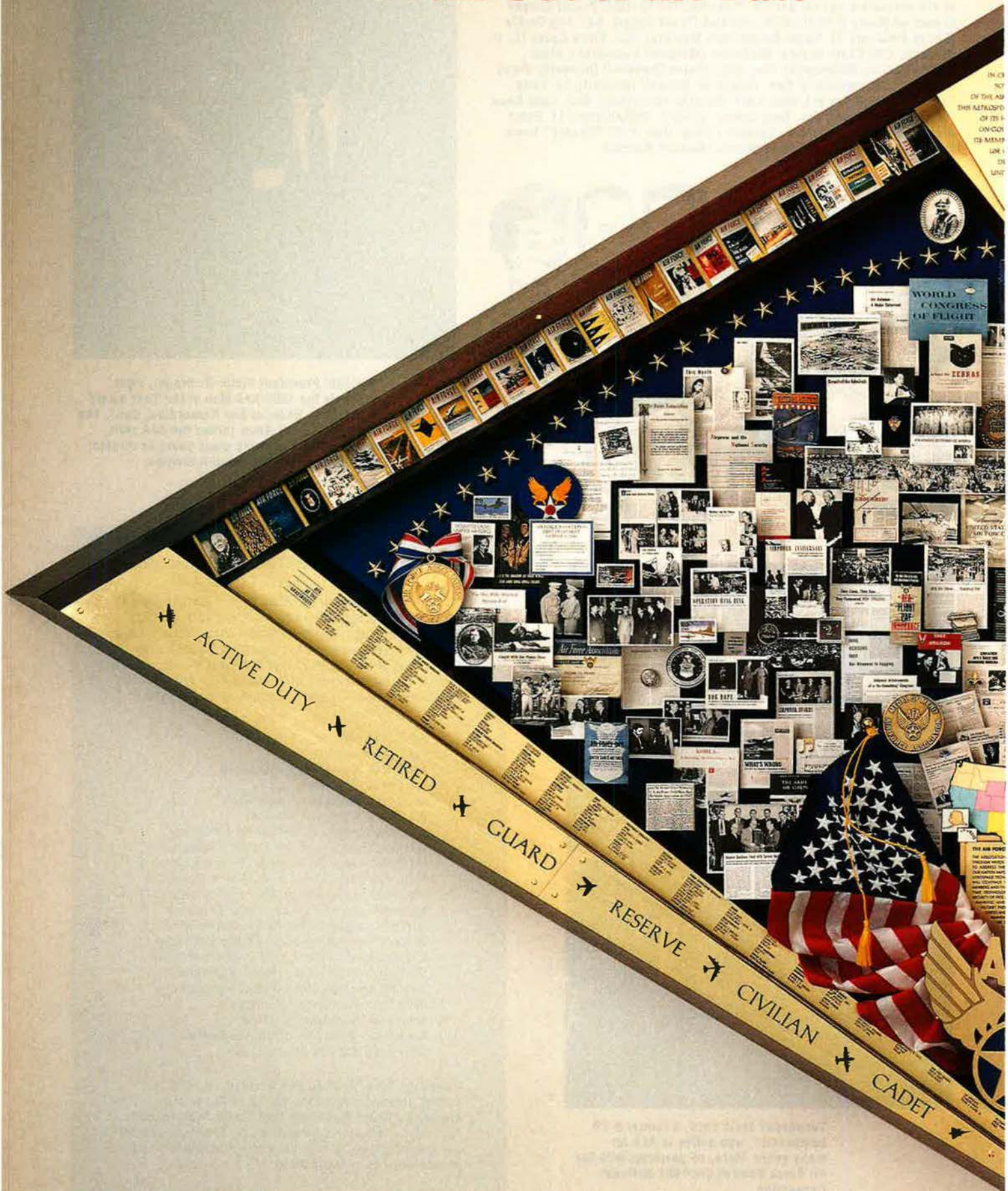
In August 1945, Gen. of the Army H. H. "Hap" Arnold and the Army Air Forces asked Edward P. Curtis to take the lead in organizing "an AAF Veterans' Association." Along with the request came a study exploring the idea of such a group. That paper posed no less than twenty-one possible names, but the one eventually chosen—the Air Force Association—was not among the twenty-one suggested:

- Air Force Legion
- Air Force League
- Air Force Veterans Association
- Air Force Council
- Air Force Veterans Federation
- Air Force Veterans Alliance
- National Legion of Air Force Veterans
- National League of Air Force Veterans
- National Association of Air Force Veterans
- National Federation of Air Force Veterans
- National Fraternity of Air Force Veterans
- National Council of Air Force Veterans
- United League of Air Force Veterans
- United Federation of Air Force Veterans
- United Association of Air Force Veterans
- United Council of Air Force Veterans
- United Alliance of Air Force Veterans
- American Air Force Veterans
- American Veterans of the Air
- American Veterans of the Air Force
- Air Force Alumni Association

Curiously, Billy Mitchell had founded, in 1926, an earlier group known as the Air Force Association. It was headed by World War I ace Capt. Eddie Rickenbacker. That organization was unsuccessful, however, and did not last very long. It was not a direct ancestor of the present Air Force Association.



# From Out of the Past





VISION OF THE  
ANNIVERSARY  
ASSOCIATION.  
RENDS THE VISION  
AND THE  
EDICATION OF  
THE EFFECTIVE  
POWER IN  
OF THE  
ATES AND  
LIFE.



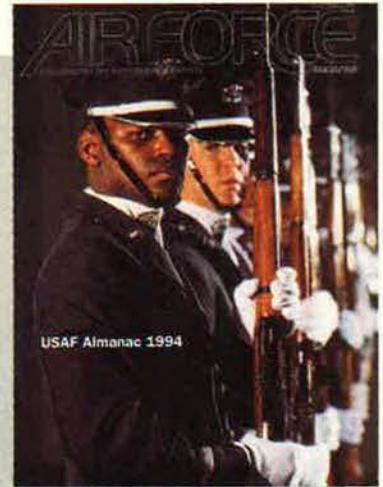
Artist Lawrence M. Romorini has assembled more than 225 mementos and miniaturized pictures, magazine covers, and other commemorative items in this retrospective collage, which recalls all manner of details from AFA's first half century. It takes considerable looking to see everything in this remarkable work, which measures eighty-four inches across. It will hang in the reception area of the Association's headquarters building, where it will remind visitors of special moments in AFA history.



## Profiles of AFA Membership

As of October 1995 (Total 170,000)

61%	One-year members	Of AFA's service members (who account for about twelve percent of the US Air Force total strength):
15%	Three-year members	
24%	Life Members	
		60% are officers
28%	Active-duty military	40% are enlisted
39%	Retired military	
16%	Former service	Of AFA's retired members:
7%	Guard and Reserve	70% are retired officers
6%	Patron	30% are retired enlisted
2%	Cadet	
2%	Spouse/widow(er)	



AFA's most famous product is the Air Force Almanac, published each year in May. It has become the standard look-it-up reference for everyone—including the US Air Force—for facts and figures about the Air Force.





The annual Air Force Almanac is popular all over. In 1991, it was translated into Japanese and published in this authorized edition by Koku-Fan. The cover illustration was the same as the one that appeared on the regular edition in May 1991.



## Aerospace Education Foundation Scholarships

Awarded to	Year begun	Number awarded to date
Von Kármán	Graduating AFROTC cadets for graduate study	Fall 1989 55
Angel Flight/Silver Wings	Angel Flight/Silver Wings members who are college juniors and seniors	January 1993 30
Eagle Grant	Selected graduates of the Community College of the Air Force	Fall 1991 1,300
Spouse	Spouses of USAF active-duty, Guard, and Reserve members for graduate or undergraduate study	July 1995 30



Delegates to the 1951 Convention gather for the Airpower Banquet at the Coconut Grove in Los Angeles, Calif.



## AFA Books

**Coyne, James P.** *Airpower in the Gulf*. Washington, D. C.: Aerospace Education Foundation, 1992.

**Editors of *Air Force Magazine*.** *Almanac of Airpower*. New York: Arco, 1989.

**Editors of *Air Force Magazine*.** *Space Weapons: A Handbook of Military Astronautics*. New York: Frederick A. Praeger, 1959.

**Goldberg, Alfred, ed.** *A History of the United States Air Force, 1907-57*. Princeton, N. J.: D. Van Nostrand, 1957.

**Loosbrock, John F., and Richard M. Skinner, eds.** *The Wild Blue: The Story of American Airpower, The Best from Air Force Magazine*. New York: G. P. Putnam's Sons, 1961.

**Schweibert, Ernest G., and the Editors of *Air Force Magazine/Space Digest*.** *A History of the US Air Force Ballistic Missiles*. New York: Frederick A. Praeger, 1964-65.

**Skinner, Richard M., and William Leavitt, eds.** *Speaking of Space, The Best From Space Digest*. Boston: Little, Brown, and Company, 1962.

**Straubel, James H.** *Crusade for Airpower: The Story of the Air Force Association*. Washington, D. C.: Aerospace Education Foundation, 1982.

## Locations of AFA National Headquarters



A thirty-eight-year-old dream was realized in 1984 with the opening of the Air Force Association Building in August and its formal dedication in September. AFA's first national president, Jimmy Doolittle, led the throng of Association leaders, members, and guests who came to the ceremony by bus from the National Convention hotel.

### In Washington, D. C.

February 1946 .....	1603 K Street, N. W.
Mid-1946 .....	1616 K Street, N. W.
June 1949 .....	901 16th Street, N. W.
November 1950 .....	1424 K Street, N. W.
January 1954 .....	701 17th Street, N. W.
April 1961 .....	1901 Pennsylvania Avenue, N. W.
April 1964 .....	1750 Pennsylvania Avenue, N. W.

### In Arlington, Va.

August 1984 .....	1501 Lee Highway
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## AFA Executive Directors



**Willis S. Fitch**  
1946-47



**James H. Straubel**  
1948-80



**Russell E. Dougherty**  
1980-86



**David L. Gray**  
1986-87



**John O. Gray**  
1987-88



**Charles L. Donnelly, Jr.**  
1988-89



**John O. Gray**  
1989-90



**Monroe W. Hatch, Jr.**  
1990-95



**John A. Shaud**  
1995-



Newly elected Aerospace Education Foundation Chairman George D. Hardy presents an AFA mantel clock to the retiring Foundation Chairman Sen. Barry M. Goldwater (R-Ariz.) at a dinner at the National Air and Space Museum in December 1986.





Bob Stevens'

# "There I Was..."

"There I Was" made its debut in the January 1964 issue and ran every month—360 issues—for the next thirty years. For most, but not all, of that run it appeared on the last page of the magazine. There were a total of 362 pages, because two episodes were doubles. The final installment was in the December 1993 issue.



ROGER RUDDER

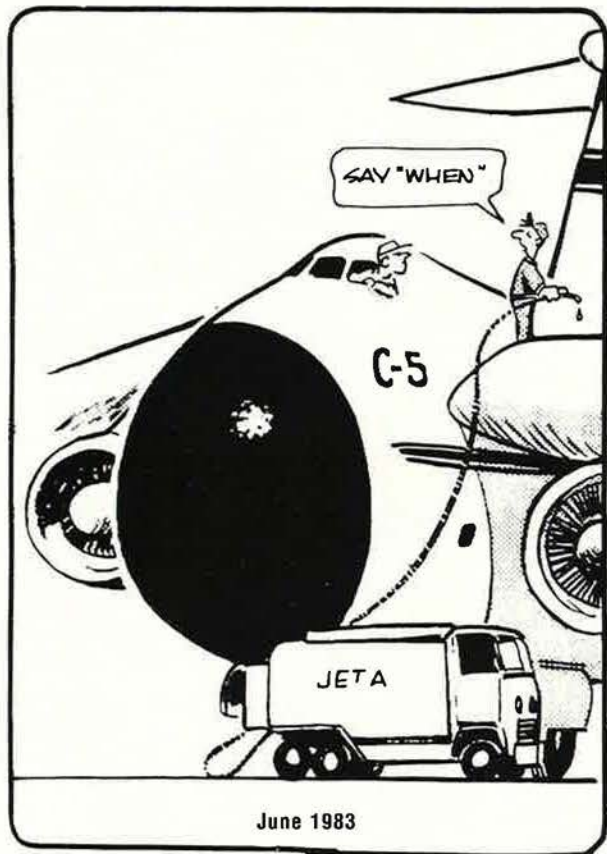
YOU'LL JUST HAVE TO WAIT, THAT'S ALL!!

May 1966



"LIGHT & INACCURATE" WAS WHAT HE SAID...

January 1964



SAY "WHEN"

C-5

JETA

June 1983



CADET DUMBJOHN, LOOK! NOW WHAT ARE YA GONNA DO?

AT-6 HALL STATION

February 1976



**During World War II, the War Art Advisory Committee sent combat artists to nearly every theater of the war to record events that changed the world.**

# Art Under Fire

**B**y spring 1943, the War Art Advisory Committee, headed by painter and sculptor George Biddle, had selected forty-two artists, many of them with established reputations, to chronicle World War II as part of the Army Corps of Engineers' "War Art Unit." Soon after the first teams began to arrive in the Pacific theater, Congress withdrew funding for the program. Some military artists were assigned to combat units, while many of the civilian artists were left on their own. A few found work as war correspondents for Life Magazine.

The following year, Congress modified its opposition and authorized the soldier-artists to do what many of them were already doing. When the United States Air Force Art Program was begun in 1949, Secretary of the Army Gordon Gray transferred some 275 paintings on Air Force subjects to it. These formed the nucleus of a collection that today contains more than 7,000 works of art.

Many of the paintings in this small selection were sketched on the spot. Some of the artists flew on combat missions, making drawings that became these works once they returned to base.



Briefing at North Africa, by Rudolph Von Ripper.

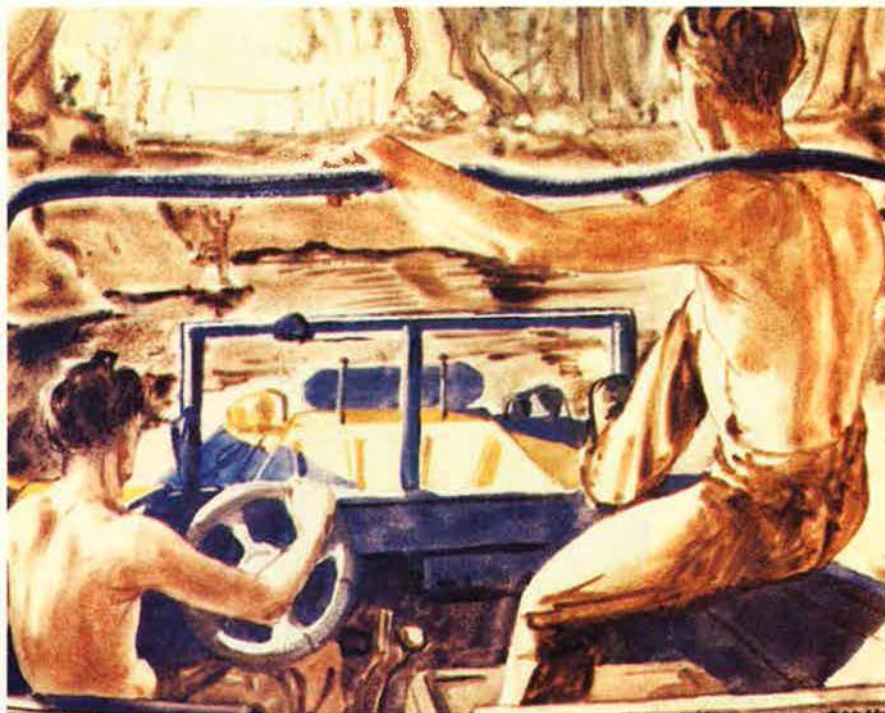




*Shooting the Breeze, by Charles Baskerville. Mr. Baskerville reached the rank of lieutenant colonel as Official Portrait Painter of the Army Air Forces.*



Amphibious Vehicle Ready to Pick Up Litter Case, a watercolor by James Scott.



Arthur S. Rothenberg's Operation Zebra. During the war he was stationed near Cambridge, UK, where he documented the activities of the Third Air Division, Eighth Air Force, under the leadership of Maj. Gen. Curtis E. LeMay.







*Night Watch on Ascension Island, by Jack Levine. Mr. Levine's paintings are included in the collections of the Metropolitan Museum of Art, N. Y.; the Museum of Modern Art, N. Y.; and the Art Institute, Chicago, among others.*





*This painting by Samuel D. Smith is simply called Tragedy. Mr. Smith studied with Jack Levine and as a technical sergeant spent time in west Africa and the China-Burma-India theater. He is now a professor emeritus at the University of New Mexico, where he taught from 1956 until 1984.*

*Albert Gold painted this bustling street scene, The Field at Thurleigh. He had been inducted in May 1942 and was one of the artists already in the Army before being selected by the Art Advisory Committee. His work is included in the collections of the Library of Congress and the Philadelphia Museum of Art, among others.*







Wounded Aboard, by Lawrence B. Smith.



**No US fighter except the F-22 will hold a definite edge on next-generation European fighters.**

# The Gray Threat

**By Mark Lorell, Daniel P. Raymer, Michael Kennedy, and Hugh Levaux**

**W**ITH the collapse of the Soviet Union and sharp downward pressure on defense spending, weapon systems conceived during the Cold War are under major political attack. A prime target is the F-22 fighter. This stealthy aircraft, now in the latter stages of development, is slated to replace the F-15C as the Air Force's premier air-superiority fighter.

The F-22 is the Air Force's top-priority system, but the program is vulnerable. Already, budget cuts have pushed back initial operational capability to 2004, and planned production has been slashed by forty percent, from 750 to 442 aircraft. With total cost projected to reach \$71 billion, however, the F-22 is still one of the largest of all programs and continues to be scrutinized.

Opponents argue that, given the evaporation of the Soviet threat and decline in Russia's military aerospace industry, USAF no longer needs such a sophisticated fighter. The Air Force, the Defense Department, and industry officials warn that critics fail to take into account the widespread proliferation of "gray threats"—a new generation of ad-

vanced European fighter aircraft and munitions likely to be widely exported.

The three fighters in question are the multinational EF-2000 Eurofighter, France's Rafale, and Sweden's Gripen. According to the Air Force, these warplanes "will have significant speed, stealth, and maneuverability improvements over current types and . . . are actively being marketed worldwide."

## **"F-15 Class—Or Better"**

Supporters of the F-22 claim that the new European fighters will be significantly more capable in agility, stealth, and other performance parameters, compared to existing US F-16s and F/A-18s and even upgraded versions of these aircraft. One senior Air Force official explicitly stated that the EF-2000 and the Rafale "are in the F-15 class or better." Thus, the supporters argue, without the F-22, US forces could someday have to confront an opponent who, through the purchase of the new European aircraft, possesses major weapon systems equal or superior to USAF counterparts.

How serious are the "gray threats"?

*This French-built Rafale going through its paces at a recent air show is one of three advanced technology European fighters with the potential to match or surpass the capabilities of all US counterparts currently in the inventory.*





**Figure 1: Technical Comparisons**

<b>Parameter</b>	<b>EF-2000</b>	<b>Rafale</b>	<b>Gripen</b>	<b>F-16C/40</b>	<b>F-15E</b>
Maximum weight (lbs.)	46,305	47,400	28,000	42,300	81,000
Design weight (lbs.)	33,000	33,500	20,000	27,185	49,000
Empty weight (lbs.)	21,495	19,973	14,600	18,238	32,000
Internal fuel carriage (lbs.)	8,818	9,420	5,000	6,846	13,123
Maximum external load (lbs.)	14,330	17,637	10,000	12,000	24,500
Store stations (number)	13	14	7	9	11+
Length (feet)	52.33	50.17	46.25	49.33	63.75
Span (feet)	35.92	35.75	27.58	31.00	42.83
Wing area (square feet)	538	495	330	300	608
Wing loading (lbs./square foot)	61	68	61	91	81
Maximum thrust (lbs.)	40,460	32,800	18,000	23,770	68,200
Thrust-to-weight ratio	1.23	.98	.90	.87	1.39
G limit	9	9	9	9	9
Maximum angle of attack (degrees)	33+	32	26	26	30+
Takeoff distance (feet)	970	1,290	1,290	1,400	1,400
Landing distance (feet)	1,610	1,290	1,610	2,950	4,250
Maximum speed (Mach number)	2.0	1.8	2.0	2.0+	2.5

*Data in this table were compiled by RAND Corp. They come from a variety of unclassified sources, including officials of the European aircraft contractors, government reports, and press accounts. Some figures have been derived by RAND on the basis of other reliable data.*



A RAND research team conducted an extensive series of unclassified interviews with key European government and industry officials engaged in development of these fighters, focusing on three basic questions:

- How good are they (and how much better can they get)?
- Will research and development be completed and full-scale production launched?
- Will they be widely exported outside of Europe?

Though great uncertainty exists, all available information points to this conclusion: The concern expressed by the Air Force and the Defense Department should be taken seriously. The evidence is that these European aircraft will be highly competitive with existing US fighters and future variants, will be fully developed and procured, and will be sold outside of Europe. The F-22 would be the only US fighter with a clear combat edge.

It appears that, with these three fighters, the Europeans will take a significant step toward closing the performance gap between American fighters and Europe's models. The new fighters are multirole designs featuring cutting-edge technologies, including large, integral, load-bearing composite structures; canard configuration; relaxed stability with fully computerized digital flight controls; some measure of stealth (at least compared to traditional air-

craft); and sophisticated pilot displays and controls.

The EF-2000 will be built by British Aerospace (UK), Deutsche Aerospace (Germany), Alenia (Italy), and CASA (Spain), with the UK and Germany providing technological leadership. Rafale, developed by Dassault, has been created on a purely national basis in France. Far smaller than the first two, Sweden's JAS 39 Gripen has been developed by Saab.

How capable will they be when put to the ultimate test of aerial combat? The question is, of course, extremely difficult to answer. Nonetheless, a rough approximation of combat capability can be achieved by developing basic estimates of air vehicle performance capabilities and by examining in detail several key, high-leverage munitions and subsystems.

Figure 1 presents key design and performance data—obtained from contractors and other open sources—for the three European fighter aircraft and comparable data for two front-line USAF fighters—the Lockheed Martin Block 40 F-16C and the McDonnell Douglas F-15E.

Consistent range data were not available. However, it appears that EF-2000 and Rafale have ranges somewhat greater than the F-16's, while the Gripen's range is somewhat less. The F-15E is probably superior to all because of its massive fuel load.

## Impressive Performance

These new European aircraft are impressive in many respects. EF-2000 and Rafale are quite similar in several parameters, including gross weight, payload, stores stations, physical dimensions, speed, and field lengths. EF-2000 has an advantage in thrust-to-weight (T/W) ratio, a key attribute in close-in dogfighting.

Basic performance data relevant to aerial combat suggest that EF-2000 and Rafale will hold clear superiority over the Block 40 F-16C and essential equivalence in important areas with the F-15E. Because it is a much smaller fighter, Gripen is, not surprisingly, outclassed by the F-15 and the other two European fighters. However, the lightweight Swedish entry compares favorably in several respects to the F-16.

The new European fighters show a superior T/W ratio, compared to the F-16, while the EF-2000 is close to the F-15E. Rafale and EF-2000 boast angle-of-attack capabilities superior or roughly comparable to the capabilities of the two US fighters. Gripen's AOA capability is probably about the same as the F-16's.

These data do not reflect important agility advantages that all three European fighters may possess as a result of the static instability of their designs and their canard-delta configurations, combined with their advanced fly-by-wire flight-control systems.

It is difficult, without actually performing a full-scale air-to-air combat simulation analysis, to predict the winner of any future combat between current US fighters and the new European aircraft. However, some insights can be gained through a closer examination of other factors, such as weapons.

European planners intend to develop and equip their new fighters with a variety of high-leverage, advanced subsystems and munitions. Several merit further discussion because of their high potential for enhancing the combat effectiveness of the fighters in ways that cannot be captured in basic performance data.

Subsystems of particular interest include the RBE2 fire-control radar intended for the Rafale, and the integrated electronic warfare systems (IEWS) and infrared search and track (IRST) systems under development

Photo © Bob Froehner / Arms Communications



The JAS 39 Gripen, said to compare favorably with the F-16, is shown here equipped with five different types of next-generation air-to-air missiles—weapons crucial for maximizing the combat power of the new European fighters.



**Figure 2: Claimed Combat Simulation Scores**

Fighter (Origin)	Effectiveness Score	Inferred Exchange Ratio
F-22 (US)	.91	10:1
EF-2000 (European)	.82	4.5:1
F-15F (US)	.60	1.5:1
Rafale (France)	.50	1:1
F-15C (US)	.43	1:1.3
F/A-18E/F (US)	.25	1:3
F/A-18C (US)	.21	1:3.8
F-16C (US)	.21	1:3.8

*Simulation scores registered in this table assume beyond-visual-range aerial combat against threat aircraft possessing the capabilities of the Russian Su-35 fighter equipped with missiles similar to AMRAAM. BAe supplied the effectiveness scores, and RAND translated these into standard exchange ratios. This simulation did not measure the performance of the Swedish Gripen or the US F-15E. The F-15F to which this table refers is a possible upgrade of the USAF F-15 fighter.*

for EF-2000 and Rafale. These systems not only exhibit advanced technologies and capabilities but suggest a significant narrowing of the gap between US and European avionics.

The RBE2 is Europe's first phased-array fire-control radar for a fighter. This type can provide major operational advantages over existing radars. No current US fighter is equipped with a phased-array radar. However, an active phased-array system is under development for the F-22.

Historically, European contractors have lagged considerably behind the United States in the development of electronic warfare systems. This situation may be changed by introduction of the Defensive Aids Subsystem (DASS), now under development for the EF-2000, and the IEWS planned for both EF-2000 and the Rafale. Detailed combat-simulation studies conducted by the UK's Defence Research Agency (DRA) and reported to the House of Commons in May 1994 found DASS to be a critical subsystem that adds greatly to the combat effectiveness of EF-2000.

EF-2000 and Rafale will have new-technologyIRST systems, providing a passive option for locating and tracking aerial targets. BecauseIRSTs do not emit energy that can give

away a fighter's location, they increase stealthiness. They also provide a means, under certain circumstances, for tracking fighters with low radar cross section by detecting engine heat and aerodynamic heating of aircraft skin. Simulations conducted by the British DRA show thatIRST adds substantially to EF-2000's aerial prowess.

**"Decisive Edge" in Missiles**

For maximizing the combat power of the European fighters, nothing is more crucial than the new wave of air-to-air missiles currently planned or under development. Combat simulation studies conducted by RAND and others have suggested that new-generation, high-capability air-to-air missiles can provide a decisive edge in air combat. Most important among these missiles are new "fire-and-forget" weapons that use active, autonomous radar seekers for long range and new-generation, all-aspect imaging-infrared (IIR) seekers for close-in combat. These missiles are capable enough to potentially create favorable combat outcomes with less capable aircraft and crews.

Existing or planned European missiles may even surpass the capabilities of the US-produced AIM-120 Advanced Medium-Range Air-to-Air

Missile (AMRAAM). Rafale is designed to use the Matra-Hachette MICA missile. Unlike AMRAAM, MICA will be built in active radar and IIR-guided variants. The British Procurement Executive and the Royal Air Force are examining options to fulfill a requirement for an FMRAAM—Future Medium-Range Air-to-Air Missile—for EF-2000. British officials are seeking a weapon with longer range, higher speed, and greater agility than AMRAAM.

European contractors and government agencies have conducted numerous computer combat simulations and assessments of their aircraft. These need to be viewed with a great deal of skepticism for obvious reasons. Nonetheless, several clearly were conducted with a high level of professionalism.

In 1993 and 1994, British Aerospace (BAe) and the DRA conducted extensive computer simulations to examine the effectiveness of the various versions of EF-2000 and compare them to future Russian aircraft as well as other fighters. Both studies focused on beyond-visual-range (BVR) air-to-air combat and assumed threat aircraft having the capabilities of an upgraded Russian Su-27 (Su-35) equipped with a missile similar to AMRAAM. BAe's simulations apparently were limited to small engagements of two fighters vs. two fighters, or smaller. DRA's simulations seem to have been more sophisticated; DRA went as high as eight vs. eight engagements.

Both studies used an overall effectiveness outcome scale that ranks fighters from zero to 1.0. The higher the number earned, the greater the probability that the fighter wins in a specific mission. Thus, a score of zero means the fighter will always lose, and a score of 1.0 means it will always win. A score of .5 means a fighter will have a one-to-one exchange ratio. Some of the results of the BAe simulations are shown in Figure 2, along with RAND's own calculations of how the scores translate into more traditional exchange ratios (enemy losses vs. friendly losses).

**F-22 Has Advantage, But . . .**

The scores from both studies indicate that EF-2000 is superior to all fighters examined, with the exception of the F-22. Furthermore, BAe





**Having resolved contentious work-share issues, the nations building the EF-2000 increased the likelihood of full-scale development and production. British, German, Italian, and Spanish aerospace heavyweights are partners in the program.**

proudly notes that the F-22 is only about ten percent higher on BAe's effectiveness scale but costs about twice as much as EF-2000. However, when one uses exchange ratios—the traditional way of measuring combat effectiveness—the F-22 comes out much better, with more than double the effectiveness of EF-2000.

BAe and DRA analysts reported that all existing US fighters, with the exception of the F-15, performed relatively poorly. Even the F-15 barely exceeded a one-to-one exchange ratio and placed well below EF-2000. Rafale does not do particularly well, but it is shown to be competitive with the F-15 and superior to other US fighters. Because of limitations in radar range, speed, and acceleration, Gripen does not fare as well as the other European fighters do, but DRA found that it performed about as well as the F/A-18E/F did, the heavily modified and upgraded version of the US Navy Hornet.

French spokesmen insist that, with similar scenario assumptions, tactics, equipment, and munitions, Rafale performs about the same as EF-2000 does, and Sweden claims new-generation BVR missiles used with a ground air defense radar net and combined with Gripen's small signature and rapid turnaround rates make their fighter a highly effective weapon system.

The F-22 would perform effec-

tively against the European fighters in BVR combat because of its stealth, supercruise, and radar capabilities. If a "leaker" ever managed to get close, the F-22 would be at least a match and probably superior.

The F-15 and F-16, however, would confront something close to an even match, especially against EF-2000 and Rafale. This is not to say that current US aircraft would be outclassed, but they may confront rough parity in exchange ratios. Many planners would argue that such an outcome is politically unacceptable.

Will US fighters ever have to face these weapons? RAND found it probable that all three new European fighters will be fully developed and produced in significant numbers.

The Gripen has now entered into full production, and the Swedish Air Force is almost certain to support a substantial production run. Current SAF plans call for production of 110 aircraft, but Gripen supporters hope for a total SAF production run of 300.

The new Chirac-Juppé government recently launched a major review of overall French military spending levels. Reductions and stretchouts in procurement programs are likely.

Yet, Rafale faces little political opposition; the R&D program is now viewed as politically secure. As a key program in the new French five-year military budget law, the new fighter almost certainly will complete development and enter production.

Of the three, EF-2000 is the most uncertain. However, it will most likely be fully developed and produced, though possibly without full participation of all current nations. This argument rests largely on the perception that the UK has an unshakable commitment to the program and that other partner nations recognize that they would pay very high political, economic, and technological costs for pulling out. Indeed, in November 1995, the four partners were finally able to reach an agreement on the contentious work-share issue. This agreement dramatically increases the likelihood of full-scale development and production.

The gray threats can be taken seriously only if the new European fighters are sold outside Europe. RAND found that this is likely to be the case. Despite high prices and constraints on the global market, the three European fighters have a reasonable prospect of winning significant foreign orders.

First, several of the key European governments and contractors in these programs appear more committed than ever to promoting foreign sales and seem determined to do whatever it takes to win export orders. The three aircraft have been actively promoted on the international market. Second, export prices of these fighters will likely be broadly competitive with US fighters available for export. Third, a large potential market outside of Europe exists.

The claims made by some USAF and Defense Department officials that the European fighters represent potential gray threats deserve further serious consideration by defense analysts. The US should carefully evaluate its defense requirements and weapon needs for a possible future environment where the gray threats turn out to be real. ■

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Mark Lorell, Daniel P. Raymer, Michael Kennedy, and Hugh Levaux, all RAND Corp. analysts, researched and wrote a longer study, "The Gray Threat: Assessing the Next-Generation European Fighters," from which this article is adapted. That study was published in November 1995.



**Air Force assistance officers are still swamped with troops seeking help on their way to civilian life.**

# The Transition After the Transition

**By Bruce D. Callander**

**I**N JULY 1993, Air Force Sgt. Anita Smith left McChord AFB, Wash., with a medical discharge and a few butterflies in her stomach. Friends warned that her training and experience would count for little in civilian life, applying for a government job would be futile, and she would have to leave the Northwest to find any real opportunities.

Ms. Smith ignored the warnings. She stayed in the Puget Sound area, blended her military training with a master's degree, and landed a job with the federal Department of Housing and Urban Development. She has since moved to another government agency—the Washington State Human Rights Commission—and plans to pursue another graduate degree from a university in the region.

The ex-USAF Sergeant credits her success to her own long-range planning and to the Air Force's Transition Assistance Program (TAP), a broad-gauged effort developed during the drawdown to help exiting servicemen and -women make the switch from military to civilian employment. Ms. Smith recalled that the system "helped tremendously," teaching her vital résumé-writing skills and interviewing techniques, as well as how to describe military experience in civilian terms. "That helped me get the job with HUD," she said. "My experience there and my master's led to the job with the state."

Ms. Smith's discharge stemmed from a back injury—not the kind of separation the transition program was created to address. TAP was designed

to help the tens of thousands of active-duty members being moved out during USAF's long period of strength cuts. A blend of separation incentives and job-hunting assistance, the program was seen as a way of easing the anxiety of those whose careers were cut short by the drawdown.

## **Drawdown Nears an End**

However, that specific need has greatly diminished; USAF states that the drawdown is about ninety percent complete. Force-outs are increasingly rare. In 1995, the Air Force held only one Selective Early Retirement Board, which forced out fewer than fifty officers. No SERBs are planned for 1996. USAF does plan to roll back separation dates for 300 first-term airmen and give early retirement to 650 officers and 1,000 enlisted troops. That is a far cry from the years when USAF moved out as many as 7,500 officers and 24,000 enlisted troops per year.

Even so, the transition assistance effort is programmed to continue through the turn of the century. Today, most TAP clients are members who, like Ms. Smith in 1993, leave the service for fairly traditional rea-



sons. Not surprisingly, critics in Congress have raised questions about the need to continue a program specifically adopted to take the sting out of the force cuts. Also not surprisingly, those Air Force officials close to the program maintain it still serves a vital purpose.

"We now see it as part of the personnel life cycle," said Judy Warner, head of transition assistance at the Air Force Personnel Center, Randolph AFB, Tex. "Unlike earlier programs, this one has its basis in law and has been included in [Pentagon] directives. . . . It has been pretty much institutionalized."

Why continue the program? One answer, said Ms. Warner, is that even with personnel reductions waning, many service members are separating earlier than they had planned. For example, both officers and NCOs still are required to retire when they reach the high year of tenure for their grades, which is coming earlier than expected for many. During the big drawdown years, Air Force leaders lowered the high-year-of-tenure points for airmen to stimulate more losses. Though the drawdown has pretty much run its course, the Air Force has not yet raised the HYT points to their former levels.

Other members also continue to leave under the Temporary Early Retirement Act (TERA), a Congressionally approved program that allows a uniformed member to retire with service ranging from fifteen to nineteen years. These retirees receive reduced annuities but can claim other retirement benefits. The Air Force will continue to use TERA to help carry out the last phase of the drawdown. Though such retirements are considered voluntary, they bring abrupt change for members. Many are still relying on Air Force transition assistance to help them find second careers to supplement their reduced retired pay.

Thus, say officials, the drawdown goes on, albeit at a greatly reduced pace. For that reason, they say, the TAP effort continues to serve its original purpose. Some argue that it can be justified for other reasons. For example, said Ms. Warner, some young men and women considering enlistment apparently view the assistance program as a valuable benefit. "It's a good recruiting incentive," said Ms. Warner.

### **Business Still Brisk**

More to the point, transition assistance officers report that they continue to do a brisk business despite the drop in the pace of involuntary separations.

Arnie Chavez, the transition as-

### **Transition assistance officers continue to do brisk business despite the drop in involuntary separations.**

sistance manager at Kirtland AFB, N. M., estimates that attendance at his base's separation-related events in 1995 increased by more than forty percent over attendance in 1994, though involuntary separations were down. "As time goes by," Mr. Chavez said, "it seems as though the acceptance of the program and the need for it grow."

The transition assistance center at Kirtland is one of more than 100 such centers that have been operating at Air Force bases for several years. Cheryl Vollmer, who manages a similar center at McChord AFB, also reports a heavier-than-expected work load. "We aren't getting VSI [Voluntary Separation Incentive] and SSB [Special Separation Benefit] people now," she said, "but we have not seen a decline in our clientele. We are getting about 2,400 a quarter through the Employment Security and Resource Center and about 1,500 a quarter in counseling-type work."

The basic structure of today's assistance program remains much as it was during the heavy drawdown years, despite changes in types of separations. Its mainstay is a three-day seminar that all members must attend during the 180 days immediately preceding separation. After receiving this overview, Air Force clients can tap into a variety of resources, including individual counseling.

At Kirtland, Mr. Chavez said, much of the emphasis is on preparation for the move into civilian life. The seem-

ingly simple task of writing an effective résumé, for example, has been refined to something close to an art form. "Nowadays," he said, "you have to think of the type of résumé you need to apply for a specific job. A generic listing of experiences in chronological order may not work. You need a functional résumé designed to appeal to the specific firm."

Kirtland transition officials attempt to review service members' résumés with the eyes of potential employers. In other sessions, clients participate in mock interviews. Afterward, the sessions are critiqued and clients refine their job-hunting performances.

Mr. Chavez said that the troops have to be taught how to put their military training and experience into terms comprehensible to a civilian employer. "We have to make them aware of how much they do have," he said. "Most service members have had some kind of leadership or supervisory position, but they tend to overlook that. That's an area where they need to realize they do have abilities that will help them in the private sector."

It was that sort of preparation that Ms. Smith said helped her overcome her separation jitters and concentrate on converting her service experience into assets marketable in the civilian community.

Equally important, say Air Force managers, is the recognition that military specialties are not always broad enough to satisfy the civilian world. Many separatees need additional training to bring them up to speed. "Some are willing to do whatever they have to as far as education is concerned," said Mr. Chavez, "from attending a vocational school to going to a university to get themselves into a whole new occupation. Others will take formal education to advance themselves in the areas where they have been working."

### **Starting Early**

Either way, officials agree, early preparation is vital. At McChord, Ms. Vollmer said, "it has been rewarding to see that people are starting to listen and starting earlier. More people are going back to get more education. The earlier they realize the need for it, the better."

Ms. Vollmer puts a premium on long-range planning. While mem-



bers are not required to attend transition sessions until they are within 180 days of separation, she said, they can begin on their own even earlier. "If they can start doing some creative things even up to two years ahead of time, they are much better prepared."

Even those who did not invest in the GI Bill while in service still can get in on it when they separate. A late "buy-in" feature allows them to put up their required \$1,200 contribution, and the government will add its share. For those who can come up with the cash, it might be a shrewd investment.

The Air Force program can provide impressive assistance to those looking for immediate employment. Under a program overseen by the Department of Labor, state agencies provide a number of counseling and job-hunting services.

At Kirtland, New Mexico's Department of Labor brings in people from the local community to make presentations about the job outlook. A representative of the Department of Veterans Affairs also comes in to explain veterans' entitlements and help members fill out applications for compensation or pensions. At McChord, the state of Washington maintains an on-site employment office. A Veterans Affairs representative comes in once a week.

USAF transition clients also are given access to an array of automated systems to help them review the job market. These have expanded in recent years. "We are doing a lot of hookups with different job nets and job information lines," Ms. Vollmer said, "so that we can get direct access to customers in resource centers. When clients find possible employers, we help them fax their résumés and applications so they can get a quick response."

Despite the availability of such automated aids, job-hunting remains a daunting task. Transition managers cite a number of factors inhibiting success, including government cutbacks, base closings, and smaller defense contracts. The national economy has yet to produce a real surge in hiring.

At Kirtland, Mr. Chavez said, "I believe things have opened up a little, but . . . it still is not that easy to find . . . [well-paying] jobs. . . . Those kinds of jobs are scarce."

At McChord, Ms. Vollmer said, finding work is "somewhat a matter of being in the right place at the right time." She added, "We see some people unemployed for up to a year and a half, and we see others who have jobs before they even separate

### **Despite the availability of high-tech assistance, job-hunting remains a daunting task.**

from the military. It's a matter of a lot of networking, making sure you have current skills, and aligning yourself on the career path that you want to take."

#### **Public Service Pipeline**

By taking specific types of jobs, early retirees who leave with at least fifteen years of service can earn their way to the full retired pay they would have received had they stayed in uniform for a full twenty years.

This is how it works: All early retirees must sign up with the Public and Community Service (PCS) Registry, a pipeline toward jobs in such fields as teaching, law enforcement, social services, public housing, and conservation. Early retirees are not required to work in these areas. For those who do, however, the program amounts to serving out the balance of a service career in another form of public service.

Some limitations apply. One is that the retiree must enter public service immediately after retirement or lose whatever time elapses between then and when he does enter. Another is that retired pay is not raised until the member reaches age sixty-two.

Being on the PCS Registry is no guarantee of a job, and government jobs in general are scarce. When

openings occur, they are often filled by recently laid-off civil service employees who have hiring priority. Federal or state employment is not deemed one of the best bets for early success.

Most clients also are advised to be prepared to move to where the jobs are. Whether they want to do so depends on how much they value location. Mr. Chavez said that at Kirtland, located near Albuquerque, only about ten percent of separatees stay. The job market is not attractive.

At McChord, however, about half the transition clients over the past five years have chosen to remain in the Puget Sound area. Despite some difficult times during the defense cutbacks, the region still has a strong industrial base and several massive military installations, all of which have escaped base closing actions. In addition to those who separate at McChord and stay on, many people who retire elsewhere settle in the Northwest.

For most nonretirees, separation benefits are limited and finding jobs quickly is the imperative. Transition officials say that the anxiety levels of their clients seem lower than they were a few years ago, but some stress is still evident.

"I still have people say they are nervous, even those members who are retiring," said Mr. Chavez. "The transition program does have some avenues they can use to prevent them from getting too anxious and losing opportunities because of it."

Mr. Chavez said that the private sector is looking to the military for potential employees. "I'm finding that civilian employers realize that the experience and the discipline service members acquire are what the private sector is looking for," he noted. "For one thing, they realize that service members have security clearances, so [employers] don't have to spend as much time and money getting somebody cleared from scratch. We have gotten a number of calls from companies in the state that want to be listed among those looking for separating members." ■

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*Bruce D. Callander, a regular contributor to Air Force Magazine, served tours of active duty during World War II and the Korean War. In 1952, he joined Air Force Times, becoming editor in 1972. His most recent article for Air Force Magazine, "Officer Jobs for Enlisted Troops," appeared in the October 1995 issue.*



# The Air Force and Missile Defense

The task includes not only destroying these weapons but also finding them before they can launch.

By Bill Gertz

**S**ATURATION ballistic missile attacks against littoral forces, ports, airfields, storage facilities, and staging areas could make it extremely costly to project US forces into a disputed theater, much less carry out operations to defeat a well-armed aggressor. Simply the threat of such enemy missile attacks might deter the US and coalition partners from responding to aggression in the first instance."

Gen. Ronald R. Fogleman, the Air Force Chief of Staff, conjured up this bleak scenario in a recent statement about the threat posed by Third World missiles and the Air Force's determination to help counter it.

USAF leaders say it is the threat elaborated on by General Fogleman that has pushed the Air Force more deeply than ever into the world of missile defense. The Air Force's existing system of air- and space-

based sensors, communications channels, and intelligence systems has improved dramatically since the Persian Gulf War, when US forces put together an *ad hoc* system to feed launch detection data picked up by Defense Support Program (DSP) satellites through USAF's communications channels to the Army's Patriot antimissile batteries.

USAF today is assuming a key role in plans for active defense of US and allied forces against missile attack. The Air Force, with its fleet of attack fighters, surveillance systems, and communications, would, in most cases, be a prime instrument for preemption of enemy missiles on the ground. Moreover, it is developing a laser weapon that it believes would be able to shoot down missiles shortly after they were launched. [See "The Airborne Laser," January 1996, p. 54.]

USAF also is cast for a major support role, providing the means for the complex task of commanding and controlling US forces engaged in finding missiles, monitoring their status, detecting their launch, and shooting them down.

The Air Force has the job of building the architecture for missile defense command and control, and USAF's authority over the joint-force command-and-control function has been enshrined in joint doctrine. A Defense Department memorandum of understanding to this effect was signed July 8, 1994, designating the Air Force as the lead agency in this area.

Last year, the Air Force established a Theater Air Defense Office within the Air Staff, directed until recently by Maj. Gen. W. Thomas West. Setting up a definable entity with responsibility for all aspects of theater air defense, including missile defense, was a major step for the Air Force. The office's functions



were recently placed under the deputy chief of staff for Plans and Operations.

Theater Missile Defense (TMD) has not traditionally been an Air Force priority, but the service's substantial budget commitment to its programs appears solid.

### Attack Operations

For their part, the Army and Navy are developing six terminal- and wide-area TMD systems. The Army entries are the standard Patriot system, the Patriot Advanced Capability-3 system, the Medium Extended Air Defense System (also known as Corps SAM), and the Theater High-Altitude Area Defense system. The Navy has a pair of seabased systems known as Lower Tier and Upper Tier, the latter a wide-area defense viewed as the most promising.

The Air Force expresses no institutional interest in embracing such "catcher's mitt" systems—designed to intercept speeding warheads late in their flight as they are about to strike the target.

"When you look at terminal defense, the Air Force really doesn't have a dog in that fight," said General Fogleman. "That's a combination of Army and Navy systems. . . . We think the major contribution we're making is in the areas of battle management, attack operations, and boost-phase intercept" (BPI)—areas focused on the early stages of an enemy's missile attack.

"What we would like to do is get those things [ballistic missiles] with attack operations before they ever have a chance to launch," said Col. William R. Carter, the Air Force official heading the command-and-control combat integration requirements division. "That's really the first line."

To that end, the service has been developing new means of detection and ways to get information instantly to the pilot flying Scud-hunting missions. However, the Air Force concedes that direct attack will always be hampered by skillful use of camouflage, mobility, and concealment.

Colonel Carter acknowledged this, adding, "If [the missiles] do launch, we would really like to get them in a boost phase [just after launch, before the rocket engines burn out], where the bad stuff falls all over the bad guys. And maybe that's a disincentive, so if they [prepare to] light

the wick on that thing the next time, they'll think twice about it falling back on them."

The deterrent would be especially strong if the missiles were armed with nuclear, biological, or chemical warheads.

USAF officials warn that attack and BPI operations should not be regarded as a complete missile defense. A complete system would require other layers, such as the Army and Navy area and point-terminal defenses.

### The Second Line

The Air Force has adopted BPI as the second line of defense after attack operations. The BPI mission initially went on the drawing board as a high-speed interceptor missile that would be fired from a fighter aircraft.

The Clinton Administration asked for a relatively small amount—\$49 million in the current fiscal year—for kinetic-kill missile research, out of a missile defense budget request of \$2 billion. The future of this system is uncertain.

The most important Air Force BPI TMD system being developed is the airborne laser (ABL). "As we look at boost-phase intercept, it's no secret that we're looking at the ABL as really the weapon that will probably provide us with the most capability in that area, so we're engaged there," General Fogleman said.

The service is working hard to build a chemical-fired laser gun fitted aboard a Boeing wide-body jet, and tests so far have been encouraging.

"We're going to intercept [the missiles] when [they are] in powered flight," said Col. Richard Tebay, program director for the ABL. "If we can get them in the boost phase, it's a way of reducing the number of targets subsequent tiers have to deal with."

The ABL is in the concept design phase. Competing for the program are two industry teams—one led by Rockwell International (teamed with Hughes and E-Systems) and a second led by Boeing (teamed with Lockheed Martin and TRW).

Once the design has been worked out, a demonstrator phase will begin, probably in 1997. Plans call for this phase to culminate in 2002 with the shootdown of an actual theater ballistic missile, said Colonel Tebay,

who added, "We've come a tremendous way" with the program.

The system will have its own infrared sensors capable of picking up a missile launch hundreds of miles away. The ABL also has its own tracking, detection, and acquisition sensor, with a 360° sweep and can use external target "cuing" from spacebased sensors.

The ABL is strictly a theater weapon that would operate over friendly territory and yet be able to fire at threatening missiles as they rise through enemy airspace—all without violating borders.

Col. Patrick Garvey, an Air Combat Command officer serving as an advisor to ABL officials, sees great value in the system, as in the protection of forces deployed abroad for military operations. "We are committed to the airborne laser development," he said.

Colonel Tebay noted that the ABL would be able to deploy rapidly from the United States and go into action almost right away. "You don't deploy it and then spend a month getting it ready to go," he said. "It arrives ready to do its mission."

Once the first demonstrator is fielded in 2002, the Air Force will have the capability to position aircraft outside enemy territory and set up on-orbit combat air patrols that can protect arriving friendly troops.

### Battle Management

General Fogleman believes USAF will play the key role in battle management and command and control, adapting and upgrading systems once focused on the Soviet threat to support forces threatened by short- and medium-range missiles.

He asserted that the Air Force is committed to its role as the lead missile defense command-and-control agency. The General pledged that the Air Force "will integrate existing architectures and develop future ones that provide warfighting CINCs a flexible and seamless command-and-control system."

Colonel Carter noted that the problem has always been the high speed needed to attack enemy missiles and the lack of time available for making decisions. "We haven't had the command and control to use the destructive capability or the intrusion capability or the attack capability to do much about it," he said.



"In the Gulf War, we were not very effective" against Iraqi Scuds, he added. "We just didn't have the intelligence fusion, the rapid decision-cycle capability, [or] the target-recognition tracking capabilities to get those things, on the ground or in the air."

Of all the elements of battle management/command, control, communications, computers, and intelligence (BM/C<sup>4</sup>I), control over forces is most important, in the view of Colonel Carter. "If you don't have control, you can be the best commander in the world and it does not matter," he said. Communications is the medium for working; computing is merely one of the tools. Intelligence was brought into the function because of the surveillance and reconnaissance mission.

"Information on the battlespace is what I need, and I don't care if it comes off X sensor or Y platform," Colonel Carter said, adding that command-and-control functions must make sense of the vast amounts of data that systems provide and then be able to sift through and use the data in making battlefield decisions.

A recent joint military exercise in the Atlantic illustrated the problems of not having strong central control over the battlespace. During a simulation, a Patriot antimissile battery acted unilaterally and unintentionally shot down a Navy F-14. During a second simulated engagement, a Patriot shot down an incoming missile armed with a mass destruction warhead at the worst possible time, spreading deadly debris over a large civilian population area.

"This is what happens when you don't have integrated command and control," one Pentagon official remarked.

The Combat Integration Center, another command-and-control element, is being developed by the Air Force, along with the Ballistic Missile Defense Organization and the Marine Corps. The CIC is a version of the Command Report Center used in tactical air defense efforts. It will be improved and adapted for missile defense. The goal is to decentralize attack operations against mobile theater ballistic missiles. The center takes sensor data from satellites and joint radar and flashes the information throughout a battle theater.

A prototype CIC used during a re-

cent exercise helped to connect sensors with shooters effectively within two minutes.

In addition, the Air Force has developed a new system that provides intelligence fusion to the air commander in regional conflicts. The Joint Force Air Component Commander Situational Awareness System (JSAS) was also used successfully during Roving Sands, a Joint Chiefs of Staff exercise held each year in Texas and New Mexico. The system puts tactical intelligence imagery into what General Fogleman said is an easily viewed presentation on a laptop computer.

"Marine Corps and Air Force users lauded its contribution to the conduct of the air battle [during Roving Sands], particularly missile defense operations," said the Chief of Staff.

As part of the BM/C<sup>4</sup>I function, the Air Force also is upgrading its theater air control systems to adapt them to deliver the type of command and control needed for missile defense operations.

In April 1995, initial operational capability was declared for the Attack and Launch Early Reporting to Theater system, an array of satellite ground stations that collect and pass on information from spacebased sensors. ALERT will give the Air Force quicker warning of missile launches detected from spacebased sensors and will provide better cueing data to missile defenses than is provided by the groundbased equipment that is part of the weapons.

### Space and Airborne Sensors

A crucial part of the Air Force role in missile defense is the contribution of its sensors, and the centerpiece of that effort is a new advanced satellite constellation being built to replace the DSP satellites. Right now, DSP is the mainstay for providing missile warning information to strategic and theater commanders and their forces.

The new system being developed is a layered constellation of satellites that goes by the generic name Spacebased Infrared system. Lt. Col. Robert R. Fisher, an SBIR system

program official, said Operation Desert Storm showed that the DSP missile launch warning systems needed improvement, and, after several false starts, the Air Force is moving ahead.

"DSP was built for strategic operations during the Cold War," Colonel Fisher noted. "Its secondary mission was to support theater operations and obviously [we] can only do so much improvement with the Defense Support Program satellites."

DSP satellites were used successfully in the Gulf War to help Patriot missile batteries target Iraqi Scud missiles, but the data transfer rate from Cheyenne Mountain AS, Colo., where US Space Command received the satellite information, was slow. A system had to be cobbled together during the war to link the data to the Patriot batteries.

The new system will be composed of three levels of spacecraft. One will be a group of low-Earth-orbit space and missile tracking system satellites, formerly known as Brilliant Eyes. Another level will comprise two satellites that orbit Earth's poles. The last will be composed of four geosynchronous-orbit satellites that will provide wide coverage of Earth. The first elliptical and geosynchronous orbiting satellites will be launched in 2002; the lower satellites will be launched starting in 2006.

The new system will have improved data-processing hardware and software, with improved communications systems.

Colonel Fisher said the SBIR system will provide greatly improved warning of missile launches around the world and better data for active defenses, such as attack operations against missile sites on the ground, as well as for various phases of interception. It will provide more information for situational awareness.

"This system will report ballistic missile launches directly to affected theater forces and provide critical midcourse tracking and discrimination data for terminal defenses," General Fogleman said. "This cueing by the SBIR system will, in effect, extend an interceptor's range and increase its effectiveness against ballistic missile warheads." ■

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*Bill Gertz covers national security affairs for the Washington Times. His most recent Air Force Magazine article, "Horror Weapons," appeared in the January 1996 issue.*





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# Gallery of South Asian Airpower

By John W. R. Taylor and Kenneth Munson

## Attack Aircraft

### A-5C

China extensively redesigned the J-6 (license MiG-19) fighter-bomber into a dedicated attack aircraft (Chinese designation Q-5), the principal external change being "cheek" intakes instead of a single nose intake for the twin engines. Several hundred Q-5s were built for China's PLA Air Force, in various versions (see "Gallery of Far East/Pacific Airpower," November 1995, p. 50).



A-5-III (A-5C), Pakistan Air Force (Denis Hughes)



AU-23A Peacemaker, Royal Thai Air Force (Denis Hughes)

The much-improved A-5C, to meet a 1981 order from the Pakistan Air Force (which calls them A-5-IIIs), has a Martin-Baker zero/zero seat, upgraded avionics, and can carry weapons and drop tanks standard on other PAF aircraft, including Sidewinder air-to-air missiles (AAMs). Nanchang delivered 52 for Nos. 7, 16, and 26 Squadrons at Peshawar and Masroor, although numbers are now reportedly down to about 42. Bangladesh ordered 24 A-5Cs from 1986 to equip No. 8 Squadron at Chittagong and No. 21 at Dhaka. The 24 ordered by Myanmar, delivered from 1993, also equip two attack squadrons.

**Contractor:** Nanchang Aircraft Manufacturing Company, People's Republic of China.

**Power Plant:** two Liming WP6 turbojets; each 7,165 lb thrust with afterburning.

**Dimensions:** span 31 ft 10 in, length 51 ft 6 in (excl nose-probe), height 14 ft 9 3/4 in.

**Weights:** empty 14,105 lb, gross 20,932-26,455 lb.

**Performance:** max speed (clean) at 36,000 ft Mach 1.12, at S/L 758 mph, ceiling (clean) 52,000 ft, T-O run (clean) 2,460 ft, landing run with brake-chute 3,480 ft, combat radius (max external stores) 248-373 miles, range (with external fuel) 1,240 miles.

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** 23-mm Norinco Type 23-2K gun, with 100 rds, in each wingroot. Ten weapon stations (two pairs in tandem under fuselage and three under each wing) for up to 4,410 lb of stores including bombs, rockets, AAMs or ASMs, other ordnance, electronic countermeasures (ECM) pods, or drop tanks.

### A-7E Corsair II

In 1994 the Thai government approved the purchase of 14 former US Navy A-7E Corsair II single-seat light attack aircraft and four two-seat TA-7Cs for operation by the Royal Thai Navy. These are equipping No. 104 Squadron of the RTN at U Tapao Naval Air Base. Deliveries, following refurbishing, began in late July

1995 with the first two TA-7Cs and were to continue at the rate of two per month. Intended for a maritime strike role, they are the Royal Thai Navy's first jet fixed-wing combat aircraft. An additional three A-7 airframes are being acquired as a source of spares.

**Contractor:** Vought Corporation, USA.

**Power Plant:** one Allison TF41-A-2 (Spey) non-afterburning turbofan; 15,000 lb thrust.

**Dimensions:** span 38 ft 9 in (folded, 23 ft 9 in), length 46 ft 1 1/2 in, height 16 ft 0 3/4 in.

**Weights:** empty 19,915 lb, gross 29,000-42,000 lb.

**Performance:** max speed at S/L (clean) 698 mph, at 5,000 ft with 12 Mk 82 bombs 646 mph, ceiling 42,000 ft, T-O run 5,600 ft, landing distance 4,695 ft, typical combat radius 490-715 miles.

**Accommodation:** pilot only, on ejection seat.

**Armament:** one 20-mm M61 multibarrel gun; two pylons under fuselage and three under each wing for more than 15,000 lb of Sidewinder AAMs, TV- and laser-guided ASMs, ARMs, bombs, cluster bombs, rockets, and gun pods.

### AU-23A Peacemaker

The AU-23A is a militarized version of the Swiss Pilatus Turbo-Porter short takeoff and landing (STOL) utility transport, configured for counterinsurgency and border-control duties. Of 15 acquired by USAF for evaluation under the Credible Chase program for South Vietnam, 13 were instead transferred to the Royal Thai Air Force in the early 1970s under the Pave Coin program. Twenty more were acquired by Thailand from 1975, and about 24 are still in service with No. 202 Squadron at Lop Buri and No. 531 Squadron at Prachuap Khiri Khan for armed utility and transport missions.

**Contractor:** Fairchild Industries, USA.

**Power Plant:** one AlliedSignal TPE331-1-101F turbo-prop; 650 shp.

**Dimensions:** span 49 ft 8 in, length 36 ft 10 in, height 12 ft 3 in.

**Weight:** gross 6,100 lb.

**Performance:** max speed 175 mph, ceiling 22,800 ft, T-O run 515 ft, landing run 295 ft, range 558 miles.

**Accommodation:** pilot and provision for up to nine passengers on seats that are quickly removable for equipment or freight carrying. Hatch in floor for dropping supplies or leaflets or for a camera installation.

**Armament:** up to 2,000 lb of external stores on 500-lb capacity underfuselage station and four underwing hardpoints. One side-firing 20-mm gun in cabin, plus two side-firing or underwing pod-mounted 7.62-mm guns. External weapons (with minimum crew/passenger load) can include bombs, gun pods, napalm, and unguided rockets; other stores include flare launchers, smoke dispensers, and camera pods.

### AV-8 Harrier

Faced with growing need for an on-the-spot air presence in the Gulf of Thailand, the Royal Thai Navy ordered a V/STOL aircraft carrier from a Spanish shipyard in the early 1990s. This vessel, the 12,500-ton HTMS *Chakkrinareubet*, is now nearing completion, and aircraft to equip it have been selected. Nearly 20 years ago, Spain was a customer for first-generation Harriers, receiving 11 AV-8A(S) single-seaters and a pair of TAV-8A(S) tandem-seat trainers, which it has since replaced with AV-8B Harrier IIs. However, the seven earlier single-seaters that survive are all low-time aircraft and have now been purchased by the RTN for eventual operation (along with recently ordered Seahawk helicopters) from the new carrier. Two trainers have also been ordered. (Data for standard AV-8A.)

**Contractor:** British Aerospace Military Aircraft Division, UK.

**Power Plant:** one Rolls-Royce Pegasus Mk 103 turbofan; 21,500 lb thrust.

**Dimensions:** span 25 ft 3 in, length 45 ft 7 in, height 11 ft 11 in.

**Weights:** empty 12,190 lb, gross 17,050 lb (vertical T-O), 22,300 lb (short T-O).

**Performance:** max speed at S/L 730 mph, ceiling 51,200 ft, T-O run with 5,000-lb payload approx 1,000 ft, range with 4,400-lb payload 230 miles (lo-lo), 414 miles (hi-lo-hi).

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** four underwing hardpoints and one on centerline, plus provision to replace twin underfuselage strakes by two 30-mm Aden gun pods; max external stores load 5,300 lb. Typical stores include bombs of up to 1,000-lb size, pods of nineteen 68-mm rockets, Sidewinder AAMs (outboard underwing only), a reconnaissance camera pod, or auxiliary fuel tanks.

### G-4 Super Galeb

This much more formidable sweptwing successor to the straightwing G-2A Galeb flew for the first time on July 17, 1978, and was built in series for the Air Force of the former Yugoslavia. Six were delivered to the Air Force of Myanmar in 1990-92, for dual-role advanced training/light attack duties. In addition to a 23-mm gun, each can carry up to 2,822 lb of weapons underwing.

**Contractor:** Vazduhoplovna Industrija Soko, Yugoslavia.

**Power Plant:** one license-built Rolls-Royce Viper Mk 632-46 turbojet; 4,000 lb thrust.

**Dimensions:** span 32 ft 5 in, length 40 ft 2 1/4 in, height 14 ft 1 1/4 in.

**Weights:** empty 6,993 lb, gross 10,379-13,889 lb.

**Performance:** (at 10,379 lb gross weight): max speed at 13,120 ft 565 mph, max cruising speed at 19,700 ft 525 mph, ceiling 42,160 ft, T-O run 1,877 ft, landing run 2,674 ft, range with two drop tanks 1,553 miles.

**Accommodation:** crew of two, on tandem zero/zero ejection seats. Rear seat raised.

**Armament:** removable centerline gun pod containing 23-mm GSh-23L twin-barrel gun with 200 rds. Two pylons under each wing for such weapons as napalm tanks, cluster bombs containing eight 35-lb fragmentation munitions, containers for 40 antipersonnel or 54 antitank bomblets, 16-tube 57-mm rocket packs, triple carriers for 220-lb bombs, 12.7-mm gun pods, or drop fuel tanks.



## IA 58A Pucará

When the Sri Lanka Air Force took delivery of the first of four Pucarás, in December 1993, it became the only operator of this twin-turboprop close-support aircraft outside South America. Initially based at Anuradhapura, these No. 7 Squadron aircraft are now located at Vavuniya, closer to the territory claimed by the Tamil separatists. Intended for low-level attack duties similar to those for which USAF's A-10A was produced, the Pucará's armored cockpit floor is resistant to .30-caliber ground fire from 500 ft. Fuel tanks are self-sealing. Onboard ECM is optional.

**Contractor:** Fábrica Militar de Aviones, Argentina.

**Power Plant:** two Turbomeca Astazou XVIG turboprops; each 978 shp.

**Dimensions:** span 47 ft 6 3/4 in, length 46 ft 9 1/4 in, height 17 ft 7 1/4 in.

**Weights:** empty 8,862 lb, gross 14,991 lb.

**Performance:** max speed at 10,000 ft 310 mph, ceiling 32,800 ft, T-O run at 12,125 lb weight 985 ft, landing run 656 ft, combat radius 140–606 miles.

**Accommodation:** crew of two on tandem zero/zero ejection seats. Rear seat raised.

**Armament:** two 20-mm Hispano DCA-804 guns, each with 270 rds; four 7.62-mm FN-Browning M2-30 guns, each with 900 rds; one underfuselage and two underwing pylons for up to 3,307 lb of gun and rocket pods, bombs, cluster bombs, napalm, mines, torpedoes, ASMs, camera pods, or drop tanks.

## Jaguar International

Called *Shamsher* ("Assault Sword") by the Indian Air Force, the Anglo-French Jaguar beat the Swedish Viggen and French Mirage F1 to fulfill the IAF's deep penetration strike aircraft requirement in 1978. The first 40, with 8,040 lb thrust Adour Mk 804 turbofans, were supplied by British Aerospace. On March 31, 1982, Hindustan Aeronautics flew the first of 45 more powerful Mk 811-engine Jaguars assembled from European-built component kits. The final 46, of which more than 30 have been delivered, are being manufactured almost entirely in India, bringing the overall total to 131 (116 single-seaters and 15 combat-capable tandem two-seaters). These basic strike aircraft are operated by Nos. 5, 14, 16, and 27 Squadrons.

Twelve single-seaters, of which eight are already in service, are being equipped for Poona-based No. 6 Squadron for antiship duties. Equipment includes Thomson-CSF Agave radar in a modified nose; a new DARIN (display attack and ranging inertial navigation) nav/attack system that includes SAGEM Uliss 82 inertial navigation system (INS), a GEC-Marconi COMED (combined map and electronic display), and Smiths Industries head-up display and weapon aiming computer system (HUDWACS); and Sea Eagle antiship missiles. (Data for HAL-built single-seater.)

**Contractor:** Hindustan Aeronautics Ltd, India.

**Power Plant:** two HAL-built Rolls-Royce Turbomeca Adour Mk 811 turbofans; each 8,400 lb thrust with afterburning.

**Dimensions:** span 28 ft 6 in, length 55 ft 2 1/2 in (incl nose-probe), height 16 ft 0 1/2 in.

**Weights:** empty 15,432 lb, gross 24,149–34,612 lb.

**Performance:** max speed above 19,685 ft Mach 1.5, at S/L 745 mph, ceiling 45,000 ft, T-O run 1,855–4,100 ft, landing run with brake-chute 1,540–2,200 ft, typical attack radius with internal fuel and max external stores 334 miles (lo-lo-lo), 530 miles (hi-lo-hi).

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** two 30-mm guns in fuselage; two Magic AAMs overwing; centerline pylon and two under each wing; max external load 10,500 lb, including eight 1,000-lb bombs, BL755 or Belouga cluster bombs, packs of 68-mm rockets, or a reconnaissance camera pack. One or two BAe Sea Eagle antiship missiles in maritime version.

## MiG-23/27 (NATO "Flogger")

Ten squadrons of the Indian Air Force fly single-seat light attack versions of the variable-geometry Flogger. Nos. 10 (Winged Dagger), 220 (Desert Tigers), and 221 have MiG-23BNs (Flogger-F), almost identical to MiG-23MF interceptors except for a redesigned forward fuselage. This is tapered sharply in side elevation to house a Sokol-23N nav/attack system. The underbelly 23-mm gun is retained, but the cockpit sides are armored; low-pressure tires are fitted for off-runway operation; the fuel tanks are redesigned to fill with neutral gas as the contents are used, to prevent explosion after impact; active and passive ECM are provided. About 90 of the 95 aircraft ordered in 1980 remain available, under the Indian name *Vijay*. The Afghan Army Air Force has up to 20 MiG-23BNs at Bagram, north of Kabul.

Hindustan Aeronautics assembled under license 165 similarly configured but more specialized tactical strike MiG-27Ms (Flogger-J) under the Indian name *Bahadur* ("Valiant"). The R-29B-300 turbojet of this version is unchanged, but it has fixed engine air intakes instead of the variable-geometry type of the MiG-23; two-position

afterburner nozzles; a wider and deeper nose, housing a laser rangefinder and target tracker behind a sloping window, to permit use of laser-guided missiles; a 30-mm six-barrel gun; a PrNK-23M nav/attack system, providing automatic flight control, gun firing, and weapons release, even during maneuvers; provision for new stores, including a three-camera reconnaissance pod; and other refinements. Deliveries were terminated in 1994, and 27Ms now equip Nos. 2, 9 (Wolf Pack), 18, 20, 22, 31 (Ocelots), and 222 (Tigersharks) Squadrons. A midlife update is proposed, to replace the PrNK-23M nav/attack system with HAL/Smiths/SAGEM DARIN. (Data for MiG-27M.)



**MiG-23BNs, Indian Air Force**  
(Peter Steinemann)



**Mirage 5DPA2, Pakistan Air Force**  
(Denis Hughes)



**OV-10C Bronco, Royal Thai Air Force**  
(Denis Hughes)

**Design Bureau:** Mikoyan OKB, Russia.

**Power Plant:** one Soyuz/Khachaturov R-29B-300 turbojet; 25,350 lb thrust with afterburning.

**Dimensions:** span 45 ft 10 in spread, 25 ft 6 1/4 in swept, length incl nose-probe 56 ft 0 1/4 in, height 16 ft 5 in.

**Weights:** empty 26,252 lb, gross 39,685 lb.

**Performance:** max speed at 26,250 ft Mach 1.7, at S/L Mach 1.1, ceiling 45,900 ft, T-O run 2,625 ft, combat radius at S/L 242 miles, ferry range 1,553 miles.

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** one underbelly 30-mm six-barrel GSh-6-30 gun; seven external hardpoints for 6,615 lb of 500-kg bombs, 57-mm rockets, two Kh-23 ("Kerry") ASMs, four R-60 ("Aphid") AAMs, or other stores.

## Mirage 5

No. 8 Squadron of the Pakistan Air Force, at Masroor, is the only south Asian dedicated combat unit to operate Mirage 5s, with a mix of land-attack 5PA2s and maritime-attack 5PA3s. No. 22 Squadron, the Mirage OCU (operational conversion unit), at the same base has 5PA4s and two two-seat 5DPA2s. Other 5PA4s equip the Mirage Squadron of the Combat Commanders' School at Sargodha. The Mirage 5 was intended originally as a specialized single-seat ground-attack development of the Mirage III fighter. The radar was deleted and other avionics and systems simplified to permit

increased internal fuel capacity and external stores load within the same gross weight, but subsequent options resulted in a narrowing of the differences between the equipment standards of the III and 5. Pakistan's 5PA2s have Cyrano IV multimission radar; the 5PA3s are equipped with Agave radar for compatibility with Exocet antiship missiles. About 40 5PA4s and 5PA2s, and 10 5PA3s, are currently operational. (Data generally as for Mirage III.)

## O2-337 Sentry

Eleven O2-337 (337H-SP) armed conversions of the Cessna T337 "push and pull" light twin are reported to be available for patrol/attack duties with No. 103 Squadron of the Royal Thai Navy. Used airframes were rebuilt by Summit to zero-time status before delivery, and four standard NATO MALL-4A pylons were mounted underwing on each aircraft to carry weapons and other stores. No. 3 Maritime Squadron of the Sri Lanka Air Force uses a basic Cessna 337F *Skymaster* for visual surveillance from Trincomalee (China Bay). (Data for O2-337.)

**Contractor:** Summit Aviation Inc, USA.

**Power Plant:** two Teledyne Continental TSiO-360 turbocharged piston engines; each 225 hp.

**Dimensions:** span 38 ft 2 in, length 29 ft 10 in, height 9 ft 2 in.

**Weights:** empty 3,160 lb, gross 5,200 lb.

**Performance:** max speed at S/L 188 mph, at 10,000 ft 206 mph, ceiling 28,500 ft, T-O run 538 ft, landing run 449 ft, range 1,100–1,353 miles.

**Accommodation:** provision for up to six seats.

**Armament:** Each pylon can carry up to 350 lb, including 7.62-mm or 12.7-mm gun pods, rocket pods, bombs, containers, markers, flares, and other stores.

## OV-10C Bronco

The twin-turboprop, twin-boom OV-10 Bronco was the first aircraft designed from the start for specialized counterinsurgency operations. In 1971–73, the Royal Thai Air Force took delivery of 32 OV-10Cs for light ground-attack and forward air control (FAC) missions. About half of them still equip No. 411 Squadron of 41 Wing at Chiang Mai. Flying over the local mountains, they form part of the forces combating insurgency and drug trafficking in the notorious Golden Triangle.

**Contractor:** Rockwell International Corporation, USA.

**Power Plant:** two AlliedSignal T76-G-416/417 turboprops; each 715 ehp.

**Dimensions:** span 40 ft 0 in, length 41 ft 7 in, height 15 ft 2 in.

**Weights:** empty 6,893 lb, gross 9,908–14,444 lb.

**Performance:** max speed at S/L 281 mph, ceiling 24,000 ft, T-O run (9,908 lb gross weight) 740 ft, landing run 740–1,250 ft, combat radius with 3,600 lb weapon load 228 miles.

**Accommodation:** crew of two, in tandem.

**Armament:** two short sponsons each house two 7.62-mm M60C machine guns, with 500 rds per gun. Four pylons under sponsons each have a capacity of 600 lb; a centerline fifth pylon can carry 1,200 lb. Stores can include bombs, fire bombs, cluster bombs, rocket packs, 7.62-mm Minigun and 20-mm gun pods, flares, smoke canisters, and Sidewinder AAMs.

## Sea Harrier

The 23 Sea Harrier FRS. Mk 51s bought for operation from the Indian Navy's two carriers, *INS Vikrant* and *Viraat*, are similar to the Royal Navy's original FRS. Mk 1s, which performed so well in the 1982 Falklands campaign. Six were delivered in 1983–84, followed by 17 more in 1989–92; 22 remain in service with Indian Navy Air Squadron 300 (White Tigers). They are based at Dabolim, Goa, when not embarked, together with the four Harrier T. Mk 60 tandem two-seat trainers of INAS 551, the Navy's jet OCU. The trainers are similar to the nonmaritime Harrier but have Sea Harrier avionics (minus the Blue Fox air-to-air/air-to-surface radar). In late 1995, government approval was awaited for a proposed upgrade for the single-seaters that would combine Elta (Israel) pulse-Doppler fire-control radar and electronic warfare equipment with British Aerospace ASRAAM dogfight missiles. (Data for FRS. Mk 51.)

**Contractor:** British Aerospace Defence Ltd, UK.

**Power Plant:** one Rolls-Royce Pegasus Mk 104 vectored-thrust turbofan; 21,500 lb thrust.

**Dimensions:** span 25 ft 3 in, length 47 ft 7 in, height 12 ft 2 in.

**Weights:** empty 14,052 lb, gross 26,200 lb.

**Performance:** max speed at high altitude Mach 1.25, at S/L more than 736 mph EAS, short T-O run (without ski-jump) approx 1,000 ft, high-altitude intercept radius 460 miles, strike radius 288 miles.

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** one centerline and four underwing hardpoints for up to 8,000 lb of stores (5,000 lb for vertical T-O), including Sea Eagle ASMs, 1,030-lb free-fall and 1,120-lb parachute-retarded bombs, rockets, and flares. Four Magic 2 AAMs can be carried on outboard



pylons. Provision for replacing underfuselage strake fairings with two 30-mm Adgen gun pods.

#### Su-7BM/20/22M-4 (NATO "Fitter-A/C/K")

The current strength and combat capability of the Afghan Army Air Force are unknown. There is reported to be a fighter regiment at Shindand with up to 70 single-seat Fitters of various kinds. Thirty of them are said to be original fixed-wing Su-7BMs (Fitter-A). The rest are a mix of early production variable-geometry Su-20s (Fitter-C) and Su-22M-4s (Fitter-K) bequeathed to the Air Force when Soviet forces quit Afghanistan. The 22M-4s represent the final and most advanced variant of the Fitter family, with the same power plant as, and indistinguishable externally from, the Russian Air Force's Su-17M-4. The outer wings offer manually set sweep angles of 30°, 45°, and 63°. Features compared with the Su-20 include a laser rangefinder in the intake centerbody, Doppler navigation radar inside the bottom of the deepened nose, additional fuel in a deeper spine fairing, and a cooling air intake forward of the dorsal fin. (Data for Su-22M-4.)

**Design Bureau:** Sukhoi OKB, Russia.

**Power Plant:** one Saturn/Lyulka AL-21F-3 turbojet; 24,800 lb thrust with afterburning.

**Dimensions:** span 44 ft 10 in spread, 32 ft 10 3/4 in swept, length incl probes 62 ft 5 in, height 16 ft 10 in.

**Weights:** empty 23,738 lb, gross 42,770 lb.

**Performance:** max speed at height Mach 1.74, at S/L Mach 1.1, ceiling 49,865 ft, T-O run 4,922 ft, landing run 3,609 ft, range at high altitude 1,585 miles, at S/L 870 miles.

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** two 30-mm NR-30 guns in wingroots, each with 80 rds. Nine pylons under wings and fuselage for up to 8,820 lb of bombs, rocket packs, 23-mm gun pods, two R-60 ("Aphid") AAMs, or ASMs including Kh-25ML ("Karen"), Kh-27 ("Kegler"), Kh-29 ("Kedge"), and Kh-58 ("Kilter"). When gun pods are fitted, with downward attack capability, the two underbelly pods can be mounted to fire rearward.

#### Su-25 (NATO "Frogfoot")

Afghanistan is believed to have obtained 12 single-seat Su-25 (Frogfoot-A) close-support aircraft and three two-seat Su-25UB (Frogfoot-B) operational conversion and weapons trainers in 1988. Their status after seven years of conflict is unknown. If fully serviceable, they offer a formidable attack capability, not least because of the features built into them to reduce vulnerability when battling through to ground targets at low level with a heavy weapon load. Details of these were given in the "Gallery of Russian Aerospace Weapons" in the March 1995 *Air Force Magazine*. Self-protection aids include a radar warning system, AAMs, and 256 flares to counter IR missiles. The turbojets are able to operate on any fuel likely to be available in combat areas, including MT gasoline and diesel oil. (Data for basic Su-25.)

**Design Bureau:** Sukhoi OKB, Russia.

**Power Plant:** two Soyuz/Tumansky R-195 turbojets; each 9,921 lb thrust.

**Dimensions:** span 47 ft 1 1/2 in, length 50 ft 11 1/2 in, height 15 ft 9 in.

**Weights:** empty 20,950 lb, gross 32,187-38,800 lb.

**Performance:** max level speed at S/L Mach 0.8, max attack speed, airbrakes open, 428 mph, ceiling 22,965 ft, T-O run 1,970-3,935 ft, landing run 1,312-1,970 ft, range with 9,700 lb of weapons at S/L 466 miles, at height 776 miles.

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** one twin-barrel AO-17A 30-mm gun in port side of nose, with 250 rds. Eight underwing pylons for 9,700 lb of air-to-surface weapons, including Kh-23 ("Kerry"), Kh-25 ("Karen"), and Kh-29 ("Kedge") ASMs, SPPU-22 pods for 23-mm guns with twin barrels that pivot downward, 57-mm to 330-mm rockets, laser-guided rocket-boosted bombs, and 1,100-lb incendiary, antipersonnel, and other cluster bombs. Two small outboard pylons for R-3S ("Atoll") or R-60 ("Aphid") AAMs.

nine BN-2A Maritime Defenders have Bendix RDR 1400 radar and are allocated to INAS 318 at Port Blair. INAS 550 at Cochin received six standard BN-2A Defenders for multiengine training and general observation duties. Pakistan's Navy formed a new squadron, No. 93 at Mehran, to operate the two BN-2T Maritime Defenders of the Maritime Security Agency on EEZ (exclusive economic zone) patrol. A former Seychelles police islander has been militarized and transferred to that country's Defense Force, also for maritime patrol, and a second may be in service with the Seychelles Navy. (Data for BN-2T Maritime Defender.)

**Contractor:** Pilatus Britten-Norman, UK.

**Power Plant:** two Allison 250-B17C turboprops; each 320 shp (flat rated).

**Dimensions:** span 49 ft 0 in, length 36 ft 3 3/4 in, height 13 ft 8 3/4 in.

**Weights:** empty 4,040 lb, gross 7,000 lb.

**Performance:** max cruising speed at 10,000 ft 196 mph, at S/L 177 mph, ceiling over 25,000 ft, T-O run 837 ft, landing run 757 ft, range 679 miles (IFR), 838 miles (VFR).

**Accommodation:** crew of one or two; mission stations for four observers or seats for up to nine passengers, or six litters and two medical attendants.

**Armament:** two underwing hardpoints on each side for gun or sensor pods, releasable weapons, or (in-board) auxiliary fuel tanks.



Dornier 228-212, Royal Thai Navy



F27 Maritime, Royal Thai Navy

#### Br 1150 Atlantic 1

Three former French Navy Atlantic 1 maritime patrol aircraft were sold to Pakistan in the mid-1970s; a fourth was acquired later. They are operated by No. 29 Squadron of the Pakistan Navy at Mehran. Equipment includes a retractable radar, magnetic anomaly detector (MAD) tailboom, and an Arar electronic surveillance measures (ESM) pod on the fin tip. Sonobuoys and marker flares are stowed in the rear fuselage. The pressurized upper deck accommodates both the normal operational crew (two pilots, a flight engineer, three observers, a radio navigator, ESM/ECM/MAD operator, radar/IFF operator, tactical coordinator, and two acoustic sensor operators) and a relief crew.

Thomson-CSF of France is to upgrade two of the Atlantics (with options on the other two) by installing its Ocean Master radar, a maritime situation control system, new sonobuoy signal processing and navigation equipment, and DR 3000A ESM. To provide a spares

source for the four operational Atlantics, three additional surplus aircraft, minus avionics, were acquired from France in late 1994.

**Contractor:** SECBAT consortium, France, Germany, Italy, Belgium, and the Netherlands.

**Power Plant:** two Rolls-Royce Tyne RTy20 Mk 21 turboprops; each 6,106 hp.

**Dimensions:** span 119 ft 1 1/4 in, length 104 ft 2 in, height 37 ft 2 in.

**Weights:** empty 55,115 lb, gross 98,105 lb.

**Performance:** max speed at height 409 mph, max cruising speed at 19,685 ft 363 mph, ceiling 32,800 ft, T-O to 50 ft 4,430 ft, landing from 50 ft 3,215 ft, range 5,590 miles, max endurance 18 hr.

**Accommodation:** crew of 12 (see above), plus provision for full relief crew.

**Armament:** internal weapons bay accommodates standard bombs, mines, 385-lb depth bombs, four homing or nine acoustic torpedoes, or two Exocet ASMs. Underwing pylons for two more stores.

#### Dornier 228

This German STOL transport has appeared in several variants, of which the 228-100 series can carry 15 passengers; the 228-200 series (of which the -212 is now the standard model) is 5 ft longer. No. 202 Squadron of 2 Wing, Royal Thai Navy, is receiving three 228-212 maritime patrol aircraft, to supplement three operated by No. 101 Squadron of 1 Wing from U Tapao AB since 1993. As part of Thailand's Eastern Seaboard Protection force, these aircraft are used for surveillance missions, offshore patrol, and search and rescue. The airframes have special anticorrosion treatment. Role equipment includes Bendix/King RDR-1500B maritime search radar in an underfuselage blister, a searchlight pod on one of four underwing hardpoints, and a roller door for air-dropping survival equipment. Smoke markers and flares can be dropped from a chute in the rear of the cabin. Avionics include a digital navigation display.

India contracted in 1983 to license-build up to 150 Dornier 228s at HAL's Kanpur Division, preceded by a few German-built examples. First recipient was the Indian Coast Guard (36 228-101s ordered), with which they serve at CGAS 744 and 750 for coastal patrol, antipollution, and antismuggling missions. These have a crew of four, 360° scan Marec radar in an underfuselage fairing, Omega navigation, an IR/UV linescan for pollution detection, a one-million-candlepower searchlight, loudspeaker, marine markers, a sliding cabin door to permit air-dropping six- or 10-man life rafts, and provisions for underwing antipollution spray-pods. Armament of two underwing 7.62-mm gun pods or ASMs is optional.

The 50 Dornier 228-201s being delivered for Nos. 41 and 59 Squadrons of the Indian Air Force have a large rear-fuselage cargo door and are used for various utility and logistic support roles. The shore-based Indian Navy version (24 planned) is also the 228-201, equipped for maritime surveillance and antiship missions with Super Marec radar and antiship missiles. They have replaced Breguet Alizés of INAS 310 at Dabolim. The Bhutan Air Arm has a single 228 for utility operations. (Data for basic 228-212.)

**Contractors:** Daimler-Benz Aerospace, Germany.

**Power Plant:** two AlliedSignal TPE331-5-252D turboprops; each 776 shp.

**Dimensions:** span 55 ft 8 in, length 54 ft 4 in, height 15 ft 11 1/2 in.

**Weights:** empty 8,243 lb, gross 14,110-14,550 lb.

**Performance:** max cruising speed at 10,000 ft 269 mph, ceiling 28,000 ft, T-O run 2,200 ft, landing distance from 50 ft 1,320 ft, range 645-1,519 miles.

**Accommodation:** crew of one or two; transport, 19 passengers and 728 lb baggage, or 5,159 lb freight; ambulance, six litter patients plus nine sitting casualties/medical attendants.

**Armament:** none in basic transport role.

#### F27 Maritime, Friendship, and Troopship

Maritime, surveillance, and transport variants of the twin-turboprop Fokker F27 Friendship serve with four nations in south Asia. The basic unarmed F27 Maritime is configured primarily for coastal surveillance or search and rescue, although a Maritime Enforcer variant can be equipped by the operator for antisubmarine warfare (ASW), antiship, or armed surveillance (Fokker does not install armament). Three F27 Maritimes are operated by No. 101 Squadron of the Royal Thai Navy; although armed with Harpoon ASMs, they do not have full Enforcer-standard avionics.

The RTN's No. 202 Squadron operates a pair of F27 Mk 400M Troopships for personnel/cargo transport. A single F27 Mk 200 Friendship still flies with No. 12 (Transport) Squadron of the Pakistan Air Force. Three Mk 200s, converted and upgraded to F27 Maritime, are used by No. 27 Squadron of the Pakistan Navy and one by the Indian Coast Guard. Five operated by the Myanmar Air Force's transport squadron include an F27 Mk 100, with lower-rated (1,715 shp) Dart Mk 514

## Bombers and Maritime Aircraft

#### BN-2 Maritime Defender

About 1,200 of these small STOL utility transports have been sold, a substantial proportion of them as Defenders or military Islanders, with either 260 hp O-540 or 300 hp IO-540 piston engines (BN-2A and B) or 320 shp turboprops (BN-2T). Maritime Defenders have a "thimble" nose fairing for their search radar. Major operator in south Asia is the Indian Navy, whose



engines, and three Fairchild-built FH-227Bs, a stretched version of the Mk 200 with 2,250 shp Dart Mk 532s. (Data for F27 Maritime.)

**Contractor:** Fokker Aircraft BV, the Netherlands.

**Power Plant:** two Rolls-Royce Dart Mk 552 turboprops; each 2,210 shp.

**Dimensions:** span 95 ft 1 1/4 in, length 77 ft 3 3/2 in, height 28 ft 6 1/2 in.

**Weights:** empty 27,600 lb, gross 45,000–47,500 lb.

**Performance** (at 38,000 lb weight): normal cruising speed at 20,000 ft 287 mph, ceiling 29,500 ft, T-O run 3,200 ft, landing run 2,000 ft, max range 3,107 miles.

**Accommodation:** crew of two or three. Maritime, two to four tactical compartment operators. Troopship, up to 46 paratroops, 24 litters plus nine sitting casualties/medical attendants, or 13,283 lb of cargo.

**Armament** (not fitted by Fokker): Enforcer has two stations under fuselage and three under each wing for two or four torpedoes/depth bombs and/or two antiship missiles; provision for drop tank on each center underwing station.

### II-38 (NATO "May")

This intermediate-range, shore-based, antisubmarine/maritime patrol aircraft has a history matching that of the US Navy's P-3 Orion. Ilyushin began with the II-18 turboprop airliner. To house all the required role equipment and operators, the fuselage was lengthened, and the wings were moved forward to keep the center of gravity right. Standard avionics include nav/weather radar in the nose, search radar (NATO "Wet Eye") in an undernose radome, and an MAD tailsting. Weapons and other stores are carried in two internal bays in the fuselage, forward and aft of the wing carry-through structure. INAS 315 (Winged Stallions) of the Indian Navy has flown five refurbished former Soviet Navy II-38s from Dabolim, Goa, since 1976.

**Design Bureau:** Ilyushin OKB, Russia.

**Power Plant:** four ZMKB Progress/Ivchenko AI-20M turboprops; each 4,190 ehp.

**Dimensions:** span 122 ft 9 1/4 in, length 129 ft 10 in, height 33 ft 4 in.

**Weights:** empty 79,367 lb, gross 140,000 lb.

**Performance:** max speed at 21,000 ft 448 mph, patrol speed at 2,000 ft 248 mph, T-O run 4,265 ft, landing run 2,790 ft, range 4,473 miles, endurance 12 hr.

**Accommodation:** crew of 12.

**Armament:** attack weapons and sonobuoys in weapon bays.

### N24A Searchmaster/N22B Missionmaster

No. 202 Squadron of the Royal Thai Navy at Songkhla has five N24A Searchmaster Ls for maritime patrol and surveillance. Their equipment includes a 360° scan Litton APS-504(V)2 search radar with a 40-in flat-plate phased-array antenna in an undernose "lozenge" radome; Doppler, Omega, or inertial long-range navigation; and Barra SSQ-801 sonobuoys. One or more now have a side-looking airborne radar. Primary role is anti-piracy patrols in the Gulf of Thailand. At Phitsanulok and Don Muang, respectively, Nos. 461 and 605 Squadrons of the Royal Thai Air Force have between them about 22 shorter-fuselage N22B Missionmasters for utility and tactical transport duties (crew of one or two, plus up to 14 passengers). Some of these have been adapted as makeshift gunships. Thailand is the only south Asian operator of this Australian short/medium-range STOL utility twin. (Data for Searchmaster L.)

**Contractor:** Government Aircraft Factories, Australia.

**Power Plant:** two Allison 250-B17C turboprops; each 420 shp.

**Dimensions:** span 54 ft 2 in, length 47 ft 1 in, height 18 ft 2 in.

**Weights:** empty 5,897 lb, gross 9,100 lb.

**Performance:** normal cruising speed 193 mph, ceiling 20,000 ft, T-O run 970 ft, landing run 780 ft, range 840 miles.

**Accommodation:** crew of five.

**Armament:** provision for four underwing hardpoints, each for a 500-lb store, including gun and rocket pods.

### P-3 Orion

Five former US Navy P-3As were purchased by the Royal Thai Navy in 1992, including two nonflying airframes delivered in 1994 as a spare source. The next two, delivered after conversion by the Naval Air Depot at Jacksonville, Fla., arrived in Thailand in February 1995. Allocated to No. 101 Squadron at U Tapao, they are designated as P-3T patrol aircraft, with modified tactical navigation suite and AN/AWG-19 Harpoon antiship missile control system. The fifth aircraft is converted as a UP-3T utility/trainer, with some tactical sensor capability, including AN/AAS-36 IR detection, ESM, and TO-441/A tactical computer, and was due for delivery in late 1995.

Three P-3C Update II.75s were built for Pakistan in FY 1989, and crew training had been completed in 1991 before a delivery embargo was imposed. This was lifted in the fall of 1995. (Data for P-3C Update III.)



**N24A Searchmaster L, Royal Thai Navy**



**F-5E Tiger II, Royal Thai Air Force (Denis Hughes)**



**F-6s, Pakistan Air Force (Peter Steinemann)**

**Contractor:** Lockheed Aeronautical Systems Group, USA.

**Power Plant:** four Allison T56-A-14 turboprops; each 4,910 ehp.

**Dimensions:** span 99 ft 8 in, length 116 ft 10 in, height 33 ft 8 1/2 in.

**Weights:** empty 61,491 lb, max expendable load 20,000 lb, normal gross 135,000 lb.

**Performance:** econ cruising speed at 110,000 lb gross weight at 25,000 ft 378 mph, patrol speed at 1,500 ft at same weight 237 mph, ceiling 28,300 ft, T-O run 4,240 ft, landing distance 2,770 ft, mission radius (three hours on station at 1,500 ft) 1,550 miles.

**Accommodation:** normal crew of 10, including five in tactical compartment in main cabin; up to 11 additional relief crew or passengers.

**Armament:** one 2,000-lb or three 1,000-lb mines, or up to eight depth bombs or torpedoes, or depth bomb/torpedo combinations, in internal weapons bay. Ten underwing pylons for torpedoes, mines, rockets, or other stores.

### Tu-142M (NATO "Bear-F")

Eight giant Tu-142M (Bear-F) turboprop long-range maritime reconnaissance aircraft, acquired by India in 1985, continue in service with Naval Squadron INAS 312 at Arkonam. Equipped to the standard known to NATO as Mod 3, their J-band overwater search-and-surveillance radar ("Wet Eye") is housed in a large radome under the center-fuselage. A fairing that projects rearward from the tip of the tailfin contains MAD gear. Bear-F's basic endurance of around 30 hours can be extended by in-flight refueling.

**Design Bureau:** Tupolev OKB, Russia.

**Power Plant:** four KKBK Kuznetsov NK-12MV turboprops; each 14,795 ehp.

**Dimensions:** span 167 ft 8 in, length 162 ft 5 in, height 39 ft 9 in.

**Weight:** gross 407,850 lb.

**Performance:** max speed at 25,000 ft 575 mph, ceiling 41,000 ft, combat radius (unrefueled) 5,150 miles.

**Accommodation:** basic crew of 10 (commander, copilot, five weapon system operators, flight engineer, flight signaller, gunner) can be supplemented by relief crew members for long missions.

**Armament:** depth charges, torpedoes, and sonobuoys in two weapons bays in rear fuselage. Two 23-mm guns in manned tail turret.

## Fighters

### F-5E Tiger II

Since receiving F-16s in 1988, the Royal Thai Air Force has reassigned some of its F-5s to surface-attack roles, including antiship missions. No. 231 Squadron at Udorn Thani has a mixture of eight single-seat F-5A fighters, six two-seat F-5B combat trainer counterparts, one camera-equipped RF-5A, and four single-seat F-5Es. Two squadrons (No. 211 at Ubon and No. 711 at Surat Thani) fly F-5Es, for air defense and "aggressor" duties, respectively. The RTAF still has about 40 F-5Es and five or six two-seat F-5Fs. The F-5Es have Litton LN-39 INS, AN/ALR-46 radar warn-

ing receivers, ALE-40 chaff/flare dispensers, and HUD/WACS, plus provision for a podded GPU-5/A30-mm gun. (Data for F-5E.)

**Contractor:** Northrop Corporation, USA.

**Power Plant:** two General Electric J85-GE-21B turbojets; each 5,000 lb thrust with afterburning.

**Dimensions:** span 26 ft 8 in (27 ft 1 1/2 in over wingtip AAMs), length (incl nose-probe) 47 ft 4 3/4 in, height 13 ft 4 1/4 in.

**Weights:** empty 9,723 lb, gross 24,722 lb.

**Performance:** max speed at 36,000 ft Mach 1.64, ceiling 51,800 ft, T-O run 2,000–5,700 ft, landing run with brake-chute 2,500 ft, typical hi-lo-hi combat radius with max internal fuel, two 530-lb bombs, and two Sidewinder AAMs 553 miles.

**Accommodation:** pilot only, on ejection seat.

**Armament:** two 20-mm M39A2 guns in nose; AIM-9 Sidewinder AAM at each wingtip; one underfuselage and four underwing stations for up to 7,000 lb of bombs, cluster bombs, gun pods, rocket packs, napalm tanks, missiles, or other stores.

### F-6 (NATO "Farmer")

MiG-19s were license-built and later developed in China by Nanchang and Shenyang under the designations J-6 for the Chinese armed forces and F-6 for export. The standard J-6/F-6 day fighter-bomber corresponded to the Soviet MiG-19SF (Farmer-C). Variants included Shenyang JJ-6 (export FT-6) tandem two-seat trainers. Around 200 F-6s were delivered to Pakistan between 1966 and the late 1970s, after US military aid had been suspended following the 1965 Indo-Pakistan war. They were modified in Pakistan to carry Sidewinder AAMs and, later, to have Martin-Baker zero/zero ejection seats. A quantity of FT-6s were delivered from 1980.



The Pakistan fleet has now reduced to about 50 F-6s, still equipping Nos. 15, 17, and 23 Squadrons and No. 19 Squadron (OCU). Each unit has a few FT-6s as well, and the latter type also serves as a conversion trainer with each of the PAF's squadrons of A-5Cs. However, phasing out of the F-6 began following the arrival of F-7s, and about 40 were transferred to the Bangladesh Defense Force Air Wing in 1990. Many F/FT-6s were lost in spring 1991 during that country's disastrous floods. Bangladesh had previously received 24 F-6s directly from China, but only No. 25 Squadron (Trendsetters) at Chittagong, the fighter OCU, is now an F-6 unit, with 16 F-6s and a single reconnaissance RF-6. (Data for F-6 day fighter.)

**Contractors:** Nanchang Aircraft Manufacturing Company and Shenyang Aircraft Corporation, People's Republic of China.

**Power Plant:** two Shenyang/Chengdu WP6 turbojets; each 7,165 lb thrust with afterburning.

**Dimensions:** span 30 ft 2 1/4 in, length incl probe 48 ft 10 1/2 in, height 12 ft 8 3/4 in.

**Weights:** empty 12,700 lb, gross 22,045 lb.  
**Performance:** max speed at 36,000 ft Mach 1.45, at S/L 832 mph, ceiling 58,725 ft, T-O run 2,953 ft, landing run with brake-chute 1,970 ft, combat radius with two drop tanks 426 miles, max range on internal fuel 863 miles.

**Accommodation:** pilot only, on ejection seat.

**Armament:** three 30-mm NR-30 guns, in nose and each wingroot. Two pylons under each wing, inboard of hardpoint for external tank, to carry packs of eight air-to-air rockets, AAMs, two 550-lb bombs, or air-to-surface rockets of up to 212-mm caliber.

### F-16 Fighting Falcon

Twenty-eight Block 15 F-16As and 12 combat-capable two-seat F-16Bs were delivered to the Pakistan Air Force between 1983 and 1986. They equip Nos. 9 (Griffins) and 11 (Arrows) Squadrons at Sargodha and No. 14 (Shaheens) Squadron at Kamra; equipment includes Thomson-CSF Atlas laser target designation pods. Attrition has reduced the original 40 to about 36 (25 As and 11 Bs), but until recently spares for these were embargoed and the number still serviceable may be lower than that figure.

Twenty-eight (13 As and 15 Bs) were completed of a follow-on order for 71 (54+17), but these have been embargoed since October 1990 and will be sold to other customers. They are to Block 15 OCU (operational capabilities upgrade) standard, with updated radar, improved fire-control and stores-management systems, and Westinghouse AN/ALQ-131 jammer pods.

Deliveries of 14 Block 15 OCU F-16As and four F-16Bs to No. 103 Squadron of the Royal Thai Air Force at Korat began in June 1988. A similar-size batch, delivered from September 1995, consists of 12 Block 15 OCU F-16As and six F-16Bs. They replace Northrop F-5E/Fs of No. 403 Squadron at Takhli. (Data for Block 15 F-16A.)

**Contractor:** General Dynamics Corporation, USA (now Lockheed Martin Tactical Aircraft Systems).

**Power Plant:** one Pratt & Whitney F100-PW-200 turbofan; 23,450 lb thrust with afterburning.

**Dimensions:** span 31 ft 0 in, length 49 ft 4 in, height 16 ft 8 1/2 in.

**Weights:** empty 16,285 lb, gross 37,500 lb.

**Performance:** max speed at 40,000 ft Mach 2.05, ceiling more than 50,000 ft, T-O run 3,250 ft, landing run (with brake-chute) 2,430 ft, combat radius more than 575 miles, range with drop tanks more than 2,415 miles.

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** one M61A1 multibarrel 20-mm gun, with 515 rds, in port-side wing/body fairing. One under-fuselage and six underwing stations, plus AAM rail at each wingtip. External stores (load limit 12,000 lb) can include wide range of single or cluster bombs, rockets, laser-guided and electro-optical weapons and sensors, Pave Penny laser tracker pod, forward-looking infrared or jammer pods, or drop tanks.

### MiG-21 (NATO "Fishbed") and F-7M Aiguard

At least 800 MiG-21s were either imported or built under license for the Indian Air Force by Hindustan Aeronautics Ltd in a program that ran for a decade and a half and embraced three major variants. HAL produced about 200 MiG-21FLs before switching to the improved MiG-21M, after importing two squadrons of the similar MF. Of these earlier models, the IAF still operates two or three squadrons of FLs and three or four M/MF squadrons. Most of the 350 or so now in IAF service, equipping a further 10.5 squadrons, are of the improved MiG-21bis version (Indian name Vikram), of which about 250 were produced by HAL from 1980 to 1987. The 40 or so MiG-21U combat-capable two-seat trainers that serve alongside them were supplied by the USSR. This year, the Mikoyan factory will begin to apply its MiG-21-93 upgrade to 125 of the IAF's MiG-21bis for redelivery from early 1997, to offset delays in

developing India's indigenous replacement, the LCA (Light Combat Aircraft). The upgrade will include a lightweight multifunction radar, ring-laser INS, MIL-1553B data bus, radar warning receiver, and cockpit voice recorder, plus the ability to carry R-27 ("Alamo"), R-73 ("Archer"), and R-77 ("Adder") AAMs. A further 70 Indian MiG-21s may be upgraded later. Since the Soviet withdrawal in 1989, Afghanistan has received increasing numbers of ex-Soviet MiG-21s, which currently number about 50 single-seaters and 10 trainers and equip four squadrons forming part of No. 322 Fighter-Interceptor Regiment.

Virtually all other MiG-21 variants in the region are F-7M Aiguards, an export version of the domestic J-7 II developed in China from the original J-7 (license-built MiG-21F-13). The Pakistan Air Force ordered 20 in 1985, modified to meet PAF requirements. Deliveries to No. 20 Squadron at Rafiqi began in July 1988; they became operational some 16 months later. Designated F-7P by the PAF, they have since been supplemented by 60 more F-7Ps and 15 Guizhou-built two-seat FT-7s (PAF designation F-7TP), equipping No. 2 Squadron at Masroor, Nos. 18 and 20 at Rafiqi, and a training unit, No. 25 (OCU) Squadron, at Mianwali. A further 40 F-7Ps were reportedly ordered in 1992 to offset the US embargo on Pakistan's order for 71 F-16s. Other F-7 recipients include Bangladesh, Myanmar, and Sri Lanka. Bangladesh has 16 F-7Ms and four trainers in service with No. 5 Squadron (Supersonics) at Dhaka and No. 35 (Thundercats) at Chittagong. A few ex-Soviet MiG-21MFs and a single MiG-21UM may also survive with the former squadron. The four aircraft that (with a single FT-7) equip Sri Lanka's No. 5 Squadron at Katunayake are a hybrid version designated F-7BS, with an early-model F-7B fuselage and the four-pylon wings of the F-7M. Delivery of Myanmar's 30 F-7Ms and six FT-7s was completed in 1994. (Data for F-7M.)

**Contractor:** Chengdu Aircraft Industrial Corporation, People's Republic of China.

**Power Plant:** one Chengdu WP7B(BM) turbojet; 13,448 lb thrust with afterburning.

**Dimensions:** span 23 ft 5 1/2 in, length excl probe 45 ft 9 in, height 13 ft 5 1/2 in.

**Weights:** empty 11,629 lb, gross 16,603 lb.



F-16As, Pakistan Air Force  
(Denis Hughes)



MiG-21bis, Indian Air Force



MiG-29, Indian Air Force  
(Peter Steinemann)

**Performance:** max speed at height Mach 2.05, ceiling 59,710 ft, T-O run 3,117 ft, landing run with brake-chute 2,953 ft, combat radius on internal fuel (hi-lo-hi) 373 miles, range with three drop tanks 1,081 miles.

**Accommodation:** pilot only, on zero height/81 mph ejection seat.

**Armament:** two 30-mm Type 30-1 guns in lower front fuselage. Four underwing hardpoints for two or four PL-2/2A/5B/7 or Magic AAMs, pods of 18 x 57-mm or seven 90-mm rockets, bombs of up to 1,100 lb, or drop tanks (one 211 gallon on centerline and/or two 132 gallon under wings).

### MiG-23 (NATO "Flogger")

About 35 MiG-23MF (NATO Flogger-B) variable-geometry single-seat interceptors remain available to No. 224 (Warlords) Squadron of the Indian Air Force, based at Adampur. Known by the Indian name Rakshak ("Guardian"), this version has Sapfir-23D ("High Lark") radar, with a search range of 43 miles and tracking range of 34 miles, an undernose infrared sensor pod, and radar warning system. It carries both close-range and medium-range AAMs. Also in service are about 15 MiG-23UB (Flogger-C) tandem two-seat trainers, with a 22,045 lb thrust Tumansky R-27F2M-300 turbojet. (Data for MiG-23MF.)

**Design Bureau:** Mikoyan OKB, Russia.

**Power Plant:** one Soyuz/Khachaturov R-29-300 turbojet; 27,540 lb thrust with afterburning.

**Dimensions:** span 45 ft 10 in spread, 25 ft 6 1/4 in swept, length (incl nose-probe) 54 ft 10 in, height 15 ft 9 3/4 in.

**Weight:** gross 34,725-45,570 lb.

**Performance:** max speed at height Mach 2.35, at S/L Mach 1.1, ceiling 59,000 ft, combat radius 600 miles.

**Accommodation:** pilot only, on ejection seat.

**Armament:** one twin-barrel 23-mm GSh-23L gun in belly pack. One pylon under center-fuselage, one under each engine air intake duct, and one under each fixed inboard wing panel, for AAMs, bombs, rocket packs, or other stores. Use of twin launchers under the air intake ducts permits carriage of four R-60T ("Aphid") missiles, in addition to two R-23R ("Apex") on underwing pylons.

### MiG-29 (NATO "Fulcrum")

Three squadrons of MiG-29s now form the primary air-superiority equipment of the Indian Air Force, with more anticipated. Seventy-three MiG-29 (Fulcrum-A) single-seaters and seven MiG-29UB (Fulcrum-B) two-seat combat trainers were ordered initially, and as attrition replacements, to equip No. 28 (First Super-sonics) and No. 47 (Flying Archers) Squadrons at Poona, and No. 223 (Tridents) at Adampur, under the Indian name Baaz ("Eagle"). The aircraft retain all or most of the operational equipment fitted to MiG-29s in service in the CIS, including coherent pulse-Doppler look-down/shoot-down radar, an infrared search and track (IRST) sensor, anti-FOD (foreign-object damage) doors in the engine air intakes, 360° radar warning system, laser rangefinder, and flare packs in the "fences" forward of the tailfins. Thirty additional MiG-29s are reported to have been ordered. The in-service aircraft are to be upgraded with new avionics and the latest R-77 ("Adder") AAMs. (Data for basic MiG-29.)

**Design Bureau:** MAPO-MiG, Russia.

**Power Plant:** two Klimov/Sarkisov RD-33 turbofans; each 18,300 lb thrust with afterburning.

**Dimensions:** span 37 ft 3 3/4 in, length 56 ft 10 in, height 15 ft 6 1/4 in.

**Weights:** empty 24,030 lb, gross 33,600-40,785 lb.

**Performance:** max speed at height Mach 2.3, at S/L Mach 1.225, ceiling 55,775 ft, T-O run 820 ft, landing run with brake-chute 1,970-2,300 ft, range 932-1,300 miles.

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** six close-range R-60T/MK ("Aphid") or four R-60T/MK and two medium-range R-27R-1 ("Alamo-A") AAMs on six underwing pylons; provision for carrying R-73A/E ("Archer") close-range AAMs; able to carry bombs, submunitions dispensers, napalm tanks, and 80-mm, 130-mm, and 240-mm rockets, up to maximum 6,615 lb, in attack role. One 30-mm GSh-301 gun in port wingroot extension, with 150 rds.

### Mirage III

About 16 of the Pakistan Air Force's original 23 Mirage IIIs (13 Mirage IIIEP all-weather low-altitude attack fighters and three IIIDP tandem two-seat trainers) still equip the service's No. 5 Squadron at Rafiqi. The fighters are equipped with Thomson-CSF Cyrano II fire-control and ground-mapping radar, GEC-Marconi Doppler radar, and navigation/bombing computers, but qualification began in late 1993 of a new SAGEM weapon delivery, navigation, and reconnaissance system, known as MAESTRO (modular avionics enhancement system targeted for retrofit operations), to extend their air-to-air performance and provide air-to-ground attack capability. A new multimode pulse-Doppler ra-



dar is also expected. Thirty-six of the 42 **Mirage IIIOs** and eight two-seat **DOs** acquired when Australia replaced them with Hornets are being reworked by Pakistan's Mirage Rebuild Factory at Kamra, to equip two further squadrons; the remainder will be cannibalized for spares. Kamra is also refurbishing 10 more Mirages (nine **IIIEs** and one two-seat **IIIBL**) acquired from Lebanon in 1994. (Data for *Mirage IIIEP*.)

**Contractor:** Avions Marcel Dassault-Breguet Aviation, France.

**Power Plant:** one SNECMA Atar 9C turbojet; 13,670 lb thrust with afterburning.

**Dimensions:** span 26 ft 11 1/2 in, length 49 ft 3 3/4 in, height 14 ft 9 in.

**Weights:** empty 15,540 lb, gross 21,165–30,200 lb.

**Performance:** max speed at 40,000 ft Mach 2.2, at S/L Mach 1.135, ceiling 55,775 ft, T-O run 2,295 ft, landing run with brake-chute 2,295 ft, combat radius (lo-lo-lo) 305 miles.

**Accommodation:** pilot only, on ejection seat.

**Armament:** two 30-mm DEFA 552 guns in fuselage; one R.530 AAM under fuselage and two Magic AAMs under wings. Bombs or rocket pods can be carried underwing on attack missions.

### Mirage 2000

Between 1985 and 1988, the Indian Air Force received 42 single-seat **Mirage 2000Hs** (now reduced to 38) and seven two-seat **2000THs**. These equip Nos. 1 (Tigers) and 7 (Battle Axe) Squadrons, both based at Maharajpura AFB, Gwalior. Representing its only genuine modern multirole fighters, they proved their worth in combat situations in Sri Lanka and the Maldives islands, but recent effectiveness has declined because of a shortage of suitable pilots and the expensive necessity of having their fire-control radars serviced in France.

The IAF's 2000Hs (Indian name *Vajra*: "Divine Thunder") are generally similar to French Air Force **Mirage 2000Cs**, with RDM (Radar Doppler Multimode) (range 62 miles), Ullis 52 INS, head-up and head-down cockpit displays, ECM jammers and chaff/flare dispenser, Spirale passive countermeasures, and Serval radar warning receivers. Fly-by-wire flight controls are standard. In air-defense configuration, the aircraft can attain its top speed at 39,350 ft within 2 1/2 min of leaving the runway.

Ironically, US blocking of sales of Lockheed Martin F-16s to neighbouring Pakistan has forced that country to reopen negotiations (abandoned on cost grounds in 1992) to buy **Mirage 2000s** instead. French approval in principle for a purchase of up to 40 was announced in November 1995. (Data for *Mirage 2000H*.)

**Contractor:** Dassault Aviation, France.

**Power Plant:** one SNECMA M53-P2 turbofan; 21,385 lb thrust with afterburning.

**Dimensions:** span 29 ft 11 1/2 in, length 47 ft 1 1/4 in, height 17 ft 0 3/4 in.

**Weights:** empty 16,534 lb, gross 37,480 lb.

**Performance:** max speed at 39,350 ft Mach 2.26, ceiling 59,000 ft, T-O run approx 1,475 ft, range with four 550-lb bombs more than 920 miles.

**Accommodation:** pilot only, on zero/zero ejection seat.

**Armament:** two 30-mm DEFA 554 guns in fuselage; five hardpoints under fuselage and two under each wing for max external stores load of 13,890 lb. Two Super 530D and two Magic 2 AAMs for air defense. Ground-attack weapons include 18 x 550-lb retarded bombs or BAP 100 antirunway bombs, 16 Duraland penetration bombs, two 2,200-lb laser-guided bombs, six Belouga cluster bombs, ASMs, and packs of 18 x 68-mm or 100-mm rockets.

### Su-30MK

In addition to purchasing an initial batch of 20 or more of this tandem two-seat multirole development of the Su-27 ("Flanker"), India plans to build at least 60 under license. As an interceptor, the Su-30MK can fly 10-hr missions, including group actions in which it would assign targets to four radar-silent fighters. In an attack role, it can carry 17,635 lb of stores on 12 external stations, including bombs up to 3,300 lb each and a wide range of ASMs with standoff launch range up to 75 miles. It also retains the training capability of the Su-27UB. A flight-refueling probe is standard.

**Design Bureau:** Sukhoi OKB, Russia.

**Power Plant:** two Saturn/Lyulka AL-31F turbofans; each 27,557 lb thrust with afterburning.

**Dimensions:** span 48 ft 2 3/4 in, length excl nose-probe 71 ft 11 1/2 in, height 20 ft 10 1/4 in.

**Weights:** gross 55,115–74,955 lb.

**Performance:** max speed at height Mach 2.0, T-O run 1,805 ft, landing run 2,200 ft, combat range 1,865–3,230 miles.

**Accommodation:** two crew in identical tandem cockpits, on zero/zero ejection seats; rear seat raised.

**Armament:** bombs, rockets, six medium-range AAMs, four ARMs, six guided bombs, or Kh-31 ("Krypton"), Kh-59 ("Kingbolt"), or Kh-59M ("Kazoo") ASMs, plus laser-guidance or other pods. One 30-mm GSh-301 gun with 150 rds.



Mirage 2000Hs, Indian Air Force (Peter Steinemann)



Su-30MK (Peter J. Cooper)



AS 330 Puma, Royal Nepalese Air Force (Peter Steinemann)

## Helicopters

### AH-1 HueyCobra

The Pakistan Army's first 10 AH-1F HueyCobra attack helicopters were followed by a further 10 received in 1985. They equip Nos. 31 and 32 Squadrons, both based at Multan. Attempts to take up an option for 10 more were embargoed by the US government, and 18 are reportedly in current deployment. The Royal Thai Army operates four AH-1Fs. Standards are comparable with the US Army's full-capability TOW (Tube-launched, Optically tracked, Wire-guided) missile-carrying version, with a Hughes laser rangefinder/tracker, Kaiser pilot's HUD, digital fire-control computer, Doppler navigation, hot metal and exhaust plume IR suppressor, IR jammer, IFF, and composite rotor blades. (Data for *AH-1F*.)

**Contractor:** Bell Helicopter Textron, USA.

**Power Plant:** one AlliedSignal T53-L-703 turboshaft; 1,800 shp.

**Dimensions:** rotor diameter 44 ft 0 in, span 10 ft 9 in, fuselage length 44 ft 7 in, height 13 ft 5 in.

**Weights:** empty 6,598 lb, gross 10,000 lb.

**Performance:** max speed 141 mph, ceiling 12,200 ft, range 315 miles.

**Accommodation:** pilot and copilot/gunner in tandem armored cockpits.

**Armament:** two weapon stations under each stubwing; outer stations can each carry four TOW antitank missiles, inboard stations each a launch tube for seven to 19 x 2.75-in rockets. GE undernose turret for 20-mm M197 three-barrel gun with 750 rds.

### AS 330 Puma and AS 332 Super Puma

More than 30 countries have used these multipurpose helicopters for military duties, though only two of them are in the south Asia region. Major user is the Pakistan Army, which has about 25 of the **AS 330L** final production Puma for miscellaneous transport duties with Nos. 21 and 25 Squadrons; a single **AS 330J**, similar to the L, serves as a VIP transport. At Kathmandu, the Royal Nepalese Air Force has two earlier Pumas, an **AS 330C** (1,400 shp Turmo IVB engines) and an **AS 330G**, with metal instead of composite rotor blades. The Nepalese Royal Flight operates a single civil-registered **AS 332L Super Puma** (1,877 shp Makila 1A1 engines, uprated transmission, and airframe improvements). (Data for *AS 330L*.)

**Contractors:** Aerospatiale, France; Westland Helicopters, UK.

**Power Plant:** two Turbomeca Turmo IVC turboshafts; each 1,575 shp.

**Dimensions:** rotor diameter 49 ft 2 1/2 in, fuselage length 46 ft 1 1/2 in, height 16 ft 10 1/2 in.

**Weights:** empty 7,970 lb, gross 16,315 lb.

**Performance:** max cruising speed at S/L 160 mph, ceiling 15,750 ft, range 341 miles.

**Accommodation:** crew of two; 16 fully equipped troops, six litter patients and six seated persons, or 7,055 lb of internal or external freight.

**Armament:** provisions for side-firing 20-mm gun, two 7.62-mm machine guns, rocket packs, and other weapons.

### Bell 212 and 412

About 61 of these twin-turbine helicopters are in military service or on order by south Asian countries, consisting of 53 of the lower-powered **Bell 212** and eight examples of the **Bell 412**, which has a four-blade main rotor and uprated power plant. Twelve 212s serve with No. 1 (utility) Squadron and two with No. 31 (VIP) Squadron of the Bangladesh Air Force at Chittagong and Dhaka, respectively. Eight (some converted locally for counter-insurgency missions) fly with No. 4 Squadron of the Sri Lanka Air Force at Katunayake. This unit has also converted its four 412s to an armed configuration.

The Pakistan Army has two VIP 412s in its disaster-relief 6th Aviation Squadron, based in Islamabad. Largest regional user is Thailand, whose Army will have 50 or more 212s and Navy seven for support duties with No. 203 Squadron. The Royal Thai Air Force has two 412s, forming part of the country's Royal Flight. (Data for *Bell 212*, with *412* in parentheses.)

**Contractor:** Bell Helicopter Textron, USA/Canada.

**Power Plant:** one Pratt & Whitney Canada PT6T-3B (PT6T-3B-1) Turbo Twin Pac turboshaft; flat rated at 1,290 shp (1,400 shp).

**Dimensions:** rotor diameter 48 ft 2 1/4 in (46 ft 0 in), fuselage length (both) 42 ft 4 3/4 in, height 14 ft 10 1/4 in (15 ft 0 in).

**Weights:** empty 5,997 lb (6,495 lb), gross 11,200 lb (11,900 lb).

**Performance:** max cruising speed at S/L 115 mph (140 mph), ceiling 13,000 ft (16,500 ft), max range 261 miles (408 miles).

**Accommodation:** pilot and up to 14 passengers or equivalent cargo.

**Armament (both):** can include a 12.7-mm or 0.50-in machine gun in ventral turret, plus provisions for externally mounted antitank or antiship missiles, gun pods, or rocket pods.

### CH-47D International Chinook

Lop Buri AB in central Thailand is the main operating center for the aviation element of the Royal Thai Army, accommodating more than 100 fixed-wing aircraft and



helicopters in support of troop detachments throughout the country. The predominant utility helicopter types are the Bell 212 and UH-1H, but a heavy-lift capability is provided by a small contingent of five CH-47Ds, which have been in service from the late 1980s. Thailand is the only military Chinook operator in the south Asia region.

**Contractor:** Boeing Defense and Space Group, Helicopters Division, USA.

**Power Plant:** two AlliedSignal T55-L-712 turboshafts; each 3,750 shp.

**Dimensions:** rotor diameter (each) 60 ft 0 in, fuselage length 52 ft 1 in, height 18 ft 1 1/2 in.

**Weights:** empty 23,523 lb, gross 54,000 lb.

**Performance** (at 44,300 lb gross weight): typical cruising speed at S/L 152 mph, ceiling 10,100 ft, range with 14,857-lb max payload 115–161 miles.

**Accommodation:** crew of two; 44 troops, 24 litters and two medical attendants, or vehicles/cargo.

**Armament:** none.

#### Ka-25PL (NATO "Hormone-A")

No. 333 Squadron of the Indian Navy continues to operate five of the seven Ka-25PL helicopters that were purchased for operation from *Kashin II*-class destroyers. Primary mission is ASW, with secondary surveillance and search-and-rescue (SAR) duties. They are of traditional Kamov design, with contrarotating coaxial rotors. Equipment includes search radar in a large undernose radome, dipping sonar, and sonobuoys stored on a rack on the starboard side.

**Design Bureau:** Kamov OKB, Russia.

**Power Plant:** two Mars GTD-3M turboshafts; each 986 shp.

**Dimensions:** rotor diameter (each) 51 ft 7 3/4 in, fuselage length 32 ft 0 in, height 17 ft 7 1/2 in.

**Weights:** empty 10,505 lb, gross 15,873 lb.

**Performance:** max speed 130 mph, ceiling 11,000 ft, range 250–405 miles.

**Accommodation:** crew of two; main cabin is large enough to contain 12 folding seats.

**Armament:** one 18-in ASW torpedo in underfuselage weapons bay.

#### Ka-28 (NATO "Helix-A")

For antisubmarine duties from its new and upgraded *Kashin*-class ships, the Indian Navy has 15 Ka-28 helicopters. Assigned to No. 333 Squadron at Dabolim, they are generally similar to the CIS Navy's Ka-27PL. Each can be stowed in much the same hangar space as a Ka-25 but offers greatly improved performance and military capability. The general configuration is little changed, with contrarotating coaxial rotors, but the cabin is enlarged and twin fins replace the triple tail unit of "Hormone." Two TV3 turboshafts enable flight to be maintained on one engine at max gross weight. Equipment includes an undernose 360° search radar, dipping sonar, IFF, radar warning receivers, IR jammer, and ESM. The autopilot provides automatic approach and hover on a preselected course, using Doppler radar, enabling use of the dipping sonar at night and in adverse weather. Ka-28s normally operate in pairs, one tracking the hostile submarine, the other dropping depth bombs. Officially released information claims an effectiveness against submarines cruising at up to 40 knots, at a depth of 1,650 ft, out to 125 miles from the helicopter's base, by day and night.

**Design Bureau:** Kamov OKB, Russia.

**Power Plant:** two Klimov TV3-117V turboshafts; each 2,190 shp.

**Dimensions:** rotor diameter (each) 52 ft 2 in, fuselage length 37 ft 1 in, height 17 ft 8 1/2 in.

**Weight:** gross 26,455 lb.

**Performance:** max speed 168 mph, ceiling 12,000 ft, range 310 miles.

**Accommodation:** crew of three.

**Armament:** two torpedoes or four depth bombs, plus sonobuoys, in ventral weapons bay.

#### Lynx

Following its purchase of six surplus Royal Navy Type 21 frigates, the Pakistan Navy announced its requirement for a commensurate number of ship-based antisubmarine helicopters. To meet this need, in June 1994 it ordered three Westland Lynx, with options on three more. The order was met by the transfer of ex-RN Lynx HAS, Mk 35, delivered in 1994 and 1995. Capable of antisubmarine classification and strike, air-to-surface-vessel search and strike, reconnaissance, search and rescue, troop transport, fire support, vertrep, communications, and fleet liaison, this version of the Lynx has a nose-mounted GEC-Marconi Seaspray search and tracking radar, and can carry Sea Skua antiship missiles. (Data for HAS, Mk 3.)

**Contractor:** Westland Helicopters Ltd, UK.

**Power Plant:** two Rolls-Royce Gem 41-1 turboshafts; each 1,120 shp.

**Dimensions:** rotor diameter 42 ft 0 in, fuselage length 45 ft 3 in, height 11 ft 5 in.

**Weights:** empty 7,370 lb, gross 10,500 lb.



**Ka-28, Indian Navy (Denis Hughes)**



**Mi-17, Sri Lanka Air Force (Denis Hughes)**



**Mi-25 Akbar, Indian Air Force (Peter Steinemann)**

**Performance:** max cruising speed 144 mph, ceiling 8,450 ft, radius (SAR, with reserves) 111–132 miles, max range 368 miles.

**Accommodation:** pilot and copilot or observer, plus systems operators, six litters and a medical attendant, or 2,000 lb of internal equipment or cargo; in SAR configuration, crew of three, nine survivors, and 600-lb capacity external rescue hoist.

**Armament** (ASW configuration): two pylon-mounted Mk 44, Mk 46, or Sting Ray homing torpedoes, one each side of fuselage, plus six marine markers; or two Mk 11 depth charges; or up to four BAe Sea Skua semiautomatic homing antiship missiles.

#### Mi-8/17 (NATO "Hip")

The basic production version of this family of multipurpose helicopters, first flown in 1962, is the Mi-8 with two TV2 turboshaft engines and a starboard-side tail rotor. Since the beginning of the 1980s, customers wanting higher performance have been able to buy the Mi-17 (Hip-H), with 1,923 shp TV3-117MT engines in shorter nacelles and with the tail rotor on the port side.

The Mi-8T (Hip-C) is the standard heavily armed assault transport, intended to put down troops, equipment, and supplies behind enemy lines within 15–20 minutes of a nuclear or conventional bombardment/air strike. The Mi-8TV (Hip-F) is even more heavily armed, with a 12.7-mm KV-4 nose machine gun, with 700 rds, and a triple stores rack on each side of the cabin, able to carry 192 rockets in six packs, plus six 9M14 (NATO "Sagger") manual command to line of sight antitank missiles. Approximate numbers of Mi-8/17s active with south Asian air forces are: Afghanistan 45; Bangladesh seven Mi-8, 12 Mi-17; Bhutan two Mi-8; India 80 Mi-8, 50 Mi-17 (Indian names *Rama* and *Pratap*, respectively); Pakistan Army 10 Mi-8, five Mi-17; and Sri Lanka 11 Mi-17, two of Pakistan's Mi-17s have a VIP interior; the other three supplement two Bell 412s and four UH-1Hs available for disaster relief with 6th Aviation Squadron. The Mi-8MT and Mi-8MTV are Hip-Cs and Fs updated to Mi-17 standard. (Data for military Mi-8 Hip-C.)

**Design Bureau:** Mil OKB, Russia.

**Power Plant:** two Klimov TV2-117A turboshafts; each 1,677 shp.

**Dimensions:** rotor diameter 69 ft 10 1/4 in, fuselage length 59 ft 7 1/2 in, height 18 ft 6 1/2 in.

**Weights:** empty 16,007 lb, gross 26,455 lb.

**Performance:** max speed at 3,250 ft 161 mph, ceiling 14,750 ft, range 264 miles as passenger transport.

**Accommodation:** crew of two or three; 24 troops on tip-up seats along cabin sidewalls, or 12 litter patients and an attendant, or 8,820 lb of freight or vehicles, loaded via rear clamshell doors and hook-on ramps.

**Armament:** twin rack on each side of cabin, able to carry 64 x 57-mm rockets in four UV-16-57 packs, or other weapons.

#### Mi-24/25/35 (NATO "Hind")

Versions of this combat helicopter are in service with the Afghan Army Air Force (about 25 Mi-24s) and Indian Air Force (40 Mi-25s and 35s, Indian name *Akbar*). The Mi-24 is the standard attack helicopter of the CIS armed forces that has the added capability of carrying eight combat-equipped troops in its main cabin. Its export counterpart, the Mi-25, corresponds to the Mi-24D (Hind-D) gunship, with a 12.7-mm YakB-12.7 four-barrel nose gun, with 1,470 rds, four weapons pylons under its stubwings, and wingtip launchers for four 9M17P Skorpion ("Swatter") antitank missiles.

The Mi-35 is the export model of the Russian Army's Mi-24V (Hind-E), with up to eight 9M114 ("Spiral") radio-guided, tube-launched, antitank missiles in pairs on its wingtip and underwing stores pylons. It has a HUD for the pilot, replacing the former reflector gunsight, and an enlarged undernose automatic missile guidance pod, R-60 ("Aphid") AAMs and the same range of alternative weapons as those of Hind-D can be carried on the underwing pylons. The Mi-35P is similar to the CIS forces' Mi-24P (Hind-F), with a GSh-30-2 twin-barrel 30-mm gun (with 750 rds) mounted on the starboard side of the nose, replacing the usual undernose Gatling. (Data for Mi-35P.)

**Design Bureau:** Mil OKB, Russia.

**Power Plant:** two Klimov TV3-117 turboshafts; each 2,190 shp.

**Dimensions:** rotor diameter 56 ft 9 1/4 in, fuselage length 57 ft 5 1/4 in, height 21 ft 4 in.

**Weights:** empty 18,078 lb, gross 26,455 lb.

**Performance:** max speed 208 mph, ceiling 14,750 ft, range on internal fuel 310 miles, with auxiliary tanks 620 miles.

**Accommodation:** crew of two (pilot at rear); flight mechanic, and provisions for eight troops or four litter patients in main cabin.

**Armament:** one GSh-30-2 twin-barrel 30-mm gun; up to eight 9M114 antitank missiles. Alternative loads on four underwing pylons include 32-rd packs of 57-mm rockets, 20-rd packs of 80-mm rockets, UPK-23-250 pods each containing a GSh-23L twin-barrel 23-mm gun, up to 3,300 lb of bombs, mine dispensers, or other stores. Provisions for firing AKMS guns from cabin windows.

#### Mi-26 (NATO "Halo")

Being the world's largest production helicopter has hampered export sales of the Mi-26. It offers a tempting target when used in combat areas. Elsewhere, it is usually possible to haul larger payloads at higher speed by STOL fixed-wing transports. As a result, military export deliveries have been restricted to 10 Mi-26s for No. 126 (Feather Weight) Helicopter Unit of the Indian Air Force, based at Chandigarh. Features of the aircraft include a cargo hold and payload very similar in size to those of a C-130H Hercules, loading via clamshell doors and ramp at the rear of the cabin, main landing gear legs that are adjustable individually in length to facilitate loading and to permit landing on varying surfaces, and all equipment necessary for day and night operation in all weathers. Optional items include a closed-circuit TV system to observe slung payloads, infrared jammers and suppressors, infrared decoy dispensers, and a color-coded identification flare system.

**Design Bureau:** Mil OKB, Russia.

**Power Plant:** two ZMKB Progress D-136 turboshafts; each 10,000 shp.

**Dimensions:** rotor diameter 105 ft 0 in, fuselage length 110 ft 8 in, height 26 ft 8 3/4 in.

**Weights:** empty 62,170 lb, gross 123,450 lb.

**Performance:** max speed 183 mph, ceiling 15,100 ft, range 497 miles with standard fuel, 1,190 miles with auxiliary tanks.

**Accommodation:** crew of four; compartment for four additional persons aft of flight deck and about 20 tip-up seats along each sidewall of hold. Max accommodation for 80 combat-ready troops, or 60 litter casualties and four or five attendants. Freight loads include two airborne infantry combat vehicles or a standard 44,100-lb ISO container.

**Armament:** none.

#### S-58T

First flown on March 8, 1954, the original piston-



engined S-58 was produced as the HSS-1 Seabat antisubmarine helicopter for the US Navy. Subsequent versions included US Army H-34 Choctaw transports for 18 troops or eight litter patients. None remains in service, but the airframe began a new life on August 19, 1970, when Sikorsky flew the first S-58T, reengineered with a PT6T-3 coupled turboshaft. Approximately 146 conversions and conversion kits were delivered before the program was sold to California Helicopter in 1981. Among current S-58T operators is No. 201 Squadron, Royal Thai Air Force, at Lop Buri AB, which has 14 for utility transport duties.

**Contractor:** California Helicopter International, USA.  
**Power Plant:** one Pratt & Whitney Canada PT6T-6 Twin-Pac coupled turboshaft; 1,875 shp.  
**Dimensions:** rotor diameter 56 ft 0 in, fuselage length 47 ft 3 in, height 15 ft 11 in.  
**Weights:** empty 7,577 lb, gross 13,000 lb.  
**Performance:** max speed 138 mph, hovering ceiling OGE 6,500 ft, range with standard fuel 278 miles.  
**Accommodation:** crew of two: 18 troops or eight litter patients.  
**Armament:** normally none.

### S-70B Seahawk

To serve alongside the Harrier attack aircraft on its soon-to-be-acquired new aircraft carrier, HTMS *Chakrinareubet*, the Royal Thai Navy decided in October 1993 to order six Sikorsky S-70B-7 Seahawk helicopters. It is understood that these will have the secondary roles of maritime patrol and search and rescue, as well as the ASW role of their US Navy SH-60B counterparts. Equipment will include a 600-lb capacity rescue hoist, mounted on the port side of the cabin. Deliveries are to begin in 1997. (Data for US Navy SH-60B.)

**Contractor:** Sikorsky Aircraft, USA.  
**Power Plant:** two General Electric T700-GE-401C turboshafts; each 1,800 shp.  
**Dimensions:** rotor diameter 53 ft 8 in, fuselage length 50 ft 0 1/4 in (40 ft 11 in folded), height 12 ft 5 1/2 in (13 ft 3/4 in with tail pylon folded).  
**Weights:** empty 13,648 lb, gross 18,373-21,884 lb.  
**Performance:** max speed at 5,000 ft 145 mph, mission radius with 1-hr loiter 173 miles, with 3-hr loiter 57 miles.  
**Accommodation:** crew of three (pilot, copilot/tacoco, and sensor operator).  
**Armament (ASW):** two or three Mk 46 or Mk 50 torpedoes or Penguin antiship missiles, pylon-mounted one on each side of fuselage aft of main cabin door. Provision for one or more pintle-mounted 7.62-mm machine guns in cabin doorways.

### S-76B/H-76N Eagle

More than 80 civil Sikorsky S-76Bs have been sold since the mid-1980s. The H-76, first flown in February 1985, is a militarized version, but despite the commercial model's success no customers had emerged for the armed version until last fall, when the Royal Thai Navy placed an order for six navalized H-76Ns. To be delivered this year, these will serve in a shore-based capacity as coastal patrol and search-and-rescue helicopters. Differences from the standard S-76B include armored crew seats, optional self-sealing fuel tanks, strengthened airframe, uprated transmission, and sliding cabin doors. Equipment options include an emergency flotation system, a 3,300-lb capacity cargo hook, 600-lb capacity rescue hoist, and a cabin speaker and loudhailer. In armed configuration, the H-76 can be equipped with a mast- or roof-mounted sight, pilot's HUD, laser rangefinder, RWR, and chaff/flare dispenser. (Data for H-76 except where indicated.)

**Contractor:** Sikorsky Aircraft, USA.  
**Power Plant:** two Pratt & Whitney Canada PT6B-36A turboshafts; each 981 shp.  
**Dimensions:** rotor diameter 44 ft 0 in, fuselage length 43 ft 4 in, height 14 ft 5 1/4 in.  
**Weights:** empty (typical) 6,680 lb, gross 11,400 lb.  
**Performance (standard S-76B at 11,700 lb gross weight):** max speed 178 mph, max cruising speed 166 mph, ceiling 15,000 ft, range at 4,000 ft 322 miles (30 min reserves), 402 miles (no reserves).  
**Accommodation:** crew of two, plus systems operator(s) according to role. Cabin can accommodate 12 evacuees on seats or 16 sitting on floor; medevac version can carry three litter patients (or six prone patients if not on litters) plus two medical attendants.  
**Armament:** provision for pintle-mounted 7.62-mm gun in each cabin doorway; multipurpose pylon system (MPPS) permits external carriage of gun and rocket pods, mines, torpedoes, or Hellfire, TOW, Stinger, or Sea Skua missiles.

### SA 315B Lama and Cheetah

Aerospatiale developed the **Lama** (first flight March 17, 1969) from its Alouette II to meet an Indian forces' requirement for a helicopter capable of efficient operations in the Himalayas. License production continues by Hindustan Aeronautics, which has delivered more than 240 since 1972, under the Indian name **Cheetah**.

Twelve equip the Indian Air Force Helicopter Training School at Hakimpet, while about 40 serve with four squadrons of Indian Army Aviation for air observation post and liaison duties. No. 8 Squadron of the Pakistan Army Aviation Corps has about 15 Lamas, of which the first six came from Romanian production in 1987. They, too, are employed primarily for high-altitude missions, in the Karakoram Range and to the Siachan glacier. (Data for HAL SA 315B.)

**Contractor:** Hindustan Aeronautics Ltd, India.  
**Power Plant:** one HAL-built Turbomeca Artouste IIIB turboshaft; derated to 542 shp.  
**Dimensions:** rotor diameter 36 ft 1 3/4 in, fuselage length 33 ft 6 1/4 in, height 10 ft 1 1/4 in.  
**Weights:** empty 2,193 lb, gross 3,858 lb, normal 4,078 lb with slung cargo.  
**Performance:** max cruising speed 119 mph, ceiling 21,000 ft, range (max) 341 miles.  
**Accommodation:** pilot and copilot or passenger, side by side, three passengers to rear; or pilot, two litter patients, and medical attendant. External sling loads up to 2,205 lb.  
**Armament:** none.

### SA 316 Alouette III and Chetak

French Alouette production of the original **SE 3160** was superseded in 1969 by the **SA 316B** with uprated Artouste engine, built also by Romania and Switzer-



**S-58T, Royal Thai Air Force**  
(Denis Hughes)



**SA 315B Cheetah, Indian Army Aviation**



**SA 316B Chetak, Indian Air Force**  
(Denis Hughes)

land. License manufacture of the SA 316B continues in India, where more than 330 have so far been built under the Indian name **Chetak**, in addition to early Alouette III imports from France. Up to 120 of these, some equipped for an antitank role, are with nine or more helicopter units of the Indian Army; smaller quantities also serve with the Indian Air Force (about 40), Navy (15, principally with INAS 321 and 331), and Coast Guard (six with CGAS 800). With the smaller Cheetah, the Chetak is destined for replacement by HAL's new Advanced Light Helicopter (ALH). The Royal Nepalese Air Force has two Chetaks. The 10 SE 3160s used by the Myanmar Air Force for liaison duties may

no longer be airworthy. The Pakistan Air Force has about a dozen Alouettes (average of two each with six squadrons) for SAR and light duties; that country's Army has about 20 for liaison; its Navy's No. 333 Squadron has four equipped with depth charges for ASW; four others (three SAR-equipped) were acquired in 1994 from the Royal Netherlands Air Force. One or two Alouette IIIs are operated by the Seychelles People's Air Force for coastal patrol and other duties. (Data for HAL-316B **Chetak**.)

**Contractors:** Aerospatiale, France; Hindustan Aeronautics Ltd, India.  
**Power Plant:** one HAL-built Turbomeca Artouste IIIB turboshaft; derated to 550 shp.  
**Dimensions:** rotor diameter 36 ft 1 3/4 in, fuselage length (incl tail rotor) 33 ft 4 1/2 in, height 9 ft 9 in.  
**Weights:** empty 2,711 lb, gross 4,850 lb.  
**Performance:** max cruising speed at S/L 115 mph, ceiling 10,675 ft, range (max) 296 miles.  
**Accommodation:** pilot and up to six passengers or equivalent cargo; normally pilot only, or pilot and gunner, in armed versions; pilot plus two litters and two other persons in SAR or medevac configuration.  
**Armament:** range of possible weapons includes a tripod-mounted 7.62-mm machine gun with 1,000 rds aft of pilot's seat, or 20-mm gun with 480 rds, turret-mounted on port side of cabin. Instead of guns, can carry two or four wire-guided antitank missiles on external rails or 68-mm rocket pods. ASW version can carry two torpedoes or depth charges, or one of these weapons plus an MAD bird.

### Sea King

Westland's Sea King is a license-built development of the Sikorsky SH-3 antisubmarine helicopter, with extensive power plant and equipment changes. Its export customers have included the navies of India and Pakistan, which still operate them in ASW, SAR, and other forms. India received 12 **Mk 42s** in the early 1970s, for No. 330 Naval Air Squadron, followed in 1980 by three **Mk 42As**. Later deliveries included 20 **Mk 42Bs** for Nos. 336 and 339 NAS and six assault and transport **Mk 42Cs**.

About 36 of these original 41 remain in service. Typical equipment on the ASW **Mk 42B** includes MEL Super Searcher radar, Doppler navigation, GEC-Marconi AOS-902 sonobuoy processor and tactical processing system, Alcatel HS-12 dipping sonar, Chelton 700 sonics homing, GEC-Marconi Hermes ESM, Louis Newmark AFCS (automatic flight-control system), and fittings for Sea Eagle antiship missiles. The remaining six of seven **Mk 45/45A** Sea Kings operated since 1975 by No. 111 Squadron (Sharks) of the Pakistan Navy are broadly similar but equipped for Exocet missiles. (Data for **Mks 42A/45**.)

**Contractor:** Westland Helicopters Ltd, UK.  
**Power Plant:** two Rolls-Royce Gnome H.1400-1 turboshafts; each 1,660 shp.  
**Dimensions:** rotor diameter 62 ft 0 in, fuselage length 55 ft 9 1/4 in, height 15 ft 11 in.  
**Weights:** empty 13,672 lb, gross 21,000 lb.  
**Performance:** cruising speed at S/L 129 mph, ceiling 14,000 ft, radius of action (three torpedoes, two hours on station) 144 miles.  
**Accommodation:** flight crew of two; ASW, two systems operators; SAR, up to 22 survivors; transport, up to 28 troops.  
**Armament:** provisions for Sea Eagle or Exocet missiles, up to four homing torpedoes, four depth charges, Ultra Electronics minisonobuoys, smoke floats, marine markers, and other weapons and equipment.

### UH-1 Iroquois/Bell 205

These single-engine workhorse members of the original "Huey" family still serve with many countries, mostly in light transport, SAR, utility, or liaison roles. The major south Asian operator is Thailand, with more than 100 still in service. About 70 of these are Army aircraft, comprising a mixed bag of **UH-1As**, **Bs** and **Hs**. The Royal Thai Air Force and Navy have some 30 and four UH-1Hs, respectively, and the Border Police 26 **Bell 205A-1s**. Myanmar's air force still has about 12 UH-1Hs, while the Pakistan Army operates approximately five each of the UH-1H and Italian-built Agusta-Bell 205A-1. (Data for UH-1H.)

**Contractor:** Bell Helicopter Textron, USA.  
**Power Plant:** one AlliedSignal T53-L-13 turboshaft; 1,400 shp.  
**Dimensions:** rotor diameter 48 ft 0 in, fuselage length 41 ft 10 1/4 in, height 11 ft 9 1/4 in.  
**Weights:** empty 5,210 lb, gross 9,500 lb.  
**Performance:** max cruising speed 127 mph, ceiling 12,600 ft, range 318 miles.  
**Accommodation:** pilot and 11-14 troops, or six litters and a medical attendant, or 3,880 lb of cargo.  
**Armament:** normally none.

### W-3 Sokol

Poland's Swidnik helicopter factory and design center has produced more than 5,400 Russian Mi-2s under



license since 1965. The much-improved W-3 Sokół ("Falcon"), with Polish-built Russian engines, has a fuselage some 25 percent larger, more than twice the power, and the ability to carry some 2.5 times the payload. It first flew November 16, 1979, production began in 1985, and the 80 built by early 1995 included 12 for the Myanmar Air Force, primarily for SAR and observation missions. They equip a mixed squadron (with Mi-2s and UH-1Hs) at Mingaladon and are the first military Sokóls to be exported.

**Contractor:** PZL Swidnik, Poland.

**Power Plant:** two PZL Rzeszów PZL-10W turboshafts; each 900 shp.

**Dimensions:** rotor diameter 51 ft 6 in, fuselage length 46 ft 7½ in, height 12 ft 5½ in.

**Weights:** empty 8,002 lb, gross 13,448–14,110 lb.

**Performance** (at 13,448 lb weight): max cruising speed at 3,280 ft 146 mph, ceiling 16,725 ft, range 444 miles (internal fuel), 761 miles with auxiliary fuel.

**Accommodation:** crew of two; up to 13 passengers, four litters and a medical attendant, eight survivors



**MiG-25R, Indian Air Force (Peter Steinemann)**

plus a two-person rescue crew and doctor, or up to 4,630 lb of internal or external cargo.

**Armament** (Polish Air Force W-3W): one GSh-23 twin-barrel 23-mm gun on lower starboard side of fuselage; cabin-side attachments for pods of air-to-surface unguided rockets (57-mm or 80-mm), bomblet dispensers, or minelaying packs; up to six machine guns at cabin windows.

## Reconnaissance and Special Mission Aircraft

### IAI-201 Arava

IAI-201 military Aravas were the major production versions of this Israeli general-purpose STOL transport, which first flew in March 1972; more than 70 were built. Three delivered to the Royal Thai Air Force in the early 1980s have specialized avionics by Elta of Israel and are employed by No. 605 Squadron at Don Muang as elint and/or communications relay aircraft. The pod-and-boom Arava has a hinged tailcone that opens more than 90° to give unrestricted access to the 450 cu ft cabin.

**Contractor:** Israel Aircraft Industries.

**Power Plant:** two Pratt & Whitney Canada PT6A-34 turboprops; each 750 shp.

**Dimensions:** span 68 ft 9 in, length 42 ft 9 in, height 17 ft 1 in.

**Weights:** empty 8,816 lb, gross 15,000 lb.

**Performance:** max cruising speed at 10,000 ft 198 mph, ceiling 25,000 ft, T-O run 960 ft, landing run 820 ft, max range 621 miles.

**Accommodation:** crew of one or two; up to 24 troops, 16 paratroops with two dispatchers, 10 litters with two medical attendants, small vehicles, or equivalent cargo, in main cabin.

**Armament** (optional): fuselage-side attachments for two 0.50-in single-gun packs, with pylon below each pack for six-rd rocket pod.

### MiG-25R (NATO "Foxbat-B")

No other air force in south Asia can match the capability of the Mach 2.83 Foxbats that have been flown by No. 102 (Trisonics) Squadron of the Indian Air Force, based at Bareilly, since 1981. The four **MiG-25R** (Foxbat-B) single-seat reconnaissance aircraft and two tandem two-seat **MiG-25RU** (Foxbat-C) trainers are strictly "straight and level" aircraft, with no concessions to agility. Construction is 80 percent welded tempered steel, with eight percent titanium in areas subject to extreme heating, and 11 percent heat-resistant aluminum alloy, by weight. With a 1,400-gallon underbelly tank, the MiG-25R can fly 1,323 miles at cruising speeds up to Mach 2.35. Any one of three interchangeable photographic/elint modules, with five camera windows and flush dielectric panels, can be carried in the forward fuselage.

**Design Bureau:** Mikoyan OKB, Russia.

**Power Plant:** two Soyuz/Tumansky R-15BD-300 turbojets; each 24,675 lb thrust with afterburning.



**Mirage IIIIRP, Pakistan Air Force**

**Dimensions:** span 44 ft 0¼ in, length 70 ft 8½ in, height 21 ft 4 in.

**Weights:** empty 43,200 lb, gross 81,570–90,930 lb.

**Performance:** max speed at height Mach 2.83, at S/L Mach 0.98, ceiling 68,900 ft, T-O run 4,100 ft, landing run 2,625 ft, range at supersonic speed 1,015–1,323 miles, subsonic 1,158–1,491 miles.

**Accommodation:** pilot only, on zero-height/80–775 mph ejection seat.

**Armament:** all MiG-25Rs are capable of carrying six 1,100-lb bombs.

### Mirage IIIIR

Pakistan's first photoreconnaissance Mirages were three **Mirage IIIIRPs**, delivered in 1969 and basically similar to the IIIIE fighter except for an extended nose containing five Omera Type 31 cameras instead of a Cyrano fire-control radar. These can be mounted in various arrangements to provide day or night photography at low, medium, or high altitude. The two 30-mm guns and air-to-ground weaponry capability of the IIIIE are retained. Ten more were ordered in 1975, and 11 of the 13 continue in service with No. 5 Squadron of the Pakistan Air Force at Rafiqui. Subsequent improvements include a dorsal antenna for a radar warning receiver. (Data as for IIIIE except as follows.)

**Dimensions:** length 50 ft 10¼ in.

**Weight:** empty 14,550 lb.

## Transports

### An-12/Y-8 (NATO "Cub")

Up to 10 of the 12 **An-12BP** medium-range transports that equipped the Afghan Republican Air Force in the early 1990s may still survive, although their use by that country's warring factions may mean that not all remain airworthy. Powered by four 3,945 ehp ZMKB Progress/Ivchenko AI-20K turboprops, the An-12 carries 90 troops, 60 paratroops, or 44,090 lb of freight. Loading is via a door under the upswept rear fuselage, but the An-12BP lacks an integral ramp for vehicles.

The Chinese **Y-8A** is outwardly similar to the An-12BP except for redesigned Chinese turboprops of a higher rating than the AI-20K, a rear-loading ramp/door, and more pointed nose glazing. One or two **Y-8Ds** are operated by No. 201 Heavy Transport Squadron of the Sri Lanka Air Force at Ratmalana, differing from the standard military Y-8A only in having avionics by Collins and Litton. They have been modified in Sri Lanka for use as bombers. Four Y-8Ds are flown by the Air Force of Myanmar at Mingaladon. (Data for Y-8A.)

**Contractor:** Shaanxi Aircraft Company, People's Republic of China.

**Power Plant:** four Zhuzhou WJ6 turboprops; each 4,260 ehp.

**Dimensions:** span 124 ft 8 in, length 111 ft 7½ in, height 36 ft 7½ in.

**Weights:** empty 78,264 lb, gross 134,480 lb.

**Performance:** max speed at 22,965 ft 425 mph, ceiling 34,120 ft, T-O run 4,167 ft, landing run 3,445 ft, range with 44,090-lb max payload 791 miles, with max fuel 3,489 miles.

**Accommodation:** crew of five and 14 passengers in pressurized forward section of fuselage; unpressurized main cabin for 96 troops, 82 paratroops, or 60 litter patients and 20 seated casualties plus three attendants, or two army trucks or helicopters. Rear loading ramp/door (not on An-12).

**Armament:** provision for two 23-mm guns in manned tail turret.

### An-26 (NATO "Curl")

Fifteen An-26 freighters are believed to remain serviceable in Afghanistan. They are standard aircraft, with a "beaver-tail" rear fuselage, an auxiliary turbojet in the rear of the starboard engine nacelle, few cabin windows, and Oleg Antonov's unique rear-loading ramp. This forms the underside of the rear fuselage when retracted, in the conventional way, but can be slid forward under the rear of the cabin to facilitate direct loading onto the floor of the hold, or when the cargo is to be air-dropped. (Data for An-26.)

**Design Bureau:** Antonov OKB, Ukraine.

**Power Plant:** two ZMKB Progress/Ivchenko AI-24VT turboprops; each 2,780 ehp; plus 1,765 lb thrust RU-19A-300 auxiliary turbojet for turboprop starting and to provide additional power for takeoff, climb, and cruising flight, as required.

**Dimensions:** span 95 ft 9½ in, length 78 ft 1 in, height 28 ft 1½ in.

**Weights:** empty 32,518 lb, gross 50,706–52,911 lb.

**Performance:** cruising speed at 20,000 ft 270 mph, ceiling 24,600 ft, T-O run 2,855 ft, landing run 2,135 ft, range with max payload 770 miles, with max fuel 1,652 miles.

**Accommodation:** crew of five, plus station for load supervisor or dispatcher; 12,125 lb payload. Electrically powered mobile hoist, capacity 4,409 lb, and conveyor to facilitate loading and air-dropping. Provision for carrying 40 paratroops on sidewall tip-up seats, or 24 litters and an attendant.

**Armament:** provision for pylons on the sides of the fuselage for carrying up to 4,409 lb of weapons or supply containers.

### An-32 (NATO "Cline")

The powerful turboprops and high-lift wings of this short/medium-range transport enable it to operate from unpaved strips at airfields 14,750 ft above S/L in an ambient temperature of ISA + 25°C. The airframe is basically similar to that of the An-26 but with triple-slotted trailing-edge flaps outboard of the engines, automatic leading-edge slats, enlarged ventral fins, and a full-span slotted tailplane. It also embodies improvements to the landing gear retraction mechanism, deicing and air-conditioning systems, electrical system, and engine starting.

About 120 An-32s, named **Sutlej** after a Punjabi river, are operated by Nos. 12, 19, 33, 43, 48, and 49 Squadrons of the Indian Air Force, plus training wings. Afghanistan is reported to have six. No. 3 Squadron of the Bangladesh Air Force, based at Jessore, has three. Two are used by the Sri Lanka Air Force to transport fuel, weapons, and supplies to forces in combat in the north-east of the country. Operated by No. 201 Squadron, they replaced two HS 748s that had been shot down.



**Design Bureau:** Antonov OKB, Ukraine.

**Power Plant:** two ZMKB Progress AI-20D Series 5 turboprops; each 5,042 ehp.

**Dimensions:** span 95 ft 9 1/2 in, length 78 ft 0 1/4 in, height 28 ft 8 1/2 in.

**Weights:** empty 38,158 lb, gross 59,525 lb.

**Performance:** max cruising speed 329 mph, ceiling 30,840 ft, T-O run 2,495 ft, landing run 1,542 ft, range with max payload 745 miles, with max fuel 1,565 miles.

**Accommodation:** crew of three or four; up to 50 passengers, 42 parachutists and a jumpmaster, 24 litter patients and three medical personnel, or 14,770 lb of freight.

**Armament:** provision for carrying four bombs or other stores on hardpoints on each side of the fuselage, below the wings.

#### C-47 Skytrain

The career of the inimitable C-47 stubbornly refuses to come to an end, and among the services still employing it is the Royal Thai Air Force, whose No. 603 Squadron at Don Muang has four. No. 202 Squadron of the Royal Thai Navy at Songkhla also has two C-47s and one EC-47 for eint/sigint duties. At one time, some RTAF aircraft were configured as AC-47 gunships, but none of this version is thought to remain. (Data for C-47B.)

**Contractor:** Douglas Aircraft Company, USA.

**Power Plant:** two Pratt & Whitney R-1830-90C radial piston engines; each 1,200 hp.

**Dimensions:** span 95 ft 6 in, length 63 ft 9 in, height 17 ft 0 in.

**Weights:** empty 18,135 lb, gross 26,000-31,000 lb.

**Performance:** max speed at 10,000 ft 224 mph, ceiling 26,400 ft, range 1,600 miles.

**Accommodation:** crew of two; up to 27 troops, 18-24 litters, or 10,000 lb of cargo in main cabin.

**Armament:** none.

#### C-130 Hercules

Thirty-three years after deliveries began, four early-production C-130Bs, seven C-130Es, and a single commercial L-100 Hercules continue in service with No. 6 Squadron of the Pakistan Air Force, based at Chakiala. The 11 C-130s have been upgraded by Singapore Aerospace, prolonging their careers even further. Seven current-standard C-130Hs, with uprated engines and more modern avionics, and five stretched (112 ft 9 in long) C-130H-30s are operated by No. 601 Squadron of the Royal Thai Air Force at Don Muang. (Data for C-130H.)

**Contractor:** Lockheed Martin Aeronautical Systems, USA.

**Power Plant:** four Allison T56-A-15 turboprops; each 4,508 shp.

**Dimensions:** span 132 ft 7 in, length 97 ft 9 in, height 38 ft 3 in.

**Weights:** empty 76,469 lb, gross 155,000-175,000 lb.

**Performance:** max cruising speed 362 mph, ceiling 26,500 ft, T-O run 4,000 ft, landing run 1,500 ft, range with 40,000-lb payload 2,238 miles.

**Accommodation:** crew of four, plus loadmaster; up to 92 troops, 64 paratroops, 74 litters and two medical attendants, or 49,818 lb of vehicles, artillery pieces, or cargo in main cabin.

**Armament:** none.

#### C-212 Aviocar

In March 1995 the Royal Thai Army ordered two Series 300 Aviocars from CASA, after evaluating this small STOL utility transport against the German Dornier 228. Expected to be delivered this year, they will be configured with 22 foldaway troop/paratroop seats, and will replace the RTA's now-elderly Shorts 330UTTs. Avionics will include a Honeywell automatic flight-control system with GPS navigation, Bendix/King RDS-82 weather radar, and a Collins TCAS (traffic alert and collision avoidance system). Contrary to statements in the previous edition of this Gallery, the Royal Thai Air Force does not have Indonesian-built NC-212-200s; the reported order for two by Myanmar was also apparently in error. (Data for C-212 Series 300.)

**Contractor:** Construcciones Aeronauticas SA (CASA), Spain.

**Power Plant:** two AlliedSignal TPE331-10R-513C turboprops; each 900 shp (flat rated).

**Dimensions:** span 66 ft 6 1/2 in, length 52 ft 11 1/4 in, height 21 ft 7 3/4 in.

**Weights:** empty 8,333 lb, gross 17,857 lb.

**Performance:** max cruising speed at 10,000 ft 220 mph, ceiling 26,000 ft, T-O distance 2,000 ft, landing run 935 ft, range at max cruising speed 519 miles (with max payload), 1,045 miles (with max fuel).

**Accommodation:** crew of two; up to 25 troops (or 24 paratroops and jumpmaster), 12 litters and four medical personnel, or up to 6,217 lb of cargo.

**Armament:** one 551-lb hardpoint on each side of fuselage optional, for machine gun pods, rocket pods, or one of each.



**An-32, Bangladesh Air Force (Peter Steinemann)**



**C-130B Hercules, Pakistan Air Force (Denis Hughes)**



**II-76MD Gajraj, Indian Air Force (Richard Malachowski)**

#### G222

Like USAF, with its C-27A Spartans, the Royal Thai Air Force chose Italian-built G222s to meet a light tactical transport requirement. Six were ordered in 1993, to replace the last three of RTAF's 24 original C-123K Providers. With their rear-loading ramp, the G222s make possible rapid loading and unloading of cargo and/or personnel on short unprepared airstrips, in remote areas, as well as air-drops. Deliveries to No. 602 Squadron at Don Muang began in 1995.

**Contractor:** Alenia, Italy.

**Power Plant:** two General Electric T64-GE-P4D turboprops; each 3,400 shp.

**Dimensions:** span 94 ft 2 in, length 74 ft 5 1/2 in, height 34 ft 8 1/4 in.

**Weights:** empty 34,610 lb, gross 61,730 lb.

**Performance:** max speed at 15,000 ft 303 mph, ceiling 25,700 ft, T-O run 2,250 ft, landing run 2,860 ft, range with max payload 783 miles.

**Accommodation:** crew of two or three; 46 troops, 40 paratroops, 36 litters and four attendants, or 19,840 lb of freight, vehicles, and guns.

**Armament:** none.

#### HS 748

Hindustan Aeronautics built 64 HS 748s under license for the Indian Air Force: 29 aircrew trainers, 20 HS 748(M) freighters with side-loading cargo door, three for aerial survey, and 12 VIP transports for the Headquarters Communications Squadron at Palam. About 50 continue in service, the freighters with No. 11 (Rhinos) Squadron at Gwalior, the trainers with the Navigation and Signals School at Begumpet and the Transport Training Wing at Yelahanka. Two civil-registered 748s serve, under military control, with India's Border Security Force.

British-built 748s serve with the Royal Nepalese Air Force (one VIP); and the Royal Thai Air Force, where five share duties with the C-47s of No. 603 Squadron. Sri Lanka's trio were reduced to a single example when the other two were shot down by Tamil SAMs in April 1995. (Data for Series 2A.)

**Contractors:** Hawker Siddeley Aviation, UK (now British Aerospace); Hindustan Aeronautics Ltd, India.

**Power Plant:** two Rolls-Royce Dart Mk 532-2L/S turboprops; each 2,280 ehp.

**Dimensions:** span 98 ft 6 in, length 67 ft 0 in, height 24 ft 10 in.

**Weights:** empty 25,453 lb, gross 46,500-51,000 lb.

**Performance:** max cruising speed 278 mph, ceiling 25,000 ft, T-O run 2,480 ft, landing run 1,140 ft, range with 9,527 lb payload 1,624 miles.

**Accommodation:** crew of two; up to 58 troops, 48 paratroops and dispatchers, 24 litters and nine sitting patients/medical attendants, or up to 13,047 lb of cargo (17,547 lb at overload max T-O weight).

**Armament:** none.

#### II-76MD (NATO "Candid")

Since deliveries began in 1985, Nos. 25 and 44 (Mountain Geese) Squadrons of the Indian Air Force have operated 24 II-76MD medium/long-range transports, with the name *Gajraj* ("King Elephant"). Compared with the original military II-76M, the MD has D-30KP-2 upgraded engines that maintain full power up to ISA + 23°C. Gross weight and payload are increased; an additional 22,046 lb of fuel increases range with max fuel by 745 miles.

Freight handling is facilitated by rear ramp/doors and advanced mechanical systems for loading, unloading, and positioning containers and other freight inside the 8,310 cu ft hold. Being fully pressurized, the II-76 can carry troops as an alternative to freight.

**Design Bureau:** Ilyushin OKB, Russia.

**Power Plant:** four Aviadvigatel D-30KP-2 turboprops; each 26,455 lb thrust.

**Dimensions:** span 165 ft 8 in, length 152 ft 10 1/4 in, height 48 ft 5 in.

**Weight:** gross 418,875 lb.

**Performance:** cruising speed at 29,500-39,370 ft 466-497 mph, T-O run 5,580 ft, landing run 2,950-3,280 ft, range with max payload 2,265 miles, with 44,090-lb payload 4,535 miles.

**Accommodation:** crew of seven, including two freight handlers; up to 140 troops, 125 paratroops, or 110,230 lb of freight.

**Armament:** two 23-mm twin-barrel GSh-23L guns in manned tail turret. Provision for packs of ninety-six 50-mm IRCM flares in landing gear fairings and/or on sides of rear fuselage.

#### Skyvan

The Royal Nepalese Air Force at Kathmandu has two *Skyvan Srs 3Ms*, for paratroop and supply dropping, assault landing, casualty evacuation, and troop, vehicle, and ordnance transport. Their 6-ft-6-in-square interior cross section enables them to accommodate a wide variety of awkwardly shaped loads or cabin installations. A full-width door in the upswept rear fuselage gives unrestricted access to the hold. They have operated regularly into primitive airstrips up to 10,000 ft above sea level. The Royal Thai Army's two *Shorts 330UTTs*, a stretched, utility transport variant of the *Skyvan*, are destined for early replacement by recently ordered C-212 Aviocars. (Data for *Skyvan Srs 3M*.)

**Contractor:** Short Brothers plc, UK.

**Power Plant:** two AlliedSignal TPE331-2-201A turboprops; each 715 shp.

**Dimensions:** span 64 ft 11 in, length 41 ft 4 in, height 15 ft 1 in.

**Weights:** empty 7,400 lb, gross 13,700-14,500 lb.

**Performance:** (at 13,700 lb gross weight): max cruising speed at 10,000 ft 202 mph, ceiling 22,000 ft, T-O run 780 ft, landing run 695 ft, range with 5,000-lb payload 240 miles, with max fuel 670 miles.

**Accommodation:** flight crew of one or two; 16 paratroops plus dispatcher, 22 troops, 12 litters plus two attendants, or 5,200 lb of cargo.

**Armament:** none.

#### Y-12 (II)

Following about 30 of the lower-power Y-12 (I), the Y-12 (II) is now the main production version of this small Chinese STOL transport. More than 80 have been sold, including nine delivered to the Sri Lanka Air Force between 1986 and 1990. Although nominally belonging to No. 202 Light Transport Squadron of the 2d Transport Wing at Ratmalana, they have also been used for maritime patrol and surveillance, while some have been adapted as makeshift bombers, able to carry a 1,000-lb weapon load in raids against the Tamil separatists. Corrosion has degraded their airframes, and three of the nine were grounded in 1994 to provide spares for the other six.

**Contractor:** Harbin Aircraft Manufacturing Corporation, People's Republic of China.

**Power Plant:** Two Pratt & Whitney Canada PT6A-27 turboprops; each 620 shp (flat rated).

**Dimensions:** span 56 ft 6 1/2 in, length 48 ft 9 in, height 18 ft 3 1/2 in.

**Weights:** empty 6,261 lb, gross 11,684 lb.

**Performance:** max cruising speed at 9,840 ft 181 mph, ceiling 22,960 ft, T-O run 1,116 ft, landing run 656 ft, range (max fuel) 832 miles.

**Accommodation:** crew of two; up to 17 passengers, 15 paratroops, or 3,748 lb of cargo.

**Armament:** normally none.



## Joint STARS

A milestone in the integration of large, complex ground surveillance technology

JSTARS played a pivotal role in the Gulf War. Today, a greatly enhanced system is available to U.S. allies. It detects, locates and tracks moving vehicles in real time while providing high-resolution, near-real-time Synthetic Aperture Radar images. This unprecedented level of situational awareness is as critical in combat as in peacetime and crisis. And JSTARS' compatibility with all other space, airborne and ground-based surveillance and

reconnaissance assets makes it the optimum choice for our allies. Northrop Grumman. The right technologies. Right now.

**NORTHROP GRUMMAN**

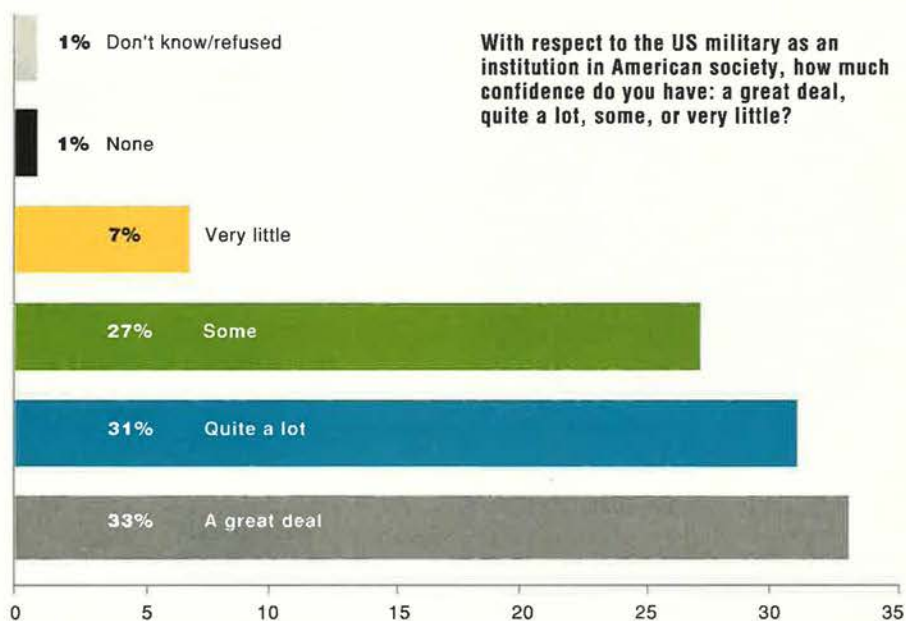




Here's a sampling of views on defense issues as expressed in public opinion surveys.

# Defense in the Polls

## Confidence in the Armed Forces



**A**MERICANS have considerable confidence in US troops and their leaders. However, they tend to think skilled diplomacy, rather than military strength, is more likely to ensure peace. They are not opposed to dispatching US forces on nontraditional humanitarian missions, for certain specific purposes, but they want US troops overseas to be under American command.

Judging from a survey of polls taken during 1995, the public has little desire to raise the Pentagon's budget. Nor does it evince much enthusiasm for cutting it, either. Americans apparently do think that the US and Russia ought to work harder to make deeper cuts in their Cold War-era nuclear arsenals.

### A Consensus

Such are a few results of polls published in recent months. They come from a large sampling of polling data made available to *Air Force Magazine* by the Roper Center for Public Opinion Research, located at the University of Connecticut. Poll results fluctuate, sometimes dramatically, but the results cited herein are representative of a broad consensus of views.

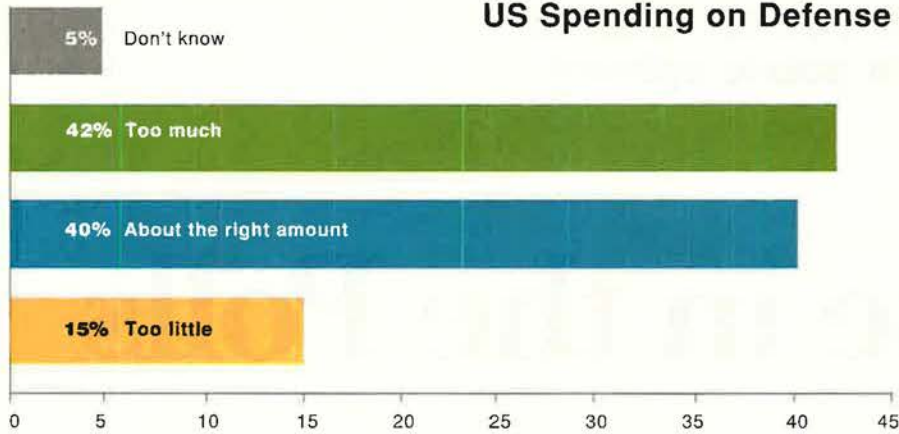
As part of that consensus, Americans give top priority to the possible use of force to halt the spread of mass-destruction weapons, such as nuclear, biological, and chemical arms. The public, however, does not feel as strongly about protecting weak nations from invasion. Americans think Washington should extract payment from allies whom it defends with military force. They emphatically do not want Germany and Japan to take on bigger military roles in the defense of Europe and Asia, respectively.

Percentages may not sum to 100 because of rounding. ■

Source: The Gallup Organization, for Cable News Network and *USA Today*, April 1995.



## US Spending on Defense

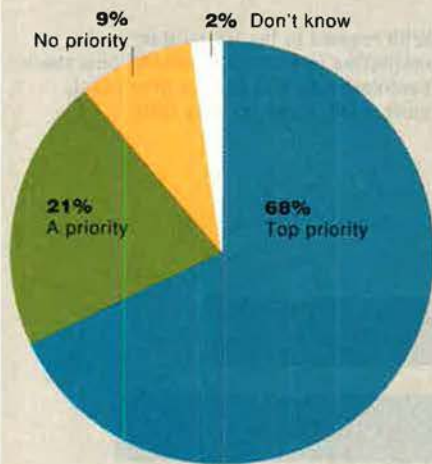


In terms of the amount of money the government in Washington spends for national defense, do you think we are spending too little, too much, or about the right amount?

Source: Market Strategies/Greenberg Research, for The Americans Talk Issues Foundation, June 1995.

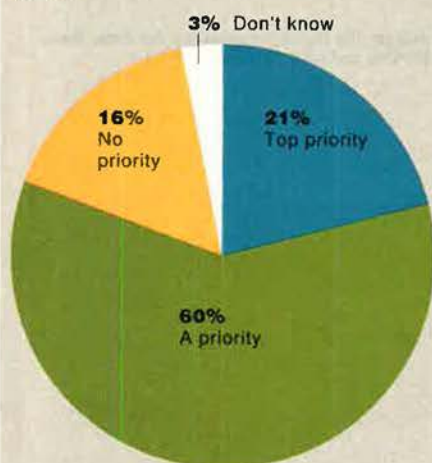
## Stop Weapons of Mass Destruction

On a list of possible long-range foreign policy goals, should preventing the spread of weapons of mass destruction have top priority, priority but not top priority, or no priority at all?



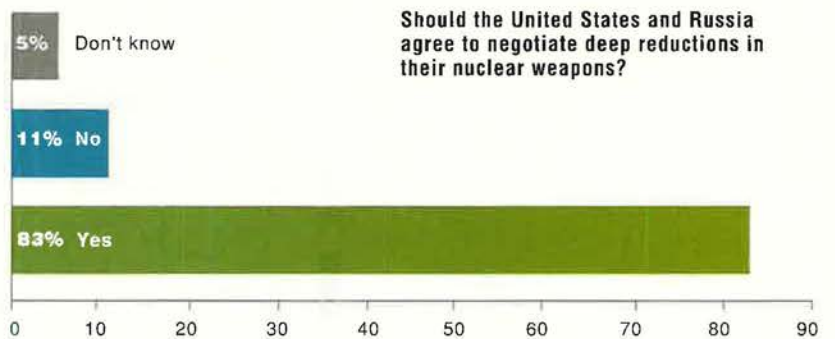
## Protect Weak Nations

Should protecting weaker nations against foreign aggression have top priority, priority but not top priority, or no priority at all?



Source: Princeton Survey Research Associates, for Times Mirror Co., June 1995.

## Deeper Cuts in Nuclear Arms?



Should the United States and Russia agree to negotiate deep reductions in their nuclear weapons?

Source: Associated Press, April 1995.

## Germany and Japan

After World War II, America and its Allies forced Japan and Germany to limit their armed forces, and the United States has provided military deterrence in Asia and Europe. Would you like to see Japan and Germany take on a larger military defense role?

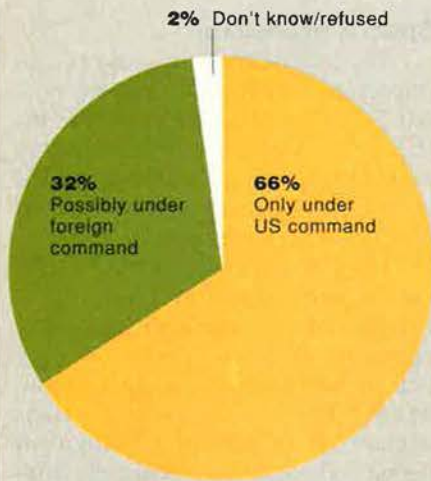


Source: Associated Press, March 1995.



## Command of US Troops

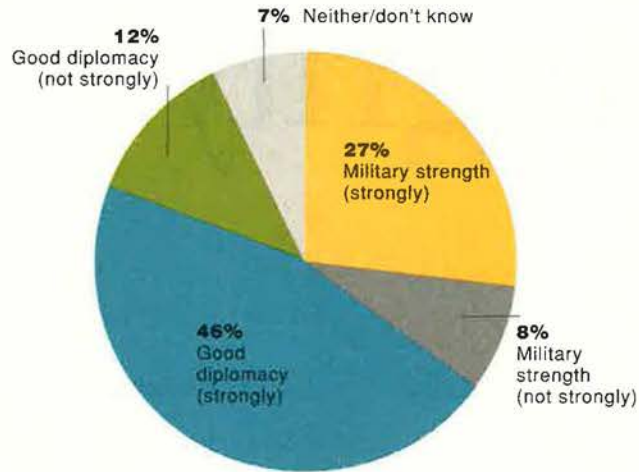
Do you think American troops should only take part in military operations under US command, or do you think there may be circumstances when American troops could be placed under foreign command?



Source: Market Strategies/Greenberg Research, for The Americans Talk Issues Foundation, June 1995.

## Military Force vs. Diplomacy

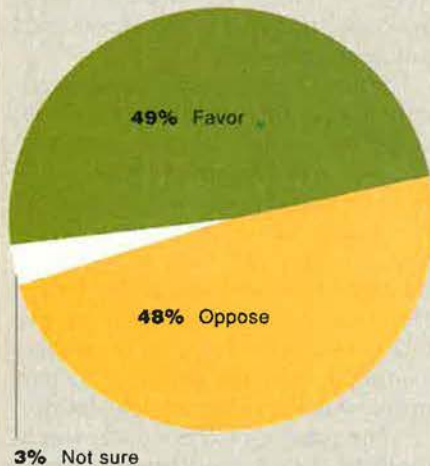
Does the statement, "The best way to ensure peace is through military strength," reflect your views, or does the statement, "The best way to ensure peace is through good diplomacy," reflect your views, even if neither is exactly right? Do you feel strongly about either statement?



Source: Princeton Survey Research Associates, for Times Mirror Co., April 1995.

## Defense for Deficit Reduction?

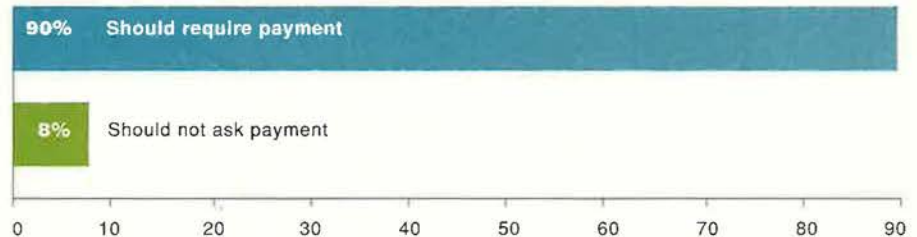
Would you favor or oppose cutting spending on defense to reduce the budget deficit?



Source: Louis Harris and Associates, June 1995.

## Seek Payment for US Operations?

If the US intervenes militarily anywhere in the world for the benefit of other nations as well as ourselves, then which of these two positions comes closer to your own thinking? "We should require other nations to pay a share of the costs depending on their ability to pay and how much the intervention is in their interest," or, "We should not ask other nations to pay a share of the costs because it might compromise our moral leadership and make us seem too mercenary."



Source: Market Strategies/Greenberg Research, for The Americans Talk Issues Foundation, June 1995.

## US Involvement in UN's Third World Operations

Do you approve or disapprove of sending UN forces—including some US military forces—to Asian or African countries in order to do the following missions?

Possible Mission	Approve	Disapprove	Don't Know
Prevent famines and mass starvation?	63%	30%	7%
Prevent one side from slaughtering the other in a regional conflict?	52%	40%	8%
Restore law and order if the governments break down completely?	47%	46%	7%
Keep peace when two sides in a conflict have called a truce?	46%	47%	7%

Source: Princeton Survey Research Associates, for Times Mirror Co., June 1995.



**The standards for military professionals are higher than those for society at large.**

# Integrity

*Gen. Ronald R. Fogleman is the Chief of Staff of the Air Force. Here are excerpts from his remarks on November 8, 1995, to the cadets of the US Air Force Academy, Colorado Springs, Colo.*

## **Great Concern**

“One of the founding fathers of our Air Force, Gen. ‘Hap’ Arnold, addressed the importance of integrity in 1942 in his book *Army Flyer* [written with Brig. Gen. Ira C. Eaker]. In that book, he said: ‘It is an unwritten law, but as binding as the unwritten common law in the English system of jurisprudence, that an . . . officer’s word . . . can be depended on to be the absolute truth. . . . The military profession takes great pride in its reputation in this regard, and its senior professionals never forgive any deviation.’ In my view, the fact that such deviations may still exist should be of great concern to all of us in the military.”

## **Integrity First**

“The Air Force Academy strives to develop your individual appreciation for the importance of integrity—first, by identifying it as a cadet core value; second, through the Academy’s Honor Code; and third, by striving to develop officers with forthright integrity, officers who do the right thing in their professional and private lives and take responsibility for their choices.

“Last spring, when the corporate leadership distilled the core values of the US Air Force into three ideals, we took a page out of the Academy playbook and cited ‘integrity first’ as one of the hallmarks of the Air Force professional. Over the past year, some of you may have heard me speak of my four pass-fail items for Air Force leaders. One of those is that leaders must have absolute, bed-rock integrity.”

## **Special Profession**

“As a practical matter, why is it so important that Air Force officers—Air Force leaders—demonstrate integrity? In short, it’s because of the nature of the business we’re engaged in. We belong to a very special profession—the profession of arms.

“The US Air Force exists for one reason, and one reason alone. That is to fight and win America’s wars when called on to do so. That’s the only reason we exist as an institution. The Air Force is not a social actions agency. It is not an employment agency. The Air Force Academy does not exist to provide a first-class education to some of the brightest young men and women in America. It exists to produce leaders of our Air Force.”

## **Avoid Careerism**

“Not all [of you] will become general officers because becoming a general officer is not what an Air Force career is about. It is about being a leader at whatever level you’re assigned and to whatever level you may rise.

“When I graduated from the Academy, I was told that if I had a full and complete career, I could expect to become a lieutenant colonel. I still believe that this should be the goal for young lieutenants entering active duty. It is not easy to become a lieutenant colonel in our Air Force. If you are fortunate enough to achieve that rank and be selected to become a colonel, then you will become part of our Air Force senior leadership.

“The general officer rank is something that occurs more through stroke of luck than it does any other way. But, the fact of the matter is that careerism is not what should be taught at or taken away from this institution.”

## **Higher Standards**

“The Air Force exists to fight and win wars—that’s our core expertise. It’s what allows us to be called professionals. We’re entrusted with the security of our nation. The tools of



our trade are lethal, and we engage in operations that involve risk to human life and untold national treasure.

"Because of what we do, our standards must be higher than those of society at large. The American public expects it of us and properly so. In the end, we earn the respect and trust of the American public because of the integrity that we demonstrate."

### **Bedrock of Integrity**

"In addition to [taking the commissioning] oath, we also subscribe to what the noted British soldier-scholar Gen. Sir John Hackett calls the 'unlimited liability' clause. Simply said, in the pursuit of the profession of arms, if you are called on to lay down your life for your country, for your family, for your fellow Americans, you're expected to do so. And it is no big thing. It is just a part of this profession that you've embarked upon. No other profession entails such a commitment.

"When we ask those whom we lead to take such an oath and to accept 'unlimited liability,' it's essential that the leaders in this profession of ours possess an absolute bedrock of integrity and self-discipline.

"It must be so. In this way, you assure your troops they will not be used in a frivolous or wasteful manner, and you sustain the trust of the American people who count on us to take good care of the nation's most treasured resource—its sons and daughters."

### **Here and Now**

"This isn't something that will only happen on someone else's watch.

"In late September, twenty-four members of our profession—twenty-two Americans and two Canadians—died when an AWACS [E-3 Airborne Warning and Control System aircraft] crashed on takeoff from Elmendorf AFB, Alaska. Their ranks were spread from lieutenant colonel to airman. They were an Air Force team. . . .

"When that crew reported to their duty station that morning, they weren't thinking about giving their lives for their country. They were thinking about the training mission that was coming up. It was a mission to hone their skills in anticipation of an upcoming deployment to US Southern Command to take part in counterdrug operations.

"They believed in what they were doing, and they trusted one another. They were all part of the military profession on that fateful morning, and they gave their lives for the countries they served.

"It's because we ask people to put themselves in a set of circumstances that could lead to this kind of outcome that we must, as leaders, have bedrock integrity. Our people must understand and know that. In this manner, your integrity will provide the basis for the mutual trust, the confidence, and *esprit* that is so critical to the effective operation of a military organization."

### **When No One Is Looking**

"What does all this mean in practice? What will it mean to you in your day-to-day activities as a future Air Force officer? Frankly, it means that sometimes you will be disappointed and you will feel lonely because, unfortunately, you won't always work for people of integrity.

"But also it means you must demonstrate the utmost integrity and honesty in everything you do—on duty and off duty. You must be straightforward in your dealings with superiors and subordinates alike. You must set the example of principled behavior for all to observe, and you must do the right thing, even when no one is looking.

"It is this example that inspires troops to demonstrate similar integrity and self-sacrifice. When they know your word is your bond, then confidence and trust will permeate the outfit. On the other hand, nothing destroys an outfit's effectiveness quicker than a lack of integrity on the part of its leadership."

### **Good, Bad, and Ugly**

"Air Force officers must create an honest and open atmosphere within their units. Their troops must feel comfortable in coming to them with bad news as well as good news. When you become part of the leadership, don't shoot the messenger because that will just discourage others from giving you the honest feedback you need to run a unit.

"You should report the good, the bad, and the ugly up the chain to your superiors. It's much better for your boss to find out about problems directly from you than after the fact, when you've failed in a mission or

unnecessarily endangered lives or resources."

### **Don't Lie**

"We must also clearly establish the standard within our units that Air Force people do the right thing. We don't pencil-whip training requirements, we don't violate tech data, we don't falsify documents, and we don't make inaccurate reports. The bottom line is we don't lie.

"When an NCO or a maintenance officer signs off a write-up in the aircraft forms, the crew accepts their word—their signature—that the aircraft is safe and ready for flight. This is an act of trust and faith.

"When a young engineer certifies that a rocket propulsion system is ready for launch, the owners and operators of the multimillion dollar satellite system on top of the launcher take his or her word at face value.

"Inevitably, a failure to comply with established requirements and procedures unnecessarily places at risk lives, equipment, and operations. Time after time we've seen instances where training, maintenance, or operational activities have not been documented, have been improperly documented, or have been untruthfully documented, and these have resulted in tragedy.

"We can ill afford such behavior in a business like ours that deals in lethal instruments and the lives of people. There is no substitute for honesty and integrity in our profession. What we do is just too important."

### **No Scapegoating**

"In the end, integrity means having the courage to take responsibility for your actions and those of your subordinates. Don't quibble, don't try to shift the blame, don't look for scapegoats in your outfit. If you fouled up, then fess up and press on. In doing so, you will set the right example for your troops and earn the respect of your subordinates and superiors alike. . . .

"I remember [a] quote from my professional reading—a quote from Gen. Robert E. Lee. He said, 'Duty, then, is the sublimest word in the English language; you should do your duty in all things. You can never do more. You should never wish to do less.'

"These are good words for all of us to reflect upon." ■







By John L. Frisbee, Contributing Editor

## Bombers Over Burma

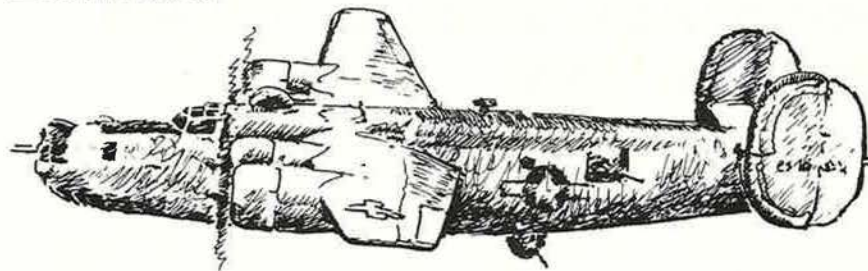
It was up to a gunner and the navigator to get the riddled B-24 to an emergency landing.

**B**EFORE the 7th Bomb Group arrived in India during March 1942, it had a long and distinguished record, extending back to World War I. During the early weeks of World War II, some of its members participated in the defense of Java against heavy attacks by Japanese air and naval forces. When the group arrived in India, it formed the nucleus of Tenth Air Force's heavy bomber capability, with the primary task of defending the supply line from India to China.

By mid-1942, the Japanese controlled most of Burma, had cut the Burma Road to China, and threatened the air supply line over the Hump. Japan's supply line was also vulnerable. The main port, Rangoon, in southern Burma, was a target of frequent attacks by 7th BG bombers. The distance from 7th BG bases, northwest of Calcutta, to Rangoon was comparable to that from London to Berlin. Rangoon was defended by Japanese fighters on many fields north of the port.

On the morning of November 11, 1943, a formation of B-24s, with 7th BG's 9th Bomb Squadron in the lead, took off for an unescorted strike on He-ho airfield north of Rangoon. The number three ship of the lead element was flown by Lt. Ben Graves and copilot Lt. Cyrus Kurth. Reconnaissance photos showed many enemy fighters at He-ho, but none attacked until "bombs away" from 16,000 feet, when a lone enemy fighter dove nearly straight down out of the sun. The first of several attacks set the left wing of Lieutenant Graves's B-24 ablaze and killed SSgt. William Burtch, the nose gunner.

As TSgt. Douglas Labat, flight engineer and top turret gunner, was firing at another Zero, the B-24 was hit again by cannon fire. A shell came through the windshield, exploding on the flight deck. Copilot Kurth was killed instantly, and pilot Graves was



wounded and stunned by the explosion. The plane banked sharply to the right, almost colliding with the B-24 flown by Lt. Charles V. Duncan, Jr., in number two position.

Labat climbed out of his turret and rushed to the flight deck where he found Kurth, nearly decapitated and lying over the control column, while the barely conscious Graves was attempting to pull the bomber out of its dive. Labat dragged Kurth's body out of the seat, slid in, and managed to get the bomber level and partially under control as it reached 8,000 feet. The wing fire blew out during their dive, but the two Zeros that followed the damaged B-24 riddled it with shells that miraculously spared the remaining crew members. The hydraulic system had been cut in several places, and the prop governor of the number three engine was frozen at 2,300 rpm.

A groggy Graves told Labat that he could hold the plane and that Labat should return to his turret. Navigator Lt. Grant Erwin then climbed up to the flight deck to investigate. He patched up Lieutenant Graves's head and neck wounds, then slipped into the copilot seat to relieve Graves. Two more attacks were driven off by the gunners. At last, the sky appeared to be clear of enemy fighters.

Labat again came down from his turret and relieved Erwin at the controls so the navigator could plot a course home or to the nearest friendly field. As Graves lapsed in and out of consciousness, Labat kept the plane on course. Two enemy fighters continued to follow them but turned away as the B-24 approached an airfield at Chittagong, near the Burma-India border, for an emergency landing.

As they neared the field, the crew told Sergeant Labat that the landing gear would not lock in the down position. So he could work on the problem, Labat again turned the controls over to navigator Erwin. Because the aircraft had power and was starting its final approach, he told Erwin not to attempt a landing or allow Graves to try until the gear was fully down and locked.

When the bomber was at about twenty feet over some sailing ships, the gear locked in place. Labat returned to the flight deck, standing between Graves and Erwin. Graves had recovered enough to attempt a landing, but ahead of them was a dike, too high to clear. In the nick of time, Labat shouted to Graves and Erwin to pull back on the controls. The wheels hit the dike, but Lieutenant Graves was able to recover and put the aircraft down on the runway.

All was not over yet. There were only 800 pounds of hydraulic pressure remaining. Labat knew the brakes could be used only once. He told Graves and Erwin not to let up on the brakes until the plane stopped rolling. As the B-24 came to a halt, Lieutenant Graves passed out completely.

Lieutenants Graves and Erwin and Sergeant Labat, who had saved the plane and the crew, were awarded Silver Stars for their heroic actions. They and the crew had hit their target successfully and were credited with destroying several enemy fighters. It had been a day of tragedy and triumph in a little-remembered corner of a great war. ■

*Thanks to Charles V. Duncan, Jr., of Modesto, Calif., who was a pilot on this mission.*





# National Report

## Congress Shoots Down Source Tax

In landmark legislative action in December, both houses of Congress adopted by voice vote a measure declaring that "No State may impose an income tax on any retirement income of an individual who is not a resident or domiciliary of such State." That marked the end of the "source tax," a practice by which states tracked down former residents who retired to states without an income tax and extracted revenue from them on the grounds that the state of previous residence was the "source" of their pension income.

"This is great news," said Air Force Association National President Gene Smith. "We've been after this one for a long time. AFA and other organizations in the Military Coalition opposed the source tax, pointing out the implications for military

retirees who may have lived, through no choice of their own, in a dozen locations in the course of their military careers.

The attractiveness of the source tax to the states that imposed it, notably California, was that it allowed them to raise money without risking complaints from their own voters. In 1992, *Air Force Magazine* reported the case of a retired Air Force officer who received a bill from California for \$11,000 in "overdue" taxes and termed the source tax "an interstate shakedown."

The sponsor of the bill that passed Congress in December was Rep. Barbara F. Vucanovich (R-Nev.), who first introduced it in 1988. The Air Force Association began working with Representative Vucanovich on this issue in 1989.

**"We really couldn't have gotten this bill through both chambers of Congress without the active grass-roots support of citizens from across the nation and groups like the Air Force Association who made sure their members of Congress understood how unfair source taxing really is."**

—Rep. Barbara Vucanovich

## Attention Air Force Veterans

In conjunction with other activities highlighting the Air Force's Fiftieth Anniversary in 1997, the Air Force Association and Aerospace Education Foundation are helping support the production of a two-hour documentary looking at a half-century of Air Force history and beyond. The documentary is being produced by a team led by CreatiVentures, Inc., for The Discovery Channel.

The production team wants to tell the story of the Air Force through the experiences of its people, from the flight line to the cockpit, from the support roles to the desks of the decision-makers. If you have anecdotes, stories, photographs, video, or other mementos you would like to share, please send them to the following address along with instructions on whether the producers can keep the material or should return it:

**CreatiVentures, Inc.**

Attn: AF 50th  
3823 Plaza Drive  
Fairfax, VA 22030

Some material not included in the documentary may be used to produce a companion commemorative coffee table book.

## Partners for Five Decades

Deputy Assistant Secretary of the Air Force Jimmy Dishner (left) and Gene and Rae Smith (standing) join Bob and Dolores Hope for lunch at the Bob Hope Village Community Center at the Air Force Enlisted Widows and Dependents Home in Shalimar, Fla. Mr. Hope put on a benefit show in Shalimar, organized by AFA's Eglin Chapter, to raise funds for the Air Force Enlisted Widows and Dependents Home Foundation. Bob Hope's relationship with AFA goes back to the beginnings. Mr. Hope was one of the stars of AFA's "Wing Ding" at Madison Square Garden in 1948 and has appeared at many an Association program since then. An AFA chapter in California is named in his honor. Mr. Smith is National President of AFA.







By Frances McKenney, Assistant Managing Editor

## Twenty-Fourth L. A. Ball

For more than twenty years, the Air Force Association has saluted various individuals, occasions, commands, and even places at the annual Los Angeles Air Force Ball. Last year's theme was succinct—"Proud to Serve."

In October, AFA recognized all who sacrifice in military and military-related roles to serve the nation—from men and women in uniform to those who support them; from those in industry who conceive, design, and produce equipment to those who deliver it. Just as the Air Force mission extends from the infinite reaches of space to the remote corners of the world, the ball honored a wide spectrum of military members and civilians—and those behind every person in uniform: mothers, fathers, sisters, brothers, and spouses who also serve as they wait and hope and sometimes fear. All are dedicated to accomplishing that mission.

Embodying the highest degree of service was special guest Col. Bernie Fisher, USAF (Ret.), holder of the Medal of Honor for heroism in Vietnam. Also honored were C. Gerald "Jerry" King, president of Boeing Defense and Space Group, and Rep. Jane Harman (D-Calif.).

Mr. King received AFA's Special

### **We gratefully acknowledge the following for their support of the L. A. Ball.**

The Boeing Co., Defense and Space Group  
The Foundation of the Litton Industries  
Gencorp Aerojet  
GTE Government Systems Corp.  
Honeywell Inc.  
Hughes Aircraft Co.  
ITT Aerospace Communications Division  
Lockheed Martin  
Logicon, Inc.  
Loral Federal Systems  
McDonnell Douglas  
Rockwell International Corp.  
Thiokol Corp.  
TRW, Inc.



*At the L. A. Ball, Rep. Jane Harman (D-Calif.) received an AFA Special Award for distinguished Congressional leadership from National President Gene Smith (left) and L. A. Ball General Chairman Edward C. "Pete" Aldridge, Jr., a former Secretary of the Air Force.*

Award for Distinguished Aerospace Industrial Leadership from AFA President Gene Smith for outstanding management and superb execution of key aerospace programs. The citation read, "The Defense and Space Group's steadfast commitment to meeting the nation's military needs and participation in cutting-edge programs, including the B-2 bomber and F-22 fighter, have clearly marked Boeing a leader in the aerospace industry."

Representative Harman received AFA's Special Award for Distinguished Congressional Leadership from the ball's General Chairman Edward C. "Pete" Aldridge, Jr., former Secretary of the Air Force. Her citation read, "For extraordinary effort as a member of the US House of Representatives National Security Committee in support of critical aerospace priorities. Her unwavering dedication to the C-17 Globemaster III, to Department of Defense space programs, and to technology development has greatly enhanced the nation's security and the vitality of the aerospace industry."

The two military hosts for the ball, Lt. Gen. Lester L. Lyles, commander

of Air Force Space and Missile Systems Center (SMSC), and Lt. Gen. Bruce L. Fister, commander of 15th Air Force, presided at the event.

Air Force Secretary Sheila E. Widnall, Chief of Staff Gen. Ronald R. Fogleman, and Commander in Chief of North American Aerospace Defense Command and US Space Command and Commander of Air Force Space Command Gen. Joseph W. Ashy, Pacific Air Forces Commander Gen. John G. Lorber, and Air Combat Command Commander Gen. Joseph W. Ralston also attended the ball.

SrA. Janelle Green, SMSC, sang the National Anthem, and Air Mobility Command's Band of the Golden West, under the direction of Capt. Dean Zambinski, provided a program of patriotic music. Also taking part was the Los Angeles AFB Color Guard.

The ball, a prime fund-raiser for USAF-oriented activities, presented a check for \$50,000 to Thomas J. McKee, president of the Aerospace Education Foundation.

This year's event will take place October 25, 1996.

—James A. McDonnell, Jr.

USAF photo by Ron Hall



**Before the Ball**

In what may become an annual event, the **Orange County/Gen. Curtis E. LeMay (Calif.) Chapter** hosted AFA Golf Day as a lead-in for the Los Angeles Symposium in October.

Held at the Los Alamitos Navy Golf Course in Cypress, Calif., the tournament involved sixty golfers from the active-duty, industry, and chapter ranks. Chapter Secretary Richard C. Baynes reported that Recon Optical's Tom Coney scored the lowest net (with handicap). Maj. Dave Little, USAF, from Los Angeles AFB, had the lowest gross (without handicap). ABEX NWL Aerospace team members Don Beverage, Augie Caponechi, Chuck Ranney, and Jim Shaffer made up the best foursome.

Maj. Gen. Edward J. Nash, USAF (Ret.), who was deputy chief of staff for Operations at Military Airlift Command, Scott AFB, Ill., spoke at the chapter's December meeting, where new officers were elected. In addition to Mr. Baynes, they are President Carl Bureman, Executive Vice President David Graham, and Treasurer Neil Cole.

**Whatever It Takes**

Howard C. Strand of the **Battle Creek (Mich.) Chapter** got the job done—despite the November federal government shutdown and though he had to pay the guest speaker's plane fare.

Maj. Gen. Robert W. Parker, 20th Air Force commander, headed the



*Getting ready for the Orange County/Gen. Curtis E. LeMay (Calif.) Chapter's golf tournament are Brig. Gen. Leonard F. Kwiatkowski (left), program director for the Military Satellite Communications Joint Program Office at Los Angeles AFB, Calif., and Mr. Aldridge, who is now Aerospace Corp. president.*

guest list for a November chapter dinner that boasted five other generals. In his remarks, he looked back on his thirty-two years of service. His US Strategic Command inspection team duties in the former Soviet Union also gave the General a chance to tell "many stories about his experiences while there, as well as about life in general in Russia," reported Mr. Strand.

Other distinguished guests at the

dinner were ANG Maj. Gen. E. Gordon Stump, the Michigan adjutant general; Maj. Gen. Lucius Theus, USAF (Ret.), former director of Accounting and Finance and now chairman for the Michigan Committee for Employer Support of the Guard and Reserve; Brig. Gen. Ronald L. Seely, ANG, assistant adjutant general for Air for Michigan; Brig. Gen. Richard A. Rann, USAF (Ret.), the state's former assistant adjutant general for Air; and Brig. Gen. Arthur P. Tesner, USAF (Ret.), also a former state assistant adjutant general for Air.

Mr. Strand began organizing this star-studded evening at the AFA National Convention, where he ran into a former co-worker, Col. Robert A. Raub, AFRES, a public affairs officer at Air Force Space Command, and asked him to find a guest speaker for the chapter. By the next day, Colonel Raub had arranged for General Parker to stop at Battle Creek on his way to other business at Fort Rucker, Ala. Then the federal government shut down, and Mr. Strand faced the prospect of being without a speaker at a gala for 200 people. However, the General agreed to drive from 20th Air Force headquarters at Francis E. Warren AFB, Wyo., to Denver, Colo., and Mr. Strand paid his plane fare to Detroit. There, he met General Parker and drove him the rest of the way to Battle Creek.

A former commander of the 127th Tactical Fighter Wing, Selfridge ANGB, Mich., Mr. Strand found it a lot easier



*In November 1995, CMSAF Paul W. Airey, USAF (Ret.), posed with (l-r) AFROTC Cadet Andrea Clift, AFJROTC Cadet Lisa Bowen, and AFROTC Cadets Lynn Sylmar, Monica Trychon, and William K'ite after a speech to the Colonel H. M. "Bud" West (Fla.) Chapter about the Air Force Memorial.*



to round up the other guests. "Four of them worked for me at one time or another," he said, and General Theus was an Air War College classmate.

### LSU Dines Out

Louisiana State University's AF-ROTC Det. 310 held a dining-out in November, along with Arnold Air Society and Angel Flight members and the **Baton Rouge (La.) Chapter**.

Guest speaker Lt. Gen. Edwin E. Tenoso, commander of 21st Air Force, McGuire AFB, N. J., addressed an audience of 350 guests, including university officials. The gathering capped a week of LSU activities honoring graduates who served in the military.

At the dining-out, General Tenoso, a colleague of Chapter President Thomas H. Normile during the Vietnam War and later at Squadron Officer School, joined Maj. Gen. Oris B. Johnson, USAF (Ret.), in presenting past State President Ivan L. McKinney with an AFA Exceptional Service Award. Louisiana State President Michael F. Cammarosano received an AFA Medal of Merit and a leadership award named for General Johnson. The awards recognized Mr. Cammarosano's service as chapter president during 1994-95, when the chapter received AFA's Outstanding Chapter Award.

Col. Paul L. Jacobs, USAF, commandant of cadets at LSU, also received a Medal of Merit at the dining-out. Chapter member Paul Landry and his wife, Inga, received the PegE C. Normile Financial Award. They have made generous contributions to the chapter's scholarship fund for LSU AFROTC cadets and Angels.

### An Astronaut in Fort Wayne

There's nothing like asking. Ted Huff, Jr., of the **Fort Wayne (Ind.) Chapter** did, and as a result, chapter member Paula McCaleb, a fifth-grade teacher at Pleasant Center Elementary School, Fort Wayne, received her Teacher of the Year Award from Apollo 13 astronaut Capt. James A. Lovell, Jr., USN (Ret.).

Chapter Vice President Huff and Ms. McCaleb went to hear the former astronaut address Magnavox Corp.'s Management Club at Fort Wayne's Memorial Coliseum. Before the event got under way, Mr. Huff, who once worked as an electronic-testing supervisor for Magnavox, asked company officials if Mr. Lovell had time to present the award to Ms. McCaleb.

"He was very gracious about it," said Mr. Huff. Mr. Lovell finished a television interview and made the presentation just before taking to the

stage to speak to a crowd of more than 700.

Pleasant Center is a magnet school for aerospace education, and Ms. McCaleb serves as a resource for the chapter whenever it starts a new *USA Today/AEF* "Visions of Exploration" program. She said her students were excited about her meeting Mr. Lovell and planned to watch "Apollo 13," the movie about his 1970 attempt to reach the moon.

### A Man With a Plan

AFA chapters much larger than the thirty-six-member **Roanoke Valley (N. C.) Chapter** face the same challenges it does.

As Chapter President Winfield Britton put it, the older chapter members frequently leave town to do the traveling they never had time for before retirement, while the younger members don't have the time to organize or attend chapter activities.

The downsizing of the military has also affected the chapter. It is near Seymour Johnson AFB, Mr. Britton explained, and the chapter used to be able to contact the base and easily arrange for a speaker. These days, with fewer USAF service members available for public speaking duties, it is more difficult to secure a speaker.

But Mr. Britton has not given up. He has plans for a newsletter, intends to find Air Force veterans in the area and send them copies, and in December he canvassed area businesses, seeking support for a chapter holiday dinner. Mr. Britton's dedication to reviving the Roanoke Valley

Chapter seems particularly impressive, considering that he served in the Air Force for only four years, as a teletype operator, from 1950 to 1954. He is now a retired postal worker.

### It Takes Something Special

For the thirty-five-member **Lester W. Johnston (Ind.) Chapter**, President Ted Heckman said finding a meeting place has been a problem. In the last eight years, they bounced from a room at the local gas company, to a private home, to a hospital meeting room, but they have finally found a home at the local library, where they have been scheduling a room for a year in advance.

Mr. Heckman said some chapter members live fifteen miles from the chapter's home base of Marion, Ind. "It's got to be something special to get them out," he said.

In November, they turned out for chapter member Kenneth Felty's slide show documenting his year at Ubon RTAFB, Thailand, during the Vietnam War, where he was an AC-130 illuminator operator. His job was to "hang out the tail of the airplane and watch out for ground fire," he explained.

Mr. Felty, a twenty-six-year-old staff sergeant at the time, bears scars on his arm from an attack on the AC-130 during a mission to An Loc, Vietnam, in May 1972. He said the gunship was over the target area for twenty minutes, and so much firepower was aimed at it that his helmet took thirty-nine hits. It was scrapped out and so, along with magazines about gunships



Former astronaut James Lovell, who is now on a full-time public speaking schedule, found a moment during an appearance at Fort Wayne, Ind., to present the Fort Wayne Chapter's Teacher of the Year Award to Paula McCaleb. Mr. Lovell has been in the spotlight lately because of the movie "Apollo 13" and his book, *Lost Moon: The Perilous Voyage of Apollo 13*.



# AFA'S TWELFTH ANNUAL AIR WARFARE SYMPOSIUM

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■ **Invited Speakers**

Top military leaders will explore air warfare requirements in the context of budget constraints, the need to modernize forces, and an uncertain future. Speakers will include: **Hon. Sheila E. Widnall**, Secretary of the Air Force; **Gen. Ronald R. Fogleman**, Chief of Staff, USAF; **Gen. Robert L. Rutherford**, commander in chief, US Transportation Command; **Gen. Joseph W. Ralston**, commander, Air Combat Command; **Gen. Joseph W. Ashy**, commander in chief, NORAD, and commander in chief, US Space Command; **Gen. Richard E. Hawley**, commander in chief, USAF; Army **Gen. William W. Hartzog**, commander, Training and Doctrine Command; and **Lt. Gen. George K. Muellner**, principal deputy to the assistant secretary of the Air Force for Acquisition. For more information, contact Jim McDonnell **703/247-5810** or Elizabeth Smith **703/247-5838**, or call **800/727-3337**, ext. 2030, for updated recorded information.

■ **Golf Tournament**

AFA's Central Florida Chapter will sponsor a golf tournament on Walt Disney World's Magnolia and Palm Courses on Wednesday, February 14. Contact Jim DeRose **407/356-5750**.

■ **Gala**

The chapter will sponsor its twelfth annual black-tie Gala on Friday, February 16. Proceeds will benefit AFA's Aerospace Education Foundation and the Air Force Memorial Foundation as well as AFOTC scholarships and other aerospace education activities. Contact Marty Harris **407/356-4810**.

**For hotel reservations**, call Buena Vista Palace Hotel **800/327-2990** or nearby Grosvenor **800/624-4109** or Doubletree Guest Suite Resort **800/222-8733**. Mention the AFA Symposium for special rate.

■ **Registration Form**

Advance registration closes Friday, **February 9, 1996**. No refunds can be made for cancelations after this date.

**Mail this form to:**

Air Force Association  
Attn.: Elizabeth Smith  
1501 Lee Highway  
Arlington VA 22209-1198

**Phone: 703/247-5838**  
**Fax: 703/247-5853**

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Symposium fee for AFA Individual or Industrial Associate member is **\$450**. Fee for nonmember is **\$500**. Fee includes sandwich lunch, reception/buffet (includes two drink vouchers), and continental breakfast.

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and a 105-mm howitzer shell, it became a visual aid in his presentation to the chapter.

### Drill to Thrill

They called it the Delaware Eagle Drill Classic.

In November, the **Delaware Galaxy Chapter** helped Delaware AFA sponsor a statewide JROTC competition to prepare the teams for national competition in April.

Eleven high schools brought about 250 Air Force, Army, and Navy JROTC cadets to the event. They served in units from Dover, Caesar Rodney, Smyrna, Sussex Tech, Polytech, Glasgow, Christiana, Seaford, Middletown, Mount Pleasant, and Cape Henlopen. They competed in regulation, inspection, color guard, and knockout drills. Middletown High School was the overall winner, followed by Dover and Smyrna High Schools.

"It was an impressive display of drill competition, and there was tremendous enthusiasm shown by everyone there," said Chapter President Col. Emmett Venett, ANG.

The 436th Airlift Wing commander, Brig. Gen. Robert J. "Mike" Boots, from Dover AFB, conducted the awards ceremony, along with Dover Mayor James Hutchinson. The Dover AFB Honor Guard and public affairs office provided judges and other support for the event.

### Warbirds on Tour

In World War II, **Burlington (Vt.) Chapter's** Willie Racine was a tail-gunner on B-24s in the 458th Bomb Group, Eighth Air Force, based in the UK. Today he is a retired auto dealer in South Burlington, Vt., but he recalled his thirty-five wartime missions recently when he hitched a ride on a restored B-24 Liberator.

Former Chapter President John W. Roach arranged for the fly-in of a restored B-24J and a B-17 Flying Fortress to Burlington. The vintage aircraft belong to the Collings Foundation, of Stow, Mass., which takes the warbirds on tour around the US.

Mr. Racine was given a ride in the B-24J's tail turret from Rutland to Burlington because he had helped arrange a previous fly-in.

"It brought back sad memories but also some good memories," said Mr. Racine of the ride, adding, "I did like flying until I got overseas to combat."

Also in October, National Vice President (New England Region) Dr. Phillip J. Sleeman installed the chapter's new officers. They are President David L. Ladd, Vice President



*Rep. Sonny Callahan (R-Ala.) (second from right), a member of the Mobile (Ala.) Chapter, was keynote speaker at a Veterans Day luncheon in Mobile. Here, he poses with (l-r) National Director Frank M. Lugo, Robert Brannon, and Chapter President Richard F. Brannon. At the luncheon, Robert Brannon, the chapter president's father, represented World War II veterans of the Coast Guard.*

Erwin Waibel, Secretary Andrew Bosstock, and Treasurer A. E. E. "Gene" Ardensohn. Mr. Ladd recently retired from full-time Air National Guard duties as commander of the 158th Fighter Group, Burlington IAP, Vt., and is now assistant adjutant general for Air for Vermont.

The Collings Foundation also took the restored B-24J *All American* and the B-17 *Nine-O-Nine* to the Evansville, Ind., airport. There, the **P-47 Memorial (Ind.) Chapter** helped arrange everything from discounted motel rooms for the crew members, discounted aircraft fuel, and free ramp space to extensive coverage by the local media.

Chapter President Charles E. Dougan, Sr., reported that chapter members manned an AFA table during the three days that the aircraft were open for tours.

He estimated that 1,500 visitors toured the bombers, which went to Indiana as part of a Salute to Veterans Tour, commemorating the end of World War II.

### Front-Page News

Brig. Gen. George N. Williams, then commander of the 97th Air Mobility Wing, addressed a group of more than 200 at the **Altus (Okla.) Chapter's** Community Partner Appreciation Luncheon in November. His appearance brought front-page recognition for AFA in the local newspaper, where it was the lead item.

General Williams, who now commands the 60th Air Mobility Wing, Travis AFB, Calif., told the gathering of chapter members, community leaders, and active-duty service members about developments in speed, range, precision, and stealth he has seen since he entered the Air Force in 1970 after graduating from Southern Illinois University. He also highlighted the important role of air mobility. "Today, even in Bosnia, the peace agreement is dependent on the US mobility airlift airplanes and tankers to move that force to where it needs to be moved," he said.

The Altus Chapter, with 594 members, has 130 Community Partners and has earned a Gold Award for the past four consecutive years. What's its secret? The chapter's Community Partner Program Chairman Robert H. Ottman is the former executive director of the Altus Chamber of Commerce. With an extensive network of contacts to call on, in his first week of signing up Community Partners, he netted fifty businesses. The next week, he signed up twenty-five. Then he had to curtail his efforts because he couldn't give the personal touch to so many people. He added that AFA's goal of promoting national security is what sparks the local businesses' interest in the program.

When inviting the Community Partners to the appreciation luncheon, he told them, "It's a free lunch—the only one you'll get all year."



## Coming Events

April 19-21, **New Mexico State Convention**, Windrock, N. M.; April 26-27, **Louisiana State Convention**, Baton Rouge, La.; May 17, **Maryland State Convention**, Andrews AFB, Md.; May 17-19, **New Jersey State Convention**, Absecon, N. J.; June 7-9, **New York State Convention**, Lake Placid, N. Y.; June 7-9, **Texas State Convention**, San Antonio, Tex.; June 14-16, **Arizona/Nevada State Convention**, Las Vegas, Nev.; July 18-21, **California State Convention**, Fresno, Calif.; July 26-27, **Florida State Convention**, Daytona Beach, Fla.; Aug. 2-3, **Missouri State Convention**, Kansas City, Mo.

## Professional Salesmanship

The **Brig. Gen. Frederick W. Castle (N. J.) Chapter**, too, has an experienced professional promoting AFA.

Edgar Wolf, Jr., a retired advertising and sales promotion manager for a wholesale distributor, has volunteered as the chapter's AFJROTC Coordinator for ten years. He regularly visits the Washington Township High School in Hurffville, N. J., or the Cherry Hill High Schools East and West, in Cherry Hill, N. J., where he speaks throughout the day to as many as six classes of AFJROTC cadets.

Most recently, he told them how he enlisted in the Air Force and received training as an aircraft and engine

mechanic, his selection for Officer Candidate School to become a "ninety-day wonder," and his service in the China-Burma-India theater as an aircraft maintenance officer.

He also talked about his Reserve and Korean War service. Mr. Wolf says he really grabs the young cadets' attention when he points out the direct correlation between education and income level.

At these appearances, the charter AFA member takes along *Air Force Magazine's* May issue and tells the cadets that if they have to write a report on the Air Force, the annual Almanac is a bounty of information at their fingertips.

## Just Rewards

The **Chuck Yeager (W. Va.) Chapter** held an awards presentation in December, recognizing the 130th Air-lift Group (ANG), Yeager Airport, W. Va.; Roger Samples, who was named outstanding teacher for the Central East Region; ANG Maj. Herman N. Nicely II; and Chapter President Samuel Rich.

The 130th AG provides the chapter with meeting facilities and computer graphics support. It provides orientation rides for JROTC cadets and community leaders. During the annual Retirees Day, organized by the chapter and the local VFW, it opens its medical clinic for blood pressure checks, and it opens its mess for chapter special events. For this outstanding support, the group re-

ceived a citation, accepted by Commander Col. Herbert Wheeler, ANG.

Mr. Samples earned recognition for promoting an appreciation for math and science at Bridge View Elementary School, where he was a fifth-grade teacher. He also sponsored the school's Young Astronauts program. Major Nicely received a special citation for his support of the chapter, which he has served as treasurer since 1987. Mr. Rich received an AFA Medal of Merit for 1994 and an Exceptional Service Award for 1995.

AFA National Director R. Donald Anderson made the presentations, and a color guard from South Charleston High School's JROTC unit presented the colors.

## The First Lady's Gift

In June 1994, **Metro Rhode Island Chapter** President John A. Powell received a kiss and a thank you from First Lady Hillary Rodham Clinton in Normandy, France, at ceremonies commemorating the D-Day invasion.

Mr. Powell, a nineteen-year-old private in an Army combat engineering battalion when he hit Omaha Beach in 1944, was among five D-Day veterans who received the *Croix de Guerre*, France's Medal of Honor, at the commemorative events.

Last Memorial Day, the White House invited Colonel Powell, AFRES (Ret.), to V-E Day ceremonies at Fort Myer, Va. There, Mrs. Clinton gave him a signed, framed photo of their meeting the year before in Normandy.

## More Chapter News

**Brandywine (Pa.) Chapter** President Joe Dougherty, Nick Agneta, and Vince Gallagher recently attended an exhibition of the work of aviation artist Keith Ferris. It was held in historic Berwyn Railroad Station, Berwyn, Pa., part of Philadelphia's Main Line. A section of the station has been set aside for exhibitions.

The **Cheyenne Cowboy (Wyo.) Chapter** helped sponsor the 90th Missile Wing's Air Force Ball at Francis E. Warren AFB, Wyo., in October, where AFA Executive Director John A. Shaud honored his first speaking engagement in his new post. He told a full house at the base's community center that he was proud of their contributions to America's defense.

## Have AFA/AEF News?

Contributions to "AFA/AEF Report" should be sent to *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 22209-1198. Phone: (703) 247-5828. Fax: (703) 247-5855.



The **Brandywine (Pa.) Chapter's** Nick Agneta, Vince Gallagher, and Joe Dougherty (l-r) attended an exhibition by aviation artist Keith Ferris (second from left). Since 1947, Mr. Ferris, a member of the **Union Morris (N. J.) Chapter**, has specialized in aviation themes in his art work.



# Unit Reunions

**Jolly Green Ass'n.** May 3-4, 1996, at the Ramada Inn Beach Resort in Fort Walton Beach, Fla. **Contact:** Jolly Green Ass'n, P. O. Box 965, O'Fallon, IL 62269-0965.

**Operation Where and When,** crew members of Col. Bernt Balchen in Sweden and Norway, 1944-45. June 6-7, 1996, in Kallax, Sweden. **Contact:** Capt. Kjell Agren, Swedish Air Force 21, S-971 73 Lulea, Sweden. Fax: (46) 920-38 464.

**World War II Night Fighters.** June 24-28, 1996, at the Sahara Hotel in Las Vegas, Nev. **Contact:** Alvin E. "Bud" Anderson, 8885 Plumas Cir., D-1116, Huntington Beach, CA 92646-5763. Phone: (714) 960-9058.

**15th and 20th Weather Squadrons Ass'n.** May 1-5, 1996, at the Holiday Inn in Hampton, Va., in conjunction with the Air Weather Ass'n. **Contact:** Luke Campeau, 4175 S. Granby Cir., Aurora, CO 80014. Phone: (303) 680-3269.

**22d Squadron,** Tachikawa AB, Japan. April 5-7, 1996, at the NCO Club at Offutt AFB, Neb. **Contact:** MSgt. Wayne H. Monsen, USAF (Ret.), N19441 Camp 12 Rd., Dunbar, WI 54119. Phone: (715) 324-6541.

**Pilot Class 43-K** (Central Flying Training Command). May 15-19, 1996, in Cincinnati, Ohio. **Contact:** Lt. Col. Harold A. Jacobs, USAF (Ret.), 17545 Drayton Hall Way, San Diego, CA 92128. Phone: (619) 485-5041.

**58th Fighter Ass'n** (69th, 310th, 311th, and 201st Mexican Squadrons), 1969-94. June 20-23, 1996, in San Antonio, Tex. **Contact:** Anthony J. Kupferer, 2025 Bono Rd., New Albany, IN 47150. Phone: (812) 945-7649.

**69th Fighter-Bomber Squadron,** Korea (1952-58). June 20-23, 1996, in San Antonio, Tex.

**Mail unit reunion 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.**

**Contact:** Roger Warren, 7550 Palmer Rd., Reynoldsburg, OH 43068. Phone: (614) 866-7756 or (813) 345-8254.

**155th Night Photoreconnaissance Squadron.** April 29-May 2, 1996, at the Showboat Hotel in Las Vegas, Nev. **Contact:** H. W. "Bill" Clark, 1848 Winterwood Blvd., Las Vegas, NV 89122-1136. Phone: (702) 457-5587.

**310th Pursuit/Fighter Squadron** (World War II), 310th Fighter-Bomber Squadron, Korea (Luke AFB, Ariz.). June 20-23, 1996, in San Antonio, Tex. **Contact:** Thomas H. Wellbaum, 8444 W. Seldon Ave., Peoria, AZ 85345-7935. Phone: (602) 878-7461.

**316th Fighter Squadron** (World War II). June 4-6, 1996, in Wilmington, N. C. **Contact:** MSgt. Wesley D. Moore, USAF (Ret.), 38 Bayle Mountain Rd., Center Ossipee, NH 03814.

**394th Bomb Group** (World War II). May 15-18, 1996, in Tampa, Fla. **Contact:** John C. Beale, 4206 Shadow Oak Woods, San Antonio, TX 78249. Phone: (210) 493-0221.

**394th Bomb Squadron and 4th Reconnaissance Squadron,** 5th Bomb Group, 13th Air Force, Pacific (World War II). April 11-14, 1996, at the Town and Country Hotel in San Diego, Calif. **Contact:** Dag T. Larsen, 410 Church Rd., Ojai, CA 93023. Phone: (805) 646-8761.

**924th Fighter Wing,** which included 924th Tactical Fighter Group, 704th Tactical Fighter Squadron, and 446th Troop Carrier Wing. April 12-14, 1996. **Contact:** Capt. Joe Wiggins, AFRES, 924th Fighter Wing, Bergstrom AFB, TX 78719-2557. Phone: (512) 369-2615.

**C-74 Globemaster I.** For a reunion, seeking contact with veterans from West Palm Beach, Fla., and Mobile, Ala., who flew the C-74 Globemaster I. **Contact:** Lt. Col. John H. Ralph, USAF (Ret.), 1402 Quail Creek Dr., Enid, OK 73703.

**Massachusetts State College, Amherst** (now the University of Massachusetts, Amherst). For a reunion, seeking former cadets in the Air Force Cadet Program in 1944. **Contacts:** John S. Piekarczyk, 6 Lerner Dr., Dudley, MA 01571. Phone: (508) 943-1132. Don Berg, 97 Botany Bay Rd., Worcester, MA 01602. Phone: (508) 791-2729.

**Victory Field, Tex.** For a reunion on October 5, 1996, seeking contact with veterans of primary training between 1941 and 1944 at Victory Field, Tex. **Contact:** Ann G. Huskinson, Red River Valley Museum, P. O. Box 2004, Vernon, TX 76385-2004.

**100th Air Refueling Squadron.** Seeking contact with former members for a 1996 reunion. **Contact:** Lt. Col. Charles R. Wagner, USAF (Ret.), 810 Ronell St., St. Peter, MN 56082-1815. Phone: (507) 931-6973. ■

# Bulletin Board

Seeking the whereabouts of **SSgt. Nevill Hill**, based at Burdrop Park, UK, 1953-56. **Contact:** Andrew W. Ross, 79-82 Northgate, Canterbury, Kent CT1 1BA, UK.

Seeking information on the **L-4J Grasshopper, #44-80299**, sold as surplus June 20, 1946. **Contact:** Lt. Col. Thomas M. Culbert, USAF (Ret.), 73 Fendall Ave., Alexandria, VA 22304.

Seeking the whereabouts of **Janka Green** (Varavka Bichkovsaya Nina Fyodorovna), who left Belorussia in 1945 and knew TSgt. Fredy Green. **Contact:** Vern Aarflot, Whisby A Site, Eagle Moor, Lincoln LN6 9DP, UK.

Seeking the whereabouts of an American airman based at Burtonwood AB, UK, 1944-45, who returned to visit "Pint-Sized Margaret." **Contact:** A. Mellor, 2 Bryn Tirion, Dingle Rd., Leeswood, Mold, Clwyd, North Wales CH7 4SP, UK.

Seeking an aerial photograph of **Da Nang AB, Vietnam**, taken around 1969. **Contact:** Charles L. McCarn, 842 Ravenwood Ct., Biloxi, MS 39532.

Seeking the whereabouts of USAF airman "**Ben**" **Bradley**, stationed possibly at RAF Upper Heyford, UK, in 1954. **Contact:** A. C. Stuart, 14 Tanfield Lane, Northampton NN1 5RN, UK.

Seeking information on the **Bell P-59, the Lockheed P-80 and F-94, the Republic F-84/84F, the North American F-86, and the Northrop F-89.** **Contact:** Thomas J. Goetz, 216 Lynn Lane, Westfield, NJ 07090.

Seeking contact with "**Z-Man**" (Mike?) who was stationed at Carswell AFB, Tex., 1990-92, knew Sheri Portlock, and may have moved to Alaska. **Contact:** Sheri Baxter, c/o P. O. Box 921004, Fort Worth, TX 76121-1004.

Seeking USAF insignias, badges, patches, and clothing. **Contact:** Aljo Wijnands, Leusderweg 261, 3818 AG Amersfoort, the Netherlands.

Seeking USAF old-style master sergeant patches with blue background and silver stripes and/or green background with blue stripes. **Contact:** Ken McNail, 1114 First St., Cheney, WA 99004.

Seeking contact with crew members of the **B-47**

**City of Miami** that was refueled by a KC-97, possibly over the Gulf of Mexico, in mid-1957. **Contact:** Edward J. Golden, 401 Hoosick St., Troy, NY 12180.

Seeking current and former USAF and Strategic Air Command personnel with information about and photographs of **Atlas D/E/F and Titan I** systems, sites, and units. **Contact:** Lancelot R. Wright, 718 N. 143d St., Apt. #104, Seattle, WA 98133-6969.

Seeking contact with **SSgt. Ernest Woods**, based at RAF Burtonwood, UK, 1943-45, whose last known address was Bronx, N. Y., in 1948. **Contact:** Mrs. M. J. (Woods) Broderick, 7 Westfield Rd., Leicester LE3 6HT, UK.

Seeking information on and photographs and slides of Air Defense Command aircraft participating in USAF **Worldwide Rocket Meets** held at Vincent AFB, Ariz., 1953-58. **Contact:** Larry Davis, 4713 Cleveland Ave. N. W., Canton, Ohio 44709.

Seeking **My Secret War**, by Richard S. Drury, and **The Illustrated History of Skyriders: The**



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## Bulletin Board

**Vietnam War**, by Robert F. Dorr. **Contact:** James E. Young, Jr., 137 Welter Rd., Butler, PA 16001-9506.

Seeking contact with members of the **309th Fighter Squadron**, 31st Fighter Group, stationed in San Severo, Italy, August–October 1944. Also seeking information on **1st Lt. Howard S. Schmid**, killed in action October 17, 1944, and **1st Lt. Huebert S. Garlock**, taken prisoner at Stalag Luft I, Barth, Germany, October 17, 1944. **Contact:** Jeffrey R. Elver, 5056 N. Ardmore Ave., Whitefish Bay, WI 53217.

Seeking contact with **Billy Picketts** of the 43d Air Supply Squadron, Erding, Germany, 1946–48, who was also stationed at Bolling AFB, D. C., 1950–51. **Contact:** Joseph Stuck, P. O. Box 5834, Belleville, PA 17004-5834.

Seeking the whereabouts of **Patricia (Petwa) Center**, whose father, John Center, was stationed at Ellington AFB, Tex., in 1971, and whose family transferred to Germany in 1972. **Contact:** Lisa Watts Kerr, 10731 Rambling Trail, Houston, TX 77089.

Seeking contact with former members of the **Mediterranean Air Transport Service**, including the headquarters squadron, the 327th and 328th Ferrying Squadrons, and the 329th Transport Squadron, North Africa and Italy, 1943–45. **Contact:** Maj. Thomas E. Calhoun, USAF (Ret.), 4027 New Copeland Rd., Tyler, TX 75701.

For the **8th Air Force Museum**, seeking books from veterans, one book per veteran, with veteran's name and group written inside. **Contact:** David B. Dahlberg, 4224 W. 36th St., St. Louis Park, MN 55416.

Seeking contact with anyone who knew **TSgt. Harold E. Penoyer**, a radio operator on the Devane crew, 348th Bomb Squadron, 99th Bomb Group, shot down over Gerbini, Sicily, July 5, 1943, and taken prisoner by the Germans. **Contact:** Robert H. Penoyer, 123 N. New Ave., Apt. #D, Monterey Park, CA 91755.

Seeking photographs and recollections from former personnel assigned to **Wendover Field, Utah**, 1942–45. **Contact:** Charles R. Tiemeyer, Wendover Field Project Office, Box 197, West Jordan, UT 84084.

Seeking contact with former **66th Fighter Wing** personnel stationed at Sawston Hall near Duxford Airfield, UK, World War II. **Contact:** Robert Huddleston, 66 Linden Ave., Mercersburg, PA 17236.

Seeking the whereabouts of **Lt. Rudolph Cooperesmith**, originally from Minnesota, stationed in the Paddington borough of London, 1943–44. **Contact:** Patricia Lynne Wilkins, 47 Hedley Ave., Blyth, Northumberland NE24 3JP, UK.

Seeking information on **Zebulon Thomas Hamilton, Jr.**, a photographer with 5th Air Force, at Port Moresby, Papua New Guinea, and Bolling Field, D. C., 1942–44. **Contact:** Paul Hamilton, 2870 Club House Rd., Costa Mesa, CA 92626.

Seeking an in-flight photograph of 8th Combat Command Squadron's **C-46 Curtiss Commando Old Dumbo**, World War II. **Contact:** Maj. James C. Cobb, USAF (Ret.), 104 Bonita Dr., Homewood, AL 35209-2006.

Seeking **patches**, uniforms, flight clothing, aircraft identification models, manuals, and captured enemy items from World War II to Operation Desert Storm. **Contact:** Lt. Col. Terry Carlson, USAF (Ret.), P. O. Box 250, Round Lake, IL 60073-0250.

Seeking contact with **Henry Lee Brandenburg**, who graduated from Aviation Cadet Class at Craig Field, Ala., November 20, 1944. **Contact:** Richard Broere, 5 Wave Pl., St. Augustine Beach, FL 32084-6391.

Seeking information on **Clay McWhirter Isbell**, originally from Austin, Tex., who entered the Army Air Forces in the summer of 1941. **Contact:** Allan F. Beck, 5229 Beech Ridge Rd., Nashville, TN 37221.

Seeking contact with former personnel of the **20th Fighter-Bomber Group**, 12th and 31st Fighter Escort Wings, 1950–51. **Contact:** Duncan Curtis, 69 Braemor Rd., Calne, Wiltshire SN11 9DU, UK.

Seeking contact with 8th Air Force member **James "Jimmy" Turner**, originally from Kentucky, who was stationed at East Anglia, UK, in 1945. **Contact:** Juanita Doresse Norris, 33 Hallwicks Rd., Stopsley, Luton, Bedfordshire LU2 9BG, UK.

Seeking photographs of aces **John Curry, Ripley Jones, John Lynch, James Peck, Reade Tilley, and Lance Wade** at Malta in 1942. **Contact:** Robert H. Barnes, P. O. Box 1697, Battle Creek, MI 49016.

Seeking contact with **SMSgt. Larry Mullins**, an NCO Club manager at RAF Bentwaters, UK, in the late 1960s. **Contact:** Maurine Knott York, 1300 Furman Dr., Sumter, SC 29154.

Seeking contact with **MSgt. Lemanuel Mitchell**, stationed at RAF Chicksands, UK, 1962–65, who knew Rosemary Beard. **Contact:** Darrel M. Aebi, 31 Runham Close, Lewsey Farm, Luton, Bedfordshire LU4 0HA, UK.

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Seeking the whereabouts of **SSgt. John J. Ryder**, originally from Pennsylvania, who served with the Weather Service, Fuchu AB, Japan, 1955-56, and at Wheeler AFB, Hawaii, 1956-57. **Contact:** Rosemary Gick-Von Ohlen, 25-11 College Point Blvd., Flushing, NY 11354-1034.

Seeking information about or contact with former members of 14th Air Force's **375th Bomb Squadron**, 308th Bomb Group, in the China-Burma-India theater, 1943-44, especially the crew of the B-24 *Battlin' Bitch*. **Contact:** Paul R. Robb, 720 Lendall Lane, Fredericksburg, VA 22405-2327.

Seeking the whereabouts of **Rick Bennett** and former 1967-68 USAF **Wiesbaden Junior High School** students. **Contact:** Gary B. Wolff, 3513 Pennsylvania Lane, Plano, TX 75075.

Seeking the whereabouts of **MSgt. Lee P. LaRoche** and his wife, stationed at Manston, UK, in the 1950s. **Contact:** A. J. Portman, 5 Tibberton Close, Halesowen, West Midlands B63 3ER, UK.

Seeking information on and memorabilia and photos of the **Boeing B-52**. **Contact:** R. Allen Kline, P. O. Box 472, Glenmont, OH 44628.

Seeking contact with anyone who was in Army Air Forces with "Dragnet" actor **Jack Webb**, 1942-45. **Contact:** Dan Moyer, 846 W. Main St., Bellevue, OH 44811.

Seeking contact with **Lt. Clement Yahia (Jahia)**, who was in Brussels in September 1944 and who lived on Long Island, N. Y. **Contact:** Jacques Gobert, Boterberg 13, B-1630 Linkebeek, Belgium.

Seeking USAF-published materials on **Vietnamese language training** for military personnel. **Contact:** Lt. Col. Bob Catherman, USAF (Ret.), 1305 175th Pl. N. E., Bellevue, WA 98008.

**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 type-written; 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**

Seeking information on bombardier **Lt. Samuel "Jack" Lewis**, missing in action on his eleventh mission over Holland, and navigator **Capt. Lawrence Grant**, missing in action during his second tour in Italy. **Contact:** James W. Shasteen, P. O. Box 16, Sullivan, IL 61951.

Seeking information on World War II Army Air Forces **auxiliary drop tanks** used in the European theatre. **Contact:** Col. Jack McMahon, USAF (Ret.), 9225 Lockman Lane, Dresden, OH 43821-9763.

Seeking the whereabouts of **Lt. Col. Ralph C. Budde**, who flew F-4 Phantom IIs, possibly with the 475th Tactical Fighter Wing. He was last known to be at George AFB, Calif., January 1972. **Contact:** A. Thomas Finney II, 421 E. Rice Ranch Rd., Santa Maria, CA 93455-5562-21.

Seeking information on **Charles Cranford**, a navigator on a 733d Bomb Squadron, 463d Bomb Group, B-17G that flew in Italy, 1944-45. **Contact:** William H. Cather, 314 Windsor Dr., Birmingham, AL 35209.

Seeking photos from and contact with former members of the 344th Bomb Squadron's "**Killer Kanes Pyramiders**" and the 491st Bomb Group's "**The Ringmasters**." **Contact:** Mark Natola, R. R. #3, P. O. Box 177, Cornish, NH 03745.

Seeking leather, or blue or green nylon, **flight jackets**, including A-2, B-10, B-15, L2, L2B, and MA-1 designs. **Contact:** Maj. Charles C. Blanchard III, USAF (Ret.), 145 Lanman Rd., Niceville, FL 32578.

Seeking contact with personnel of the **637th Radar Squadron**, Othello AS, Wash., who may have been exposed to radioactive discharges from Hanford nuclear reactors. **Contact:** Hanford Environmental Dose Reconstruction Project, Nuclear Waste Program, Dept. of Ecology, P. O. Box 47651, Olympia, WA 98504-7651.

Seeking contact with former members of the **College Training Detachment**, Austin College, Sherman, Tex., February-October 1943. **Contact:** Maj. Robert E. Donegan, Sr., USAF (Ret.), 2198 Parkway Dr., Charleston, SC 29412.

Seeking information on **Sergeant Teese (Teesh)**, based in Ireland in World War II, who knew Kathleen from southern Ireland. **Contact:** Frances Catherine Hamer, 87 Oxford Rd., Acocks Green, Birmingham B27 6DR, UK.

Seeking contact with members of the **Cantrell** family, who were stationed at RAF Chelveston, UK, in the early 1960s. **Contact:** Steve Page, 22 Wellingborough Rd., Rushden, Northamptonshire NN10 9YN, UK.

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# Pieces of History

Photography by Paul Kennedy

## The Force Behind the Force



*The Air Force Association, in its fiftieth-anniversary year, has managed to generate a considerable body of artifacts. The patches, plaques, mug, and gavel shown here are only a sample. The miniature AFA flag is mounted alongside the POW/MIA banner, recalling the Association's special commitment to the prisoners of war and missing in action. The*

*books and vintage issue of Air Force Magazine are reminders that AFA's leading product has always been information—which is now being presented on the Internet as well (AFA's site on the Worldwide Web is <http://www.afa.org>).*





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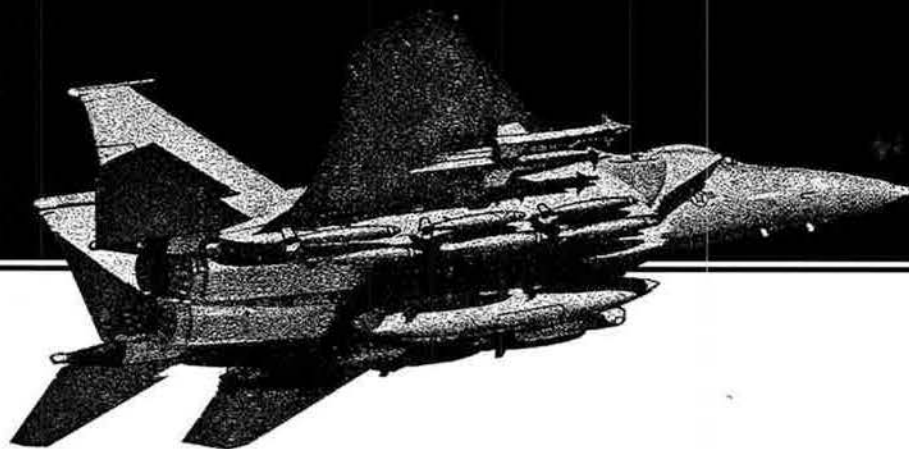
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