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AIR FORCE MAGAZINE

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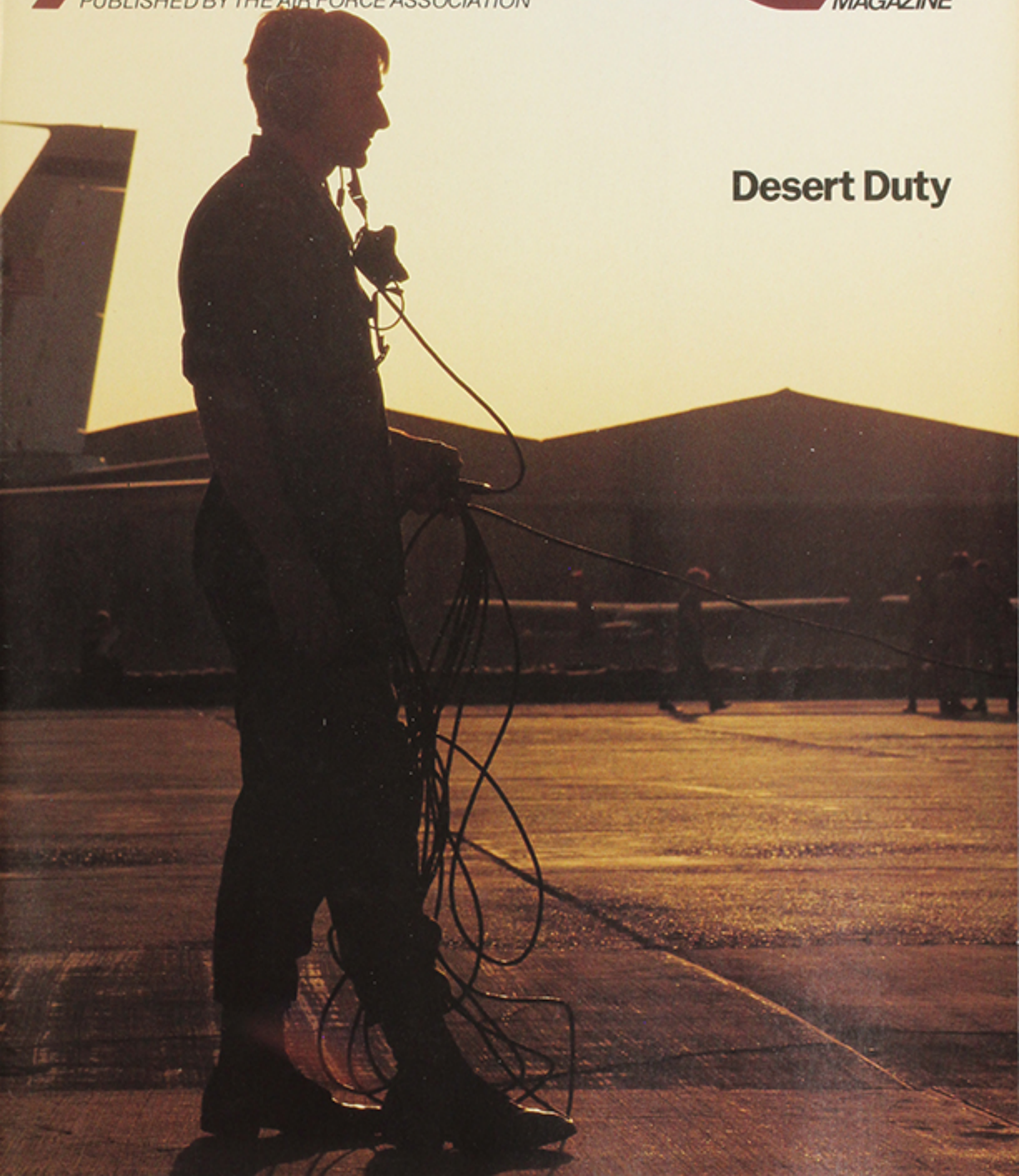

Desert Duty

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February 1991, Vol. 74, No. 2

AIR FORCE MAGAZINE

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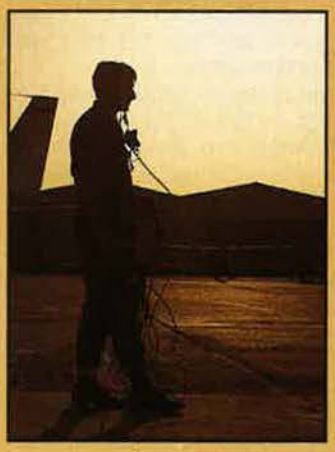

About the cover: Sgt. Harland McCallum, an assistant crew chief with the 963d Aircraft Maintenance Unit, surveys the flight line before the takeoff of an E-3 Sentry AWACS aircraft in Saudi Arabia. USAF photo by TSgt. Hans Deffner.

Desert Duty

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Editorial

By John T. Correll, Editor in Chief

The B-2 and Television

ACCORDING to opinion polls, a high percentage of Americans think the B-2 Stealth bomber should be canceled. This is understandably distressing to the US Air Force, which regards the B-2 as a critical requirement.

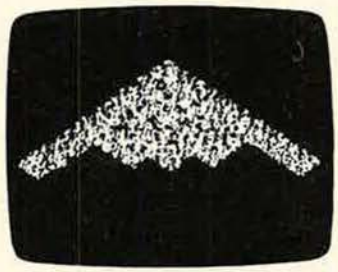
In a free society, public opinion has a powerful influence on public policy. That is fundamental to our process of government and politics, but the principle is subverted when the public does not have accurate information on the issues. It is important, therefore, to ask what evidence the public heard before reaching a verdict on the B-2.

Part of the answer is provided by Stephen Aubin, an Olin research fellow at the Boston University Center for Defense Journalism. Analyzing B-2 coverage, day by day for more than a year, Mr. Aubin found that the three major television networks—the main source of news for most Americans—fed their viewers a distorted story.

ABC, CBS, and NBC concentrated, almost single-mindedly, on the cost of the B-2. They showed little interest in the aircraft's military mission, capabilities, or technology. Its role in arms control and strategic deterrence got very short shrift. The networks reported with relish on problems in the B-2 program but consistently ignored the successes.

To merit airtime, a story had to be visual and dramatic. For one eight-month stretch, between rollout and taxi tests, the B-2 practically disappeared from network newscasts. The reason, apparently, was that the producers had no interesting new pictures to show. When there were pictures, the newscasters overlaid them with pejorative adjectives like "exorbitant" and "ominous-looking." Mr. Aubin cites several instances in which television enhanced or cooked the facts, making the story more titillating.

The networks seldom passed up an opportunity to be snide. ABC's Diane Sawyer pitched her July 10, 1989, report this way: "What's long overdue, way over budget, and proved today it can travel at least six miles on the ground?" She added that the B-2 "rolled up and down a runway in California today, the first time it's gone anywhere under its own power." Did the viewers understand that the news element in this cleverness was that the B-2 had done exactly what it was supposed to do in its taxi test?



The Stealth bomber may foil radar, but it's vulnerable to another electronic device: the network TV camera.

A week later, Fred Francis of NBC followed Ms. Sawyer's pattern as he reported the B-2's first flight: "The bat-winged bomber, the costliest weapon ever built, eighteen months overdue, and already being trashed by Congress, lifted gracefully into the California dawn." The networks felt compelled to point out that this first flight was not very fast and not very high and did not demonstrate the B-2's ability to evade radar. Did the viewers understand that the flight was not supposed to do any of those things, or, given such cues as "costliest," "overdue," and "trashed," did they reach some other conclusion?

In April 1989, CBS told the nation that the new Secretary of Defense, Dick Cheney, had reservations about the B-2. A month later, Mr. Cheney gave the B-2 program high marks for quality control and expressed his support. CBS did not find that newsworthy.

Print media coverage of the B-2, which Mr. Aubin also studied, was more complete and better balanced. Newspapers, magazines, and newsletters had their share of negativism and bias, Mr. Aubin said, but the expanded context in print mecia "often gives the reader a fighting chance to form his own opinion."

It is no surprise that the most analytical coverage was in technical and trade publications, whose readers expect more than superficiality. Still, many reporters and columnists in general-interest publications seemed to understand that although the cost of the B-2 was an issue, it was not the only issue and perhaps not even the most important issue.

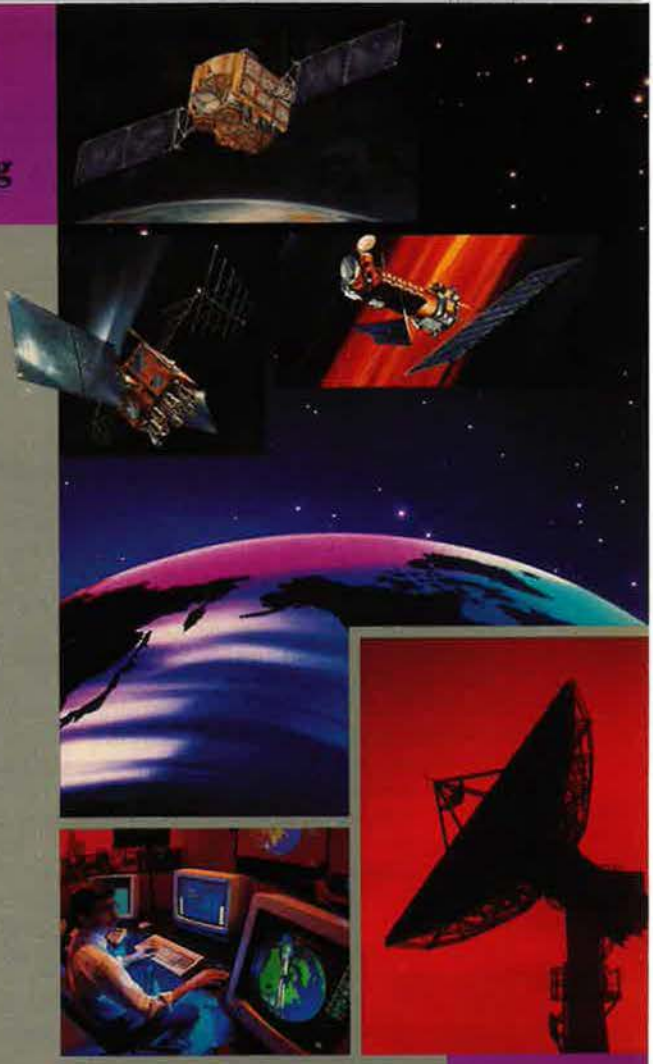
Mr. Aubin presents a fuller report of his findings in *The B-2 and Network News,* published in January by the Aerospace Education Foundation. Mr. Aubin is demonstrably not flacking for the B-2 or any other Pentagon program. In fact, he even points out a couple of negative angles the networks missed on the B-2.

Who knows what conclusions the vast viewing audience might have reached about the B-2, given a fuller set of facts and exposure to less simplistic considerations? Unfortunately, the networks have not given us a chance to find out.

The fate of the B-2 will probably be decided in Congress this year. The hand of those who oppose the program is undoubtedly strengthened by the B-2's bad image in the opinion polls. Let us hope that the final round of debate goes deeper than the fluff dispensed on the evening newscasts. Both the airplane and the public deserve better than they have gotten from network television.

It is ironic that the B-2, designed to defeat enemy radar, remains vulnerable to an electronic device of a different kind. It has no effective defenses against the domestic television camera. ■

Command & Data Processing



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Letters

Tribute to an Educator

For sixteen years, a highlight of AIR FORCE Magazine has been Gen. T. R. Milton's column. Word that the December "Viewpoint" is his last came as something of a shock. It was, most of us thought, a permanent part of the magazine.

General Milton wrote from a background of combat experience and command and staff work at the highest national and international levels. His "Viewpoint" columns were marked by a sense of history and political reality. He never sidestepped controversial issues, and we always knew exactly where he stood. Hence, not everyone agreed with him, but he moved many readers to enter the debate. Witness the number of letters, pro and con, that followed many columns. Nothing warms the heart of an editor more than that.

Ross Milton helped educate a generation of young people and forced many of us elders to rethink long-held beliefs. That aside, not the least attraction of his columns was literary excellence. Reading them was pure pleasure. Thanks to him and to AIR FORCE Magazine for all that.

Col. John L. Frisbee,
USAF (Ret.)
Fork Union, Va.

• *Colonel Frisbee is a former editor and current contributing editor of* AIR FORCE *Magazine.*—THE EDITORS

Airpower Debate

"Bravo Zulu" to Col. Dennis Drew *[see "We Are an Aerospace Nation," November 1990 issue, p. 32]* and to General Milton for timely, concise support to the national debate on airpower and its uses. Colonel Drew seems correct in most areas, except when he begins to discuss trade and airpower's exclusivity.

The vast majority of our trade is still conducted on the sea, not in the air. The best way to destroy cargo ships is with subs, and airpower on the open sea is only marginally effective against subs. You don't send subs to shoot down aircraft; don't expect aircraft to be effective against subs. A *Los Angeles*–class submarine, however, will do quite nicely against a quiet *Akula*. Colonel Drew asserts that "land and naval forces, except in the most unusual circumstances, cannot operate without airpower, but airpower can function effectively—perhaps even decisively—without support from land and sea bases." I submit that *Trident* SSBN captains would (rightly) object mildly. Granted, ballistic missiles are aerospace power, but the D5 silos are not directly road-accessible.

Long-range airpower just can't do it all yet. If America were ever to fight a war without access to land bases, the good Colonel's buddies may be quite glad to hoist a cold one in a club that sits at a Seabee-built air base on a remote island that Marines secured.

The formulation by General Milton seems much more accurate *[see "Viewpoint: Last Visit With LeMay," November 1990 issue, p. 105]*. "If it is true that airpower has never attained victory by itself, it is equally true that no war can be won without it." If events in progress in the Persian Gulf prove the contrary, perhaps we will all have reason to change the "can" to "should." I pray that the American lives that airpower can spare will be spared.

God bless the Air Force. I am very grateful for the massive portion of SIOP and Army support you provide. You can't do it all. Nobody can.

Lt. Stephen E. Rollins,
USN
Lemoore, Calif.

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

Academy Grads Heard From

Mr. R. Miller *[see "The Academy's Cost," November 1990 "Letters," p. 12]* responds to General Milton's "Viewpoint" on the Air Force Academy *[see "The Academy Is an Investment," September 1990 issue, p. 154]* and offers some of his opinions. Unfortunately, his points are severely obscured by emotionalism and an obvious bias against Academy graduates.

Before commenting on Mr. Miller's letter, I want to state that General Milton presented an intellectual and poetic piece on our "nation's springtime." He emphasized that our nation must continue to produce (during peacetime and between crises) military leaders who are dedicated to the selfless and demanding stewardship of life in the military. He was not analyzing the merits of the Academy vs. ROTC. . . .

Mr. Miller shared some observations from the perspective of a former combat aviator in Vietnam. Without a doubt, we have a great deal to learn from Mr. Miller (and others with "recent" combat experience). He strongly suggests that ROTC is sufficient (and considerably less expensive) as a commissioning source in terms of combat performance—and this may be true. However, he offers no suggestions, other than eliminating the Air Force Academy, to improve Air Force commissioning programs.

The service academies are designed to provide grit and perseverance. They should be the baseline for all other commissioning programs. Both ROTC and OTS are essentially designed to supplement the basic corps of regular officers. Unfortunately, whether by fate or choice, not all potential officers are afforded the opportunity to attend a service academy.

ROTC and OTS graduates should be (and are) given the same opportunities for promotion and leadership positions as Academy graduates. I have served with officers with commissions from all three sources, and I can say that the source of commission did not correlate with any partic-

ular degree of professionalism or competence. That conclusion should not suggest that the Academy has failed. . . . Our military leadership needs the heterogeneous blending of Academy, ROTC, and OTS commissions.

Should Academy graduates be required to serve a mandatory career? No, sir. The type of commitment our nation needs and deserves from its military leadership is and should continue to be strictly voluntary. Is it better to have a loyal servant for five years or a dissatisfied one for twenty? The Academy's selection criteria and curriculum should be designed to recruit and train the caliber of officer that the Air Force needs for twenty to thirty-five years of service, but it is impossible to retain an entire Academy class for that duration—by law, there is a limit to the number of colonels and general officers who can serve on active duty. . . .

Mr. Miller is right about our nation's financial problems. But cutting the quality of our Academy training programs will not repair those finances. On the contrary, as General Milton said in his article, "In the lull between crises, the important thing is to keep the right people in uniform somehow, worrying about national security while the rest of the country pursues other matters."

Lt. Col. Ronald J. Scott, Jr., USAF
USAFA '73
Little Rock AFB, Ark.

I felt compelled to respond to Mr. Miller's apparent double standard in his attempt to measure the taxpayer's return on an Air Force Academy graduate.

Mr. Miller sets forth the premise that there is no measurable difference in the quality of officer produced by the Academy and other commissioning programs. While I [believe] there is a difference, for argument's sake I will agree that he is correct. In a given group of 100 officers, doctors, lawyers, or members of any other profession, you will find the spectrum from poor performer to star; you would find the same in any subgroup of, for example, Academy graduates considered separately.

However, Mr. Miller quite clearly draws the distinction between sources of commission in singling out "Academy graduates who got out and are using their education (and flight training) for civilian professions." What about the ROTC and OTS graduates who received the same training? Why did this difference suddenly become so clear—is it because we cost so much?

The truth is that, once again, Academy graduates are like any other pilot, doctor, or engineer in the Air Force. We make personal career decisions based on individual situations and in light of many complex factors, such as job satisfaction, family considerations, and the notion of service to country. Some stay, some choose to leave. Are ROTC graduates entitled to be any less committed than Academy graduates? Or are they held to a lower standard because they cost less? Also, the idea of a mandatory career for Academy graduates is ludicrous. Mr. Miller would be hard-pressed to find many eighteen-year-olds willing to commit the next twenty-four years of their lives to a profession they know little about.

Finally, let's stop maligning Academy graduates or pilots or engineers who take their military training and apply it to civilian professions. . . . Let's remember that any period of service in the armed forces, faithfully and honorably rendered, has a solid, measurable value to the nation and should not be trivialized if it falls short of a career. Whether they choose to serve five, ten, or twenty years, every day of that service those in the armed forces are there to do whatever the nation may ask of them. Look at Desert Shield. Even those who may be awaiting a DOS [date of separation] are there, facing the same perils as everyone else. . . . Just preparing for hostilities can be costly, too. Ask the families of my classmates who have died in the five years of "peace" since we graduated.

Capt. Matt Lyons, USAF
USAFA '85
Great Falls, Mont.

Two letters in your November 1990 issue really grabbed my attention. As an Air Force Academy graduate from the Class of 1980 (the first class with females), I am compelled to respond to both.

The first was "Twisted Logic" [by Lt. Col. (Dr.) Robert W. Feldtman, AFRES, p. 14]. I find it refreshing and extremely surprising that anyone still in the Air Force would comment in such an honest manner on the controversial subject of women in the military. . . . I entered the Academy with our "pioneering" women cadets. I know that many of our female graduates have gone on to do great things in their Air Force careers, but what I experienced that summer was far from great.

Two things quickly became evident: that the Air Force was quite unsure what to do with our female classmates, and that it was equally determined to graduate as many of them as possible. . . .

Cadets would be formed up for the

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Letters

assault course and physical training, while as many as thirteen of fifteen females watched from parade rest. Many seemed always on sick call and excused from most physical conditioning. To make matters more frustrating, we would read in the next day's newspaper how our women were "doing as well as or even better than the males in the class." What a crock. . . .

Don't get me wrong, I really do not have a problem with women in the military, just the ones who cannot cut it. Why have a double standard for men and women at the Air Force Academy, or anywhere in the military? Either a certain physical standard is required or it isn't. I would much rather serve with a female who can cut it than with a male who can't.

A certain standard of fitness should be applied to everyone without regard to gender. This is the military, not IBM, and the object is to kill your opponent. Those women who can cut it should have the "opportunity" to be right up there on the front line with the men who can cut it.

Now on to R. Miller and "The Academy's Cost." I have always believed that you get what you pay for, but apparently Mr. Miller does not. He says he "has no grudge against cadets," but obviously he does. If he had spent any time as a cadet at the Air Force Academy, he would know that life at USAFA is a great deal more than "football, hockey," and "a lot of play and a lot of busywork." We all gained the confidence, knowledge, and self-discipline that can only be obtained from an extremely demanding program. Any one of us could have taken the easy way out anytime and become a "$58,000" ROTC graduate, but we did not. . . .

My classmates achieved, applied, were accepted, and graduated. They had the knowledge, training, and drive to succeed in the Air Force, and they did so. Mr. Miller's accusations sound like little more than sour grapes. I am impressed by Mr. Miller's combat missions, but I feel his career's end was due less to someone else's special privilege than to his own desire to do something else.

One final point, on which Mr. Miller and I do agree: It really "gripes me" too that retention is so low for Air Force Academy graduates. I think perhaps we were given standards so high that life in the "real" Air Force was a giant letdown. Air Force leadership must know that a crisis exists when its most expensively educated company school graduates are leaving the service as soon as they get the chance. The "mandatory career" Mr. Miller desires for USAFA graduates is not the answer. An improved service in which graduates (and everyone else) want to stay and run things would seem a much better alternative.

Mr. Miller makes the point of comparing costs between ROTC and USAFA officers and even goes so far as to suggest that "$58,000" ROTC graduates are the way to go. If money is the issue, Mr. Miller, why spend money to train anyone? If less is equal, or even more, why not just give lieutenant's bars to everyone who wants them?

The answer: because you get what you pay for.

Daryll Keeling
USAFA '80
Evergreen, Colo.

Circular Error Probable

In "Bombardier" in the December 1990 issue *[see p. 76]*, you show a picture of a B-25 with the markings of the 499th ("Bats Out of Hell") Squadron, 345th Bomb Group. The caption states, "In the B-25, the bombardier had to load the forward machine guns in addition to his primary duties."

The B-25 pictured is a strafer. We did not use a bombardier, since all bombing and strafing was done at treetop level. Armorers loaded the guns on the ground prior to flight. The pilot charged the guns in flight. The pilot fired the guns and dropped the bombs in addition to flying the plane.

Col. George L. Cooper,
AFRES, (Ret.)
Tonganoxie, Kan.

Incomplete Gallery

In AIR FORCE Magazine, December 1990, there appears a "World Gallery of Trainers."

In the article, I miss the Swedish Piston-Engine Saab Supporter, or T-17 as it is named in NATO/Denmark. I also miss the Saab 105, or SK 60 as it is named in the Swedish Air Force.

Because of this I find the headline "*World* Gallery" misleading.

Karl G. Widén
Air Attaché,
Swedish Embassy
Washington, D. C.

• *There are few of the above-mentioned aircraft flying and none in production. We apologize for the omission, but to manage the size of the "Gallery," we had to leave out some of the hundreds of types of trainers flying worldwide.*—THE EDITORS

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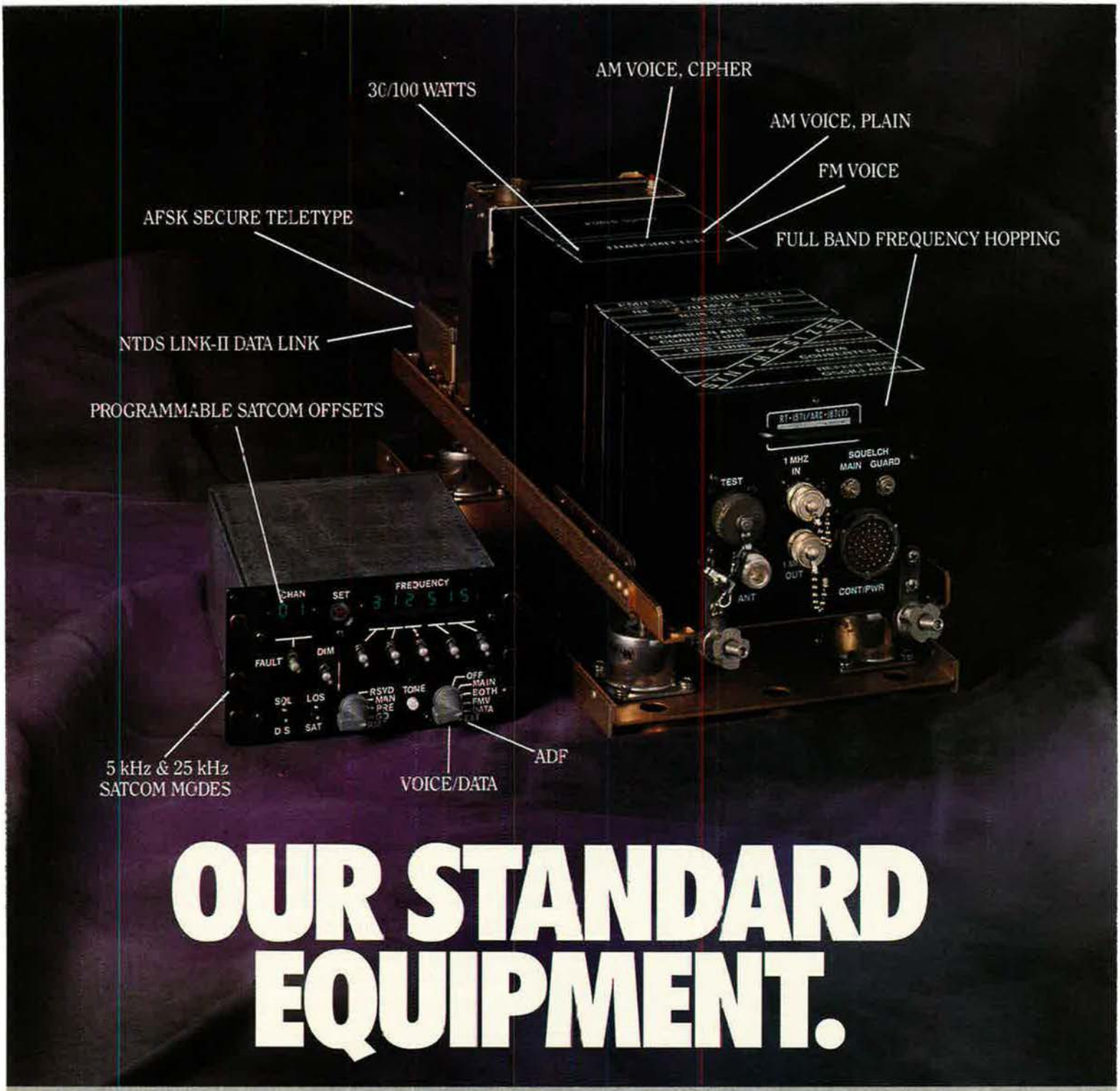

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Aerospace World

By Jeffrey P. Rhodes, Aeronautics Editor

★ A December 31 deadline marking the end of the Air Force's Advanced Tactical Fighter program's demonstration/validation phase began to loom large as the two competing teams continued their intensive flight test programs at the Air Force Flight Test Center at Edwards AFB, Calif., in late November and early December.

General Dynamics test pilot Jon Beesley recorded the first missile launch from either of the ATF designs when he fired an AIM-9M Sidewinder from the number two Lockheed/Boeing/General Dynamics YF-22 prototype on November 28. Flying level at 20,000 feet at Mach 0.7 over the Naval Weapons Center at China Lake, Calif., Mr. Beesley opened the weapons-bay doors. With visual confirmation from the chase pilots that the doors were open and a green "launch ready" light on his instrument panel, he fired the missile. The AIM-9 was not fired at a target.

The aircraft, weapons bay, support system, and launcher were heavily instrumented to accumulate test data before and during the shot. The airplane, powered by two Pratt & Whitney YF100-PW-100 engines, will also be used for a test firing of an AIM-120A Advanced Medium-Range Air-to-Air Missile. That shot was scheduled for late December.

The number one YF-22 (powered by two General Electric YF120-GE-100 engines) engaged the type's thrust-vectoring nozzles for the first time on November 15. Chief test pilot Dave Ferguson reported that with the nozzles engaged and airspeeds as low as 120 knots, roll rates in excess of 100 degrees per second have been achieved. Both prototypes are now using the nozzles.

Air Force Maj. Mark Shackleford has taken the number one YF-22 to angles of attack in excess of forty degrees. The YF-22 team hopes to get as high as sixty degrees AOA by the end of the test program. As of December 15, the number one YF-22 had logged thirty-five flights and 42.1 hours and the number two aircraft had logged twenty-one flights and 22.7 hours.

Meanwhile, on the other side of the partitioned hangar at the ATF Combined Test Force at Edwards, Northrop and McDonnell Douglas completed testing of their number one YF-23 prototype on November 30. The P&W-powered aircraft was flown by chief test pilot Paul Metz, who made the first flight in the plane on August 27. The plane, now in flyable storage, completed thirty-four flights and forty-three hours.

The aircraft was flown six times for an average of forty-three minutes each time on its last day of work as a reliability and maintainability demonstration. There was a one-hour turnaround between flights. This YF-23 was flown at supercruise speeds of up to Mach 1.5, and the weapons-bay doors were opened to accumulate acoustic and vibration data. The team did not fire any missiles.

The number two YF-23 prototype achieved supercruise on November 29. The GE-powered aircraft's speed was immediately classified by the Air Force, indicating a speed without afterburner in the neighborhood of Mach 1.6 or better. The aircraft had been flown thirteen times for just over eighteen hours. Northrop estimated that the number two aircraft would be flown another six to eight times before testing ended.

★ NASA recorded one completely successful space shuttle mission and one that was mostly successful in less than thirty days in late November and early December. The end of STS-35 and the beginning of STS-38 came just twelve days apart, the second-shortest period between shuttle missions. Both of the missions had been postponed from the spring because of hydrogen leaks.

While *Atlantis* was being processed for STS-35, a classified Department of Defense mission, contractors mistakenly left a nine-foot-long, seventy-pound beam in the payload bay. The beam fell several feet when the orbiter was raised to the vertical position, and it did minor damage. Processing was not delayed significantly, however. The launch was delayed a week by an undisclosed payload problem that occurred November 9 while the shuttle stack stood on Launch Complex 39A.

An AIM-9M Sidewinder air-to-air missile streaks away from the number two Lockheed/Boeing/General Dynamics YF-22 prototype during the single test conducted late last year, the first firing from either of the ATF designs. The missile was housed in the enclosed bay on the side of the aircraft's air intake.

—Photo by Paul Jackson

These Douglas A-4KU Skyhawks, along with seventeen others, make up half of the Kuwaiti Air Force in exile. The squadron now operates from Dhahran AB, Saudi Arabia. Incorporated into the Royal Saudi Air Force, the Skyhawks and fifteen Dassault Mirage F.1CKs defiantly wear the "Free Kuwait" legend on their fuselages.

The thirty-seventh shuttle mission, the seventh DoD flight, got under way at 6:48 p.m. on November 15. The night launch was the fifth in the shuttle program (the second this year) and the sixth in US history. Only one more dedicated DoD mission is scheduled. The Defense Department will put classified payloads on "open" missions in the future.

The crew of Air Force Col. Richard Covey (mission commander), Navy Cmdr. Frank Culbertson (pilot), Marine Col. Robert Springer, Army Maj. Charles Gemar, and Air Force Lt. Col. Carl Meade (mission specialists) deployed the payload, designated AFP-658, early in the flight. The payload weighed 22,000 pounds and was believed to be either a signal or photographic satellite placed in orbit over the Middle East. Commander Culbertson, Major Gemar, and Colonel Meade were all making their first trip into space.

High winds at Edwards AFB, Calif., prompted NASA to delay the landing, then shift it to the 15,000-foot-long runway at Kennedy Space Center in Florida. Colonel Covey brought *Atlantis* down at 4:43 p.m. EST on November 20. This was the sixth landing at KSC and the first time in five years the 3,000-foot-wide strip had been used. Unlike *Discovery* in its problem landing in April 1985, *Atlantis* suffered no tire damage, and the runway will now be the primary backup landing site.

After four delays (three related to the hydrogen leaks and one caused by problems with the Astro-1 payload), *Columbia* lifted off from Launch Complex 39B at 1:49 a.m. December 2, the tenth time that orbiter had gone into space. The thirty-eighth shuttle flight was the sixth to begin at night, the seventh US night launch overall, and the sixth launch to occur in 1990.

The Astro-1 payload is a pallet-mounted observatory containing three ultraviolet telescopes and one X-ray telescope designed to observe the hottest and most violent objects in the universe—*e.g.*, supernovas, white dwarf stars, and quasars. However, the 12.5 ton, $150 million observatory had technical problems from the beginning of the mission.

The first set of problems arose from a faulty telescope pointing system. The crew first tried to point the telescopes manually, which was difficult but achieved limited success; then they got new software from ground controllers; then the Astro-1 computer crashed. The problem was compounded by malfunctions in two display units.

Having ground controllers do a majority of the pointing work, with fine corrections being made by the astronauts, solved the problem. Although much of the scheduled research could not be performed, the pictures obtained by the crew were of great interest to the scientific community.

A clogged waste water pipe threatened to end the mission early, but the crew worked around the clog by using urine-collection devices and empty water containers. The mission ended a day early because of threatening weather at both landing sites. The crew brought *Columbia* down at Edwards AFB at 9:54 p.m. PST December 11. It was the fourth night landing in shuttle history.

The crew consisted of Vance Brand (mission commander), Air Force Col. Guy Gardner (pilot), Jeffrey Hoffman, Mike Lounge, Robert A. R. Parker (mission specialists), Dr. Samuel Durrance, and Dr. Ronald Parise (payload specialists). Mr. Brand was making his fourth spaceflight. At fifty-nine, he is the oldest person to fly in space. Drs. Durrance and Parise were space rookies. The seven-man crew was the largest to go into space since the *Challenger* disaster in 1986.

★ The aerospace industry's defense business declined slightly in 1990 and will drop off more sharply, although not disastrously, in 1991. This downturn will be offset by solid growth in the industry's civil sector.

Such were the tidings delivered by Don Fuqua, president of the Aerospace Industries Association of America, at the annual aerospace review-and-forecast luncheon sponsored by AIA and the Aviation/Space Writers Association last December in Washington.

AIA anticipates that aerospace defense spending will "fall considerably below present levels" in 1991 and that the industry's defense sales will remain depressed through the 1990s, Mr. Fuqua said. "We are now feeling the delayed impact of several negative-growth [defense] budgets, and we expect substantially lower levels of defense sales throughout this decade," he stated.

The industry's nondefense business is good and will get better, AIA expects. Sales, profits, exports, and backlogs reached record levels in 1990 in the civil sector and will go up in 1991. Sales for 1990 were expected to reach $31 billion, a forty-two percent increase over those for 1989.

Mr. Fuqua said that AIA estimated total sales of $131.4 billion for 1990. Compared to 1989, this represents a twelve percent gain in current dollars but a 3.6 percent decline in inflation-adjusted dollars, he reported.

In sum, he said, AIA expects that the industry as a whole will experience "a moderate decline in real, inflation-adjusted overall sales volume throughout this decade."

★ **VCR ALERT**—The award-winning PBS documentary series **"Nova" will have a series of episodes covering the Soviet space program** later this month. "The Invisible Space Man" (February 26) profiles Sergei Karolev, the designer of the first Soviet rockets. "The Dark Side of the Moon" (February 27) details the Soviets' se-

SCIENCE/SCOPE®

A thermal imaging system that turns night into day for crews of U.S. Navy SH-2F Light Airborne Multi-Purpose System (LAMPS) helicopters is aiding in the fight against drugs. LAMPS helicopters, equipped with the Hughes Aircraft Company's AN/AAQ-16 Hughes Night Vision System (HNVS), have been participating in law enforcement operations in support of the Coast Guard Carribean Squadron, flying hundreds of vital law enforcement surveillance sorties, sighting and reporting many suspect surface vessels which otherwise would have gone undetected. HNVS has been installed on a variety of U.S. Army, Air Force and Navy helicopters, and a derivative of the system has been selected for the U.S. Tri-Service V-22 Osprey.

The U.S. Navy now has the first full-function simulator for military hovercraft. This amphibious vehicle, called the Landing Craft Air Cushion (LCAC), incorporates state-of-the-art hovercraft technology. It is one of many training systems built by Hughes Simulation Systems, Inc., a subsidiary of Hughes Aircraft Company. The Full Mission Trainer accurately replicates the amphibious environment and dynamic responses of the craft, while providing an effective training platform for all crew positions. LCAC simulates many unprecedented operations at sea. It creates real-time, multiple sea-state, three-dimensional wave and ocean models, and integrates visual and motion experience.

U.S. military aircraft crews will now be protected against laser threats. Together with the U.S. Army, Hughes has developed a warning system for U.S. helicopter crews subjected to laser threats. The AN/AVR-2 Laser Detecting Set (LDS) detects, identifies and characterizes optical signals 360-degrees around the aircraft. Interfacing with a Radar Signal Detection Set, the system also functions as an integrated radar and laser warning receiver system. The Army and Marine Corps have successfully completed testing and initiated production of this laser detecting system, which will soon be standard equipment on their combat helicopters.

A self-leveling thermode greatly reduces adjustments in a new reflow soldering system. The Hughes-built system, designated the Model HTT-SLT, is especially designed for soldering edge connectors and flex circuitry to printed circuit boards. The self-leveling feature makes it easier to align the work piece and heater bar in the same plane for even heating, while thermocouple control provides highly uniform temperature distribution with rapid heating and cooling for higher throughput. The system also incorporates the Hughes HTT-650 power supply that provides an accurate and repeatable timed pulse for consistently high quality reflow solder connections.

An innovative computer program dramatically reduces the hours required to model the performance of new missile designs. Called Generic Missile Simulation (GEMS), the software, created by Hughes, cuts the evaluation time of new missile designs from six months to one to 20 days, depending on the complexity of the missile. The time saving is accomplished because GEMS contains a library of generic building blocks needed for missile system simulation. These building blocks are combined, or modified, as necessary to simulate a new missile design. In the past, each new design required its own, unique simulation software.

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

HUGHES

Subsidiary of GM Hughes Electronics

Anniversaries

• *February 1, 1911:* The first licensed aircraft manufacturer in the US, the Burgess and Curtis Co. (no relation to the company founded by Glenn Curtiss) of Marblehead, Mass., receives authorization from the Wright Co.

• *February 17, 1911:* Navy officials see their first demonstration of a seaplane as Glenn Curtiss flies from North Island, Calif., to USS *Pennsylvania* anchored in San Diego Bay, taxis alongside, and is hoisted on board. The aircraft (a modified Type III fitted with pontoons) is then returned to the water, and Mr. Curtiss flies back to North Island.

• *February 22, 1921:* American transcontinental airmail service begins. The route between San Francisco and Mineola, N. Y., is flown in fourteen segments by pilots flying US-built de Havilland DH-4s. The first flight, made mostly in bad weather, takes thirty-three hours and twenty minutes.

• *February 12, 1931:* The Detroit *News* buys a Pitcairn autogyro for promotional purposes. This is the first sale of a commercial autogyro in the US.

• *February 19, 1936:* Airpower advocate Billy Mitchell, who resigned his commission just over ten years earlier after being court-martialed, dies in New York City at the age of fifty-seven. He is buried in Milwaukee, Wis.

• *February 28, 1946:* The Republic XP-84 Thunderjet prototype is flown for the first time at Muroc Dry Lake, Calif., with Air Force Maj. Wallace Lein at the controls.

• *February 5, 1951:* The US and Canada announce jointly their intent to set up a Distant Early Warning (DEW) system for North American air defense.

• *February 17, 1956:* Company test pilot Tony LeVier inadvertently makes the first flight of the Lockheed F-104A Starfighter as the plane skips off the runway during high-speed taxi tests at Edwards AFB, Calif. The first official flight takes place March 4.

• *February 1, 1961:* The first Boeing LGM-30A Minuteman I intercontinental ballistic missile is launched from Cape Canaveral AFS, Fla. It travels 4,600 miles and hits in the target area. This is the first time a first-test missile has been launched with all systems and stages functioning.

• *February 3, 1961:* Strategic Air Command begins continuous airborne alert with its EC-135 airborne command post aircraft. The "Looking Glass" mission was reduced to only periodic flights after July 24, 1990—one result of the easing of world tensions.

• *February 24, 1966:* The first attempted salvo (simultaneous) launch of two LGM-30A Minuteman I ICBMs is successfully carried out at Vandenberg AFB, Calif. This test is a demonstration of launch techniques that will be used at operational bases under combat conditions.

• *February 6, 1971:* Apollo 14 Commander Alan Shepard, a Navy captain and the first Mercury astronaut, becomes the first person to play golf on the moon, using a field-modified soil-sample scoop as a club. The third moon-landing mission, which also includes Navy Cmdr. Edgar Mitchell and Air Force Maj. Stuart Roosa, takes place between January 31 and February 9.

cret plan to reach the moon before the US did. "The Mission" (February 28) follows the training, flight, and return to Earth of a cosmonaut crew.

★ **APPOINTED—Victor H. Reis,** a career research scientist, was named **director of** the Defense Advanced Research Projects Agency **(DARPA)** on November 13. His previous experience includes service as DARPA's deputy director, special assistant to the director of the Massachusetts Institute of Technology's Lincoln Laboratory, and numerous other senior-level positions in government and the private sector. A mechanical engineer by training, he is a graduate of Rensselaer Polytechnic Institute and holds advanced degrees from Yale and Princeton. He is a former member of the Air Force Association's Science and Technology Committee.

★ **HONORS—Sacramento Air Logistics Center** at McClellan AFB, Calif., and the **Warner Robins ALC Directorate of Communications and Computer Systems** at Robins AFB, Ga., were named the winners of the **Quality Improvement Prototype Award** for 1991 in late November. The award is presented annually by the Office of Personnel Management to the best-managed organizations in the federal government. Thirty-four agencies were nominated, but the Air Force Logistics Command units were the only recipients. This marked the first time an Air Force organization has received the award since its inception in 1988.

Air Force Academy junior **Chris Nelson** was named the **Western Athletic Conference men's cross-country runner of the year** on November 12. This was the first time that a Falcon harrier received this honor. Cadet Nelson won the WAC title at WAC/NCAA District VII Championships held in Salt Lake City, Utah, on November 10, helping the Falcons to a third-place overall team finish. He finished twenty-ninth at the NCAA Championships the following week and earned All-America honors, the first Falcon runner in seventeen years to do so.

★ **PURCHASES—Rockwell** received a $32 million Air Force Systems Command Aeronautical Systems Division contract on November 16 for initial production of the **AGM-130A rocket-propelled glide bomb.** The Lot 1 contract covers the procurement of twenty-eight television-guided AGM-130s, test equipment, training support, and flight testing. The contract calls for fifteen production verification launches from F-111s and F-15Es starting in early 1993. Contract options total $71.4 million and call for 175 additional weapons, support, and production tooling. Funding for the options will be released as the program meets key milestones. The first production AGM-130 will be delivered in the last quarter of FY 1992. The Air Force hopes to acquire 960 TV-guided and 3,088 infrared-guided AGM-130s over a ten-year period.

McDonnell Douglas received a $20 million Naval Air Systems Command contract on December 3 for integration, development, and flight testing of a **radar-equipped AV-8B Harrier II V/STOL attack jet.** The prototype will be fitted with the Hughes APG-65 radar found on the F/A-18. The radar will improve the pilot's situational awareness, navigation during poor weather and other low-visibility conditions, and air-to-ground bombing accuracy. The contract also authorizes the twenty-four Marine Corps AV-8Bs ordered in FY 1991 to be built in the new configuration, called Harrier II Plus. The prototype is expected to fly in October 1992, with production deliveries starting the following spring. The Marine Corps is considering remanufacture of the existing AV-8B fleet to a radar/night attack configuration. Harrier II Plus aircraft will get a new engine, the Rolls-Royce F402-RR-408.

The Oklahoma City Air Logistics Center at Tinker AFB, Okla., exercised a $15.4 million contract option with **Learjet** for **contract logistic support of the Air Force's fleet of C-21As** in November. Glasco, a subsidiary of Learjet, will provide maintenance and spares support for the seventy-nine

Air Force and four Air National Guard C-21s stationed at sixteen bases around the world. The C-21, a military version of the Model 35 business jet, is used for administrative, high-priority cargo, and medevac missions. Since 1984, when delivery of the jets began, the fleet has logged more than 130 million miles and has a mission capable rate greater than ninety-five percent.

★ **DELIVERIES—General Dynamics** delivered the **first wide-body Centaur upper stage** to Cape Canaveral AFS, Fla., on December 10. The Centaur will be fitted to the top of a Martin Marietta Titan IV heavy-lift space booster in order to put a classified payload into space later this year. The new Centaur carries fifty percent more propellant than the Centaur D-1A used with the Atlas booster and, at fourteen feet, is four feet wider. The wide-body Centaur is one of fifteen that GD is building under a $1.3 billion Martin Marietta subcontract. The Titan IV–Centaur combination will be able to boost 10,000-pound payloads to geosynchronous orbit.

Rockwell Collins delivered the **first Automatic Target Handoff System** (ATHS) to the Air National Guard's **174th Tactical Fighter Wing** at Hancock Field, Syracuse, N. Y., in late November. The ATHS allows voiceless target information exchange. A forward air controller can send the entire standard nine-line target briefing directly to the ATHS-equipped F-16, which then translates the information to appear on the pilot's head-up display. The procedure takes only seconds to complete, allows for no miscommunication, and aids in concealing the location of the attacker and the FAC. General Dynamics modified the 174th TFW's first F-16A and will modify both of its F-16Bs. Ogden Air Logistics Center at Hill AFB, Utah, will modify the wing's nineteen other F-16As. The ATHS project took eleven months and just $5.4 million to complete. In 1989, the 174th TFW became the Air Force's first dedicated ground-attack F-16 wing when the unit was equipped with nonjettisonable GPU-5/A 30-mm gun pods.

LHTEC, the joint venture of Allison and Garrett, delivered the **first two T800-LHT-800 engines** to the Army in mid-November. The engines, designed for the Army's Light Helicopter (LH, formerly LHX), will be installed in one of the Coast Guard's HH-65A Dolphin short-range recovery helicopters. The new engines will enhance the Aerospatiale-built HH-65's capabilities and will give the Army early operational data on the LH engine. The reengined Dolphin will have a single-engine mission completion capability. It will be flight-tested at Garrett's test facility in Phoenix, Ariz., this spring. If the reengine effort is successful, it could lead to the reengining of all ninety-six of the Coast Guard's HH-65As.

Lockheed delivered the **first HC-130H(N) to the Air National Guard's 210th Air Rescue Squadron** at Kulis ANGB, Alaska, on November 28. This was the first time an ANG squadron had received a new rescue/tanker version of the venerable C-130. The aircraft will be used for in-flight refueling of Sikorsky MH-60G Pave Hawk rescue helicopters as well as for extended air search for people, surface craft, or aircraft in distress. The 210th ARS will later receive a second HC-130H(N).

★ **MILESTONES—**The **first captive-carry test of the Boeing AGM-131A** short-range attack missile (SRAM) II

was successful. The November 13 flight was conducted out of the Air Force Flight Test Center at Edwards AFB, Calif. The AGM-131A was fitted with an inert rocket motor but had a full avionics suite. The missile was mounted on a modified SRAM-A (AGM-69A) launcher aboard a 6510th Test Wing B-1B bomber for the flight. The mission was designed to check the interfaces between the missile and the aircraft. A simulated launch was also performed. The first live launch is scheduled for late this year.

The newest member of the Maverick air-to-ground missile family, the **AGM-65G, passed its first round of operational tests** in late November. The Air Force launched the first ten production missiles to come off the Hughes assembly line in Tucson, Ariz., and nine of the ten shots were successful. The infrared-guided AGM-65Gs, which feature the largest warhead (300-pound blast/fragmentation) in the Maverick line, were fired from F-4E, F-16C, and F-111F aircraft against a variety of targets during the tests. The tests were intended to verify that performance of production missiles matched that of development missiles. Maverick has recorded a success rate of eighty-five percent in nearly 5,000 launches since deliveries began in 1972.

★ **NEWS NOTES—A Pentagon report** released December 4 revealed evidence of **major mismanagement and huge cost overruns in the Navy's stealthy A-12 Avenger** carrier-based attack aircraft program. Navy Secretary H. Lawrence Garrett III fired the three top-ranking program officers, citing "errors of judgment and failures of supervision." The report was also highly critical of Under Secretary of Defense for Acquisition John A. Betti, saying that the procurement chief let rising costs and other clues that the program was in trouble slip by unnoticed. Mr. Betti resigned December 12. Secretary of Defense Dick Cheney threatened to cancel the program unless Secretary Garrett and the aircraft's contractors, General Dynamics and McDonnell Douglas, came up with a plan by January 4 to fix the deficiencies and rein in costs. On January 7, Secretary Cheney made good on his threat, canceling the A-12 contract for default. He said that he was unwilling to bail out the contractors and that no one could tell him how much it would have cost to keep the program going. The A-12 contract was the largest ever canceled by the Pentagon.

Air Force Systems Command announced a major restructuring of its laboratories on November 27. AFSC's fourteen laboratories and research centers will now be grouped into four "superlaboratories." This consolidation will allow greater integration in four technological areas—air vehicles; space and missiles; command, control, communications, and intelligence; and human systems. The new laboratories and their functional areas are Wright Laboratory at Wright-Patterson AFB, Ohio, integration of air vehicle technologies; Phillips Laboratory at Kirtland AFB, N. M., development of spacecraft, ballistic missiles, and directed energy weapons; Rome Laboratory at Griffiss AFB, N. Y., C³I technologies research; and Armstrong Laboratory at Brooks AFB, Tex., human factors research.

Air Force Recruiting Service met or exceeded all but one of its goals for FY 1990. Only recruitment of physicians fell short of the target, although the 273 doctors brought in were the largest group since FY 1980. In FY 1990, the Air Force attracted 36,000 nonprior-service enlistees and 250 enlisted with prior service. Some 700 officer candidates attended Officer Training School. Almost 1,300 health-care professionals joined the service, and roughly 300 more received scholarships to attend medical school through the Health Professional Scholarship Program. Of the nonprior-service enlistees, more than ninety-nine percent were high school graduates.

Despite operating at two to three times their normal peacetime work load, **Lockheed's Military Airlift Command airlifters (C-130, C-141, and C-5) collectively averaged a ninety-one percent on-time departure reliability rate** over the first 100 days of Operation Desert Shield (August 9 to November 18). With 8,992 departures over the period, the C-130 fleet has a rate of more than ninety-six percent, while the C-141 fleet (8,823 departures) is averaging just over ninety-one percent. The C-5 fleet logged 8,348 departures over the first 100 days and has a rate of nearly eighty-five percent.

The **Air Force launched its third Martin Marietta Titan IV heavy-lift booster** on November 12. The Titan IV, likely combined with a Boeing-built Inertial Upper Stage, lifted off from Launch Complex 41 at Cape Canaveral AFS, Fla., at 7:37 p.m. and carried a classified military payload, believed to be a Defense Support Program ballistic missile early warning satellite, into geosynchronous orbit. The Air Force has forty-one Titan IVs under contract. The first Titan IV launch from Vandenberg AFB, Calif., will occur later this year.

The **tenth operational Navstar Global Positioning System satellite was successfully launched** from Launch Complex 17 at Cape Canaveral AFS, Fla., on November 26. This was the first use of the Rockwell Block IIA satellite (designated NS-7C) and the first time the improved McDonnell Douglas SB-3A booster had been used. This new Delta II uses Hercules-built solid rocket boosters with graphite-epoxy motors and features an enlarged first stage nozzle.

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The **Air Force Academy Association of Graduates** is more than halfway to its fund-raising goal of $5.5 million dollars needed to construct a **headquarters/alumni house** on the Academy grounds. The building will be named in honor of Gen. Jimmy Doolittle. The graduates felt he best represents the qualities of leadership, courage, and dedication and that he encompasses the traditions of both the Army Air Corps and the Air Force. The alumni center will house conference and seminar facilities, a library lounge, boardroom, display and entertainment area, and association administrative offices.

★ **DIED**—Retired **Gen. Jack J. Catton,** notable pilot and Air Force senior commander, of a heart attack at his home in Riverside, Calif., on December 4. He was seventy. In 1944, he flew the first Boeing B-29 across the Pacific to the Marianas, and he later participated in early peacetime nuclear weapons tests. He flew combat missions in Korea and then led the 92d Bomb Wing from Fairchild AFB, Wash., to Guam in the first test of B-36 capabilities in sustained operations overseas. Later in his career, he commanded Fifteenth Air Force, Military Airlift Command, and Air Force Logistics Command. After retirement, he served as a senior vice president with Lockheed.

Retired **Vice Adm. Forest S. Peterson,** one of a dozen men to fly the North American X-15 research aircraft, of cancer at a hospital in Georgetown, S. C. He was sixty-eight. He started his military career in destroyers during World War II and earned his wings after the war. He was the only Navy X-15 pilot, and he made five flights in the aircraft (attaining a record-setting speed of Mach 5.30 in 1961), each of which was trouble-plagued. He commanded the nuclear-powered carrier USS *Enterprise* (CVN-65) from 1969 to 1971. His last assignment was as commander of Naval Air Systems Command. He then went into private business. ■

Senior Staff Changes

RETIREMENTS: Gen. John T. **Chain,** Jr.; L/G Harry A. **Goodall;** L/G Thomas J. **Hickey;** M/G Charles D. **Metcalf;** L/G Craven C. **Rogers,** Jr.; L/G Carl R. **Smith.**

CHANGES: M/G John L. Borling, from DCS/Ops. and Dep. Dir., Ops., STRACOS, Hq. SAC, Offutt AFB, Neb., to Ass't DCS/P&O, Hq. USAF, Washington, D. C., replacing M/G (L/G selectee) Charles A. May, Jr. . . . **M/G Howell M. Estes III,** from DCS/P&R and Dep. Dir., P&R, STRACOS, Hq. SAC, Offutt AFB, Neb., to DCS/Ops. and Dep. Dir., Ops., STRACOS, Hq. SAC, Offutt AFB, Neb., replacing M/G John L. Borling . . . **Col. (B/G selectee) Mark H. Lillard III,** from Exec. Officer to C/S, SHAPE, NATO, Casteau, Belgium, to Cmdr., 57th AD, SAC, Minot AFB, N. D., replacing B/G Robert E. Linhard . . . **B/G Robert E. Linhard,** from Cmdr., 57th AD, SAC, Minot AFB, N. D., to DCS/P&R and Dep. Dir., P&R, STRACOS, Hq. SAC, Offutt AFB, Neb., replacing M/G Howell M. Estes.

SENIOR EXECUTIVE SERVICE (SES) CHANGE: Roger M. Blanchard, from Chief, Prgms. & Res. Div., Hq. USAF, Washington, D. C., to Dep. Dir., Personnel Mgmt., Hq. USAF, Washington, D. C., replacing Roy Gay.

SCIENTIFIC AND TECHNICAL (ST) CHANGE: Nicholas J. Pagano, from Materials Research Engineer, Materials Laboratory, WRDC, Wright-Patterson AFB, Ohio, to Senior Scientist, Composite Micromechanics, Materials Laboratory, WRDC, Wright-Patterson AFB, Ohio. ■

"The Air Force," says its new Chief, "must adapt or go the way of the dinosaurs."

McPeak's Plan

By James W. Canan, Senior Editor

"MAKE no mistake, international events and internal pressures will reshape the military services. The Air Force must adapt or go the way of the dinosaurs."

Gen. Merrill A. McPeak spoke those words on becoming Air Force Chief of Staff and promised that the Air Force, under his leadership, will indeed adapt.

He delivered his message in addressing the Air Force Association symposium titled "The US Air Force—Today and Tomorrow" late last year in Los Angeles, Calif.

General McPeak disclosed plans for a major reorganization—reshaping combat units and cutting management staffs in major commands and at the Pentagon.

He acknowledged that the Air Force has an image problem, that it has managed to give the impression that it tells lies. He said he will seek to correct that impression by calling for candor and honesty on every count.

For the Air Force, "the three themes for the years just ahead of us will be integrity, openness, and restructuring," he declared.

The new Chief of Staff saluted his predecessor and longtime friend and fellow fighter pilot, Gen. Michael Dugan, who had set the stage for restructuring and had made a point of being frank and open—too much so, as some saw it.

General Dugan's on-the-record candor about US operations and prospects in Operation Desert Shield led to his dismissal as Chief of Staff. This led in turn to speculation that the next Chief of Staff would see silence as the better part of valor for himself and for the Air Force at large.

General McPeak quickly quashed such speculation. "Mike Dugan was on the right track," he told his AFA audience.

He noted that General Dugan had made himself available to the media, had written as-I-see-it messages about important issues for weekly distribution throughout the Air Force, and had "sent an open letter to all Air Force generals describing his belief in openness and the need for increased internal and external dialogue."

General McPeak declared, "His approach was correct, and we should continue what he began."

Like "Real Enemies"

He was asked at the symposium whether openness will be a guiding principle in the Air Force's dealings with industry as well.

"I sure hope so," he replied. "I have the impression that a lot of progress can be made in this area, that we need to work in a much more congenial, convivial manner with industry. We need to hire more engineers and fewer lawyers.

"Sometimes we treat each other like we were real enemies. That's not so. We're in this thing together. Our common objective is to produce the best, most cost-effective defense for this nation, and we ought to act that way."

Under Secretary of the Air Force Anne N. Foreman struck the same chord at the AFA symposium in discussing the interrelated topics of ethics, Air Force relations with industry, and industry's performance on Air Force contracts.

Claiming that a strong defense "will require ever more sophisticated systems" and that "a robust industrial base will be required to support it," she expressed concern that funding for production and research is on the wane.

"There is serious doubt as to our ability to deliver on schedule what we promised," Under Secretary Foreman declared. "Something has to change. We must recover the public's trust in our ethics and our products, and we must strike the right balance to retain the technological edge that has underwritten our enormous success.

"But we must do so at affordable, economically viable levels. We need to develop acquisition and development strategies that are flexible enough to withstand the changes in the world and the political realities that go with them. . . . We must communicate our problems, recommendations, conclusions, and solutions clearly and candidly, however difficult or even painful that may be."

Under Secretary Foreman claimed that "the Air Force and our industrial partners have a natural advantage" in striving to gain and sustain technological superiority. "From the beginning, the essence of airpower has been the ability to respond to changing needs by championing innovation," she declared.

General McPeak discussed his ideas for just such a response in the context of force cuts that lie ahead. The Air Force will have to be reorganized substantially if it is to remain combat-ready while slimming down, he claimed. He predicted that USAF will have shrunk by twenty percent from the mid-1980s to the mid-1990s and said remolding of the force will be required to keep it fit to fight in all foreseeable contingencies.

"We must review the way we do business at every level, from the squadron to the Air Staff," he declared. "Our goal is to ensure that we are adapting, evolving, . . . [and] well-organized, with the measure of merit being combat capability."

"Sometimes we treat each other like we were real enemies. . . . We're in this thing together. Our common objective is to produce the best, most cost-effective defense for this nation, and we ought to act that way."

The Top Priority

A few days prior to the AFA symposium, General McPeak testified at the Senate Armed Services Committee hearing on his nomination by the President to be Chief of Staff. He told the committee that "reorganization is my number one priority."

Staying combat-ready while downsizing poses a "significant management problem" for the Air Force, he said. It involves "the way we're organized from the flight line all the way up to the Air Staff."

He elaborated on this when questioned at the AFA symposium, raising the likelihood of a new look for forward-deployed units with a heavy share of the responsibility for exercising USAF's global reach and applying its global power.

So-called "composite forces" are in the offing. Central to their existence will be composite wings made up of different kinds of aircraft for all sorts of missions, such as air superiority, long-range and short-range land attack, reconnaissance, and suppression of enemy air defenses.

"The composite wing makes a lot of sense to me, especially in forward-deployed locations," General McPeak declared. "Wings ought to be organized around their missions. Some can continue to be monolithic."

Monolithic wings are homogeneous with regard to aircraft. Each such wing consists of only one kind of plane optimized to do one main mission, such as air superiority or ground attack. As an example, General McPeak referred to the wing of F-15 air-superiority fighters at Kadena AB, Okinawa, a unit for which he was responsible in his prior role as commander in chief of Pacific Air Forces.

"It's a standard wing," he said. "It's really not there to do anything in Okinawa. If we have to defend Okinawa, we can provide air defense with a lot less than seventy-two F-15s.

"That wing's mission is to go somewhere else in the theater, and, in combination with other assets already there or flying in from CONUS, to put together a force package of [varied] capabilities."

General McPeak noted that the Air Force had deployed such a multifaceted composite force in piecemeal fashion to Saudi Arabia and the surrounding region in Operation Desert Shield.

"We know," he continued, "that if we have to do something in Saudi Arabia today, it will not be a wing of seventy-two PAA [Primary Aircraft Authorized] F-16s that does it. It will be a force [of aircraft] made up of some attackers, some defenders, some standoff jammers, some [Wild] Weasels, some tankers, and so forth.

"So we're now in the process of practicing in Saudi Arabia the kinds of composite-force tactics that we may need to use if it ever comes to

hot shooting in that part of the world."

He went on to declare that "forward based forces, at least, should be organized the way we intend to use them in wartime, so they can train together and work together in peacetime."

Great Variety

Composite wings could take various forms. Those styled primarily for the application of firepower might mix counterair fighters, long-range bombers, shorter-range interdiction aircraft, and close air support planes, along with, for example, surveillance and command-and-control aircraft. Composite wings tailored more to logistics and combat support would be heavier on transports and tankers. Each wing might embody a general-purpose squadron or two of dual-role fighters, such as the latest variants of USAF's F-15 and F-16.

Logistics considerations are crucial. Engines and other components have become increasingly interchangeable among different kinds of aircraft. Moreover, improved reliability and maintainability of hardware makes it easier to mix and fix the varied hardware that would be found in composite wings.

General McPeak underlined that point at the AFA symposium. "The reason we haven't done such a thing [formed composite wings] over the years is that we have been afraid of costs," he said. "It's expensive, especially if you have to create intermediate-level maintenance organizations on each base where you have a composite wing so organized.

"But recently, our R&M [reliability and maintainability] efforts are beginning to pay off in much better in-commission rates, much lower break rates, much-reduced requirements for eye-level maintenance on each base. Accordingly, in concept at least, we can begin to see the possibility of two-level maintenance.

"When we get to that, the composite wing becomes a lot more possible [because] the economics of it become a lot more credible."

The Chief of Staff made it clear that the Air Force will not run wild with composite wings. "We might still want to have some wings—especially CONUS wings with the principal mission of overseas reinforcement—to be organized in a monolithic form, because of the economies of scale that are possible in that kind of organization.

"So in the end, I think, we will need a balance, a mixed [force] structure of monolithic and composite wings—some composite wings, mostly forward deployed, and some monolithic wings that might be stationed more to the rear."

He said the reorganization of the Air Force will involve sharp numerical reductions in blue-suit management circles all the way to the top.

"No matter how bad the problem, no matter how difficult the circumstances, the Air Force as an institution does not, will not, and cannot accept anything less than absolute, rock-solid, uncompromising integrity."

"The Air Staff won't be exempt from a relook," said General McPeak. "We are reducing our management structure in the major commands by over thirty percent, so it only seems logical that the Air Staff should undergo a similar reduction. In my view, we should aim to cut the Air Staff by up to thirty percent."

He enumerated "operating principles for us as we restructure," as follows:

- "Eliminate layers to streamline and flatten our organization.
- "Use a total-quality approach, aiming to eliminate low-value-added activities.
- "Combine authority and responsibility so that we have true accountability for performance at every level."

Above All, Integrity

General McPeak told the AFA audience that he will insist on integrity in all things. "No matter how bad the problem, no matter how difficult the circumstances, the Air Force as an institution does not, will not, and cannot accept anything less than absolute, rock-solid, uncompromising integrity," he asserted.

He claimed that the Air Force does not lack integrity and that it has nothing to be ashamed of, but he conceded that it has given an impression to the contrary.

"Our image has been hurt," he said. "We must correct this misperception. The public, Congress, industry, and the press must believe in our integrity. Integrity is so important that we can't stand even the appearance of its absence."

Among instances "where appearances hurt the Air Force," General McPeak cited "the use of the F-117 in Panama" and "the procurement of the B-1B."

The Air Force was accused of having made false claims about the accuracy and effectiveness of bombing by two USAF F-117s over Panama one night in December 1989 and of subsequently trying to cover up its alleged prevarication.

General McPeak explained at the AFA symposium that the mission of the F-117s had been to put bombs close enough to two barracks to stun and disorient—but not kill—the Panamanian troops within. The aimpoints for the bombs were in open fields about fifty meters from the barracks, he said.

He also noted that wind conditions caused the pilots to switch targets prior to takeoff and that "the F-117s ran into unexpected weather conditions in the target area."

"So the pilots ended up dropping on aimpoints that were just sightly different than planned. Call it the fog of war or Murphy's Law. Anyway, one pilot hit less than 100 meters from the intended target. The other was over 100 meters."

The Chief of Staff claimed that the bombing accuracy of the F-117s had been good enough, implied that it could have been a little better, and declared that it was not, in any case, the issue.

"I've dropped a few bombs, and I've had days where I'd have been proud of such scores," he said. "Today, though, we've come to expect better results."

He continued, "The real problem was that the initial reporting to the general public mentioned only that the bombs went precisely where they were aimed, which was true, and that the purpose—to stun and disorient the Panamanian troops—was achieved, which was also true.

"But there was more to the story, and it trickled out over time, with the result that it looked to some like the Air Force had slanted the initial reports for its own purposes. A subsequent investigation cleared the Air Force of wrongdoing, but the damage had been done."

Shadow Over the B-1B

As to the B-1B, "the electronic countermeasures issue cast a shadow over our good work" on the bomber program, General McPeak said.

He continued, "We made a bad mistake in assuming that the ALQ-161 [electronic countermeasures, or ECM, suite] was far enough along to keep pace with the highly concurrent development and production of the aircraft. We knew that ECM was mission-essential, and we thought —and said—that we had it in hand. But we did not grasp the magnitude of the problem until we were fielding the aircraft without a robust, adaptable ECM system."

The Chief of Staff conceded that the Air Force "should have recognized the ECM problem sooner" and that "we could have done better" in dealing with it and in divulging it. He insisted, though, that "the ECM story was taken out of context and used to create the perception that the Air Force had lied about the B-1B."

For all that, he said, what mattered in the end was that the Air Force had "the appearance of a lack of integrity." Such an appearance "just will not do," he asserted.

General McPeak said the Air Force is fortunate to have Dr. Donald B. Rice as its civilian leader "as we seek to burnish our image." He described Air Force Secretary Rice as "a man of complete and unquestioned integrity" who "gives us the best possible leadership."

The Chief of Staff promised that the Air Force's uniformed leadership will do its part to set things right. "We will make mistakes—not many, because we know our business, but some. They will be honest mistakes. We will never cut corners."

To avoid mistakes, Air Force leaders, starting with himself, need to hear the truth as well as speak it, the Chief of Staff contended. He hopes to set the tone for "a healthy dialogue" throughout the service that will "involve listening to opposing views."

"I've noticed that the only people who will tell me I'm wrong are the ones who actually respect me. I'm more interested in the substance than the appearance of respect. We must instill this kind of openness at all levels of command."

"I want to be told when I'm wrong," he said. "I've noticed that the only people who will tell me I'm wrong are the ones who actually respect me. I'm more interested in the substance than the appearance of respect. We must instill this kind of respect—this kind of openness—at all levels of command."

Despite all that needs to be done, "the Air Force is doing a lot right today," General McPeak claimed. "We have a lot going for us."

As pluses, he cited personnel, readiness, equipment, sustainability, operating tempo, training, tactics and doctrine, "great leadership at the sharp end" of operations, and smooth teamwork with sister services and allies, all of which he fully intends to sustain.

"I believe Operation Desert Shield is proving just how capable and ready our forces are—active, Reserve, and Guard," he said.

Support for Joint STARS

The Chief of Staff expressed satisfaction with the progress that the Air Force is making in modernizing the force amid international uncertainties and budget cuts, and he gave credit to its practice of "focusing our efforts on one large weapon system per major program area—the B-2 for strategic bomber modernization, the C-17 for airlift, and the Advanced Tactical Fighter for air superiority." He also mentioned "other important modernization programs—the Advanced Cruise Missile, AMRAAM, ICBMs, Titan IV, Joint STARS, and KC-135 reengining."

General McPeak denied a published report that he had questioned USAF's need for Joint STARS (the Joint Surveillance Target Attack Radar System) in view of the diminished threat of war in Europe. On the contrary, he said, Joint STARS will continue to be necessary because it enables the Air Force and Army to do a much better job of interdiction.

He explained that Joint STARS will enable the Air Force to go beyond the "classic type of interdiction"—for example, bombing roads and bridges to create chokepoints behind enemy lines. He continued, "What we've been trying to do all along is to back up traffic so we can attack enemy forces. But the real target is not the road. It's the truck. What Joint STARS gives us is a much better possibility of going after the truck directly. We can certainly do interdiction without Joint STARS, but we waste a lot of effort."

General McPeak used Joint STARS to make a broader point about USAF as a team player.

"I think one of the great virtues of Joint STARS is that both the ground commander and the air commander will have the same picture," he said. "The Air Force wants to be part of the combined-arms team. That means we have to work well with commanders on the ground. It's a lot easier to do that when we share a common understanding of what's going on out on the battlefield." ■

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Deterrence is both a strategic mission and a tactical one, and the distinction between them is fading.

Deterrence Across the Spectrum

By James W. Canan, Senior Editor

STRATEGIC deterrence, always the Air Force's first order of business, is no longer perceived as synonymous with nuclear forces alone. It also stands for the projection of conventional forces to faraway places for strategic purposes.

Take, for example, Operation Desert Shield. In it, the Air Force sent tactical forces to Saudi Arabia and Turkey and put strategic forces on alert on Diego Garcia and in the US.

All had a common mission of deterrence: to stem Iraq's incursions at the tactical level and, from the strategic standpoint, to make Baghdad think twice about continuing to develop nuclear weapons and menacing the Middle East.

Desert Shield may have been the best evidence yet that, for the Air Force, deterrence has become multidimensional in a multipolar world. More and more, USAF sees strategic deterrence and force projection in the same light and melds strategic and tactical goals.

The new meaning of deterrence was discussed at the Air Force Association's symposium on "The Air Force—Today and Tomorrow" late last year in Los Angeles. Several Air Force leaders addressed it from different standpoints.

Among them was Lt. Gen. Jimmie V. Adams, then the three-star deputy chief of staff for Plans and Operations, now commander in chief of Pacific Air Forces. He discussed deterrence in the context of USAF's theme of "global reach, global power."

Said General Adams, "As we're pulled on the one hand by a changing world and on the other by a constricting budget, a fundamental question emerges: What role will the Air Force play in a new world order? The answer is increasingly clear: a role that is the essence of airpower—the ability to react fast, far, and overwhelmingly."

Such ability is indispensable to USAF's pursuit of global reach and global power, a goal that puts a premium on force projection, General Adams said. He declared that "sustaining deterrence with nuclear forces is the first objective . . . of the Air Force plan to achieve and maintain global reach."

That objective "remains intact," even as the cold war recedes, be-

Backdropped by sunset, an Air Force FB-111 is refueled for a long flight, epitomizing USAF's global reach. At an AFA symposium late last year, Air Force leaders made it clear that the top mission is still strategic nuclear deterrence, cold war or not, but that nonnuclear airpower also deters when deployed afar.

—USAF photo by MSgt. Ken Hammond

cause the Air Force "will continue to have a need for a modernized strategic force," come what may, General Adams said.

The Four Basics

He emphasized four other basic objectives that, along with strategic nuclear deterrence, "frame the Air Force plan to achieve and maintain global reach." The others: "providing versatile combat forces, supplying rapid global mobility, controlling the high ground, and building American influence."

All came into play in USAF's Desert Shield deployments to Saudi Arabia and its environs, undertaken in the first instance to deter Iraq from following through on its takeover of Kuwait by invading Saudi Arabia.

Iraq's "threat to world order reminds us that we must maintain the capability to concentrate force in a responsive manner over great distances," the General claimed. "We have amassed on the Arabian peninsula the most capable air force ever. Our investments in training, spares, and people have paid off.

"Clearly, we can have a smaller force than previously required for the central European scenario, but it must be ready. We've seen, from the limited warning time we had in the Gulf, just as in Panama, that we have no time to train or rearm after a crisis begins."

At the AFA symposium, Lt. Gen. Donald O. Aldridge, vice commander in chief of Strategic Air Command, took note of SAC's increasing nuclear/nonnuclear duality as the Air Force's prime instrument of both strategic deterrence and global power.

He asserted, "As strategy has evolved, so has Strategic Air Command. Let there be no doubt, SAC has both a nuclear and a conventional mission, and we plan and train for both.

"SAC forces, in total, support the strategy of global reach, global power. Some are in the nuclear arena, some are in the conventional arena, and most are in both."

He said SAC must continue to "possess the muscle" necessary for nuclear deterrence, and must "have the flexibility to react quickly in a crisis."

Addressing the Air Force's need to "structure the forces necessary to execute a global reach, global power strategy," General Aldridge insisted that "forces with global reach—bombers and airlifters and [the tankers needed] to extend the ranges of both those missions and for the deployment of tactical forces —are a must."

The Air Force's recognition of the increasing synergy between strategic and tactical missions and forces in the name of long-range airpower is evident in its willingness to take another look at requirements for at least one major acquisition program: Milstar.

Loading Down Milstar

Designed mainly to provide surefire, unjammable communications for strategic nuclear forces during nuclear war, the highly expensive Milstar system of satellites and terminals has come under fire on Capitol Hill. Congress cut its funding and ordered the Air Force to restructure it with more attention to its contributions in support of tactical combat, less to those in support of strategic warfare.

At the AFA symposium, prior to

the congressional action, General Aldridge indicated that SAC can live with a less extensive Milstar system in view of the reduced Soviet threat.

Said he, "Milstar probably got in trouble because too many people tried to load too much on its back. SAC is very supportive of the basic Milstar architecture, but, in today's environment, we are not pushing for the full-up, original system that was envisioned by some. We think we need it, but we think that what supports the tactical forces would also be satisfactory as an interim [strategic] capability for SAC."

He stressed that SAC is, above all, an instrument of nuclear force and of strategic nuclear deterrence and that this is not likely to change.

The US must maintain "a credible nuclear retaliatory capability" in order to negotiate arms-reduction agreements with the Soviet Union from a position of strength, he said. Such negotiations notwithstanding, "The Soviet Union is still the only nation with the means to destroy our society as we know it," and nuclear deterrence "will be a necessity for the US . . . as long as that [Soviet] capability exists," he declared.

The SAC vice commander in chief claimed that nuclear forces do more than meets the eye in the name of deterrence. "Our ability to project power at the nuclear level—thus deterring nuclear war—is fundamental to our ability to respond at lower levels of conflict," he said.

General Aldridge continued, "As we move from the relative stability of a highly disciplined bipolar arrangement of world powers, we can see a multipolar arrangement developing [in which] many nations will have similar military capabilities.

"As the military power of the US and the Soviet Union is reduced, coupled with the dramatic proliferation of technologies of intermediate-range ballistic missiles and cruise missiles within Third World nations, an environment of instability is likely to result."

This compels the US to "focus attention on the threat posed by the emergence of irrational actors who may become emboldened by the proliferation of weapons and the redistribution or leveling of military and political power in the world," the SAC vice commander in chief said.

In any case, he added, "US forces must be capable of intervening decisively through the application of overwhelming power, and SAC forces and resources are vital to that effort."

General Aldridge made it clear that SAC stands fast in its requirements for a mixed strategic force of intercontinental ballistic missiles and manned bombers, but he indicated that bombers are more compelling in SAC's current scheme of things.

—USAF photo by MSgt. Bill Thompson

F-4G Wild Weasels of the 52d and 35th Tactical Fighter Wings get gas from a KC-135R of the 19th Refueling Wing while flying over the coastline of Bahrain as part of US Operation Desert Shield. The Air Force's show of mobility and flexibility in that operation is a classic example of "global reach, global power."

Be Sure to Keep Enough

He declared, "Today, the manned bomber is the cornerstone of our long-range deterrent forces. It is the most flexible offensive weapon system we have, and it is becoming the weapon system of choice to maintain stability in an arms-control environment."

Noting that numbers of ICBMs and bombers are sure to be cut in that environment, the SAC officer said that the US must make sure it keeps enough bombers "to allow for the option of projecting lethal airpower over great distances with minimum reaction times" in all manner of contingencies.

He added, "The nation's need for a quick-reacting power-projection capability with great lethality will grow as we draw back from overseas basing and as we draw down our force structure. Future conflicts—and especially regional conflicts like the current one in southwest Asia—will be fought with the weapons on hand."

General Aldridge declared that "time-sensitive, lethal projection of firepower at long ranges is our forte," but also noted that "in most cases, we will act in concert with the other US services and, sometimes, with our allies."

Emphasizing SAC's nonnuclear prowess, he noted that the command's long-range bombers "can reach any point on the globe within hours" and can "deliver a wide range and large number of munitions very accurately against a multitude of land targets."

SAC's B-52s are also adept at laying mines and attacking ships in support of the US Navy's maritime missions, he said. Once the B-1B comes to the fore as SAC's prime penetrator, the B-52 will become a formidable platform for delivering standoff weapons. "Today, our B-52s remain capable of delivering the traditional iron bomb, but the B-52s of the near future will be capable of striking targets with pinpoint accuracy while remaining beyond an enemy's defenses."

How? "By using standoff nonnuclear weapons that are being developed."

General Aldridge reminded the

symposium audience that SAC's "bombers carry the bulk of our retaliatory nuclear weapons, varying from standoff systems, such as air-launched cruise missiles and short-range attack missiles, to extremely lethal, high-yield gravity bombs."

"We also need to remember," said he, "that we maintain a large portion of our bomber fleet on day-to-day alert" and that the fleet can be dispersed or "launched under positive control" to make it survivable under nuclear duress.

"When you combine survivability with the high accuracy, large numbers, and varying types of weapons our bombers can deliver, you have an awesome retaliatory nuclear force—one that is credible to any potential enemy," General Aldridge asserted.

Strategic Air Command's Case

In this context, he presented SAC's case for the B-2 bomber. "The most important strategic modernization effort at SAC is centered on improving our manned bomber force," he said, because today's bomber force will be too little, too old, and too vulnerable to do what may need to be done in the future.

"Those opposed to the B-2 talk cost, but they never ask what the cost to the nation would be [of] not going forward with the B-2 if that decision leads to a failure of deterrence," General Aldridge said.

At the AFA symposium, Air Force Chief of Staff Merrill A. McPeak also spoke out strongly for the B-2 when asked to assess the state of USAF's strategic programs.

General McPeak called the B-2 "our highest-priority program, because there is no mission that is more important to us than the strategic mission."

He also said, "I think it [the B-2] is an endangered species. There's not as much support for it as we need to have. I will go to work to try to solve that problem, but it's a man-sized job."

The Chief of Staff noted that the US "national strategy has been based on the concept of deterrence" and on the triad of strategic weapons—manned bombers, land-based ICBMs, and submarine-launched ballistic missiles—that gives it substance.

The triad, he said, "has always been overinsurance," because "it has always been true that one leg of that triad could inflict such massive damage on any potential opponent that the one leg would be enough to deter any rational person. We chose the triad approach because we wanted to be conservative. . . . The potential consequences of being wrong are so grave that we felt we had to overinsure. . . .

"That's what we ought to be talking about and asking—is the principle of overinsurance still a good one? What I find being talked about instead, when I go around Washington, is price. Here we have a case of people knowing the price of something but perhaps not its value."

General McPeak claimed that bombers constitute "the stabilizing leg of the triad" because they are "the slow flyers."

"A B-2 attack, developing over a period of hours, would allow for some time to consult, to energize the hot line to Washington, to ask, 'Is this an accident or is this deliberate? Are you attacking us?'"

On the other hand, "the fast flyers," ballistic missiles, are "destabilizing, because they leave virtually no time for such questions" and evoke "a use-it-or-lose-it kind of psychology" on the receiving end, he said.

The Bomber Incentive

"It is for this reason," the Chief of Staff went on, "that both sides in START have agreed to try to [encourage] each other to continue in the manned bomber business" and that "the rules are arranged so that each B-1B will count as one weapon system and one warhead, even though each contains many more [warheads] than that."

He asserted, "We will make a big mistake if we don't continue that [B-2] program to completion." The B-2 issue "could be kind of a crossroads, a major turning point, for this country in terms of its national security policy, and one in which we simply must make the right decision," he said.

As to ICBMs, General McPeak said the Air Force has put in abeyance its original plan to deploy Peacekeeper in the rail-garrison mode in 1992 but will "continue with a comprehensive R&D program so that we can go ahead with it

—USAF photo by TSgt. Dave McLeod

Maintenance crews at McConnell AFB, Kan., check out the avionics in the nose of a B-1B bomber. SAC gives top priority to modernizing its bomber fleet, first with the B-1B, then with the B-2, because that fleet is the linchpin of US forces "necessary to execute a global reach, global power strategy," a SAC general stressed at the AFA symposium.

—USAF photo by TSgt. John Fecteau

SSgt. Robert Blackwood of the 60th Operational Maintenance Squadron changes a left wing navigation light on a C-5A at Travis AFB, Calif. Airlift is a vital element of USAF's ability to deter war by transporting tactical air and ground forces over great distances for strategic purposes, as in Operation Desert Shield.

in the future if that becomes necessary."

The development of a smaller, single-warhead ballistic missile "will take longer—out to around 1997," he said, "so it isn't quite so imperative that we decide what we're going to do about the small missile. We can make a deployment decision sometime later, closer to the mid-1990s, once we understand our position [as a result of] START."

General Aldridge also indicated that some of the steam has gone out of programs for mobile ICBMs. Those weapons "make a contribution to stability," and Peacekeeper would undoubtedly be more survivable if mobile.

But the SAC vice commander in chief also noted that deploying the fifty Peacekeeper ICBMs and their 500 reentry vehicles (RVs) on trains "would not add to our warfighting ability, because we already own those RVs in a different deployment mode."

Were SAC forced to choose between developing mobile ICBMs and developing the B-2, "obviously, we think the B-2 should have first priority," General Aldridge said.

The C-17 airlifter program, criticized in some circles, received strong endorsements at the AFA symposium. General McPeak described it as "very impressive, very high priority," and declared that Operation Desert Shield had demonstrated the value of, and the need for, the airlift capability that the C-17 is expected to augment.

In his remarks at the AFA symposium, Gen. H. T. Johnson, commander in chief of the unified US Transportation Command and of Military Airlift Command, said "amen" to that. He equated deterrence with long-range airpower and force projection, attributes that, he claimed, the C-17 would have enhanced in Desert Shield.

General Johnson described the C-17, which is in the late stages of development, as "an airplane America must have, an airplane that General Schwarzkopf [the top US commander in Desert Shield] would have liked to have [had]" for airlifting troops and heavy equipment to Saudi Arabia.

Far More Firepower

"The C-17 would have made a major difference," General Johnson asserted. "With it, we could have increased our airlift throughput by thirty-five percent," an increase that could have accommodated "twenty additional tactical fighter squadrons or two additional . . . brigades," he said.

"That is a lot of firepower—perhaps the difference between victory and defeat," he asserted.

In any case, Operation Desert Shield showed the importance of airlift but was "much more than just an airlift operation," General Johnson said. In it, he added, "all of our Air Force capabilities are being tested. Fighters, tankers, reconnaissance, and AWACS rounded out a powerful deterrent force that made the difference during the [operation's] early days."

He claimed that "Desert Shield began as, and continues to be, a deterrent effort. Because of our capability to move such a powerful force to the Arabian peninsula in such a timely manner, we have—at least for the time being—deterred further aggression."

General Johnson declared, "America's deterrent efforts, made possible through our global reach, have been an overwhelming success."

Addressing the AFA symposium, Gen. Robert D. Russ, commander of Tactical Air Command, made the point that the force-projection and war-waging capabilities of the Air Force's tactical units can be attributed to their high state of readiness, unprecedented reliability, and realistic training.

He declared, "The mission capable rate today of our fighters is a little over eighty-six percent. That means eighty-six percent of our fighters are ready to go to war anytime, anywhere, twenty-four hours a day. In a squadron of twenty-four airplanes, twenty-one are ready to go to war immediately, and the other three would take a few hours to get ready through normal maintenance."

The TAC commander continued, "We've advertised for years that we could deploy any squadron anywhere in the world in twenty-four hours. We got the call, and I said, 'All right, deploy them.' Our first squadron out of Langley [AFB, Va.] was gone well within the twenty-four hours, as was our AWACS. They flew 8,000 miles in fifteen hours with seven in-flight refuelings. That is a long way for fighter squadrons to go. It was not the easiest thing in the world. . . . They did it, and they did it very well."

General Russ noted that the 1st Tactical Fighter Wing had aircraft on alert in Saudi Arabia "within twenty-four hours after they left Langley. Within the first five days, we had five squadrons there, all of them up and ready to go, ready to deter." ■

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Desert Duty

By Stewart M. Powell

—Photo by Robert F. Dorr

McDonnell Douglas F-15C Eagle air-superiority fighters (above) of the 1st Tactical Fighter Wing reached Saudi Arabia on the second day of Operation Desert Shield after a fourteen-hour flight requiring up to eight midair refuelings. At right, Sgt. Harland W. McCallum, an assistant crew chief with the 963d Aircraft Maintenance Unit, prepares for takeoff of an E-3 Sentry Airborne Warning and Control System (AWACS) aircraft.

NIGHT and day, one could see the Air Force's heavily armed F-15 fighters roar into the desert sky from Alert Base Alpha in Saudi Arabia, giving the United States the power to defend the kingdom from Iraqi aggression or to go on the offensive.

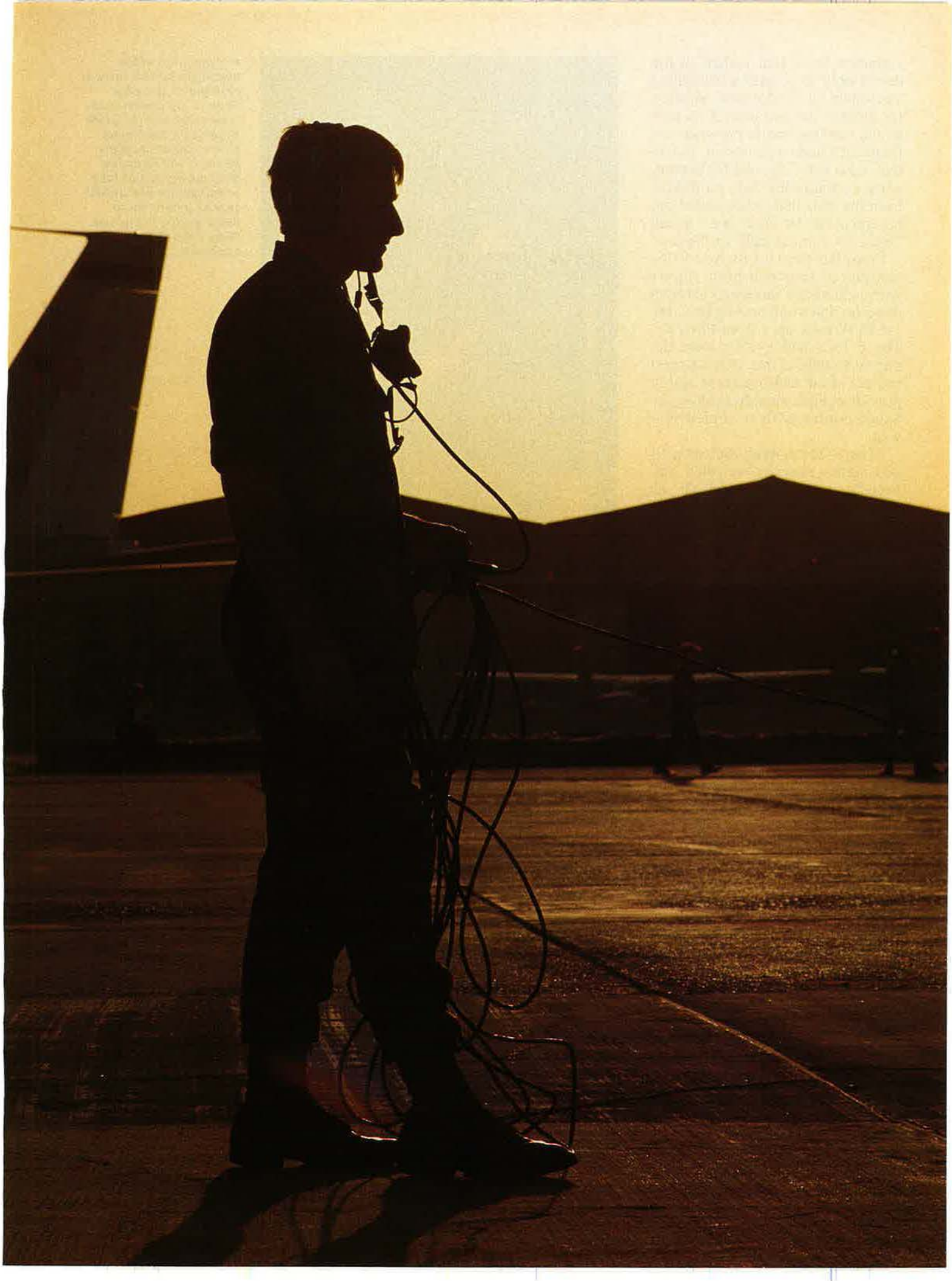
It was a double-edged task, perfectly suited to the versatile aircraft, pilots, and ground crews of the 1st Tactical Fighter Wing, which rushed from Langley AFB, Va., to the Persian Gulf in August to thwart a threatened Iraqi advance.

The mission, hardships, and challenges faced by the men and women of the 1st TFW were a microcosm of Operation Desert Shield itself as US reinforcements continued to pour into Saudi Arabia throughout the autumn and first months of winter.

Like sweltering Army forces dug in on the front lines and Navy ships patrolling nearby waters, the 1st TFW prepared itself to be able to switch from defensive to offensive operations within minutes of receiving a White House order. Like other US military units subjected to the punishing mix of sand, heat, and the unexpectedly high humidity of the Saudi wasteland, the 1st TFW and its equipment suffered unforeseen difficulties.

Logistic support occasionally lagged. Highly trained Air Force personnel suffered under a grinding regimen of endless work days and too few off-duty distractions in what they soon discovered to be the most puritanical of Islamic societies.

These hardships provided a sharp test of morale within the proud all-



volunteer force that rushed to the desert only to go into a frustrating slowdown as Washington awaited for months the outcome of its economic and diplomatic pressures on Baghdad's Saddam Hussein. For all that, however, Col. John McBroom, wing commander, felt confident from the start that, when called on, his and other Air Force units would "finish [a war] quickly in the air."

From the moment its first F-15s completed fourteen-hour flights with eight midair refuelings to touch down on Saudi soil on August 8, the 1st TFW took up a front-line role. The F-15Cs and F-15Ds were deployed to defend one of the largest centers of air reinforcement and to provide combat air patrols along the Saudi border with occupied Kuwait.

"There was nobody between us and them—*nobody,*" recalled Sgt. Fred Dunning of Richmond, Va., an aircraft mechanic. "I can't speak for others, but I know I was kind of shaky."

Showing the Flag

Air Force Lt. Gen. Charles A. Horner, who in the early days served as US Central Command's on-the-scene commander, worked without letup to cobble together a defensive force with whatever personnel or equipment happened to be on hand, knowing full well that the token US forces could at that time really only show the flag and buy time.

Before he relinquished his field responsibilities to his boss, Central Command's Commander in Chief Gen. Norman Schwarzkopf, General Horner had this to say: "Every night, before I go to bed, I have to say to myself, 'What if the attack comes tonight? What do we do?'"

For the 1st TFW, the pace started out fast and rarely slackened. Its pilots flew missions four times as long as their eighty-minute sorties at Langley. Ground crews worked on rotating twelve-hour shifts to keep planes armed and operating. "These planes fly great," observed SSgt. Tim Clem of Fort Worth, Tex. The reason, he emphasized, was that "we've got good people to take care of them."

In the first months of Operation Desert Shield, Air Force ground crews readied their aircraft while blending high-tech efficiency with old-fashioned superstition, which often surfaced when lives could be in danger. One crew chief, inspecting an outbound F-15 flown by Maj. Kevin Sheehan of Grafton, Va., carefully checked the connections on the Sidewinder and Sparrow air-combat missiles before tugging loose their safing pins. Then, in a gesture of good luck intended for Major Sheehan, he affectionately touched the wing of the plane as it edged toward the runway.

Overall, however, the attitude on the flight line was cautiously relaxed. "We're just here to do a job," said MSgt. Roger Dogi of Lynchburg, Va., a laid-back munitions specialist and twenty-year veteran. "We're doing what we're paid for."

As the overnight August deployment of F-15s dramatized, Saudi Arabia's remote location and the fast-moving nature of the crisis were the factors that gave the Air Force its most prominent combat role since the Vietnam War. Within thirty days of the order to move, more than 500 US tactical fighters, bombers, electronic warfare planes, and surveillance aircraft had poured into the region to bolster Saudi defenses while slower-moving ground forces got into position. By year's end the fleet topped 1,200.

A component of the aluminum bridge: after a preflight check, SSgt. Roger L. Oberhelman, a crew chief with the 314th Organizational Maintenance Squadron, signs off his C-130 Hercules. MAC moved 72,000 tons of equipment and 91,000 service personnel to Saudi Arabia in the first thirty days of the operation.

—USAF photo by TSgt. Hans Deffner

The Aluminum Bridge

Military Airlift Command (MAC) aircraft, during just the first thirty days of the operation, moved an astonishing 72,000 tons of equipment and 91,000 service personnel halfway around the world. This was vital to US plans for bolstering a thin line of American defenders in the critical days before more than 130 ship deliveries boosted this nation's stockpiles to more than 7.5 million tons of materiel, enough to sustain the expanding US force for more than thirty days of combat.

Once the government in Riyadh opened additional airfields to American aircraft, Gen. H. T. Johnson, commander in chief of MAC and of the unified US Transportation Command, dipped into the Civilian Reserve Air Fleet (CRAF) inventory to utilize seventeen civilian passenger jets and twenty-one cargo planes.

The airlift's "aluminum bridge" encountered "no major surprises," recalled General Johnson. "We're fortunate we didn't have to fight our way in."

Well before President Bush paid his visit to US troops on Thanksgiving, tankers from Strategic Air Command carried out more than 15,000 midair refuelings during almost 42,000 flight hours. In more than 5,400 missions by early December, MAC had lost only one cargo plane. That was a giant C-5A Galaxy that crashed on takeoff from Ramstein AB, Germany, killing thirteen Air Force Reservists.

In a paper made public shortly before Iraq lunged into Kuwait, USAF Secretary Donald Rice wrote that the post–cold war world required an Air Force that would "deter, deliver a tailored response, or punch hard when required—over great distances with quick response."

In effect, that is exactly what the Air Force did.

"The quick reaction," said General Horner, "was the main reason the United States was able to deter an immediate outbreak of hostilities," which would have meant going to war at a time and in circumstances far less favorable to the US than to Iraq.

The Pentagon laid great responsibilities on the Air Force's inventory of more than 1,200 aircraft, which were dispersed to more than two dozen air bases in Saudi Arabia, Bahrain, Qatar, the United Arab Emirates, Oman, and Turkey and on British-owned Diego Garcia in the Indian Ocean. As former Air Force Chief of Staff Gen. Michael J. Dugan foresaw, a no-holds-barred air campaign was envisioned against Iraqi forces. Secretary of Defense Dick Cheney may have sacked General Dugan for his remarks, but no one publicly challenged their accuracy.

Exercise Imminent Thunder last fall, which featured 1,100 allied aircraft, showed for the first time the likely scale of the bombing campaign that would be needed to destroy Iraqi positions inside Kuwait and thereby spare an estimated 200,000 US ground troops the need to fight their way through thirty-mile-wide, World War I–style Iraqi defenses.

In addition to Navy attack planes, the US put together plans to call rapidly on the Air Force's Diego Garcia–based B-52 bombers, F-111 fighter-bombers based in Saudi Arabia and Turkey, and Saudi-based US attack aircraft—F-117A stealth fighters, F-15E multimission fighters, F-16s specially equipped for ground attack, and A-10 Thunderbolt II close air support planes.

From the outset, US air-to-air fighters—primarily the Air Force's F-15s and F-16s, secondarily the Navy's F-14s and F/A-18s—were given the responsibility for expeditiously seizing the skies from Iraq's fleet of more than 500 warplanes, among them late-model Soviet-built MiGs (including the MiG-29) and French-built Mirages.

—USAF photo by TSgt. Rose S. Reynolds

An F-111 fighter-bomber from the 48th Tactical Fighter Wing (USAFE), RAF Lakenheath, UK, takes off from a Desert Shield airfield. The EF-111A in the background, an electronic countermeasures aircraft, comes from Mountain Home AFB, Idaho, home of the 366th TFW.

Unexpected Flexibility

The front-line USAF fighter aircraft quickly showed the breadth of Air Force capabilities. Said Maj. Gen. Joseph W. Ralston, the Air Force's director of tactical programs, "we have never specifically focused on tailoring our forces only for the defense of NATO. We have tried to build the flexibility in our forces and the deployability of our forces for many years."

American pilots used the weeks of "near war" in late 1990 and early 1991 to study Iraqi tactics and perfect their responses. American flyers always had "healthy respect" for their Iraqi counterparts, maintained USAF's Lt. Gen. Thomas R. Ferguson, Jr. Yet no amount of professed respect could hide other realities, on which Air Force officials focused immediately. "Now, are the aircrews trained as well?" General Ralston asked. "Are the weapons there? Are the avionics there? No."

Colonel McBroom explained that the pilots from the 1st TFW spent the opening months of Desert Shield trying to penetrate not just the doctrine of the Iraqi pilots, but also their mindset. As the Colonel explained it at the time, "We look at how bold he is. And we look at tactics: How is he going to fight against us?"

Many of the Air Force's insights, such as they were, resulted from unpublicized cat-and-mouse air engagements over the Saudi-Kuwait border as well as from around-the-clock monitoring of Iraqi air operations by Saudi and US E-3 Sentry Airborne Warning and Control System (AWACS) planes.

The tasks of these computer- and electronics-laden AWACS surveillance aircraft were vital. For months, they flew missions lasting as long as twenty hours in order to track the Iraqi warplanes that occasionally raced south from their airfields toward Saudi Arabia. US

F-15s and allied aircraft then would "paint" the would-be intruders with their targeting radars—the signal for the Iraqi pilots to retreat.

The Iraqi tactic was characterized in this fashion by Lt. Col. Laszlo Bakonyi of Austin, Tex., an AWACS mission crew commander: "They just like to duke the border."

Detection and identification of the Iraqi fighters helped to refine the plans and improve the coordination of allied forces as well as smooth Saudi decision-making on knocking down intruders in peacetime.

"In almost all situations, we want the Saudis to make the call on whether the guy is a hostile or whether they want us to shoot," explained Col. Thomas F. Bliss, of the 552d AWACS Wing deployed from Tinker AFB, Okla., who also noted that American pilots had been given authority to fire only if fired upon.

The Toll on Equipment

The constant probing and testing exacted a price from US equipment and personnel. Losses of an F-111 fighter-bomber, an Air National Guard RF-4C reconnaissance plane, and an F-15 fighter during a single ten-day period claimed six lives. A "flying stand-down" was initiated to ensure training programs that would, according to one Air Force official, "maintain the highest levels of combat readiness with safe operations."

The F-15 fleet suffered problems, too, including fuel seepage from vent tubes while the fighter was airborne. In the first twenty-three days of the deployment, 1st TFW aircraft experienced such seepages roughly once every two days, rather than once a month as is usually the case. The problem often was corrected by pilots "playing with the switches." On other occasions, aircraft had to return to base to deal with some unexplained problem that would leave senior officers scratching their heads.

The Air Force took a number of steps to reduce the abrasive effects of sand on sensitive equipment. Filters were changed frequently. Rigorous daily inspections were carried out. Crews carefully and regularly scrutinized equipment that might be examined less frequently back home. Special precautions were taken with aircraft canopies. Engine intakes and exhaust nozzles were covered whenever aircraft were on the ground.

Most of the difficulties that cropped up, Air Force officers reported, were handled by ground crews experienced with harsh desert conditions. Squadrons of the 1st TFW, for example, had exercised in Jordan and Egypt within the past five years and therefore were somewhat better prepared than most for a deployment to Saudi Arabia.

"I don't mean to tell you it's a piece of cake," said Air Force Lt. Gen. Jimmie V. Adams, deputy chief of staff for Plans and Operations, after reviewing the evidence of the first weeks of Desert Shield. "But we know the special things that have to be done to deal with temperature and dust."

Theater-wide, USAF fighter aircraft in the early months had a mission capable rate of ninety percent —up from eighty-five percent in peacetime. Of grounded aircraft on any given day, half were awaiting proper parts. The other half were undergoing repairs.

Timely deliveries of spare parts were crucial for relatively smooth operations. Five depot centers in the United States funneled spares into the logistics train to be flown to Saudi Arabia on daily cargo flights. On one typical day, forward deployed Air Force units ordered 297 spares; 240 were shipped immediately.

When shortages occurred, Saudi stockpiles proved to be invaluable sources of supply. Over the past decade, the kingdom's small but highly advanced air force has built up a huge supply of parts and equipment that is common with USAF inventories. "The advantage with the Saudis is this: When we're thinking F-15, they're thinking F-15," explained TSgt. Marv Kusumoto. "We both talk the same language."

American planes slid easily into tailor-made Saudi F-15 facilities, located behind sand-colored revetments and in hangars fitted with blast doors. The Saudis, said Colonel McBroom, "build everything big and everything right."

Life after work, however, left a lot to be desired.

Airmen from the 435th AGS, Rhein-Main AB, Germany, change the engine of a C-130. Desert conditions have taken their toll on sensitive equipment, but, through rigorous daily inspections and special precautions, ground crews have managed to keep their aircraft flying.

—USAF photo by MSgt. Jose Lopez

Bedrock City

At the end of missions or shifts, many 1st TFW personnel returned to "Bedrock City," a sandy tent city of air-conditioned accommodations for 1,100 located near a flight line. The invented community takes its name from Fred Flintstone's hometown in the 1960s' animated television series and from sweating airmen who drove tent pegs into rock-hard sand in the searing, 130-degree heat of August.

As with other units across Saudi Arabia, meals and coffee breaks became a highlight. A cafeteria known as "Dino's Diner" fed hundreds at every sitting. The goal of two hot meals a day for every airman was met quickly, but Lt. Gen. Henry Viccellio, Jr., deputy chief of staff for Logistics and Engineering, cautioned that "field" conditions might last a year before things were done "a little more permanently."

Inside the sleeping tents housing a dozen airmen each, cots had been lined up barely two feet apart. Electric lights on strings cast an eerie glow in the night. Troops tried to personalize their new homes with photographs of sweethearts, spouses, or children. It was hard, however, to disguise the Spartan conditions. Chemical gear was always kept nearby as well.

For all the inevitable tensions that came with living in crowded conditions, there seemed to be few major disciplinary problems, according to Air Force officials. Col. John Duncan, Tactical Air Command's deputy staff judge advocate, said his operation was handling fewer military justice cases than might be expected from such a large force garrisoned under austere conditions.

Front-line humor helped lighten the austerity. A sign in one tent warned: "Danger, No Swimming, Lifeguard Not On Duty." A wall inside a munitions bunker known as "The Cave" displayed a picture of Saddam Hussein peering from behind the crosshairs of a gunsight. Nearby were Sidewinders, Sparrows, and 20-mm ammunition to make good on the threat.

The give-and-take of combat medicine gave the wing's air-transportable, fifty-bed hospital an atmosphere similar to that of television's "M*A*S*H." When its ten doctors, twenty-five nurses, and 100 other personnel finished dealing with snake bites, broken bones, diarrhea, and desert eye irritations, they busily assigned each other nicknames from the popular program. Maj. Rich Williams, the hospital commander, was "Colonel Potter."

Despite cultural isolation and "Baghdad Betty's" broadcasts, morale remains good among troops of all services. US forces are prepared to switch from defensive to offensive operations within minutes of receiving the order. The US Air Force is playing its most prominent "combat" role since the Vietnam War.

Cultural Isolation

Troops had little direct experience with their very foreign surroundings, thanks to the Saudi decision to keep the troops isolated in order to avoid offending Islamic sensibilities. GIs were reminded that Saudi girls don't date. US nurses, on their infrequent visits to the downtown marketplaces, known as souks, wore flowing robes over their Western clothes, the better to cover their arms and legs. Air Force women drove only on official business; even then they drew stares of disbelief from Saudi men accustomed to prohibitions against women drivers.

Misunderstandings cropped up despite all the efforts to smooth the way. A group of women nurses unwittingly caused a stir by walking through the front door of a magnificent gymnasium on a Saudi air base —one normally used only by men but which had been opened for the first time to women for an aerobics class. Shocked Saudis ushered the women through the gym's back door.

Against such a demanding backdrop, Americans took delight in smaller pleasures: sending letters home, watching videotaped movies, playing sports, and relying on such time-tested diversions as card games or checkers.

Proximity to a flight line handling inbound C-141B StarLifters and C-5A/B Galaxies gave the 1st TFW some amenities that were harder to come by for Army and Marine troops deployed to remote locations. Precious, special-edition copies of European *Stars and Stripes* were passed along like chain letters, scoured for any hint of what might erupt from the rhetorical combat between Washington and Baghdad.

The 1st TFW's proximity to Iraqi-held Kuwait also gave off-duty troops the chance to hear "Baghdad Bruce" or "Baghdad Betty," propagandists for Radio Baghdad's English-language broadcasts. Warned one, "When our dear leader's patience has ended, the sands of Arabia shall become your unmarked grave."

Observed one American, "When you're feeling a little down, Iraq Radio really picks up your spirits." ■

Stewart M. Powell, national security correspondent for Hearst Newspapers, covered Desert Shield in Washington and in Saudi Arabia. His most recent article for AIR FORCE *Magazine was "Fallback From the Philippines" in the July 1990 issue.*

The Military Personnel Center plans a drawdown of 117,000, many of them veterans who don't want to leave service.

Going: A Fifth of the Force

By Bruce D. Callander

LAST fall, Congress voted to trim the 2,000,000-strong US military by one-fifth over five years. The US services dutifully began to work out the details of the drawdown. Just as Americans thought it was safe to celebrate the end of the cold war, there arose the danger of a hot one.

US forces in the Persian Gulf region continued to build up as 1990 wound down. Ironically, the total number of troops committed to Operation Desert Shield was moving close to the total that Congress has told the services to send home by the end of 1995.

Against that background, military planners massaged their computer models to decide where the required cuts could be taken with the least pain. At the same time, they kept a weather eye on the Persian Gulf and on the possibility that the troop-reduction plans would have to be put on hold or even scrapped.

For the Air Force, much of the "what if" drama has been played out in the USAF Military Personnel Center (MPC) at Randolph AFB, Tex. That geographically separate piece of the Pentagon manages the lives and careers of most Air Force members. Now it has the unenviable task of continuing business as usual while preparing for a major drawdown and realizing that the drawdown might be reversed by a shooting war.

MPC has been working on drawdown plans that may end the careers of some of the same people now sweating it out in Saudi Arabia's blistering desert. The agency is working from a congressional script that calls for reducing the force to the lowest level it has seen since the Korean War.

On paper, the reduction is simple and relatively mild. The Air Force is supposed to cut total strength by 100,000 over a five-year period (FY 1991 through FY 1995), presumably taking most of the numerical hit

through normal attrition and reduced recruiting. If USAF has to force some out, new legislation will make it possible to ease the pain by providing severance pay and other "transition" benefits.

Looks, however, are deceiving. What appears, in the cold text of a defense budget, to be an easy task promises in the real event to be anything but.

One problem is that the cuts go deeper than they seem. Air Force strength stood at about 532,000 on September 30, 1990. The authorization bill calls for a drop to 510,000 by the end of FY 1991 and to 415,000 by the end of FY 1995. That last level matches almost exactly the size of the Air Force three years after its birth in 1947.

Another difficulty is Congress's demand for specific cuts in officer strength, including a few in the general officer ranks.

Unprecedented Circumstances

The Air Force has taken major cuts before, but they have followed buildups and could be effected largely by the release of enlistees who, motivated to join in the first place by fear of the draft, didn't really want to make a career of the Air Force.

Unlike the post-Korea and post-Vietnam reductions, this one comes at a time when USAF already has undergone a period of belt-tightening. Since 1986, it has lost 76,000 members. Even before Congress mandated deeper cuts, the Air Force was bringing in far fewer new recruits and beginning to accelerate retirements.

Most of those remaining in the Air Force want to stay.

Another problem is that there is no assurance that the congressionally ordered cuts will stop at the levels now planned. The current blueprint for the drawdown is the FY 1991 authorization bill. However, the true magnitude of the cuts will hinge on what happens in future appropriations. These could speed the current rate of the drawdown or, perhaps, drop the planned end strengths even lower.

The simplest part of any drawdown is reducing new input to the force. Recruiters will have fewer jobs to fill and, barring major changes in the economy or public attitudes toward the military, no lack of applicants. The trick will be to pick those with the talents to fill increasingly technical specialties. Interestingly, MPC officials say, the traditional shortage of recruits qualified for the aircraft maintenance skills is less a problem than it has been. Today the demand will be higher in such fields as medical technology.

The Air Force will take in a smaller number of new airmen, but from bitter experience it has learned the folly of taking all of its cuts in the form of reduced accessions. A deep cut in recruiting would bring the service's numerical strength down fast and ease the impact on the career force, but it would leave USAF with a pool of career-eligible airmen that would be too small to provide the necessary skills when the Air Force comes off its five-year diet and has to maintain its fighting weight.

On the officer side, long lead times in the Air Force Academy and in AFROTC programs make big accessions cuts even less tempting. Shutting down these pipelines does not produce quick cuts and, as is the case with the enlisted force, creates manning problems in the outyears.

The Air Force will continue to bring Academy graduates aboard promptly but will delay call-up of some AFROTC graduates. Nonrated officers can expect waits of eight or nine months. Those slated for flight training may be delayed as much as a year. The Air Force will continue to take in some college graduates through the Officer Training School (OTS), but the numbers will be smaller and the emphasis will be on selected skills.

Speeding Retirements

At the other end of the career spectrum, the Air Force began speeding retirements even before Congress settled on the new strength figures.

Chief master sergeants still may stay a full thirty years, but the service has shut off a program that allowed small numbers of chiefs to stay for thirty-three years.

The "high year of tenure" for senior master sergeants has been dropped from twenty-eight to twenty-six years, for master sergeants from twenty-six to twenty-four years. Technical sergeants, once allowed to stay twenty-three years, now must retire after twenty years. The same is true of staff sergeants.

Among officers, some of the more senior soon will face a selective early retirement board that will tell them they won't be allowed to stay as long as they had hoped.

So far, other force-out actions are less certain. The Air Force has not yet announced any early releases of airmen. However, it already has lowered the high-year-of-tenure point for E-4s. This means that sergeants once virtually assured of reaching a twenty-year retirement now will have to be selected for staff sergeant by the ten-year point or find other work.

Fortunately for those forced out, Congress has extended severance pay to enlisted members as well as to officers.

First-term airmen still will be allowed to reenlist if they have the needed skills or can develop them. Retraining probably will become more common, and, for those who can't qualify for the more technical fields, finding a career job could be more difficult.

This job reservation system has been in place for many years, but the Air Force rarely has used it to turn away career-minded airmen. That situation may change now, and, because members must have at least six years of service to collect severance pay, most of those refused reenlistment will leave with little more than plane fare home.

By early 1991, the Air Force still had not announced any reduction-

in-force (RIF) actions among officers, but MPC does not rule out this possibility, should the process of normal separations and retirements not bring down the size of the force on schedule.

Presumably, the Air Force will delay such action as long as possible due to events in the Persian Gulf.

To ease the impact of a RIF if it becomes necessary, Congress removed the ceiling on severance pay for those who are forced out. It also has allowed the services to give them access to health care, commissaries, exchanges, dependent schools, and even base housing for specific periods after separation.

The services asked Congress to approve more generous benefits, including a system of vesting retired pay for those who didn't make twenty years. That provision wasn't passed, but the lawmakers recommended that a coming pay study explore the idea.

Who Gets Benefits?

RIF benefits can be substantial. However, few departing members are likely to see them. So far, the only ones certain to qualify are E-4s not picked for promotion by the ten-year point. Service members with fewer than six or more than twenty years are not eligible, although the new legislation "grandfathers" officers who had five years at the time of enactment.

Members who leave voluntarily or are forced out short of the six-year point will get some transition help but little extra cash.

The congressional package requires the Departments of Defense and Labor to provide employment counseling, skill testing, job referral, and even some small-business financing help. Before the law was passed, the Air Force had tested a contracted job-assistance program. Now, departing members will receive similar services with Labor, rather than the Air Force, footing the bill.

While the drawdown is intended to yield major savings in the long run, it will tax the services' budgets in the short run.

A case in point is permanent change of station, or PCS. Usually, the Air Force moves some forty percent of the force every year. The bulk of PCSs involves incoming members, those going to and from overseas bases, and those leaving service. Lowered recruiting will reduce the accession moves, but early separations and retirements will offset much of the gain. PCSs from overseas bases will increase as planned reductions in European forces materialize.

Already pinched for PCS funds, the Air Force has cut moves within the continental US and, in some cases, held service members longer in overseas posts.

The added stability is welcomed by those who like their present locations but not by those eager to go elsewhere. In either case, the situation is frustrating to officials trying to plug the gaps in unit manning. Often they must tell requesting units to hang on and make do until funds become available. As base closings generate still more moves, the situation promises to worsen.

Tight money also is hurting some of the programs the Air Force developed over the years to improve the quality of service life.

Clubs and other "revenue-generating" activities are an example. Once heavily subsidized by Air Force Morale, Welfare, and Recreation (MWR) funds, they must become self-sustaining or they will be closed.

MWR officials hope that better service and improved management will bring ailing clubs at least up to the break-even point. Some, however, already are in financial trouble. The days when the club offered junior officers and midgrade NCOs the chance to sample the life of the rich and famous are over.

Libraries, aero clubs, bowling alleys, and fitness centers are feeling the pinch. Some are relying on volunteers to fill the gaps. Where bases are unable or unwilling to take up the slack, programs will offer fewer hours and fewer services.

All-Important Child Care

One service that the Air Force is most eager to protect is child care. Relatively unimportant a decade or two ago, the base child-care center has become a necessity in these times of working couples and single parents. Its importance has been underscored by deployments to Desert Shield, which have forced many men and women to leave children behind with working spouses.

These centers and the Air Force's alternative home care facilities are closely regulated and professionally staffed—and expensive. MWR funds, some generated by on-base activities, underwrite part of the cost so that parents need pay only modest fees. As both appropriated and nonappropriated funds grow scarcer, some care centers may face the tough choice between raising fees or cutting services. Either way, members with small children would feel the impact.

Second only to worries whether they will survive the actual cuts, a fear for many members is that their careers will stall out during the drawdown. In past cutbacks, this happened. A feast of wartime promotions was followed by an exodus from the lower grades, and the forces were left top-heavy. Officers dropped to lower grades, enlisted promotions were frozen, and everybody spent long years waiting for the thaw.

Fortunately for today's members, the Air Force anticipated that problem early in the Vietnam War. It resisted the temptation to overpromote in the combat units and developed programs to maintain at least modest advancement opportunities even in the drawdown years. The up-or-out systems now in place for both officers and airmen were the result.

Airman hikes may slow a little during the present drawdown, but reduced high years of tenure for

NCO grades should create offsetting vacancies. Until recently, high-year rules applied only to airmen who had reached retirement eligibility. The Air Force was reluctant to force airmen out once they had begun their second enlistments. Now able to provide enlisted severance pay, however, officials will be less hesitant to force out career airmen when they must.

MPC says it has no plans to go beyond setting ten years as the high year for E-4s, but there is nothing to prevent the Air Force from lowering the high-year-of-tenure points for higher grades if that becomes necessary.

Similar up-or-out mechanisms apply to the officer grades. MPC officials say that these procedures keep promotion opportunities fairly normal. Officers in some grades will wait longer between being selected and pinning on their new insignia.

For both officers and airmen, the Air Force has laid on new rating systems. They were developed well before the drawdown was ordered. Both are designed to reduce the inflation that has plagued rating systems for decades and left them with questionable value in the selection process.

Fairer Selections

For officers, the new ratings will give greater weight to the recommendations of commanders. For airmen, a key change gives higher promotion point values to recent ratings than to those of past years. Neither development promises any more promotions, but they should make selection fairer.

On the assignment side, despite tight PCS budgets, MPC officials hope to retain most of the programs developed in recent years to give members more say in their future moves.

The Air Force still will allow members to list choices of assignments, for example. As always, filling out a "dream sheet" is no assurance that a member's prayers will be answered. Indeed, such assignments may be harder to come by in a shrinking force with fewer PCS dollars. The trick will be to make more realistic choices. To help, MPC has been sending out traveling assignment action teams to give members a better feel for the way the system works and a better chance to use it to their advantage.

"Join spouse" assignments still will be possible for couples in which both members are in the service. Here, as in the past, togetherness is easier to approve for junior members, becoming harder and harder to accommodate as both spouses reach higher grades and specialty levels.

The problem is finding two slots at the same base for senior members in skills where the demands are limited. The difficulty increases when one spouse is tapped for a remote assignment. In such cases, the Air Force advises the other to put in for a concurrent remote tour as well. If both can't land in the same location, at least they will have gotten their short-tour obligations out of the way and improved their chances of staying together later.

Despite the strength cuts and the tight budget, the Air Force also expects to continue paying bonuses and incentives. In the past, critics of such payments have argued that they are unnecessary during periods of strength reduction, but officials insist they still will be needed in areas where skills are scarce and civilian competition remains high.

Drawdown actions occupy at least a dozen major MPC offices and as many more in the Pentagon itself, but many have a common thread. The officials of one MPC shop after another emphasize the importance of unit-level leadership in making the transition to a smaller force. It is a subtle but unmistakable change from the decades of consolidation and centralization that marked the force's earlier development.

When MWR officials talk about keeping the foundering clubs open and saving the child-care centers, for example, they say it will be up to local commanders to find solutions. When assignment officials say that the preferences of members will be considered, they add that commanders will have to work more closely with their troops to see that it happens or to explain why it didn't. When promotion officials talk of changes in evaluation systems, they emphasize that the new programs give commanders greater responsibility not only to rate their members but also to let them know how they are doing. In retraining, retention, and even transition programs, local leaders are seen increasingly as the key players.

A generation of commanders who complained that their status had been reduced to that of caretaker and accountant see their role changing. In a smaller, less affluent force, units may have to make do, improvise, and take care of their own. Commanders schooled as managers may find the job calls for more leadership.

It's unlikely that shrinking the Air Force to its post–World War II level will bring back the old, brown-shoe Air Force. Technology and modern management techniques have made too many inroads to make the return of the morning report an attractive alternative.

It will be interesting to watch. The loss of roughly one-fifth of the force will not be without pain, and living within a tighter budget will not be easy. The effectiveness of a reduced force remains to be tested, and it may not work. But possibly, in losing much of its weight, the Air Force will regain something of what it lost in growing larger and less personal. ■

Between tours of active duty during World War II and the Korean War, Bruce D. Callander earned a B.A. in journalism at the University of Michigan. In 1952, he joined Air Force Times, *becoming editor in 1972. His most recent article for* Air Force *Magazine, "They Wanted Wings," appeared in the January 1991 issue.*

By 2005, there will be thirty-five percent fewer squadrons. Their primary mission will be air defense.

Fifty Years of European Fighter Trends

By John T. Correll, Editor in Chief

BY THE turn of the century, the number of combat fighter squadrons operated by our allies in central Europe will decrease by thirty-five percent or more.

The drop will be most evident in squadrons with sole or primary missions in ground attack. On the other hand, air defense force structure won't be cut and may, in fact, show some gains.

The units that do remain, particularly those in air defense, will be impressive. They will be able to engage enemy aircraft at greater distances, and most of the fair-weather day fighters will be gone.

By 2005, the average aircraft age will be about twenty years in the larger European fleets and upwards of thirty years in the smaller ones.

The variety of aircraft will diminish. Of the fighters flown in central Europe by non-US air forces, seventy-five percent will be of four types: the F-16, the Tornado, the Mirage 2000, and—assuming it is built—the European Fighter Aircraft (EFA).

The only new airplanes in sight are the EFA, designed for air defense, and the French Rafale multirole aircraft. Neither of these "agile fighter" programs will put more than a few squadrons on the ramp by 2000.

These projections, made for the US Air Force by the RAND Corp., are based on an assessment of plans, budgetary considerations, and other constraints facing the German, British, French, Belgian, Dutch, Danish, and Canadian air forces.

Events in Europe are subject to surprising turns, of course, but there's little chance that force struc-

New European aircraft programs are the multirole French Rafale (opposite) and the European Fighter Aircraft, designed for air defense. No more than a few squadrons of either will be operational by 2000.

© Erik Simonsen

ture will exceed the RAND forecast. If anything, "it could go much lower," says Mark Lorell, who has been talking to the Europeans and updating the estimate.

Lorell, along with Christopher J. Bowie and John Lund, did a comprehensive analysis of trends in European fighter aircraft inventories from 1950 to 2005. It was published last year, just ahead of a wave of changes to plans for the 1990s.

It now appears that the drop in force structure will be roughly twice as severe as forecast a year ago, Lorell says. A formal revision will be published later this year.

Revised Projections

RAND now makes the following projections:

Attack mission. Today seventy-eight squadrons have attack as their sole or primary mission. By the turn of the century, the number so tasked will be between thirty-six and forty-one. With many air-to-ground munitions programs now canceled, the decline in attack is even sharper than aircraft totals indicate. European air forces will fall behind in their ability to fight modernized tank forces and other moving targets on the ground.

Demise of the day fighter. Virtually all attack aircraft in 2000 will be equipped to operate at night and in bad weather, compared to a third of them that can do so today. The capability will come from a combination of terrain-following radar, inertial navigation systems, on-board computers, and night vision devices, Lorell says. This will not match the Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) system that some US fighters have, but it's a big step up from day fighters.

Air defense. Thirty-eight squadrons currently have air defense as their only mission or, in the case of dual-role units, as their primary mission. By 2000, between thirty-nine and fifty-four squadrons will be so assigned.

Beyond visual range. Slightly more than half of the air defense squadrons now have the all-weather capability to engage enemy aircraft beyond visual range. Virtually all of them will have this capability by the turn of the century.

Reconnaissance and EW. The reconnaissance effort will decline (from eleven squadrons to six or eight). There will be modest gains in electronic warfare capability. These missions, however, have never been major ones for the Europeans, and the changes will mean only marginal differences in the overall force structure.

Numbers and Diversity

In the 1950s, when NATO was new and the Russians were scarier, the US and its Allies fielded almost 250 squadrons in central Europe. Force structure dropped sharply but steadily over the next ten years, then stabilized at about 140 squadrons in the late 1960s.

Any impression that the Allies kept cutting fighter force structure after the 1960s is wrong, RAND notes. The total number of squadrons and the number provided individually by each nation have remained essentially constant for twenty-five years. Expansion programs in the 1980s actually led to a modest increase.

At present, the European nations have 116 squadrons. (The total excludes US and Canadian units.) Af-

ter the big drop coming in the 1990s, RAND believes, force structure will again level off, this time somewhere between seventy-five and ninety-five squadrons.

"The official French position is that there will be no cuts—zero—in their fighter-attack force structure, but we are projecting a decrease of thirteen to twenty-seven percent," Lorell says.

RAND predicts that the Germans will cut their fighter force structure by twenty-four to thirty-eight percent and that the British will cut by seventeen to thirty-one percent. The Dutch, Belgians, and Danes, whose combined numbers are roughly equal to one of the bigger European air forces, will cut by twenty-seven percent.

Pure all-weather interceptor forces declined after the 1950s. In partial compensation for this, the Europeans have maintained about 100 squadrons or batteries of surface-to-air missiles for the past twenty-five years.

In a modest way, the all-weather interceptor is coming back. The nations with F-16A fighters plan to modify them to F-16C levels, and the Germans are upgrading their F-4Fs with look-down/shoot-down capability against multiple targets. The EFA would add a completely new air defense aircraft.

The Big Four

The diversity of aircraft has gone up and down. The Europeans flew nine major types of fighters in the 1950s. Variety reached its peak in the late 1960s with sixteen different kinds of fighters, a colorful panoply of Lightnings, Hunters, Mystéres, Vautours, Starfighters, and others.

Twelve major types will be in service in the early 1990s, dropping toward nine types by 2005. Seventy-five percent of future fighter fleets, however, will consist of F-16s, Tornados, Mirage 2000s, and EFAs.

The single most dominant airplane will be the Tornado. Operating in attack, air defense, and electronic reconnaissance variants, it will equip a third or more of the total squadrons. The ECR (electronic combat/reconnaissance) variant, currently flown by the Germans, was a breakthrough in electronic combat, which has traditionally been "one of the weakest areas of all for the Allies," Lorell says.

The French continue to modify the basic Mirage 2000 for an assortment of uses. The latest is the Mirage 2000D (originally called the 2000N-Prime), which promises to be a very capable attack aircraft.

The big question is the future of the EFA, which, like the Tornado, is a multinational program. It has been beset with delays, cost escalation, design disputes, and other troubles.

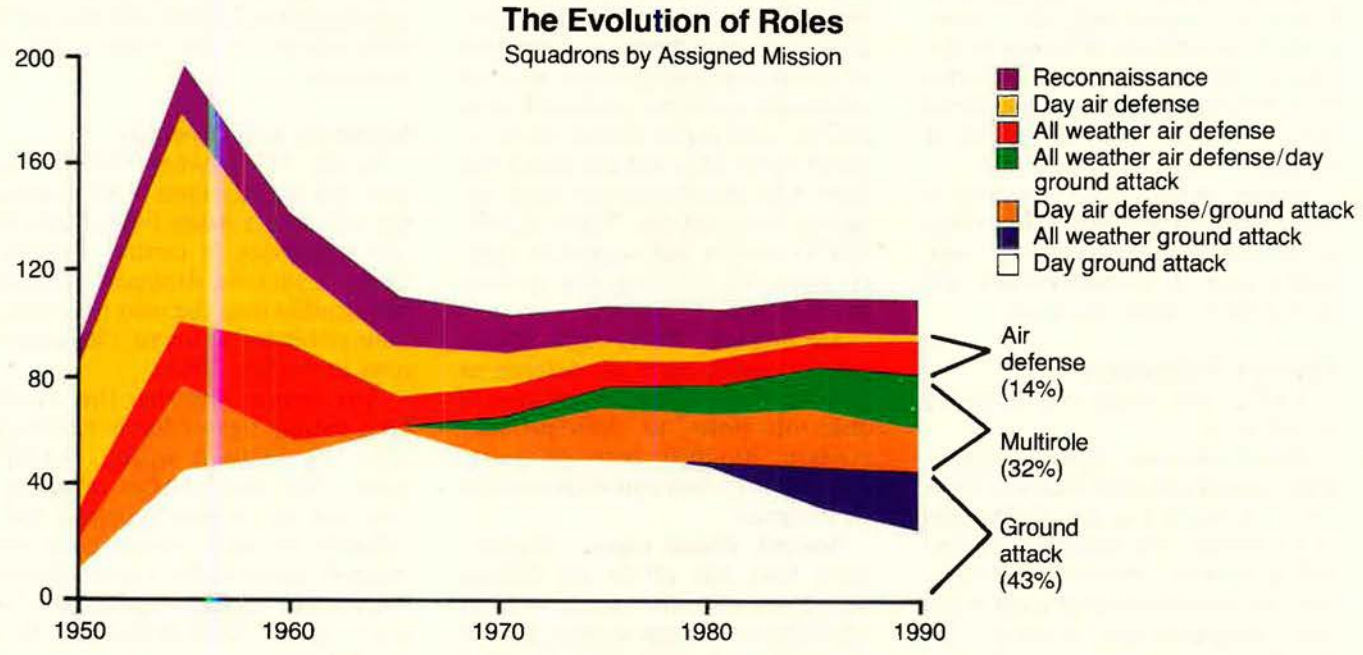
Rollout is scheduled for later this year, with initial operational capability in 1996. If everything goes as planned, 765 aircraft would be built. The British and the Germans would buy 250 each, with the Italians taking 165 and the Spanish 100.

Modernization Through Modification

With each passing year, airframe fatigue problems will intensify for the systems in service now. A considerable amount of modernization is possible through system upgrades, but to remain credibly effective the Europeans will eventually need some sort of replacement aircraft.

The second generation of jet fighters followed closely on the heels of the first. In 1955, the average age of aircraft in the European fleets hovered around five years. Since then, fighters have stayed in service longer and the average age has crept steadily upward for several reasons.

"Some aircraft, such as the F-4 Phantom II and Mirage III, were brilliant designs that could be kept effective through upgrade programs," the RAND report says. "Other aircraft were modified to perform different missions. Perhaps most important, the increasing cost

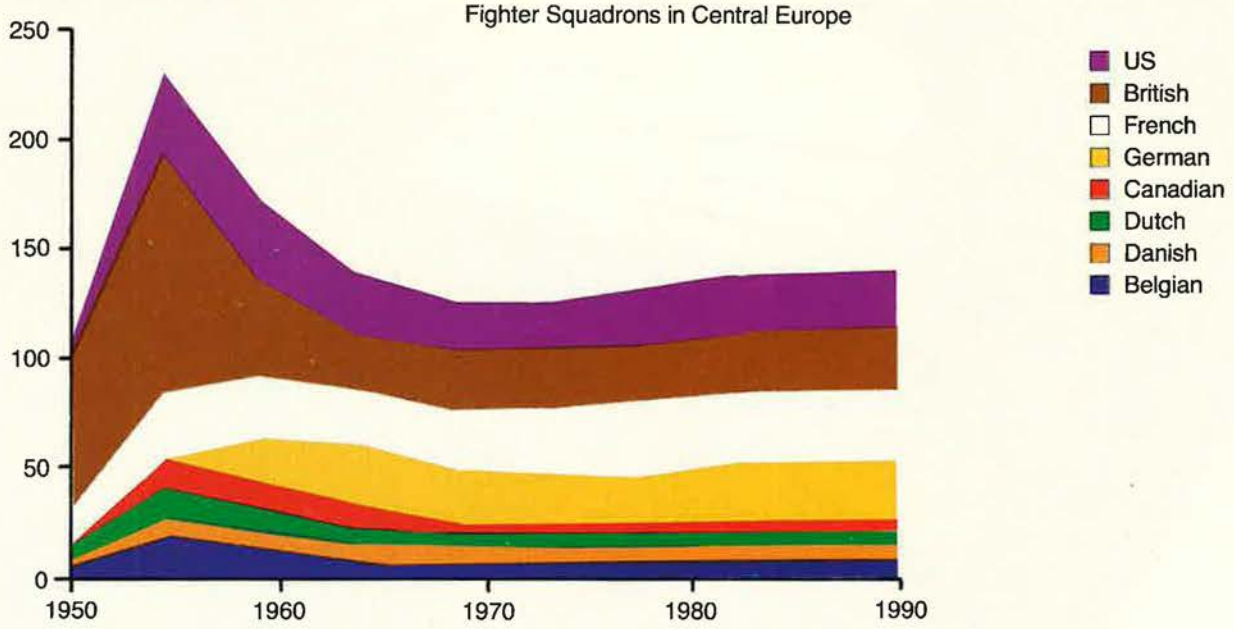


Today more than half of the Allied fighter squadrons in central Europe have attack as their only or primary mission. This is about to change. By the turn of the century, attack roles will diminish sharply and air defense will be the primary mission.

Source: RAND Corp.

Numbers and Nations

Fighter Squadrons in Central Europe



Allied air forces have always provided most of the in-place fighters in central Europe. Both the number of squadrons and the relative contribution of each nation have remained relatively constant since the late 1960s.

Source: RAND Corp.

of these weapon systems made it more and more difficult to replace them as frequently as in previous years."

The Europeans will continue to rely heavily on marginal gains from radar and avionics upgrades and the addition of new subsystems. An AMRAAM under the wing can do a lot to offset age creep.

There are limits to the "modernization through modification" approach. For one thing, it cannot incorporate stealthiness or other revolutionary technologies that call for new airframes.

Such technologies, however, are not likely for European air forces in the foreseeable future. That puts pressure on them to explain why the additional benefits of the new aircraft they propose are worth the investment.

A recurring question, as put to RAND by one Allied military planner, is, "Exactly what improvement will the EFA or Rafale provide over the F-16C?"

Nation-by-Nation Outlook

Here, as forecast by RAND, is the outlook for the seven Allied air forces in central Europe.

France. Mirage 2000 variants will steadily replace older Mirages and most Jaguars. Even if Rafale stays on schedule (it has shown a proclivity to slip), only a squadron or two will be operational at the end of the century.

Germany. Originally, Lorell says, the Germans wanted to replace six squadrons of Alpha Jet attack aircraft with the interdiction/strike variant of the Tornado. That deal fell through, and Luftwaffe procurement of attack Tornados has been terminated. Purchase of the ECR Tornado continues. Upgraded F-4Fs will be employed for air defense through the 1990s but must be replaced soon thereafter with something, presumably the EFA. Germany is a full partner in EFA development but is not yet committed to procurement.

Britain. The Royal Air Force will lose five (of its current eleven) Tornado attack squadrons. Three will be disbanded, and two have been reassigned to maritime operations. Four air defense squadrons of F-4s and two squadrons of Buccaneers, which had a secondary ground attack mission, will also be disbanded. Three Jaguar squadrons are likely to go as well. The Harrier jump jet survives, and the British plan to field a GR. Mk. 7 night-attack variant.

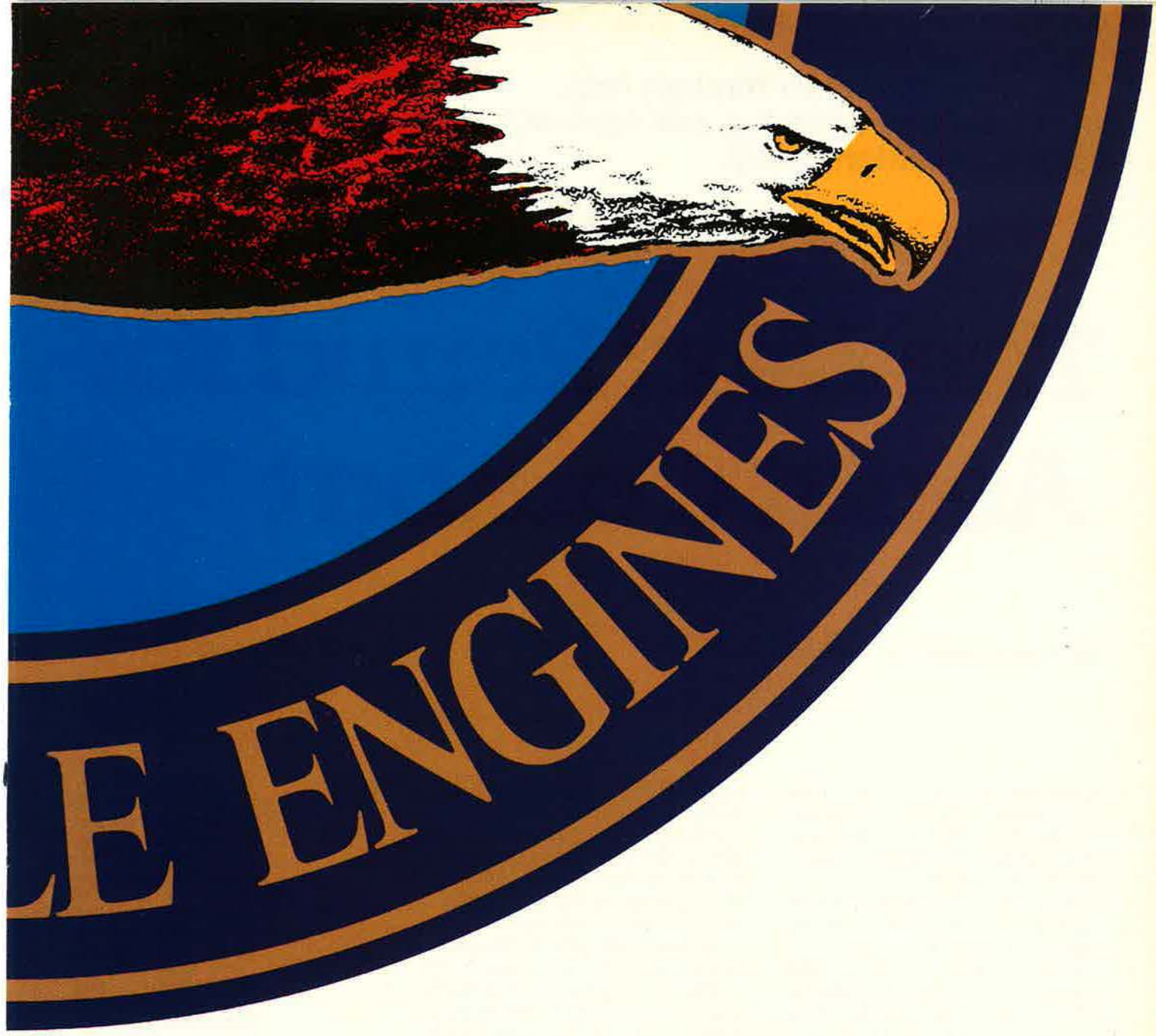
Belgium. The Belgians are reducing their commitment of F-16s to NATO from 144 aircraft to 120. They will also fall back from two squadrons of Mirage 5s with a total of fifty-six aircraft to one squadron with twenty aircraft. They plan to buy AMRAAM for their F-16s, but that procurement could be reduced or delayed.

Canada. The present Canadian fleet, with an average aircraft age of eight years, is the newest in the NATO lineup. The Canadians have shown interest in LANTIRN pods for their multirole CF-18s.

Denmark. The Danes currently have four squadrons of F-16s and two of Drakens and had planned to convert completely to F-16s and AMRAAM. Now, RAND forecasts, they may replace only half of the Drakens. Lorell estimates the Danes will be effectively down a squadron or two entering the next century because, like the other F-16 air forces, they are not buying enough aircraft to replace normal losses to attrition.

The Netherlands. The Dutch field eight squadrons of F-16s but are reducing their commitment to NATO from 162 aircraft to 144. A few years back, seventy percent of their effort was on attack missions. Lorell reports that the present mix is fifty-fifty, air defense and attack, and that "they'll be all air defense by 2000 with the present trends." ■

WHAT KIND SHOULD GO



OF ENGINES IN THE ATF?

UNITED TECHNOLOGIES
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AMRAAM has flown through rain, jammers, and lightning and against four targets simultaneously.

The Next Round for Aerial Combat

By Jeffrey P. Rhodes, Aeronautics Editor

Photos by Guy Aceto, Art Director

"THERE is no other missile in the world that can do the job AMRAAM does." If it ceased to exist, "you would have to start over again. There are no alternatives."

Brig. Gen. Ed Franklin, program manager for the AIM-120A Advanced Medium-Range Air-to-Air Missile at Eglin AFB, Fla., made that claim not long ago to emphasize what he sees as an urgent need to press on with AMRAAM, a joint USAF-Navy project.

AMRAAM is intended to replace the aging AIM-7 Sparrow. AMRAAM, however, will be much more than just an improved version of Sparrow. It will be a revolutionary advance.

It incorporates the latest and best of launch-and-leave, beyond-visual-range (BVR) combat technologies. In principle, it is like the Navy's huge AIM-54 Phoenix, another launch-and-leave weapon that has been around for more than a decade. However, AMRAAM will pack the same lethal punch and will be far smaller and lighter than Phoenix and nearly as fast.

The high-profile program seems to have surmounted the most serious technological hurdles. Not far from the site where the missile's technologies were developed and tested, the first operational AMRAAM unit, the 33d Tactical Fighter Wing at Eglin, is receiving production missiles for training.

Getting AMRAAM to this point has not been easy. The missile's development has proven more difficult and time-consuming than anyone anticipated. The program's high costs and some recent developmental setbacks have generated increased uneasiness in Congress, which even in the best of times has cast a wary eye on the program. The lawmakers continue to be skeptical.

TSgt. Michael Kennedy (left) and SSgt. Robert Sharpe (right) of the 33d TFW, Eglin AFB, Fla., secure an AIM-120A Advanced Medium-Range Air-to-Air Missile to the forward fuselage station of a 60th TFS F-15 during an upload training session. Although part of the 33d TFW is in Saudi Arabia for Operation Desert Shield, the wing will soon be the first operational AMRAAM unit.

Developing the Missile

AMRAAM had its genesis in the late 1970s, when the Pentagon brought together a select group of US Air Force and Navy pilots to discuss the future look of air-combat missiles. The pilots, all of whom had gained extensive combat experience in Vietnam, were asked to identify characteristics that would be needed in the next generation of short-, medium-, and long-range air-to-air weapons.

When it came to requirements for a new medium-range missile, the working group developed a list of thirty-three "musts."

"We looked at Sparrow, and it had a lot of shortfalls," says Luke Boykin, who served on the group. "What we came up with was incorporated in the JSOR [Joint Statement of Operational Requirements], and that became the gold document."

The group produced a body of recommendations for what then was known only as "the BVR missile," and these became the baseline for AMRAAM. Among the suggestions were that the weapon should have high velocity, good range, low maintenance needs, ability to operate in an electronic countermeasures (ECM) environment, ability to go against multiple and clustered targets, and, if necessary, a launch-on-visual-sighting capability.

"The fundamental capability is launch-and-leave," explains General Franklin. "If you lay out all the requirements, you have to have an active capability. The missile can't be tied to the aircraft."

This capability is required because the missile will eventually operate in tandem with the new Advanced Tactical Fighter (ATF), a stealthy aircraft scheduled for service in the early twenty-first century. As General Franklin says, "It just doesn't make sense to have an advanced, stealthy fighter and put a semiactive missile on it."

Because the missile had to meet a wide variety of conditions, designing it proved to be a major task. The Air Force was responsible for imposing strict limits on AMRAAM's weight. It could weigh no more than 350 pounds if it was to be carried on the wingtip and underwing rails of the F-16 fighter.

For its part, the Navy had two principal, but different, requirements.

First, due to concern about explosive accidents at sea, the Navy insisted that the missile be equipped with a heat-initiated venting system. This keeps AMRAAM's solid rocket motor from exploding in the event of a fire in a carrier's magazine.

Second, the Navy demanded that AMRAAM have a mean time between maintenance (MTBM) actions rate of 450 hours. When a carrier battle group is at sea, aircraft assigned to the daily Combat Air Patrol carry live rounds. Explains General Franklin, "They want to take a load-out of missiles, fly five or six months of sorties, and come back with missiles up and active."

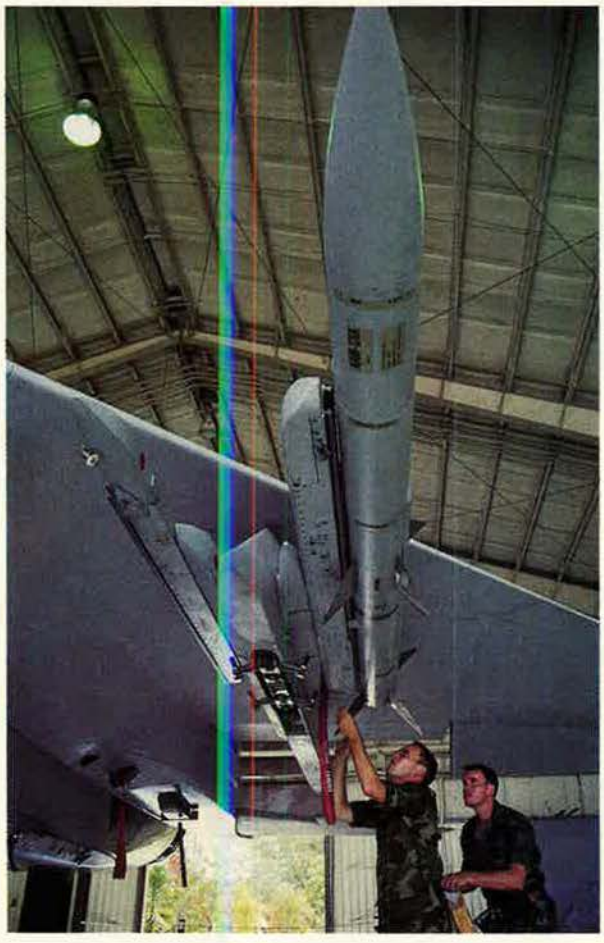
The Air Force takes a different approach. Only limited numbers of live missiles are used in regular training. However, in operations such as Desert Shield where live missiles are carried all the time, the requirement resembles that of the Navy.

AMRAAM is designed to be a "wooden" round—one that can be stored for long periods without requiring regular maintenance. Intermediate shop functions will be eliminated; when tested, the missiles either will pass or will be replaced on the line and sent to the depot for repair. No breakdown will be done in the field.

Sparrow entered service in 1956, and a whole generation of fighters has been designed around it. A major design criterion for Sparrow's successor was compatibility with four existing aircraft (F-15, F-16, F-14, and F/A-18) as well as the future ATF.

AMRAAM had to fit on existing launchers with only slight modifications to rail or ejector. Ground procedures had to be nearly identical to those for Sparrow.

Five contractors received concept definition contracts in late 1976. Three years later, Hughes and Raytheon were selected to begin prototype evaluation. After both firms had fired three prototype missiles, Hughes was declared the winner in late 1981 and given a $421 million, fifty-four-month contract to conduct full-scale development.



Work on the AIM-120A began in the late 1970s, when a group of Air Force and Navy pilots with combat experience was brought together to define requirements for the next generation of air combat weapons. Full-scale development of AMRAAM lasted from 1981 to 1989, and the missile recorded a seventy-seven percent success rate. AMRAAM will replace the venerable AIM-7.

Getting the Program Going

In January 1985, however, the full-scale development contract was stretched from fifty-four to seventy-nine months. The extension was caused by rising costs and schedule delays resulting from the difficulty of meeting AMRAAM's stringent requirements. The initial operational capability date also slipped from 1986 to 1989.

During FY 1986, Raytheon was brought in to serve as a second-source producer. Though this type

of leader-follower production arrangement is common, it is unusual to bring in a second-source manufacturer so early in the life of a program.

"You have to have a leader-follower arrangement in the right context to pay early dividends," says General Franklin. "If I were to do this again, I would have a 'leader-leader' arrangement, where the companies are dependent on each other, or wait until the design was stable [to bring on a second source]."

Though there were difficulties at the start, notes General Franklin, "we've eaten those problems. We now have two qualified contractors."

The AIM-120A that emerged from the test program is twelve feet long and seven inches in diameter. It has a wingspan of twenty-one inches and a weight of 345 pounds. The AIM-7M is one inch longer and one inch larger in diameter and has a wingspan nineteen inches greater. It weighs 159 pounds more than AMRAAM.

The finspan of the AIM-120 (twenty-five inches) is greater than the wingspan because the fins are the primary control surface. On the AIM-7, the wings serve as the control surfaces and the span is larger than that of the fins.

When AMRAAM is carried on an aircraft, it is dormant, with no tuning required. When the pilot squeezes the trigger, the missile "wakes up" and the aircraft's fire-control computer provides flight conditions and target-vector data. The missile performs a self-test and verifies the data. Then the motor starts and the missile fires off the rail, or the missile is ejected and the motor is kick-started.

One major difference between the AIM-120 and the AIM-7 is that AMRAAM can also be carried on the LAU-128 underwing launch rail. Here, Sgt. Michael Hancock positions the jammer table under the rail while Sergeants Kennedy and Sharpe slide the missile off. The fins and wings will be added once the missile is secured.

During the "command inertial" phase, the missile's speed builds to approximately Mach 4. AMRAAM, during this period, computes its own intercept course. The target information can also be updated via data link from the launch aircraft.

Once the missile has determined that it requires no more target updates, or that the launch aircraft has stopped sending this information, the missile switches to "inertial" mode. The missile now continues on the intercept path it has worked out for itself. This phase covers a distance of more than thirty miles, a tremendous increase over the range of the Sparrow.

When AMRAAM's on-board computer estimates that the target has come within lock-on range, the system aligns a miniature radar dish in the nose cone and energizes an active transmitter. The computer refines the missile's endgame course.

Once AMRAAM draws within lethal range of a target, its fuze senses the approach of impact or close approach and activates the warhead. Both blast and fragmentation kill mechanisms are used.

"The radar in AMRAAM is as capable for its size as the one in the F-15," notes General Franklin. "You figure the radar in an F-15 takes up about three feet and, with the other equipment, weighs about 450 pounds. On AMRAAM, we have a seven-inch-diameter tube with ninety pounds or less of equipment. It is a tremendous revolution in technology to shrink things and package them like that."

The combination of AMRAAM (bottom) and Sidewinder (top) seen on this load trailer at Eglin will be the primary weapons load for Air Force F-15s in the near future and for the ATF once it is fielded. Requirements call for the Air Force and Navy to buy 24,335 AMRAAMs, but this may be cut to 15,500 missiles.

Test Successes and Changes

Full-scale development of AMRAAM lasted nearly eight years, from 1981 to 1989. During that time, 128 missiles were built for launch and ground test and seventy-five missiles were fired for purposes of scoring.

In the seventy-five scored shots, AMRAAM scored fifty-eight successes (including nineteen direct hits) and only seventeen misses, chalking up a success rate of seventy-seven percent.

In addition to the seventy-five launches, two other shots were ruled "no test." Twelve more missiles were fired at other times, but not for score.

Very few of the test shots were performed under favorable conditions. On only the second shot, in fact, Air Force officials put AMRAAM through a look-down/shoot-down test, one of the most difficult scenarios devised for a missile.

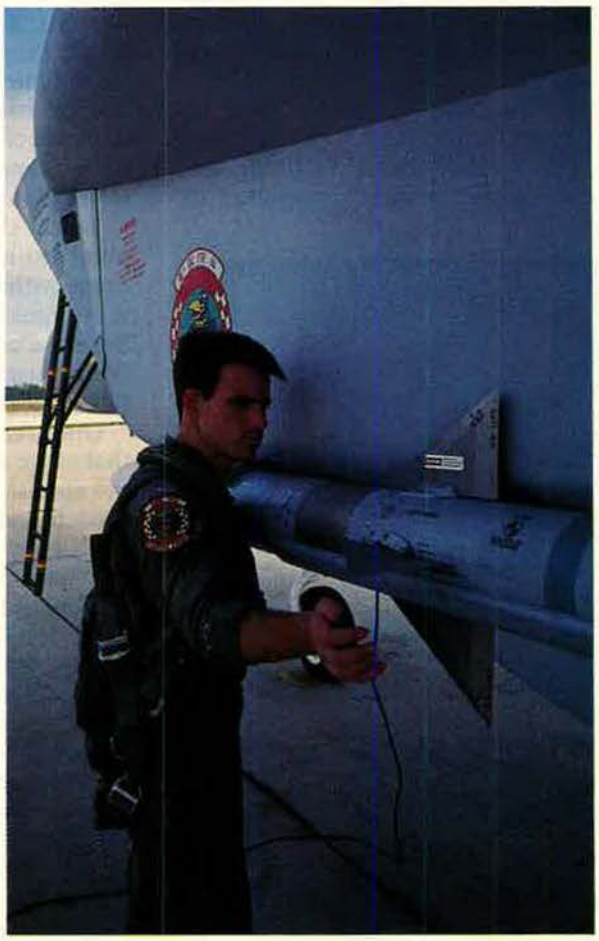
"Critics have charged that the test program wasn't severe," says General Franklin. "We shot through rain and between thunderstorms. We did look-down/shoot-down, look-up/shoot-up, multiple ECM tests, tests against clustered targets, you name it. We even had one shooter get hit by lightning. In a peacetime environment, you could not have tested the missile more thoroughly."

The AMRAAM flight-test program generated a great deal of data and validated detailed simulations that were run before each shot. "There were some things that were wrong, and we picked those up right away after each test," recalls General Franklin. "Some of the things were subtle and could only have been found from looking at the telemetry."

During testing, officials had to make changes in both hardware and software. For example, efforts to keep down AMRAAM's weight resulted in fins of unusual thinness. When these fins were tested in a high-g, high-q (dynamic pressure), low-altitude environment, their aluminum skin peeled back. This defect led to the creation of a new, more robust, but still lightweight fin.

In the case of software, AMRAAM designers frequently resorted to trial and error. "We can simulate statically, to a great extent, how radar will react to ECM," notes General Franklin. "If you add the variable of closure rate, you can't always simulate how ECM will work. There were cases where the logic wasn't right, so we changed the software. Every shot is a chance to improve the simulations. Then you do a retest."

Total missile capability was built up through use of five software tapes fed to the missile's computers over the course of the testing. This building-block approach offered immediate capability and the chance to improve the missile without further hardware changes. As information was gleaned from the tests, the data were incorporated on the next tape.



Capt. Tim Britt, a pilot with the 60th TFS ("The Fighting Crows") at Eglin, checks an AMRAAM training round before a sortie. The unit is now doing captive-carry work with AMRAAM, flying missions to verify that the missile functions properly in a prelaunch environment. Live rounds will be carried later.

Problems and Solutions

Early last year, problems cropped up during tests of operational missiles on F-15 forward fuselage ejectors. The tests revealed that, when the aircraft slowed down, air bleeding around the intakes caused AMRAAMs to vibrate so much that they failed. This problem did not occur on other aircraft. Nor did it show up when the F-15s were carrying conformal fuel tanks.

Fixes could be developed for problems such as bad solder joints and loose circuit-board supports. However, the Air Force concluded that the failures aboard F-15s were signs of much more serious defects. The service last February suspended acceptance of any more missiles.

"It is a case of the prime contractors needing to better manage their vendors," says General Franklin. "AMRAAM has 20,000 parts. If only 19,998 work, there are problems. We need to make sure all the parts work."

Throughout 1990, testing continued apace. AMRAAM last May passed what shaped up to be its toughest hurdle, a test of four missiles vs. four targets in a severe ECM environment. Earlier tests of AMRAAM in this situation saw the missile fail miserably—primarily, but not completely, because of the aircraft interface. In the May version of this so-called "World War III" test, AMRAAM scored three direct hits. The fourth shot passed within lethal range of the target drone.

The Defense Acquisition Board postponed a Milestone IIIB (full-rate production) review until this spring to see if the Air Force's "get well" program for AMRAAM is taking effect. Quality control improved markedly last summer, and deliveries resumed in August. AMRAAM's reliability figures are improving but have not yet reached the interim 200-hour MTBM goal.

In Fiscal 1990, which ended September 30, the proposed purchase of 900 missiles was deferred; only long-lead items were procured. Once the Pentagon approves full-rate production, those AMRAAMs will be built and the Lot V (FY 1991) contract for 1,800 missiles will be put up for competition. The Air Force and the Navy plan to buy 3,000 missiles a year between them from FY 1992 to FY 1997. The last scheduled buy (2,140 missiles) will come in FY 1998.

In recent months, AMRAAM has taken a long stride toward operational reality. The 33d TFW at Eglin began AMRAAM operations last February. Technicians from the Joint System Program Office and Air Force Operational Test and Evaluation Center taught a cadre of blue-suit instructors how to load the new missile. They, in turn, trained the line crews.

"The wings and fins on AMRAAM are so thin you could bend them during the upload, so we wait until the missile is actually on the aircraft" before installing them, says MSgt. David Schmidbauer, a load crew evaluator for the "Nomads," as the 33d TFW calls itself. "With the AIM-7s, we put the fins on while the missile is on the trailer. Other than that, there is no real difference in loading the two."

Loading AMRAAM on F-15 fuselage ejector stations requires one additional step. Because AMRAAM is thinner than Sparrow, the crew must install a pad the length and width of the arch of the "eagle claw" (the crew's nickname for the ejector foot) to accommodate AMRAAM's smaller diameter.

"All we are doing now is captive-carry work," says Capt. Tom Britt, a pilot with the 33d TFW's 60th Tactical Fighter Squadron. "We check to make sure it is turning on and doing what it is supposed to do." As of late last year, no live AMRAAMs had been loaded on the 33d TFW's F-15Cs.

AMRAAM's active radar and beyond-visual-range capability will give fighter pilots a huge advantage in air combat. Being able to launch the missile and have it home in on the target by itself will allow current pilots to get out of harm's way earlier and will help preserve the stealthiness of a future ATF.

What the Future Holds

The US Air Force and Navy are not the only services watching AMRAAM development intensely. The missile shapes up as the medium-range weapon of choice for the air forces of Britain and Germany. Royal Navy Sea Harriers and RAF Tornado F. Mk. 3s (the air defense variant) will be equipped with AMRAAM. So will Luftwaffe F-4Fs now being upgraded. The four-nation European Fighter Aircraft will also carry AMRAAM.

In addition, AMRAAM forms the basis of a planned Norwegian ground-based air defense system. Other foreign nations have shown interest in purchasing AMRAAM. All sales abroad will be handled through the Foreign Military Sales program.

With the end of the cold war in Europe, Congress has begun reconsidering the size of the AMRAAM program. Though Air Force plans still call for buying 24,335 missiles —the number in the original program—the service has been told to provide cost figures for a buy of only 15,500.

Such reductions would have one predictable effect: The unit cost of the missile would increase. "If the buy is cut, we are cutting off the cheapest missiles" in the program, observes General Franklin. "By then, we would be on the flat part of the learning curve." Still, he says, it is only logical that the AMRAAM buy decrease, given the scale of congressional cuts in Pentagon budgets.

An effort called the AMRAAM Producibility Enhancement Program is under way to find methods to cut missile manufacturing costs. The program includes such initiatives as qualifying second-source producers for critical, sole-source items, introducing improvements in manufacturing technologies, and incorporating new technologies.

The Air Force estimates that the program will cut the total cost of AMRAAM by $1.5 billion to $2 billion. By the end of the Lot V buy, twenty-four program items will be included on production missiles.

In addition, technicians are working to determine whether they can shrink each AMRAAM "box"—the area around the tips of fins, as seen looking from nose to tail with the missile's body in the center and the wings and fins extending diagonally. Any modifications to this box would permit more missiles to fit in the ATF's weapons bay.

Wind-tunnel work is proceeding to see if the box, now 17.5 inches square, can be reduced to 12.5 inches by clipping the wings and fins. If this change works, it will become a baseline configuration change. ■

Germany now prohibits flying lower than 1,000 feet. Air forces of the future face a shortage of places to train realistically.

The Low-Level Ban

By James Kitfield

IN MAJOR conflicts, the US and its allies rely heavily on air strikes. These options feature big packages of planes, many of which hide in electronic "ground clutter" and pierce air defenses at low, sand-blasting levels.

The Air Force is confident that today's corps of fighter pilots has been kept up-to-date in training for low-level flight and other harrowing tasks. There is fear, however, that such pilots may soon become scarce. The Air Force warns that allies have begun to slap tight restrictions on the very kinds of flying needed to develop them.

Far and away the greatest concern stems from Germany's recent ban on training below 1,000 feet—in practical terms, *all* low-level military flying. That decision, announced shortly after reunification in October, is a landmark. It denies to one of the largest US overseas forces a key facet of training. It won't be long, say pilots, before they lose a critical combat edge.

Problems are cropping up elsewhere. Under pressure from Manila, Washington has announced it will soon withdraw all Air Force fighters from the Philippines—complicating access to the Crow Valley Range, the top training site for Pacific Air Forces (PACAF).

Big reductions were made in large overseas exercises in which Air Force wings long have played major roles, chief among them Team Spirit in South Korea and Reforger in NATO Europe.

Last year NATO scrapped plans to establish a Tactical Fighter Center, a project deemed vital to creation of improved, multinational, force-on-force training sequences.

Spokesmen for US Air Forces in Europe (USAFE), asked about the new European constraints, produced an unusually blunt public response: "[Our] forces are rapidly losing the ability to train realistically, whether day or night. We are approaching the time where we will have to fight the way we train, [instead of] training to meet combat requirements."

Throughout the cold war, West Germany saw some 90,000 hours of low-level NATO military flying annually (opposite, Luftwaffe Tornados over the German countryside). Germany has now banned all training flights below 1,000 feet.

The Argument Is Over

One Pentagon-based analyst, an expert in the complex business of Air Force fighter operations, elaborates on USAF's current approach

to the training situation. "We have to respond to the marching orders our civilian political leaders give us," says he, "and right now that is that we will not fly low-level in Germany. So we're no longer arguing that decision.

"But we've also made it clear we will not deploy forces that can't train the way that they need to, and that means flying low-level."

In the low-level ban, Air Force officials sense, European public elation about the end of the cold war finally has shifted political sentiment against US air operations there.

Germany's imposition of a total ban on low-level flights clearly dismayed USAFE officials, who felt they already had made significant concessions to German public opinion on the issue. Since 1985, they say, USAFE had reduced its low-level flights by fifty percent. The Command launched an intensive campaign to educate airmen about local sensitivities. New rules and procedures banned flight over German towns, cities, and nuclear powerplants. Pilots were told to observe a noon-hour break in low-level flights during the summer vacation period.

Germans in overwhelming numbers continued to tell pollsters and politicians that they favored a total ban on low-level flights. Helping to fuel such sentiment were a number of dramatic military aircraft accidents, including the August 1988 crash that killed seventy at a military air show at Ramstein AB in western Germany.

Further tightening of restrictions came in September 1989, when the West German Defense Ministry announced that flights below 500 feet would be allowed in only seven designated areas covering just nine percent of the country. Flight durations at that height were also restricted to an average of fifteen minutes per sortie, and flights below 250 feet were banned altogether.

At that point, USAFE officials felt they had run up against a training minimum. Still the ground swell of opposition grew.

"I don't know that any of us saw a total ban coming, but we were all well aware that the pressures to further restrict these flights continued to grow day by day," says Gen. William Kirk, who served as USAFE commander in chief from 1987 until his retirement in April 1989. "We made a lot of concessions over the years, but none of them seemed to hold for very long."

Even sympathetic Germans depict such USAF efforts as futile in light of the scale of German euphoria over reunification.

"Because they live in what was a front-line state between East and West, the German people felt recent changes in eastern Europe very personally," says Col. Gottfried Hufenbach, the German air attaché in Washington. "They simply no longer buy the argument that all of these forces are in Germany solely to defend NATO against the Warsaw Pact."

The German Burden

No one disputes that West Germany bore a burden throughout the cold war. A densely populated country no larger than Oregon, it annually was the scene of some 90,000 hours of low-level military flying.

Even so, USAFE officials clearly hoped that they could satisfy German politicians with a gradual reduction in the number of low-level flights, rather than an all-out ban.

As it is, says General Kirk, USAFE forces are suddenly faced with a mismatch between their training capability and their mission.

"Low-level flights were a great burden on the German people," he says, "and I'm sympathetic. At the same time, if aircrews are not allowed to fly below 1,000 feet in today's threat environment, they're not totally mission-ready to face the kind of threats they may very well see in the Third World."

In the rapid deployment of Air Force tactical forces during Operation Desert Shield, fighter pilots see that their ability to go immediately and go low may spell the difference between life and death. They note that any hope of achieving tactical surprise hinges on an attacker's ability to take it down into the dirt.

The critical importance of low-level capability is on display at Nellis AFB, Nev., where the Air Force holds Red Flag exercises.

Videotaped footage, taken by one of the range's simulated surface-to-air missile batteries, shows an F-16 diving behind low hills and twisting through narrow valleys, popping up into view while leaving a gossamer trail of chaff, and ducking back behind rock outcroppings. The pilot totally frustrates the SAM crew's attempts to lock on for a killing shot.

"If there were no threats driving them down, pilots wouldn't fly low-level," says the Pentagon fighter expert. "If you want to conduct a successful strike, you need the element of surprise, and you need a way to get through enemy defenses and back out. Right now, that means flying low-level."

Currently the Air Force is examining alternatives that range from "exporting" Germany-based USAF pilots to other locales for flight training to reducing the size of full-time deployments to that nation.

The Air Force's search for alternatives is complicated by a number of factors. First, low-level flight skills are perishable, tending to diminish swiftly in the absence of refresher flight training. Regular training is a must.

The Liquid Blur

In addition, differences exist among pilots in their abilities to reacquaint themselves with the liquid blur of terrain passing by at 450 miles per hour. Pilots who cannot keep "current" in low-level flights must be eased back down with a supervised, three-phase program—one sortie at 500 feet, two at 250 feet, and three at 100 feet.

Officials of the Luftwaffe, which is also affected by the ban and is planning to export most low-level flying to Canada, say that the increased warning time afforded NATO forces by the dissolution of the Warsaw Pact has made such a phased requalification feasible.

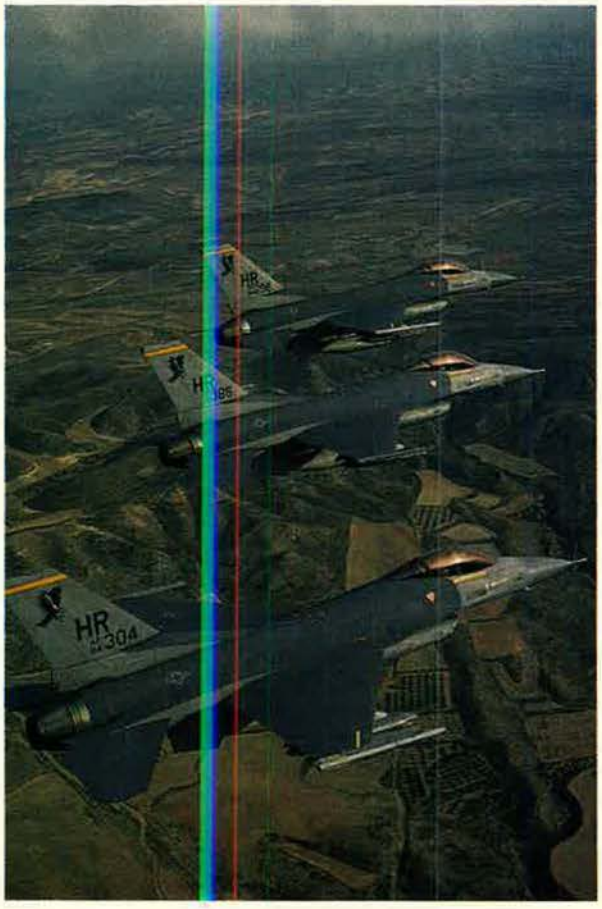
Colonel Hufenbach, however, concedes that the need for such training is not strictly—or even mainly—determined by the NATO scenario. This is particularly true for US and British air forces stationed in Germany. In fact, when a Royal Air Force unit in Germany learned that it was destined for the Persian Gulf, its commanders asked for and received special permission to disregard the low-level flight ban. F-4G Wild Weasels from USAFE's 52d Tactical Fighter Wing, Spangdahlem AB, Germany, were also deployed to the Gulf.

"I'm sure the problem does look different to US and British air forces stationed in Europe, who have to be combat-ready in case they are needed someplace else in the world," says Colonel Hufenbach. "The point is, this is a common NATO problem now, and no longer just a German problem."

In an effort to check what obviously threatens to become a divisive Alliance issue, NATO military officials are preparing a detailed report on military training requirements to make the point that low-level training continues to be a requirement. The idea, they say, is to define more clearly the rationale for the training in order to make a stronger case to politicians.

"The low-flying decision made by Germany has caused some concern, because we definitely believe a need remains for pilots to fly low in areas that are at least similar to those they would operate in," says Norwegian Gen. Vigliek Eide, chairman of the NATO Military Committee.

"We feel it's thus very important to identify requirements first, so we can argue for them as effectively as possible from a military viewpoint. At the same time, over the years we've seen many countries put lim-



—USAF photo by Sgt. David S. Nolan

To get in crucial low-level training for Germany-based pilots (such as those who fly these F-16s from Hahn AB), the Air Force may send them to other locales for flight training or reduce the size of full-time deployments to Germany.

—Staff photo by Guy Aceto

Wild Weasel hunter-killer teams (like this pair from the 35th TFW at George AFB, Calif.) need to get "down in the dirt" to do their job. USAFE Wild Weasel pilots from Spangdahlem AB, Germany, deployed to the Persian Gulf in 1990, had flown low-level training sorties from their home base, but future Weasel units may not be so lucky—or so combat-ready when deployed.

its on how we can train. We simply have to try [to] find the best possible way to train elsewhere or in other ways."

However, attempts to build a consensus for an Alliance alternative to low-level flights in central Europe have run up against constrained defense budgets. For years, military officials have argued for establishing a remote air base dedicated principally to the conduct of low-level training. Labrador, Canada, and Konya, Turkey, have been mentioned as the two most likely candidates. General Eide concedes that the effort has stalled at the last two defense ministers' meetings.

That leaves USAFE with the task of searching for a replacement for the 17,600 low-level sorties it has averaged in West Germany each year.

Money and Morale Problems?

USAFE officials say they are already planning to increase the number of weapons training deployments this year but admit that they are still unsure where they will find the extra money and transport planes to support the deployments.

Another major concern is the effect that the increased numbers of training deployments will have on morale. "If you're talking about a standard, government-issue pilot with no family, then it may be no problem," says one Pentagon analyst. "But if somebody is married, with a family back in Germany, this could definitely disrupt their personal life. It has an impact."

USAFE's greatest concern is finding alternative training locations for low-level flight. Turkey now provides the best overall training for USAFE forces, but it has the drawbacks of being fairly distant from Germany-based units and being in heavy use.

USAFE officials are talking with counterparts in Britain and France, both of which allow some low-level flights by US forces. Other ideas being floated include shifting low-level training to different NATO countries at different times of the year.

The real fear, say USAFE officials, is that Germany's ban is merely the first of many. Air-to-air training in Germany has also come under increased scrutiny in the past few months, they say. Meanwhile, shortly after the low-level ban was announced in Germany, Belgium responded with a ban on low-level training for all air forces except its own.

"We fully expect to see other NATO countries say, 'If Germany doesn't need this, why do we?'" says one Air Force officer. "There's a lot of sensitivity about trying to export to Britain or France, or elsewhere in Europe, a nuisance that Germany won't tolerate. No matter what happens, I suspect we're going to find that there's just no way to replicate that low-level. And that's going to impact our readiness."

Operation Desert Shield not only has reaffirmed the Air Force's conviction that its pilots must be ready on a moment's notice to fly and fight, but it also has underscored anew the importance of "large-package," force-on-force training.

In the early weeks of the deployment, say Air Force officials, the various air forces in the US-led coalition flew individually. With a few months in which to work, however, the air forces have begun a building-block approach to forming a joint, multinational strike force under the primary direction of Central Command, Air Force. This type of cooperation is viewed as the shape of things to come.

No New Fighter Center

Again, however, signs are not good. Since 1980, NATO military officials have pushed hard for the NATO Tactical Fighter Center (NTFC), which would serve as just such a large-package training site for multinational forces.

Certainly the need is not in dispute. NATO experts note that in past exercises, Allied pilots frequently would misread signals as simple as holding up a single finger; some NATO pilots took that to mean that the gesturing pilot had only one minute of fuel in his tanks, while others read it as a sign indicating that one hundred pounds of fuel remained.

Following the effective dissolution of the Warsaw Pact last year, plans for the NTFC were jettisoned.

General Eide, however, noting the reduction of NATO exercises in recent years and the emphasis on fielding smaller, multinational forces, emphasizes that the need for the center has not disappeared.

On the contrary, "because we're going to have smaller numbers of forces in the future, those forces we do [have] will have to be more flexible, potent, and multifunctional," says General Eide. "And that's going to require a lot of very effective training."

Crow Valley Concerns

As disappointed as Air Force officials are about the scuttling of plans for the NTFC, they are far more concerned with the cloud over the Crow Valley training range in the Philippines.

Seven Cope Thunder exercises staged each year at the 44,000-acre Philippine range are seen as the pinnacle of training in large force engagements. Pilots must coordinate a strike with a full-up mission package against a well-defended target. An F-16 pilot, for instance, not only has to hit his rendezvous with a KC-10 refueler and get off the boom on time, but he also has to take direction from AWACS command-and-control aircraft directing the strike. The F-15s flying cover will have to be in place to deal with enemy "aggressor" aircraft in the area. Before the F-16 pilot runs the gauntlet of ground-based antiaircraft batteries, he has to make sure that F-4G radar-suppression aircraft have done their jobs. He has to go in amidst electronic jamming, hit his target at a precise time, and get out.

If Crow Valley closes, the Air Force will have few places, other than the Nellis range, where it can hold this type of training.

American access to all Philippine bases, however, is governed by an agreement that expires this year. Negotiations for future basing rights had been complicated by growing Philippine nationalism and resentment toward the US military presence.

Nevertheless, Air Force training experts were clearly taken aback by last year's announcement that the US Air Force would remove by the end of 1991 the last of its fighters permanently stationed in the Philippines.

"The Crow Valley range provides us with a training capability that we don't have anywhere else in that area of operations, so we would take that as a very serious loss," says one Air Force officer. "Does that mean we're going to throw up our hands and proclaim that we can't train anymore? No. We're already looking for alternatives."

The loss of Crow Valley would prove all the more serious because the Cope Thunder exercises not only give US pilots across the vast Pacific Command a chance to get acquainted but also regularly feature visits by pilots of allied nations such as South Korea, Thailand, and Australia.

There have been reports that Washington and Manila are now discussing the concept of "privatizing" Crow Valley, or turning the range into a Philippine-run operation to which the Air Force would gain access as a paying customer. No one believes, however, that the Air Force can quickly or easily duplicate the quality of training at Crow Valley should it be put off-limits.

"You can only fight these political restrictions for so long, and then you find yourself in a position where it is no longer useful to do so," maintains Gen. Charles L. Donnelly, Jr., who commanded USAFE before he retired in 1987.

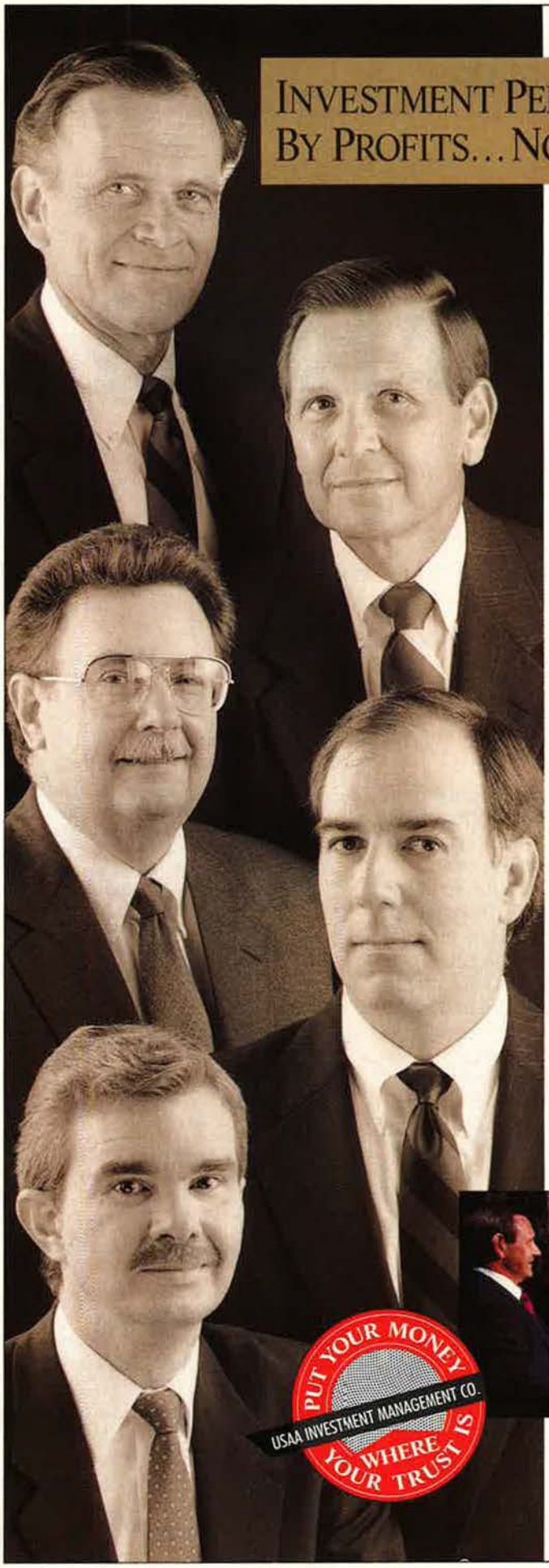
General Donnelly says that the Air Force is feeling some of the same political pressures in the US, where in recent years some low-level flight corridors have been closed, efforts to expand training ranges have been thwarted by citizen's groups, and military readiness and training accounts have been squeezed hard.

PACAF units have relied heavily on the Cope Thunder exercises, held seven times yearly at the endangered Crow Valley training range in the Philippines (above, an F-16 from the 8th TFW, Kunsan AB, South Korea, on a training flight).

Modern military aircraft are outgrowing training ranges at an alarming rate. The December 1988 report of the Commission on Base Realignment and Closure noted that a World War II fighter required an area only five miles in diameter in which to conduct training flights. With today's fighters, the diameter has grown to forty miles. The Advanced Tactical Fighter is expected to push that number to between eighty and 100 miles.

Rather than expanding to meet this greater operational radius, however, training areas worldwide are typically being whittled down by encroaching urbanization, increased commercial traffic, and more stringent noise and environmental restrictions. ■

James Kitfield is the defense correspondent in Washington for Government Executive *Magazine. For a decade, he covered the Pentagon for* Military Forum *Magazine. This is his first article for* Air Force *Magazine.*



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The Guard and Reserve face new pressures as they pick up more of the total force work load.

The On-Call Air Force

By Peter Grier

IN Panama, Operation Just Cause found Air Force Reserve units flying twenty-five percent of all airlift sorties. The Air National Guard's A-7 jets, meanwhile, flew 140 close air support missions against Panamanian ground units.

Just eight months later, at the start of Operation Desert Shield, thousands of Air Force Reservists and twenty-seven Guard units volunteered for active duty before the announcement of a Presidential call-up. They knew the deployment couldn't go on without them; they provide half of all US strategic airlift.

The Air Reserve Forces long ago shed the name "Weekend Warriors." In light of their Just Cause, Desert Shield, and other contributions, they might better be called "The On-Call Air Force."

From Panama to the Persian Gulf, from Grenada to domestic disaster and emergency operations, Air Force Reserve (AFRES) and Air National Guard (ANG) members have demonstrated that they are a key part of the Air Force for more than just a few days each month. Ever since the Pentagon in the early 1970s adopted its Total Force policy, part-time Air Force units have played a major and increasing role in virtually every operation.

Now, say officials, the role of the Guard and Reserve is destined to grow even larger. As lean budgets force a winnowing of the active Air Force, AFRES and ANG are sure to grow in absolute numbers and in the percentage of key Air Force missions that will fall to them.

On the latter score, reserve forces seem certain to take up a larger share of such missions as aerial refueling and airlift. Guard and Reserve units already provide more than half of the Air Force's communications and combat-engineering capabilities.

The pace of equipment modernization for ANG and AFRES will increase. They will enjoy an infusion of relatively new weapons, which will become available as active forces shrink.

Moreover, the reserve forces will see more unit rotations overseas, though Pentagon officials quickly add that the aircraft and personnel of the Guard and Reserve won't ever be able completely to replace forward-deployed active-duty units.

F-4Es like this one from the 301st Tactical Fighter Wing at Carswell AFB, Tex., will soon be a thing of the past; ANG and AFRES continue to phase out Vietnam-era aircraft. Modernization has boosted equipment commonality with the active-duty force to ninety-five percent. Here, pilot Lt. Col. Craig Ferguson and crew chief A1C Sean George prepare for a sortie.

Friends in High Places

A major reason that the future of part-time airpower looks bright is the attitude of Congress. Lawmakers are fans of reserve forces of all the services, which today number about 1.2 million. This sentiment stems from the dispersion of part-time units to many congressional districts, the US tradition of relying


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on a part-time militia, and—perhaps most important—the reduced cost of maintaining a reserve forces unit, only forty percent of its active-duty counterpart's cost.

For three years, Congress has rebuffed Bush Administration proposals to cut reserve forces' budgets. As approved by lawmakers, the 1991 spending plan contains funding for ANG and AFRES weapons and equipment totaling $2 billion—$1.4 billion more than the amount requested by the Pentagon.

Senate Armed Services Committee Chairman Sam Nunn (D-Ga.) speaks for many fellow senators with these words: "I believe that placing greater emphasis on our Reserve and National Guard forces should be a key element of our military strategy."

For some time to come, the biggest question will be whether ANG and AFRES will be able to find enough able personnel to fill out their units, inasmuch as the shrinkage of the active force will, over time, diminish the pool of potential Guardsmen and Reservists.

Today, ANG and AFRES are in fine shape. According to Air Force statistics, the average Air Reserve Forces flyer is thirty-five years old, has 9,700 flying hours to his credit (130 of them in combat), and serves all or part of 100 days per year. The average Air Reserve Forces maintainer is thirty-eight years old and has nineteen years in the service, sixteen of those in maintenance.

"The [currently high] readiness of the Air Reserve Forces is due to the fact that we've had, until now, a virtually limitless supply of pretrained people," says Maj. Gen. Roger P. Scheer, the recently retired head of AFRES. If the supply shrinks too much, he adds, the part-time forces may have to develop a larger, more elaborate, and more expensive training capacity.

That sentiment is echoed by Air Force Lt. Gen. John B. Conaway, chief of the National Guard Bureau: "We all need the active Air Force to maintain a certain size and stability."

In light of the severe downward trend of the defense budget, any part of the US military that just stays even can be said to be doing well. General Conaway sees such stability ahead for ANG. He predicts that, for the foreseeable future, ANG will stay about the size it is now—120,000 members under ninety-two major flags.

Domestic Emergencies

National Guard forces, unlike AFRES units, have a dual identity. State governors can call them up in emergencies such as riots or earthquakes.

It is a call that comes frequently. In 1989, a total of 14,500 Army and Air Guard personnel were called to deal with fifty-three natural disasters, four civil disorders, and 192 miscellaneous domestic emergencies.

ANG units assisted in the cleanup of the gigantic *Exxon Valdez* oil spill in Alaska, helped haul supplies to the victims of Hurricane Hugo, and provided emergency shelter and food for the victims of the San Francisco earthquake.

Under orders from Congress, the National Guard has become heavily involved in drug interdiction. Some days, more than 2,000 Army and Air Guardsmen are at work on drug surveillance and inspection duties. ANG aircraft used in antidrug work include RF-4C reconnaissance planes, C-130 transports, and KC-135 tankers.

With the total Air Force structure shrinking, ANG will begin to shoulder a large role in its missions, says General Conaway.

"We will be readjusted [to take up a larger portion of the work] in the fighter mission, the tanker mission, the airlift mission, and the reconnaissance role as the Air Force readjusts its size," says he.

The biggest increases probably will come in tankers and airlift, two roles already heavily dependent on the skills of part-time forces. Almost fifty percent of US theater airlift, for instance, now is in the Air Reserve Forces. The Guard alone accounts for thirty-four percent.

Smaller but nonetheless important changes will occur in the role of the ANG tactical fighter force. The Air Force may want to continue its current practice of keeping on active duty a full two-thirds of its fighter forces. However, says General Conaway, air defense of the continental US will be going 100 percent to ANG units.

General Scheer foresees more than stability for the Reserve. He notes that, with congressional budgets directing the Air Force to enhance the role of the Reserve, "it's quite evident the Reserve is going to take on a larger role in the future, both comparatively speaking and in real terms."

Air Force Selected Reserve has already seen rapid growth over the last eighteen years. Over that period, end strength jumped by sixty-five percent. AFRES officials are planning to increase the force by another 1,700 slots, to a total of 84,900.

—USAF photo by MSgt. Joe Davila

The rapid response entailed by Operation Desert Shield would have been impossible without the Guard and Reserve, who provide half of all US strategic airlift. The transfer of C-5 Galaxies, such as these, and C-141 StarLifters to the Reserve has greatly enhanced its airlift capability.

Like ANG, AFRES has become heavily involved in the mission of international drug interdiction. The 71st Special Operations Squadron provides helicopter transport, surveillance, and night vision goggle training to law enforcement personnel. AFRES intelligence specialists have helped the North American Aerospace Defense Command set up a counternarcotics tactical intelligence cell.

AFRES and ANG have 100 percent of the Pentagon's equipment for airborne fire fighting. Some AFRES missions are unique. For instance, AFRES accounts for 100 percent of the Pentagon's capability to carry out fixed-wing aerial spray operations.

AFRES accounts for sixty-nine percent of the Air Force's aeromedical evacuation crews and fifty-nine percent of the combat logistics support squadrons. In recent years, the transfer of C-141s and C-5s to the Reserve has greatly enhanced the capability of the half of US strategic airlift capability that has been entrusted to AFRES.

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ANG units, represented here by F-16s from the Montana ANG, have a dual identity, answering to state governors as well as being part of the total force. Legislation passed in 1990 to allow the President to call ANG and AFRES units into active duty for 360 days, rather than 180, facilitated ANG and AFRES participation in Desert Shield.

A Whole New Challenge

Theater airlift is one mission in which AFRES will get a boost. In fact, the ratio of active to Reserve might be so high that it could be worrisome.

"Anytime the reserve forces have all of any one mission," says General Scheer, one critical question becomes, "Where do you get your pretrained people from? That poses a whole new challenge."

There aren't likely to be any new Air Force Reserve flags. Any expansion in the size of the mission will probably be supported through "robusting," which means increasing the number of aircraft assigned to a unit that takes on additional responsibilities.

For example, most AFRES C-130 units have only eight airplanes and might be made more cost-effective if they were enlarged to twelve aircraft apiece. "If the Reserve should build, then robusting is the sensible way to do it," says General Scheer.

ANG increases likely will be handled in the same way. "Where we have got eighteen fighter aircraft in units," says General Conaway, "you will probably see twenty-four aircraft" in years to come.

Recent years have seen an increasing pace of modernization of part-time airpower forces. The phasing out of F-4 fighters and other Vietnam-era aircraft has boosted AFRES and ANG to ninety-five percent commonality with the active-duty force in terms of equipment. In addition, brand-new airlifters are entering part-time service. ANG received fourteen C-130s in 1989.

Another source of new or nearly new aircraft will be a process known as "cascading," which simply means passing fighters and other equipment from the active-duty force to Air Reserve Forces units. The process will speed the modernization pace. The few pockets of older airplanes still to be cleared out include a number of AFRES and ANG C-130Bs, AFRES AC-130A gunships, and the last handful of F-4 fighter units, scheduled for conversion to F-16s in Fiscal 1991.

Next, say officials, look for the Air Force to start upgrading the current generation of ANG and AFRES F-16As and F-16Bs. The problem of what to do about the rapidly aging C-141 force will also have to be addressed, and the shape of that final decision will depend on the outcome of the debate in Congress over the size of the new C-17 transport fleet.

Equipment shortages are most evident in nonaircraft equipment. AFRES continues to worry about getting enough defensive systems for its aircraft and is currently in the midst of an effort to outfit all C-130s with chaff/flare systems. AFRES F-16s have likewise begun to receive ALQ-131 ECM pods.

ANG is worried about obsolete combat and tactical control communications gear. Some forty percent of this equipment in ANG is of early 1960s vintage and suffers from a lack of interoperability with allied equipment.

The TRI-TAC (Tri-Service Tactical Communications) program is supposed to ease this problem, but budget cuts have slowed it considerably. There have also been delays in acquiring spares for the new ANG C-130s, a snag that an official ANG report says "has degraded our C-130 supportability posture."

Personnel Problems Coming?

Modernization no longer is the Guard and Reserve's main challenge. The problem that part-time force commanders worry about most, they say, is people—specifically, maintaining their training and manning levels in the face of a suddenly unstable active-duty force.

Both AFRES and ANG have long depended on building their forces around a core of pretrained Air Force professionals newly out of active-duty service, whether they be pilots or technicians. More than

Cutbacks in active-duty personnel are of real concern to ANG and AFRES commanders. If the active-duty forces shrink too much, where are the Guard and Reserve going to find the future pilots, maintainers, and technicians necessary to keep the currently high level of readiness?

eighty percent of AFRES personnel today, for example, have come directly from active duty. For the Air National Guard, the figure is about sixty-six percent.

Using dedicated slots in the Air Force system, ANG trains several hundred of its own pilots each year. Otherwise, everyone flying ANG planes would be a major or a colonel.

If the active-duty force shrinks too much, currently high readiness levels for peacetime forces might suffer, particularly as the Air Force extends the initial commitment of active pilots. "You can get the services so small that they can't support us," says ANG's General Conaway.

Commanders also worry about a general decline in the number of those willing to enter military service.

"If we have to increase our training load because of a lack of pretrained individuals, then we're going to have to figure out a way of training better, more efficiently," says General Scheer.

The cadre of full-time ANG and AFRES support personnel also needs attention. Since 1970, the full-time core of AFRES has declined from twenty-five percent to eighteen percent of total strength. In 1991, full-time ANG civilian technician end strength is scheduled to decline by 361, to 23,949.

Part-time force commanders have been urging Congress to raise existing ceilings on their full-time cadre. "Our full-time work force . . . finds itself increasingly stretched to meet the ever-expanding management requirements of our units, particularly with regard to readiness," says an AFRES planning document submitted to Congress.

Operation Desert Shield has also shown that some of the structural aspects of part-time air units may not be ideal. The peacetime Air Force Reserve duplicates the structure of the active Air Force, maintaining wings, squadrons, and other units.

When called into action, however, AFRES plugs into the existing active flag structure. That means that there is a great deal of staff duplication in the AFRES wings, and this may be a waste of effort, says General Scheer.

"Maybe there are better ways of running that," he says, implying that certain positions could be trimmed. "Not only would we cut down on our overhead costs that way, but we could be much more responsive to that man in the field when he needs something, because he wouldn't have to go to two or three organizations and seek their approval."

Inflexibilities

The unavoidable inflexibilities of service in ANG and AFRES make the complete substitution of part-time units for the active forces impossible. An ANG unit, for example, can't unplug from its location and move elsewhere, as active units will have to do in coming realignments. AFRES units are tied down by job and family commitments.

One inflexibility has been eased somewhat. In the Defense Appropriations legislation for Fiscal 1991, which began October 1, there is a provision that doubles to 360 days the duration for which the President can order reserve forces into active duty. This is a controversial move, even within Congress. It was done, however, to allay the concern of Pentagon officials about the preparedness of the reserve forces.

In Desert Shield, the Pentagon claimed that it waited to mobilize actual Reserve and Guard combat units because the old law would permit them to be called up for only 180 days, not long enough to provide the troops with refresher training, ship them to the Middle East, and deploy them for a reasonable period. So pro–reserve forces lawmakers managed to extend the legal period for which they can be called to active duty.

Desert Shield aside, overseas deployments for part-time forces will increase. The ANG's Regular Coronet Cove rotations to Panama might well serve as a model for similar rotations in other parts of the world.

That doesn't mean these trips will be easy to arrange. You can't just order an ANG F-16 pilot to Germany a few months hence. You have to ask him what time he might have available in the next year, based on his civilian job, for a training rotation.

With the drawdown of American forces in Europe, however, "there may be enough people who live overseas, Americans, that we could make reserve units of those folks over there," says General Scheer. "We may have to look at that." ■

Peter Grier is a Washington defense correspondent for the Christian Science Monitor. *His most recent article for* AIR FORCE *Magazine was "New Options for the Strategic Arsenal" in the October 1990 issue.*

Reviews

By Jeffrey P. Rhodes, Aeronautics Editor

Brute Force: Allied Strategy and Tactics in the Second World War, by John Ellis. Supported by a wealth of facts, figures, and firsthand accounts from participants on both sides, the author concludes that the Allies triumphed in World War II because of sheer numbers, not because of the strategy and tactics employed. He also claims that the ineptitude of Allied commanders needlessly prolonged the war. Looking at each theater in turn, he shows that Axis commanders greatly respected Allied airpower and artillery but marveled at how interservice rivalry, refusal to learn from experience, failure to heed intelligence reports, and lack of coordination hampered their counterparts. Viking Press, New York, N. Y., 1990. 643 pages with maps, abbreviation list, charts, notes, bibliography, and index. $29.95.

Eisenhower: A Centennial Life, by Michael R. Beschloss. In World War II, Dwight D. Eisenhower was viewed as a warrior who forged the great coalition. As President, he was often portrayed as an ineffectual leader of modest intelligence. Of this book's more than 200 photographs, most are previously unpublished, and they present the first visual revisionist account of the Eisenhower Presidency. The author criticizes other recent biographies for having given Eisenhower too much credit (his record on civil rights and McCarthyism) or not enough (his influence on George Bush). The last chapter looks at how one of the most powerful men in history has come to be considered almost irrelevant in later years. Edward Burlingame Books/HarperCollins Publishers, New York, N. Y., 1990. 253 pages with photos, notes, and index. $29.95.

Fighter General: The Life of Adolph Galland, by Col. Raymond J. Toliver and Trevor J. Constable. Adolph Galland was present at the formation of the secret Luftwaffe, at the outset of World War II he was a squadron commander, and he rose to command all German fighters. However, because he realized there was a huge difference between the bureaucratic way (Hermann Göring's way) of conducting operations and the right way, he ended the war as a squadron commander, albeit of the lone Luftwaffe Me-262 fighter unit. The text of this authorized biography of *Generalleutnant* Galland benefits from previously classified records and is illustrated with photos from the General's private collection. AMPress Publishers, Inc., Las Vegas, Nev., 1990. 355 pages with photos, glossary, appendix, and index. $27.50.

Jane's All the World's Aircraft 1990–91, edited by Mark Lambert, and *Jane's Radar and Electronic Warfare Systems 1990–91,* edited by Bernard Blake. The editorship has changed for the first time in thirty years, but the product is the same—Jane's eighty-first aircraft annual is still the aviation community's standard reference. As always, its major section contains the facts and figures on every aircraft now in production or under development. The second edition of *Radar and EW Systems* contains facts and figures on all types of radar, electronic countermeasures, elint, and comint systems, as well as radar and EW simulators and training devices. Both from Jane's Information Group, Surrey, England, and Alexandria, Va., 1990. 807 *(Aircraft)* and 587 *(Radar and EW)* pages with foreword, photos, illustrations, and index. $170 each.

LIFE: World War II, edited by Philip B. Kunhardt, Jr. *Life* Magazine was barely three years old when World War II began, but the oversize weekly became one of the principal wartime chroniclers of record for the general public. Organized by year, this book looks at the war on the battlefield as well as the home front. There is enough text to describe the action, but the more than 1,000 pictures are the primary means of telling the tale. The book is filled with classic photographs from Carl Mydans, Margaret Bourke-White, Robert Capa, and others, but many more are from *Life*'s archives and government sources on both sides and have never been published before. Numerous maps and chronologies are also included. Little, Brown and Co., New York, N. Y., 1990. 446 pages with photos, illustrations, charts, and index. $50.00.

The Military Quotation Book, edited by James Charlton, and *A Dictionary of Military Quotations,* by Trevor Boyle. The first book is a slim volume containing more than 600 observations on war, courage, combat, victory, and defeat. In addition to quoting soldiers and politicians, it also includes statements by professional writers and other observers of the human condition. The second book, originally published in England but recently printed in the US, groups the quotations in four sections—quotations by individuals (military commanders and statesmen), quotations about battles and wars, quotations about armies and soldiers, and statements on war and peace. *Military Quotation Book,* St. Martin's Press, New York, N. Y., 1990. 152 pages with illustrations and index. $12.95. *Dictionary of Quotations,* Simon & Schuster, New York, N. Y., 1990. 210 pages with indices. $35.00.

Yank: World War II From the Guys Who Brought You Victory, by Steve Kluger. Published between May 1942 and January 1946, *Yank* Magazine was written by, for, and about enlisted troops. Initially dismissed by top officers as a self-indulgent publication catering to homesick kids, the magazine became instantly and overwhelmingly popular. The author has collected the best of *Yank*—writing, art, and photography. These are eyewitness, mostly uncensored accounts of the war. The articles are primarily written by the troops, but there are also accounts from war correspondents. The impact of the words is augmented by GI drawings and "Sad Sack" cartoons drawn by Sgt. George Baker. St. Martin's Press, New York, N. Y., 1990. 356 pages with photos, artwork, contributors list, and bibliography. $25.00.

Other Titles of Note

F-14 Tomcat in Action, by Al Adcock, *P-61 Black Widow in Action,* by Larry Davis and Dave Menard, and *T-34 Mentor in Action,* by Lou Drendel. The careers of the Northrop P-61 and Beech T-34 are often overlooked, but these new titles in the "In Action" series give a good accounting. *F-14* is a completely revised edition of an earlier book. All titles from Squadron/Signal Publications, Carrollton, Tex., 1990. 50 pages each with photos and diagrams. $7.95 apiece.

Handbook on German Military Forces, by the US War Department. This massive volume is a reprint of a restricted document, a complete "smart book" on the *Wehrmacht* and the Luftwaffe. It details the administrative structure, field organization, tactics, weapons and other equipment, fortifications and defense systems, training, and uniforms and insignia of the Germans. Louisiana State University Press, Baton Rouge, La., 1990. 652 pages with photos, diagrams, charts, and index. $39.95.

Japanese Aircraft, 1910–1941, by Robert C. Mikesh and Shorzoe Abe. It is generally thought that Japan did not build any aircraft until just before World War II. In fact, nearly 400 types were built by five major companies and the government's Naval Air Arsenal during the prewar years. This book gives a complete history and technical description of each type. Naval Institute Press, Annapolis, Md., 1990. 293 pages with photos, appendices, bibliography, glossary, and index. $39.95. ■

The Air Guard is installing simulators in fourteen locations so F-15 and F-16 pilots can get more training, closer to home.

Backyard Training

By John Rhea

PRACTICE makes skilled fighter pilots, flyers able to perform missions under the most trying circumstances. That is the reason the Air National Guard is developing a new family of part-task trainers. If all goes as planned, ANG pilots soon will be able to spend more time honing air combat skills in simulators on the ground, thereby getting a greater payoff from scarce flying hours.

That's not all. Starting in mid-1991, these new trainers will be installed in the Guard's communities, rather than at distant training sites. This will reduce travel to remote Air Force bases for certain types of flying training. It will also ease the demands of ANG and active forces for time on expensive, booked-up, full-mission simulators.

As ANG officials tell it, the new trainers will be like a football team's weight room. Everybody knows he has to be in top shape when the whistle blows, but it's a lot easier to stay in shape if the training facilities are handy. The Guard intends to make the trainers handy indeed.

Fourteen of the systems will be installed around the country. The first is due to be provided in July to the 169th Tactical Fighter Group, McEntire ANGB, S. C., reports Maj. Brent W. Marler, the part-task trainer program manager at the National Guard Bureau in Washington. The last of the fourteen, he adds, is scheduled to be in place by early 1992. *[For specific locations, see box on p. 66.]*

The new part-task trainers come in two varieties, one to simulate the air-to-air mission of the F-15 and the other for the air-to-ground mission of the F-16. In this new stable of part-task trainers, the key word is *part*. They are not intended to teach basic flying skills, nor can they simulate an entire tactical mission.

The real function of these machines is to enable already skilled pilots to work on those parts of their missions with which they are not fully comfortable or satisfied. They can do this at their own pace and in ways that fit their schedules.

Cheaper and Safer

In recent years, there has been a trend throughout the military aviation community toward use of part-task trainers for specialized training *[see "The Fast-Moving World of*

Simulation," December 1988 issue, p. 75]. Doing it in this fashion is not only cheaper but also safer. How else, for example, would Air Force pilots practice airborne engine-restarts or dropping bombs?

Lt. Col. Scott Cain, a full-time ANG officer at McEntire ANGB, is eagerly awaiting his turn in the new trainer. He's an F-16 pilot who has logged more than 1,000 flying hours since 1983. Until now, however, he has had to travel south to Homestead AFB, Fla., twice each year just to put in two hours in Homestead's operational flight trainer (OFT).

Now Colonel Cain will have a trainer in his own "backyard," available twenty-four hours a day, seven days a week.

The difference between "flying" in the OFT and the part-task trainer, he says, is of the "apples and oranges" type. "The OFT is a multifunction simulator, but you can't get in by yourself," he reports. "The part-task trainer lets you do specific tasks, and you can get in any time you want."

This kind of training reinforces and enhances those skills that have already been learned, "like riding a bicycle" after not doing so for some time, according to Colonel Cain. "The average [ANG] pilot gets one or two sorties a week, but maybe he misses a couple weeks," he notes. "In air-to-ground [operations], you have to think ahead of the aircraft. You don't think switches, you think tactics."

ANG pilots—and those in the rest of the Air Force—have some limited-capability trainers today. However, the machines are too limited, according to Col. Jim Williford, chief of Requirements and Development at the National Guard Bureau. He is referring to the so-called cockpit familiarization trainer, which the Colonel says "is not fun" to use because it's a static device, and to an even more limited device called the egress trainer.

The technical problems with these devices, maintains Colonel Williford, are manifold: They don't provide dynamic training, don't give the student feedback on how he is progressing, and require an instructor pilot in order to operate.

Now, with the new part-task trainers in the wings, he hopes to be able to give every ANG squadron a key to the trainer room, where Guard pilots can practice alone at night, on weekends, or whenever they have time. This will be particularly helpful for many ANG pilots who are also commercial airline pilots, Colonel Cain adds.

Lt. Col. Scott Cain, a full-time ANG officer at McEntire ANGB, S. C., inspects an F-16 part-task trainer at the contractor's manufacturing site in Colorado. When McEntire gets its own PTTs, Guard pilots like Colonel Cain will no longer have to travel to Homestead AFB, Fla., for trainer time.

Flying Hours

Any plan to use ground-based simulators or trainers raises the inevitable and thorny question: Will it reduce flight hours?

Lt. Col. Patrick A. Caldwell, who is Colonel Williford's deputy, says that F-16 pilots today must fly five sorties per month, at an average 1.3 hours per sortie, just to meet minimum requirements for mission readiness. The idea isn't to replace those hours with time in a simulator, he adds, but to squeeze maximum value out of them.

"We have to optimize training," notes Colonel Williford. "We have to be more deliberate at first. . . . We have to be able to make mistakes at first." It's better to make those mistakes on the ground.

As part of this training, the new devices will be able to provide out-the-window digitized views with full, textured graphics of generic regions. The all-purpose desert, for example, is based on the features of a real stretch of California terrain that runs from Edwards AFB to the Pacific coast.

However, mountains and jungles are also included. This is done with what is known as digital terrain information data from the Defense Mapping Agency, which provides simulated natural and man-made features, including roads, rivers, runways, buildings, threats (such as surface-to-air missiles), and targets (such as tanks). These are the same kinds of databases used in the annual Red Flag exercises.

The pilots can also use the trainers to practice combat against simulated adversaries represented by skilled instructors acting as "red teams."

If these capabilities can be used for training, could they also be used for mission rehearsal?

This idea was raised by USAF Vice Chief of Staff Gen. John M. Loh, among others, who put it this way last year: "Can you imagine how valuable that [capability]

would have been on an operation like Desert One, back in 1980, if we could have rehearsed that mission several times through simulation on the ground beforehand?"

This kind of capability is not yet being installed in the new ANG trainers, says Colonel Williford, though there is no compelling reason against doing so. "It's not technically prohibitive," he says. "We just haven't looked at it."

However, the technology does appear to be adequate for future growth, according to Major Marler. He stresses that the trainers have been built entirely out of off-the-shelf hardware not built to military specifications. This was done to hold down costs.

of each trainer will run to about half a million dollars. CTA is providing the entire package, including installation and support of the system.

Handing Over the Key

It's like buying a new car, says Colonel Williford: "The contractor does a turnkey operation and says to us, 'Here's the key.'"

The trainers are named "CTA Eagle" and "CTA Falcon" (for training pilots of the F-15 and F-16, respectively). They are supposed to be detailed replicas of Eagle and Falcon cockpits, complete with instrument panel and flight controls. They are modeled on the 4950th Test Wing's Simulator for Air-to-Air Combat at Wright-Patterson AFB, Ohio.

ANG Units to Receive Part-Task Trainers

F-16s (Air-to-Ground)

113th TFW	Andrews AFB, Md.
127th TFW	Selfridge ANGB, Mich.
149th TFG	Kelly AFB, Tex.
169th TFG	McEntire ANGB, S. C.
174th TFW	Hancock Field, N. Y.
183d TFG	Capital Airport, Ill.
187th TFG	Dannelly Field, Montgomery, Ala.
188th TFG	Fort Smith Municipal Airport, Ark.

F-15s

102d FIW	Otis ANGB, Mass.
116th TFW	Dobbins AFB, Ga.
131st TFW	Lambert Field, St. Louis, Mo.
142d FIG	Portland IAP, Ore.
154th Comp. Group	Hickam AFB, Hawaii
159th TFG	NAS New Orleans, La.

The quality of the equipment, he adds, is adequate at least. In this regard, he maintains that the Silicon Graphics Iris image generator, which he calls "the heart of the system," is able to provide sophisticated textured graphics.

Under current plans, the fourteen trainers are being built by CTA Corp. (formerly, Computer Technology Associates) in Englewood, Colo., and Torrance, Calif. The company last fall received a $7 million contract, meaning that the cost

Each of the trainers has a dual glass cockpit that includes such features as head-up display (HUD), radars (APG-63 and APG-66), radar warning receiver, and engine instruments.

The pilot sitting in the trainer can perform high-angle-of-attack flight, stalls, stall recovery, and maximum instantaneous turn rates.

In addition, the trainers have the capability to provide dynamic visual representations of Soviet MiG-29, Su-27, and MiG-21 fighters and Tu-26 bombers. These can be run from an instructor operator station, thereby providing realistic exercises.

For all its undisputed value, this trainer procurement is not free of controversy. Two losing bidders, Loral Corp. and Perceptronics Corp., protested the award on the grounds that the CTA bid did not include all the necessary functions, including advanced graphics and supporting software.

Loral's Ohio-based simulation operation, which reportedly bid $6.1 million on the project, immediately protested the award to CTA and got a swift rejection from the National Guard Bureau. Perceptronics, a California firm, bid $7.4 million. It protested the award to the congressional watchdog General Accounting Office (GAO). The GAO currently is evaluating that protest and planned to issue a report on the matter by next month.

Perceptronics contends that CTA will need additional government funds to provide the necessary graphics, plus help from General Dynamics on the software. General Dynamics, which was a member of the Perceptronics team bidding for the trainer contract, is the prime contractor on the F-16 and therefore considered the most knowledgeable on the aircraft's software.

Staten Corbett, manager of Guard procurement, concedes that the total cost of the CTA contract can reach $10 million if all options are exercised, but he denies any impropriety in awarding additional funds to the company.

What makes this relatively small (by Defense Department standards) program so competitive? It is seen by the simulation and training industry as the forerunner to much larger programs in the future.

Tactical Air Command is considering the acquisition of up to fifty similar part-task trainers for its F-16s and up to thirty for its F-15s. Though by law this competition must be open to all comers, some observers maintain that CTA will have an advantage by virtue of its experience with the ANG program.

Regardless of how the GAO or the Air Force's top echelon rules on this particular matter, everyone agrees that the ANG needs this kind of training capability to perform its role within the total Air Force. ■

John Rhea is a free-lance writer who specializes in military technology issues and is a frequent contributor to Air Force *Magazine. His most recent article, "New Avionics for Aging Airplanes," appeared in the December 1990 issue.*

By **John L. Frisbee,** Contributing Editor

Always a Fighter Pilot

As a very young flight officer, Chuck Yeager showed the courage, skill, and determination that were to make him an aviation legend.

IN EVERY period of American aviation history there is one pilot who stands above the rest—Rickenbacker, Lindbergh, Doolittle. In our time, no doubt the pilot best known throughout the world is retired Brig. Gen. Charles E. Yeager. Everyone with an interest in aviation knows that Chuck Yeager was the first to break the sound barrier, flying with two broken ribs that he concealed from the brass. The story of that historic flight and of an Air Force career lived near the edge is told in his autobiography, *Yeager.*

For first exceeding the speed of sound, Captain Yeager was awarded the MacKay and Collier Trophies and a special Congressional Medal of Honor. The "Valor" series couldn't be complete without a story on this extraordinary blue-suit test pilot who always will be the epitome of the gung ho fighter jock.

Not so many know or remember that Chuck Yeager earned a place in this series as a twenty-one-year-old flight officer. On March 5, 1944, while Yeager was flying his eighth mission with one victory already confirmed, an FW-190 nailed his P-51, *Glamorous Glennis.* (All his planes, including the X-1, were named for his wife, who, he says, would have made "one hell of a pilot.") Bits and pieces flying around the cockpit left their mark; nevertheless, he bailed out and hid in the woods near Bordeaux in southwestern France until he made contact with the French underground. For nearly a week the underground hid him in a hayloft, where he narrowly escaped discovery by a German patrol.

After a two-night bicycle ride with a French doctor, Yeager was turned over to the Maquis, the armed French resistance, to wait for the snows in the 10,000-foot Pyrenees mountains to melt enough for an escape into Spain. Yeager worked with the Maquis as an explosives expert until he and other evaders were taken at night to a departure point near Lourdes. They were warned about heavy German patrols along the Spanish border and left to find their way through snow, rain, and often freezing temperatures that blanketed the mountain passes.

Chuck Yeager and a navigator named Patterson soon were far ahead of the others. After four days of climbing, battered by gale-force winds, they found an abandoned logger's cabin and collapsed in exhaustion. During the night a German patrol, suspecting escapees might be in the cabin, opened fire on it. Yeager went out a rear window, dragging the wounded Patterson, and slid down an icy flume into a creek. There he discovered that the unconscious navigator's lower leg was hanging by a tendon. Yeager cut the tendon with a pocket knife and bandaged the stump of Patterson's leg with a shirt.

The situation wasn't encouraging: Yeager was wet, cold, an unknown distance from the border, facing German patrols in between, and encumbered by an unconscious 180-pound companion who probably couldn't survive. Nevertheless, he wasn't about to abandon the wounded man. In pitch dark he started back up the mountain, dragging Patterson foot by foot through the snow, often slipping back down, then struggling on toward the top, gasping for breath in the thin air. How long he fought the mountain Chuck Yeager doesn't know. After periods of exhausted semiconsciousness, he saw the sky turn red in the east. They were at the summit. He could see a road far below—Spain at last.

Yeager left the still-unconscious Patterson at the side of the road where he was sure to be picked up, then pushed himself another twenty miles to the nearest village, where he was interned. Patterson was rescued by the police and taken to a hospital where he recovered. In mid-May, Yeager arrived at Leiston, sixty miles north of London, where the 357th Fighter Group was based.

Regulations prohibited an evadee from flying combat missions again for fear of his revealing, under torture, information on the French resistance if shot down again. Chuck Yeager, a very junior flight officer, fought that regulation all the way up to a meeting with General Eisenhower. Ike was so impressed with the young man that he got permission from Washington to send Yeager back to the wars. That was one of the General's best decisions. Chuck Yeager ended his tour in the 357th as a captain officially credited with eleven and a half victories, including five on one mission and one Me-262 jet. His stubborn determination to finish what he started as an evadee and combat pilot never weakened during his distinguished career as test pilot, commander, and—always—fighter pilot. ■

The Augustine Commission points to a leaner, meaner NASA.

A Crossroads in Space

By Richard H. Buenneke, Jr.

A NEW strategy unveiled recently by a Presidential commission could help the US space program overcome its midlife crisis. This overhaul could lead to a leaner, meaner National Aeronautics and Space Administration. It also could make the Air Force a valuable partner in a truly national space exploration program.

Since last summer, the Bush Administration has struggled to get the civilian space program back on track. Under a plan laid out December 10 by a blue-ribbon commission, the Air Force would team up with NASA to build a new, unmanned cargo booster to carry scientific probes and experiments. In addition, the new booster could carry a "personnel launch system," permitting a phaseout of the current shuttle fleet.

The current retooling effort goes back to July 1989, when President Bush gave a speech on the twentieth anniversary of the Apollo 11 mission. He called for deployment of a space station, a return to the moon, and human exploration of Mars. Later, President Bush said the first American should walk on Mars by 2019—the fiftieth anniversary of the first lunar landing.

Within the year, President Bush's space vision was in deep trouble. Cost estimates for Space Station Freedom soared to $35 billion and were projected to go higher once NASA and its contractors began construction. These cost estimates prompted Congress to cut NASA's space station request and to order a scale-back in the station's design. The cost estimates also led Congress to reject President Bush's $330 million request to start a moon-Mars initiative.

Budget problems on Capitol Hill were compounded by two embarrassing incidents last summer: the discovery of a faulty mirror on the Hubble Space Telescope and a four-month grounding of the shuttle fleet.

Nagging Doubts About NASA

NASA had promised that the Hubble's vision would be sharp enough to see to the far edge of the universe, but the telescope turned out to have a case of myopia once its shutter was opened. A panel of optics experts, led by retired Air Force

Chief of Staff Gen. Lew Allen, Jr. (now head of NASA's Jet Propulsion Laboratory in Pasadena, Calif.), concluded that the problem sprang from a simple error that should have been caught by NASA and its contractors. The Hubble's vision problems raised troubling questions about NASA's ability to manage large, complex projects.

Of even greater concern was the series of hydrogen leaks that grounded *Columbia* and *Atlantis* through the summer. In the wake of the 1986 *Challenger* disaster, no one questioned NASA's zeal for safety, but the stand-down raised nagging questions about the shuttle's ability to deploy and resupply a permanently manned space station.

By midsummer 1990, the controversy over NASA's goals and capabilities had reached the White House. Vice President Dan Quayle commissioned a four-month study of the entire civilian space program, selecting Martin Marietta Chairman Norman R. Augustine to lead a twelve-member panel of space experts.

The commission and its working groups visited every major NASA facility and heard from more than 350 scientists, engineers, and space experts. In December, the commission released a report that pulled no punches. "We believe America's civil space program is at a crossroads today," Mr. Augustine told reporters after the panel's conclusions were released. "We need to set out an integrated space plan that people can support."

If all of the recommendations are adopted, NASA will be transformed into an elite cadre of engineers and scientists who pursue innovative scientific experiments and develop systems that will extend the human presence into the solar system.

To recapture the spirit of the glory days of Apollo, the Augustine Commission said, NASA needs to free itself of the burden of running a temperamental shuttle fleet. Military and commercial payloads are now off the shuttle, but NASA relies on the winged boosters for most civilian missions.

The commission said the shuttle manifest should be scaled back to include only "missions requiring human presence." Panel members said it makes little sense to launch anything else on the shuttle. "In hindsight," the panel wrote, "it was inappropriate in the case of *Challenger* to risk the lives of seven astronauts and nearly one-fourth of NASA's launch assets to place in orbit a communications satellite."

Mr. Augustine said this shift could cut the number of shuttle launches to three or four flights per year. This rate could be sustained even if there were another shuttle accident—something Mr. Augustine warns could occur before the station is deployed.

Weaning NASA from the shuttle and scrapping plans for a complicated space station would help the agency concentrate on science and technology development. Emphasis should be placed first on unmanned space probes and experiments, said the panel.

A second major thrust would be "Mission to Planet Earth." This effort would seek to "bring space down to earth" by providing valuable information on global warming and other potential environmental threats.

As for the station, the commission recommended scaling it back and using it as a test-bed for human expeditions to the moon and Mars. Other parts of the station, such as manufacturing experiments in the nearly weightless environment of low-Earth orbit, would be given a lower priority.

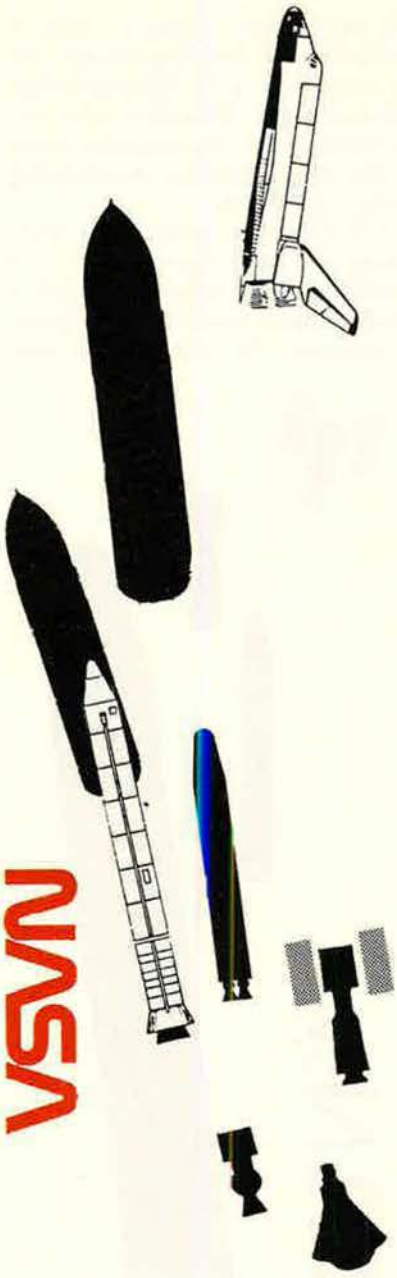
Humans vs. Robots

The commission's station recommendations were part of an effort to get the manned space program focused on a "Mission *from* Planet Earth." The panel endorsed the logic behind the President's moon-Mars initiative, rejecting the argument that robots can be just as effective as humans for operations at lunar bases or for expeditions to Mars.

"There is a difference between Hillary reaching the top of Everest and merely using a rocket to loft an instrument package on the summit," the panel said. "There is a difference between the now largely forgotten Soviet robotic moon explorer . . . and the exploits of Neil Armstrong, Buzz Aldrin, and Mike Collins."

Human exploration, said the commission, should be on a "go as you pay" basis, using a series of technological building blocks that are combined to fit shifting budget circumstances. If budgets were cut, the brunt of the cuts would be borne by the project without jeopardizing science programs.

If NASA is to develop the technology for such missions, Mr. Augustine and his colleagues said, it needs to make some major structural changes. The commission wor-



ries that the agency won't be able to compete with industry for the talent needed to build moon bases and Mars rockets.

"To work on the space program, you literally have to be a rocket scientist," Mr. Augustine said. "And when you try to think about the job of hiring and keeping rocket scientists and other talented individuals, under today's civil service rules . . . it does not give our committee a great deal of comfort."

Mr. Augustine said personnel regulations need to be changed to nurture and maintain the talent required for space programs. Other changes would make it easier for NASA to hire promising talent and to fire managers who don't perform.

As an alternative, the panel suggested that NASA's research and space centers could be converted into independent research organizations. Title to the Johnson Space Center in Houston, for example, could be transferred to a nonprofit organization, such as the University of Texas. The university would get NASA funding but would have a freer hand in personnel matters. This set-up is already used at one space laboratory: California Institute of Technology runs NASA's Jet Propulsion Laboratory.

Other sources of talent could be the Defense and Energy Departments' laboratories. Defense and Energy policymakers think space exploration projects would let weapons laboratories maintain their technical competence despite lean budgets.

The Augustine Commission made only passing references to potential military contributions. Its call for a new unmanned booster did suggest that the vehicle could combine shuttle hardware with engine technology from a joint DoD-NASA Advanced Launch System (ALS) program.

Because Martin Marietta holds contracts for ALS studies, shuttle fuel tanks, and Titan boosters, Mr. Augustine excused himself from deliberations on launch programs. His colleagues sought to avoid giving specific technical guidance to NASA and DoD.

Innovative Approaches

A more detailed plan for launch vehicle development could emerge from a study led by retired Air Force Lt. Gen. Thomas P. Stafford, a former Gemini and Apollo astronaut. In a presentation to the Augustine Commission, Lt. Gen. Donald L. Cromer, commander of Air Force Space Systems Division, said a DoD-wide study of relevant technology identified a number of intriguing possibilities. Construction practices developed by the Army Corps of Engineers could be adapted to construct bases on the lunar surface.

Components developed for the Air Force's Navstar Global Positioning System could be adapted to fly on spacecraft in orbits around the moon and Mars, said General Cromer. These constellations could help explorers navigate across the unfamiliar lunar or Martian surface and stay in touch with their home bases.

The biggest contribution could be the Air Force's work on a family of ALS boosters. Originally promoted as a producer of cargo vehicles for the Strategic Defense Initiative, the ALS program was later reoriented toward a wider range of applications.

Air Force and NASA engineers worked with industry to design a booster that was cheaper and more reliable. ALS engineers tried to come up with a booster that could be built by robots and maintained by a small pad crew.

Despite these advances, the ALS program was in deep trouble as recently as last fall. As the SDI program moved to the smaller "Brilliant Pebbles" concept, it no longer required a big launch vehicle. NASA also showed little enthusiasm for the program, preferring to lobby for more shuttles and a shuttle-derived cargo vehicle.

Even the Air Force began to back out of the ALS program. Although the service wanted a cheaper, more responsive booster, USAF also had to pay for fixes to the current fleet of ICBM-derived Titan rockets.

The ALS's fortunes may be on the rise once more. The White House has told the Air Force not to neglect the ALS project in future budget requests. This direction should please Congress, which slashed ALS budgets until it received from the Administration a firm commitment to the program.

NASA also will be able to provide funding for the ALS, which in its totality could cost $10 billion. The Augustine Commission says the space agency should close the shuttle line after delivery of *Endeavour, Challenger*'s replacement. Funds that would have gone to produce a sixth orbiter would go to a new unmanned booster. ■

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The Air Force and AFA recognize TSgt. Paul Woods, who excels at keeping airplanes in the air.

Crew Chief of the Year

By Amy D. Griswold, Editorial Assistant

—Photo by Paul Kennedy

For his performance with the 20th Aircraft Maintenance Unit, George AFB, Calif., TSgt. Paul J. Woods was named Outstanding Crew Chief of the Year. He accepted his award from AEF Vice President Thomas J. McKee (left) and AFA Board Chairman Jack C. Price (right) at the AFA National Convention last September.

As TSgt. Paul J. Woods tells it, "I just get up and go to work and do the best that I can do." His best is usually a lot better than that of others. As crew chief for a twenty-three-year-old F-4E fighter, #67-0266, Sergeant Woods recently achieved remarkable results. Between April 1989 and February 1990, the airplane racked up an 89.3 percent mission capable rate and an 88.7 fully mission capable rate.

Sergeant Woods's performance with the 20th Aircraft Maintenance Unit (AMU), 35th Aircraft Generation Squadron, at George AFB, Calif., led to his being named Outstanding Crew Chief of the Year in 1990 by the Air Force and the Air Force Association. The official nomination papers call him "the most dedicated professional in the 35th Tactical Fighter Wing."

During the period judged, Sergeant Woods's aircraft experienced only four ground aborts and zero air aborts, meaning the aircraft had an overall sortie abort rate of only 2.2 percent. This is far better than the TAC standard of 5.0 percent. In competition with twenty-four other aircraft in his unit, Sergeant Woods's F-4 was chosen High Flyer of the Month for July, October, and December 1989, and it was consistently one of the top five high flyers.

Shortly after earning this award, Sergeant Woods was transferred to RAF Lakenheath in Britain, where he now works on F-111s. During his tenure with the 20th AMU, however, Sergeant Woods demonstrated

his dedication again and again by cross-training into several other specialties. Under the Rivet Workforce program, he trained in the pneudraulics and engine specialties. In order to cut the time required to fix problems uncovered during engine bay inspections, he also took what is called "cross-utilization" training, learning the sheet-metal repair specialty. This extra training made him all the more valuable as a maintainer of his F-4.

—Staff photo by Guy Aceto

Sergeant Woods cross-trained into several other specialties, making him even more valuable as a maintainer of his twenty-three-year-old F-4E and placing him in high demand to work on aircraft whose problems "baffled other technicians." Above, maintainers work on an F-4E of the 35th TFW, George AFB, Calif.

Doing It All

When a postflight inspection of his fighter plane revealed an oil leak on the number two engine, Sergeant Woods traced the leak to a cracked engine oil tank. He led the engine removal team and not only replaced the cracked tank, but also replaced the starter and the constant-speed drive unit on the engine, washed the engine bay, and repaired all discrepancies in the bay. He easily passed the quality-assurance inspections on both the engine itself and the engine bay and, after leading the installation team, performed the max-power engine trim run himself.

Sergeant Woods's initiative and superior skills place him much in demand as a person qualified, in the words of his nomination, "to work the 'hard broke' aircraft [that] have baffled other technicians." Several incidents show why.

- An "afterburner no-light" problem had grounded another F-4 for three days when Sergeant Woods was called in to help troubleshoot. The problem, impossible to detect by external inspection, was incorrect installation of the check valve on the afterburner fuel pump. After performing extensive research into the technical order and a trim-pad engine run, he was able to pinpoint the problem.
- Sergeant Woods replaced an oil line to the number one engine oil scavenge pump on an aircraft—a difficult task because the oil line was in an awkward location. This made it unnecessary to remove the engine to get at the faulty oil line and saved the time and effort that engine removal entails.
- Sergeant Woods replaced a constant-speed drive and generator unit on another aircraft because of an intermittent problem that could not be duplicated on the ground. After replacing it, he took the old unit back to the shop. When his examination revealed that the generator unit was not the source of the problem, he and other technicians went back to the plane and were able to pinpoint a short circuit in the wire bundle behind the forward missile well. Sergeant Woods's follow-up prevented an unfixed aircraft from being returned to the flight line.
- One aircraft developed an air leak in its basic pneumatic system before a routine morning flight. Sergeant Woods was able to trace the problem and, in less than two hours, replace the leaking valve on the emergency landing gear selector. This enabled the landing gear to pass an operational checkout in time for the plane to make its afternoon sortie.

Because of Sergeant Woods's "consistently outstanding performance," his superiors selected him to deploy with his AMU to Maple Flag '89 at CFB Cold Lake, Canada. Sergeant Woods's aircraft "performed superbly" in six consecutive Code One sorties and had a perfect weapons delivery score for its practice bombs, flares, and chaff.

Still Unequaled

During this training exercise, he again had the opportunity to demonstrate his engine-changing expertise when another aircraft developed an oil leak. Sergeant Woods, according to his nomination, "supervised the engine roll-back, changed the tank pressure relief valve, and returned the aircraft to fully mission capable status in under fifty-six hours." In the words of the nomination, it was "an achievement unequaled to this day." In summing up his capabilities, the nomination noted, "Rarely does an individual of such junior rank and brief tenure so clearly rise head and shoulders above his contemporaries."

It's an accomplishment others have noticed. In fact, Sergeant Woods's excellent performance has been recognized many times in his brief career. He was the 35th Tactical Training Wing's 1988 Maintenance Professional of the Year and Distinguished Graduate of Class 89-1 of the Noncommissioned Officer Leadership School. He frequently receives written accolades from aircrews. They praise his "superb aircraft preparation, launch, and recovery techniques."

In addition to his professional duties, Sergeant Woods has found time while off duty to earn his airframe and powerplant license, to get an Associate's Degree in Aircraft Technology in January 1987, and to work toward a bachelor's degree in Professional Aeronautics from Embry-Riddle Aeronautical University, where he has maintained a 3.8 grade point average. ■

The nationality of the "honcho" pilots is no longer a mystery. The Soviets now admit their part in the Korean War.

The Russians in MiG Alley

By Steven J. Zaloga

For some forty years, suspicions have lingered about the nationality of certain pilots who flew MiG-15s in the Korean War. China long ago confessed the role of its pilots. There also were reports, never confirmed, that the best Communist pilots were in fact from the Soviet Union.

Soviet veterans finally have begun to acknowledge their participation in Korean dogfights, confirming the identity of the mystery pilots who, to Air Force flyers, were known only as "honchos." Soviet involvement in the Korean War is no longer a state secret; since 1989, the truth has poured forth.

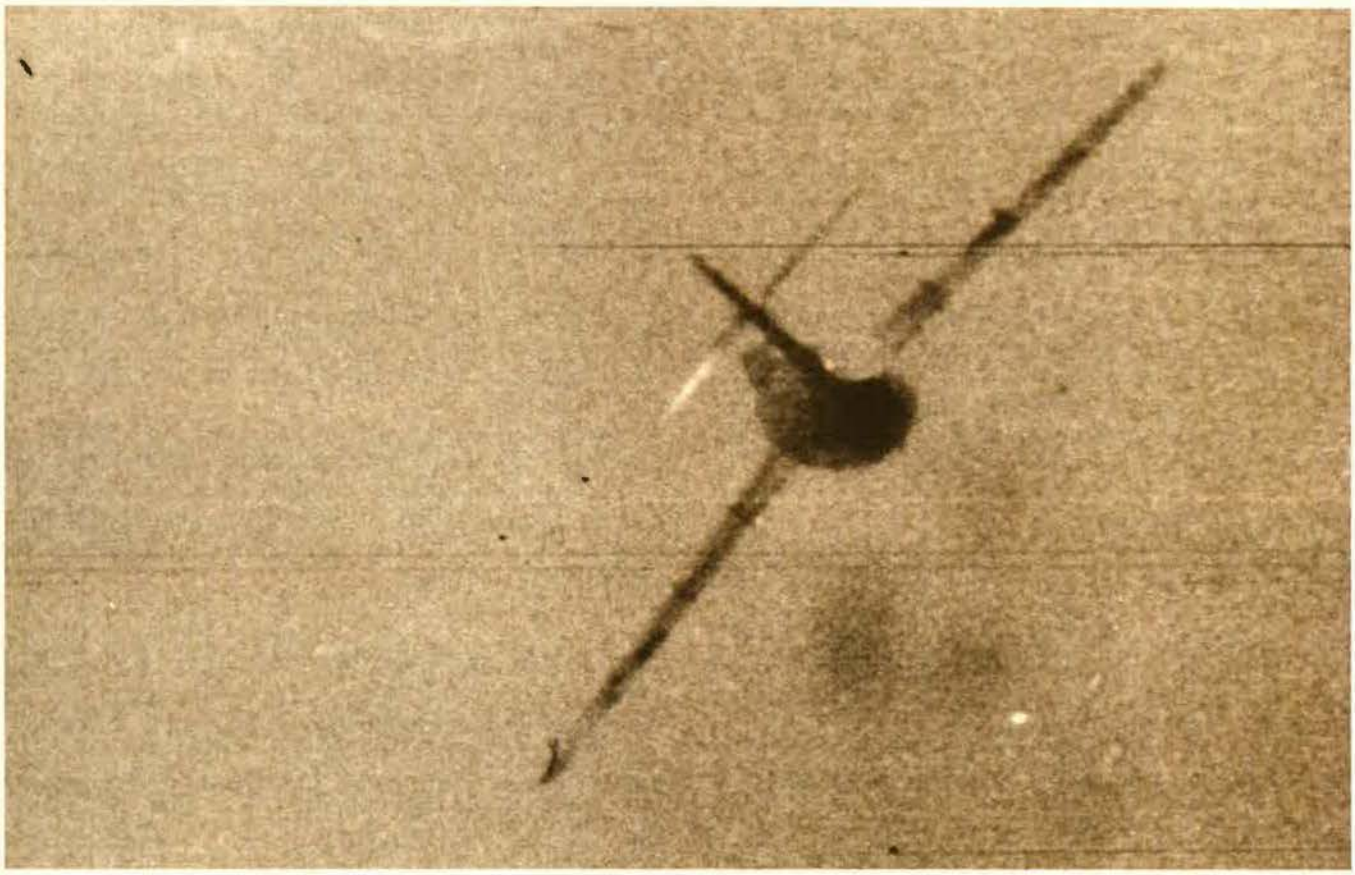
Revelations in the Soviet press make it clear that Soviet participation in the war was far more extensive than anyone had imagined. Until now, the assumption was that individual Soviet "volunteer" pilots took part. The new information establishes that Soviet pilots were involved in a large fraction of all MiG-15 battles against US fighters.

The small North Korean Air Force used in the June 1950 invasion had no jets. Its tactical airpower came from a regiment of seventy-eight Yak-9U piston-engine fighters and a regiment of seventy Il-10 piston-engine attack planes. Flown by inexperienced pilots, these planes were quickly decimated by US aircraft.

The United Nations force's successful repulse of North Korean forces led to consultations between Beijing and Moscow over future plans to aid Pyongyang. On October 1, North Korean Dictator Kim Il Sung urged China's Mao Zedong to throw the weight of the Chinese Army into the war. Mao agreed and sought Soviet aid.

For Joseph Stalin, however, the vigor of the US re-

The capabilities of the MiG-15s in Korea, like this one photographed by the gun camera of an F-86, came as something of a shock to American aircrews. Another surprise was the aggressive tactics employed by the "Communist Volunteer" pilots, who, it is being revealed now, were Soviets, some of them aces from World War II.



sponse to the invasion came as an unpleasant surprise. He had once promised Mao that the USSR would handle the air war. By October 10, he had reconsidered. As recent Soviet accounts reveal, he was fearful of US strategic airpower and wished to avoid giving a pretext for a nuclear attack on Russia. Indeed, Stalin ordered Soviet advisors to leave North Korean divisions for fear some might be captured and reveal Soviet complicity.

Stalin therefore reneged on his pledge, but he offered to give China more MiG-15s and to provide limited direct air support. As a first step, Moscow deployed several regiments of new MiG-15s to the Far East. Soviet air units did go into combat, but because most of the recent Soviet revelations about this activity come from pilots rather than military leaders, we still know little about high-level planning for this intervention. It seems likely that Stalin thought the presence of Soviet aircrews could be kept secret.

The First MiG-15s Arrive

The first combat patrols of the fighters in the Korean theater came in November. For American aircrews, arrival of the sleek new MiG-15 was a shock. That was true even though MiG-15s had been in action in the Far East months earlier. In April 1950, they first appeared over Shanghai, thwarting a Nationalist Chinese bomb campaign. They were flown by Soviet pilots. The fighting over Shanghai was not widely reported. Intelligence failed to note the presence of MiGs.

Air units selected for Korean deployment did not come primarily from Frontal Aviation, the tactical arm of the regular Soviet Air Forces. Rather, most came from interceptor regiments of the Air Defense Forces, or PVO, which was then on its way to becoming a separate service branch.

Until 1950, no MiG-15 interceptor regiments were stationed in the Far East. They were concentrated in the Moscow Air Defense District to protect the capital against US bomber attack. As a result, the squadrons earmarked for Korea were drawn from elite units. The first large Soviet aviation unit sent to Korea was an air defense interceptor division commanded by Col. Ivan Kozhedub, who, with sixty-two victories, was the top Soviet ace of World War II. Due to the pilot's celebrity status, Stalin personally ordered Colonel Kozhedub not to fly combat missions. The division's lead elements left Moscow in mid-November. At that time, a MiG-15 interceptor regiment numbered thirty-five to forty aircraft, and a division usually included three regiments.

Soviet MiG-15 regiments were based on Chinese fields in Manchuria. Many Soviet regiments underwent preliminary training at Soviet bases in the neighboring Maritime Military District.

The first USAF contact with MiG-15s occurred in November 1950. Soviet pilots showed scant interest in pushing their attacks, but Air Force pilots unexpectedly found themselves facing a formidable opponent. The MiG-15 was technologically superior to US F-80 and F-84 jet fighters, and it had a few advantages over the newer F-86, especially at higher altitudes.

In the war's first winter, however, the MiG-15 units failed to have a decisive impact on the air conflict. This was largely due to the inexperience of Soviet pilots, who only recently had converted from La-11 propeller-driv-

en fighters to jet aircraft. A US F-86 Sabre pilot scored the first kill of a MiG-15 on December 17, 1950. Five days later, on December 22, in an engagement that saw six MiGs destroyed, an F-86 Sabre became the first US aircraft to be shot down by a MiG-15.

At about the same time, China committed the Chinese People's Volunteer Air Force (CPVAF) to the Korean battle, eventually sending two of its new MiG-15 fighter divisions. The first Chinese combat patrols went out on December 26.

The bulk of Colonel Kozhedub's fighter division began moving to air bases along the Yalu River in March 1951. Soviet regiments shared facilities with Chinese regiments at Antung, Tungfeng, and Myau-Gou. The largest Chinese facility, at Antung, had a division of Chinese MiG-15s deployed there by March 1951.

Deterring the Bombers

The primary goal of the Soviet regiments was to deter Air Force B-29 bombing missions against targets in North Korea. The Chinese Air Force had different plans; it hoped to win sufficient control of the air to permit bomber and attack regiments of the CPVAF to conduct close air support missions for Chinese ground forces during its spring 1951 offensive.

The first large-scale dogfights between Soviet and US units took place in April 1951. Soviet and Chinese MiG-15s were marked with North Korean insignia. Soviet pilots even wore North Korean uniforms. Radio contact between Soviet pilots was supposed to be conducted in Korean. It was a language that few, if any, Russian and Ukrainian pilots understood. As a result, Soviet pilots took with them a small tablet with a list of common messages. Korean statements were spelled out phonetically in Cyrillic letters.

Sgt. Robert Spenard (left) and Pfc. Harry Ruch, two B-29 gunners, examine the damage to their bomber, which destroyed three MiGs despite its wounds. The MiGs exacted such a toll, however, that daylight B-29 raids were suspended, and the Superforts were restricted to night bombing using the Shoran system.

Not surprisingly, these efforts to camouflage the nationality of the Soviet pilots proved impractical in the melee of air combat, and the rules gradually were relaxed. In the war's later years, Soviet MiG-15s often flew with Soviet insignia. Throughout the war, however, Soviet pilots operated under certain restrictions designed to reduce their chances of being captured by UN forces.

For example, Soviet regiments were ordered to stay over Communist-controlled areas and were forbidden to fly over the Yellow Sea. In May 1951, Lt. Yevgeny Stelmakh was shot down during an attack on B-29 bombers. He safely ejected but landed in UN-controlled territory. He committed suicide with his pistol rather than face certain capture.

Soviet pilots soon made their presence felt. Their increasingly aggressive tactics exacted a toll on the aging B-29s. Colonel Kozhedub's regiments were first used en masse to stop the April 12, 1951, B-29 raid on the Sinuiju bridge. Three B-29s were shot down, the heaviest US losses up to that time.

The more numerous Chinese MiG-15 pilots were still too inexperienced to present much of a threat to the American escort fighters. However, a May 1951 meeting between Soviet and Chinese air force commanders at the Supreme Joint Headquarters in Mukden, Manchuria, led to the decision to form an "International Communist Volunteer Air Force" to help the CPVAF secure air superiority over the Yalu River area. In fact, the new force was neither international nor volunteer and marked a heavier commitment of Soviet aircrews.

Under the command of Gen. Georgi Lobov, a Soviet World War II fighter ace, the Soviet 64th Air Defense Corps was deployed to China in the spring of 1951 to bolster attempts to wrest control of the air from the US Air Force. The corps not only coordinated the increasing number of Soviet fighter divisions on the Yalu, but also controlled a growing number of Soviet ground air defense troops, who manned new air-surveillance radar installations, radar-directed gun units, and ground control intercept stations.

According to recent Soviet accounts, some 70,000 Soviet PVO troops served along the Yalu during the Korean War, many in these ground air defense positions.

Dogfights in MiG Alley

The air divisions of the new 64th Air Defense Corps burst onto the scene in June 1951 in a series of large-scale dogfights with F-86 Sabres over MiG Alley. Because the nationality of these new and unexpectedly tough pilots was far from certain, US Sabre pilots dubbed them "honchos," from Japanese for "squad leader" or "boss."

Far East Air Force (FEAF) intelligence soon reported that "more proficient pilots have recently been committed in Korea." The growing aggressiveness of the MiG-15 pilots forced FEAF's Bomber Command to curtail B-29 raids in the MiG Alley area of northwest Korea unless accompanied by fighter escort. MiG-15s also began systematic attacks on jet fighter-bombers, thereby impeding the railway interdiction campaign then under way. The outnumbered F-86 Sabre pilots continued to exact an unequal toll against the MiG-15s, but they could not prevent heavy B-29 losses during daylight.

By September 1951, with some 525 MiG-15s in the

A damaged MiG-15 tries to head north to the sanctuary of its Manchurian base. Soviet pilots attempted to maintain the fiction that the USSR was not directly involved in Korea, flying only over Communist-held territory and attempting to speak Korean when making radio contact.

Yalu area, Soviet and Chinese leaders were confident enough to begin planning the deployment of Chinese and new North Korean MiG-15 regiments into North Korea itself, outside Chinese sanctuaries.

The dogfights that occurred in the fall of 1951 highlighted the disparity of skills between the Chinese and Soviet pilots. In one year, China's Air Force had expanded from virtually nothing to one of the world's largest air arms, with more than 1,000 combat planes. The Chinese candidly admit that their pilots in Korea were poorly prepared but felt that the operations were a necessary learning experience. Soviet pilots were, on average, more experienced than their Chinese counterparts but not as well trained as their US foes. Many were veterans of World War II, but it appears that only a handful of wartime aces went to Korea.

Like China, the USSR used the conflict as a training ground for airmen, rotating no fewer than twelve divisions through Korea during the war. A Polish MiG-15 pilot who defected in 1953 said that many of his Russian instructors had served in Korea.

The Soviets made vigorous efforts to maintain technological superiority over the F-86 Sabres. By 1951, USAF pilots began to see the MiG-15bis, with its more powerful VK-1 engine. In the summer of 1951 an improved MiG-15bis, with better guns, went into service.

By the winter of 1951, Fifth Air Force concluded that large numbers of MiG-15s on the Yalu, and their increasing proficiency, posed an unacceptable risk to daylight B-29 missions. There were simply not enough F-86 Sabres to provide escort. As a result, the B-29s shifted to night missions using Shoran bombing systems.

The Soviet 64th Air Defense Corps attempted to counter this tactic by dispatching two night fighter regiments to Korea. One regiment, commanded by Maj. Anatoly Karelin, was originally equipped with Lavochkin La-11 piston-engine fighters. The Soviets had no suitable radar-equipped night fighter in 1952, so the Karelin unit was trained to operate in conjunction with radar-directed searchlights. The regiment soon shifted to MiG-15s, and Major Karelin, with nine victories, became the top nighttime ace.

A Change in Soviet Attitudes

By 1952, Chinese and North Korean regiments were taking over much of the air war. The Yalu air bases were home to two Soviet PVO divisions, two Chinese divisions (with reinforcements nearby), and one North Korean division. A change in Soviet attitudes toward the war is evident in the refusal of the Soviet military leadership to dispatch newer MiG-17 fighters to Korea in 1952–53. By 1952, improvements to the F-86 Sabre largely negated the technical advantages the MiG-15bis had enjoyed. The technological balance could have shifted back to the Soviet pilots with the MiG-17, but the Kremlin continued to refuse to send them. Only in the final weeks of the war did Moscow relent.

Then, in April 1953, came Operation Moolah, in which the UN Command offered a cash bounty to defecting MiG pilots. The USSR jammed Russian-language radio broadcasts of the offer, but B-29s pamphleted several Soviet regiments. Moscow does not admit that the project succeeded. After May 1953, however, the quality of MiG-15 pilots over Korea dropped markedly. There is every reason to believe that Soviet pilots stopped flying combat missions altogether.

Soviet accounts claim that by the end of the war, their forces had shot down no fewer than 1,200 US aircraft. Colonel Kozhedub's division alone claimed 258. China, rather modestly, claimed only eighty-five kills. Soviet claims are grossly exaggerated and reflect a tendency to accept claims without verification. The US Air Force acknowledged only 139 air-to-air losses—121 fighters and eighteen bombers. Sabre pilots claimed 792 MiG-15s.

The highest ranking Soviet ace of the conflict was Col. Yevgeny Pepelyayev, a regimental commander in Colonel Kozhedub's division who claimed twenty-three victories. The second highest was the corps commander, General Lobov, with fourteen.

The number of Soviet aces is not known. This writer has been able to identify twenty-one pilots awarded the highest military decoration, "Hero of the Soviet Union." Only two of the decorations were awarded posthumously. Usually the USSR decorates living pilots only if they are aces. At least two other pilots made five or more kills, but these pilots did not receive the Hero of the Soviet Union award. Given these facts, the list of purported aces may number more than twenty.

Intelligence accounts at the time recognized the presence of Soviet pilots but not of major regiment- or division-sized units. It is possible that such transfers were detected and that the intelligence remains classified today. In any event, recent Soviet articles resolve the long-standing mystery of the origins of the "honcho" pilots of the Korean air war. ■

Steven J. Zaloga writes frequently about the Soviet military and is the author of several books. This is his first article for AIR FORCE *Magazine.*

In many ways, the First Aero Squadron experience was a disaster, but it was also a turning point in military aviation.

In Pursuit of Pancho Villa

By C. V. Glines

WITH a force of more than 1,000 mounted Mexican gunmen, Francisco "Pancho" Villa on March 9, 1916, raided Columbus, N. M., and other US settlements on the international border. Sixteen Americans died. US cavalry chased Villa across the border but could not apprehend him.

In Washington, Secretary of War Newton D. Baker immediately ordered Brig. Gen. John J. Pershing, then stationed in El Paso, to pursue and capture Villa.

The Army Signal Corps First Aero Squadron, based at Fort Sam Houston, Tex., and under command of Capt. Benjamin D. Foulois, was assigned to Pershing's "punitive expedition." The squadron had eight old, low-powered Curtiss JN-3 Jennies, unsuitable for flying more than fifty miles from base.

Ground equipment consisted of ten trucks, an automobile, and a few spare parts. In addition to Captain Foulois, there were nine pilots, eighty-two enlisted men, a civilian mechanic, and two enlisted medical corpsmen.

Captain Foulois's unit reached Columbus on March 15. The next day, Capt. Townsend F. Dodd and Captain Foulois made a first reconnaissance flight into Mexico. On March 19, the squadron was ordered to proceed to Casas Grandes, Mexico, 125 miles south of the border. High winds, lack of navigational equipment, poor maps, inadequate maintenance, and mountainous terrain took their toll. Planes were scattered across the area. It took a week to round up all pilots and planes. Two planes were destroyed, but their four airmen survived with only minor injuries.

Captain Foulois and Captain Dodd made another flight, this one intended to establish communications with US troops. Over the next three weeks, the squadron was unable even to get a glimpse of Villa or his revolutionaries. The pilots couldn't coax the Jennies high enough to reconnoiter the mountain areas where Villa's troops were hiding.

The dry climate warped the planes' propellers. Blowing sand wrought havoc with the engines. By the end of the first month of operations, the squadron found its remaining six aircraft in questionable condition to conduct military operations.

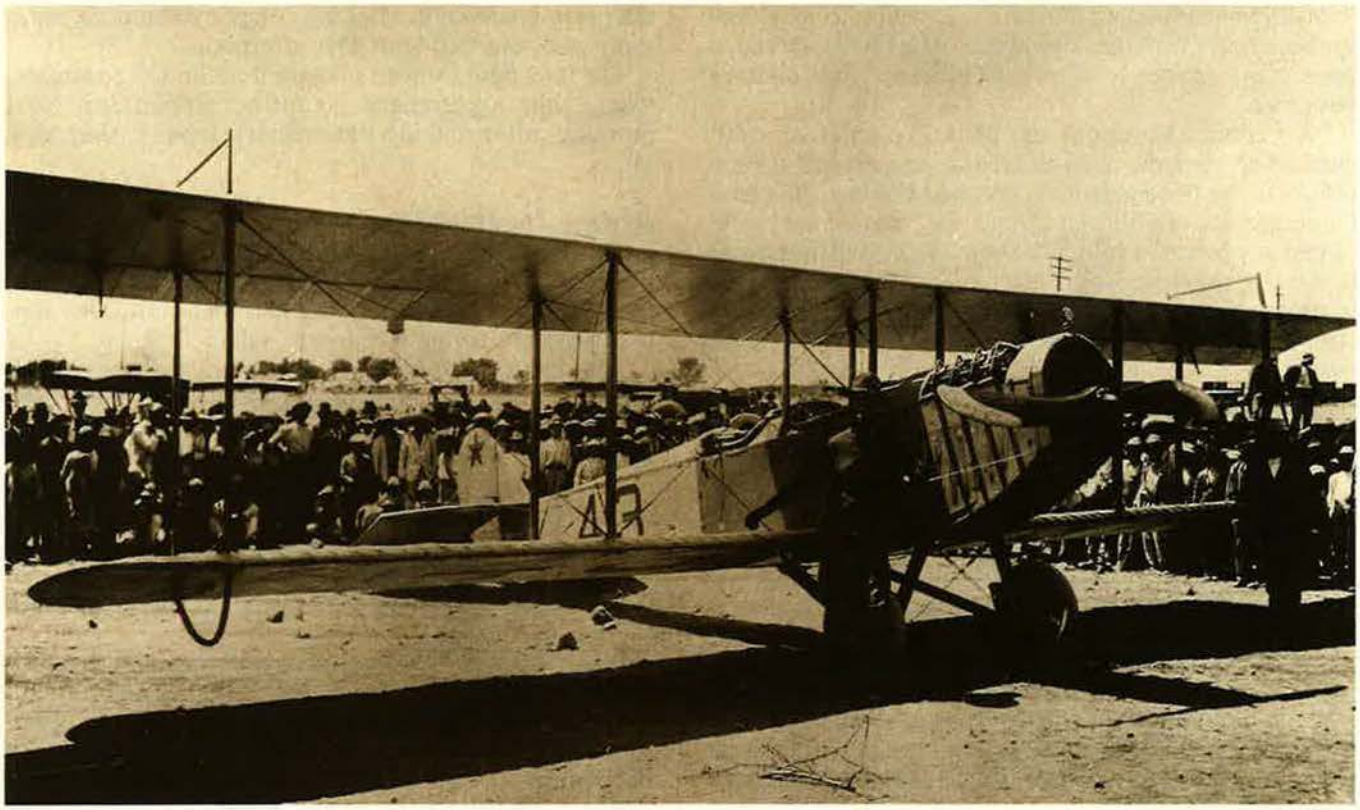
Pleading for New Planes

Several missions could not be completed due to poor weather, maintenance problems, or the planes' inadequacies. In a memorandum to General Pershing, Captain Foulois said the Jennies "were not capable of meeting the present military service conditions" and pleaded for "at least ten of the highest-powered, highest-climbing, and best weight-carrying aeroplanes" that the government could provide.

"I knew I was optimistic in thinking I would get the planes I wanted," Captain Foulois said in his memoirs, "but I was duty-bound to ask for them. In the meantime, we would do what we could within the limitations of our equipment."

Captain Foulois had only one course of action: to use the remaining planes to carry mail and dispatches between various US ground units until the planes were no longer flyable. A number of reconnaissance, photo, and mail flights were made from several locations.

One frustrating condition of the Mexican campaign was the refusal of the government of Gen. Venustiano



Just outside of Chihuahua City, Mexico, an angry mob threatened Lt. Herbert A. Dargue and his airplane as he waited alone for reinforcements. While he was taking off, rocks thrown by the crowd caused such damage that he was forced to land. He kept the photographer posing him as long as possible to avoid further violence.

Carranza to let the US troops use Mexico's railroads for transport of men and supplies. On top of that, Carranza's forces, whom the Americans thought they were helping by chasing Villa, were openly hostile.

"When the supply shortage began to get critical," Captain Foulois recalled, "I was asked to fly to the city of Chihuahua to contact the American consul there to see what could be done about getting critically needed medicine and food items. The town was held by the allegedly friendly forces of Carranza, but I was suspicious. The reports I had seen from the various commanders trying to locate Villa did not indicate any friendship, because they had been fired upon by Carranzistas."

Captain Foulois decided to send two planes with pilots and observers and duplicate messages. One plane was to land north of the city and the other on the south side. The observers were to walk into the city from opposite directions while the pilots would protect their machines and, if necessary, fly them out to prevent damage or capture.

On April 7, Captain Foulois and Lt. Herbert A. Dargue took off from San Geronimo in one plane, while Captain Dodd and Lt. Joe Carberry departed in another. Captain Dodd and Lieutenant Carberry landed without incident on the north side. Captain Dodd commandeered a carriage and drove directly to the consulate. The consul, Marion H. Letcher, contacted a few merchants. Supplies were purchased, and arrangements were made to have them shipped by train later that day.

Captain Foulois was not so lucky. "A number of townspeople had seen us circling south of the city and came running toward the field we selected," Captain Foulois said. "Four Mexican *rurales* waved rifles at us excitedly when we landed. When Lieutenant Dargue got the plane stopped, I got out and yelled to him to take off immediately to join Lieutenant Carberry north of town and that I would meet him there later."

Facing Winchester Rifles

"I immediately started walking briskly toward the city and tried to ignore the group shouting and shaking their fists at the departing plane. Four shots were fired but Lieutenant Dargue got away. I shouted at the crowd to divert their attention. The *rurales* wheeled and leveled their rifles at me. I was defenseless except for a Colt .45, which was no match for four Winchester rifles. There was nothing I could do but put my hands up—and pray. I did both."

Captain Foulois was shoved and prodded toward the city jail. As the crowd pushed him along, he heard a voice shout in English: "Do you need any help, Captain?"

Captain Foulois replied, "Yes! Go get the American consul!"

"When we arrived at the jail," Captain Foulois recalled, "I was thrust through the doorway and into a cell. An iron door clanged shut behind me, and I became the first American aviator ever to become a prisoner of war."

Captain Dodd was having no such difficulties. While the supplies were being loaded on a train, Mr. Letcher took him to see the governor of Chihuahua, who turned out to be a former classmate of Dodd's from the University of Illinois.

Meanwhile, Captain Foulois was trying to negotiate for his release with the jail warden, who finally agreed to send a messenger to General Gutierrez, the military governor.

"A Colonel Miranda, the general's chief of staff, showed up, took me in custody, and we marched several blocks to the headquarters," recalled Foulois. "General Gutierrez was affable and agreed that I should not be detained any longer. I told him about the two planes north of the city and asked for guards to keep them from being harmed. Again he was agreeable. I asked if I might visit the planes to reassure my men, and we were soon on our way."

When Captain Foulois arrived at the field north of the city, only Lieutenant Dargue was there. He had joined Lieutenant Carberry, but his arrival had drawn a large crowd of Carranzistas who crowded menacingly around both machines. With cigarettes, they burned holes in the fabric. When Lieutenants Dargue and Carberry tried to stop them, the mob slashed at the cloth with knives and machetes. Boys began to swarm all over the planes, loosening nuts and turnbuckles.

The two pilots felt their only defense was to make a strategic retreat. They started their engines and taxied to take off. Lieutenant Carberry got off all right, but he dusted the mob so thoroughly with his propeller blast that the angry crowd chased after Lieutenant Dargue's plane, throwing rocks.

Lieutenant Dargue was just lifting off when the entire top section of the fuselage behind the cockpit flew off and struck the vertical stabilizer. He chopped the throttle and landed straight ahead.

When Captain Foulois arrived with the guards, Lieutenant Dargue was doing his best to hold off the angry mob with his wits, bare fists, and a loud voice. The guards took over and quieted the crowd. Lieutenant Carberry landed at a smelting company about six miles away and returned later that afternoon.

The four pilots stayed overnight at the US consulate, where they experienced no further difficulties. Next morning, after making rudimentary repairs, they took off.

Military Theater of the Absurd

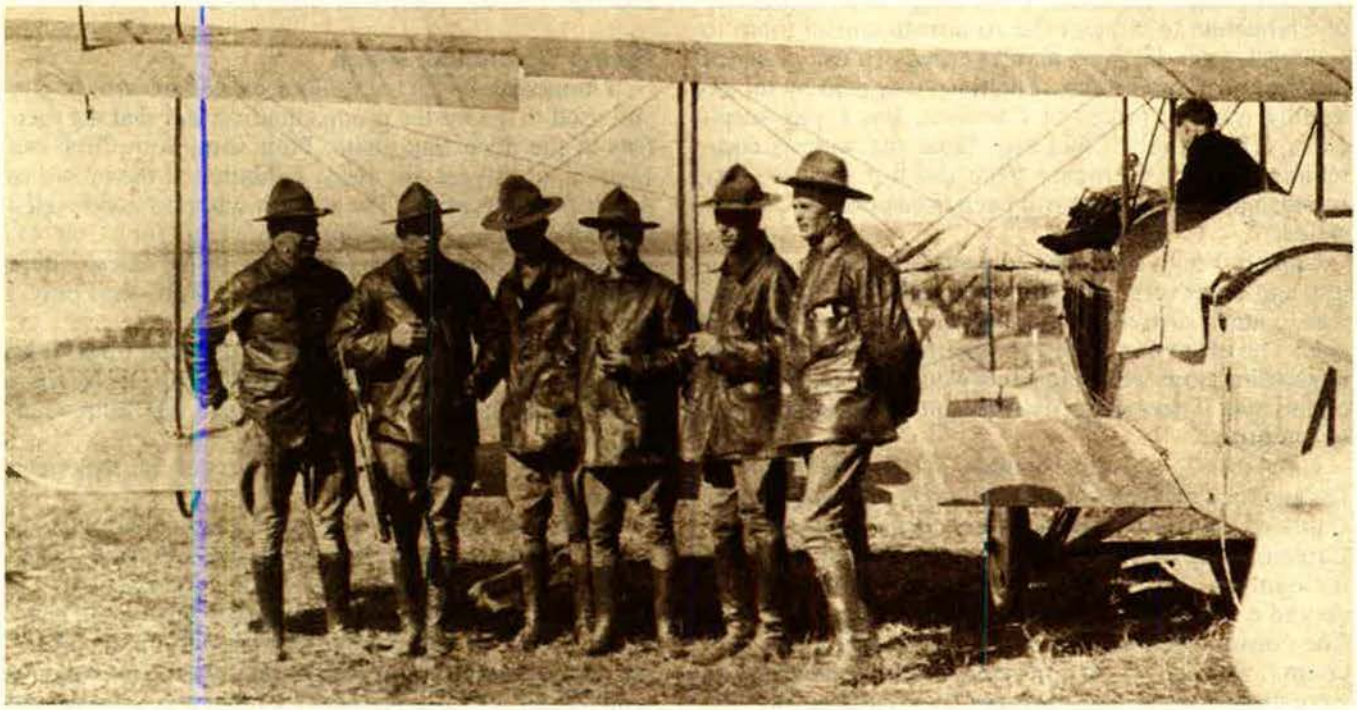
This encounter with the Carranzistas was typical of the ridiculous position in which the American forces found themselves, despite the fact that both sides supposedly were trying to capture Villa.

The deeper into Mexico the Americans penetrated, the more hostility they encountered from both Villa sympathizers and Carranzistas. On April 12, 1916, a small US cavalry unit fought a pitched battle with a band of Carranzistas, killing forty of the Mexican troops. Two Americans died, and six suffered wounds.

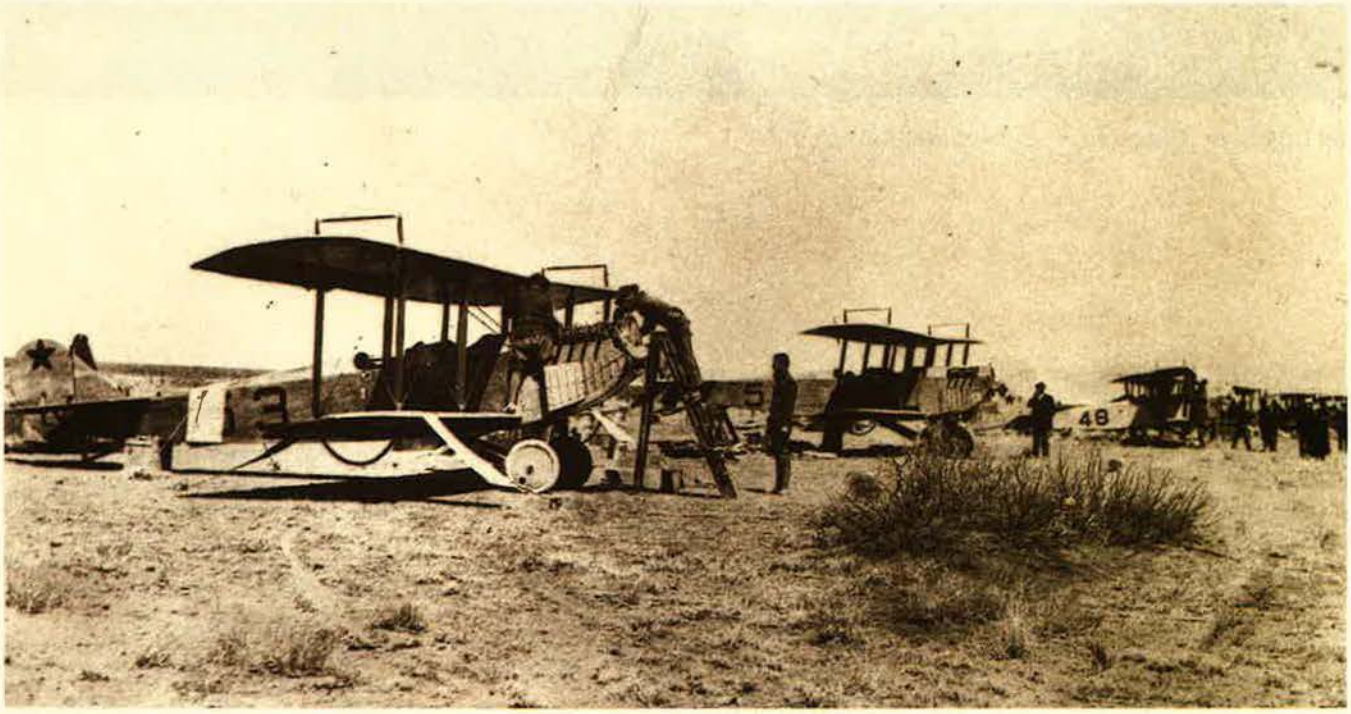
By April 14, after flying as many missions as possible, only two US planes remained airworthy. It appeared that the First Aero Squadron would go out of business, at least in Mexico.

In the interim, however, the bad news about the aviation situation had reached Washington. Secretary Baker appealed to Congress for a special, $500,000 appropriation to buy twelve new Curtiss R-2 planes. They were to be equipped with Lewis guns, automatic cameras, bombs, and radios. On April 20, the First Aero Squadron was ordered to return to Columbus to await these new planes. Captain Foulois put a match to the two tired Jennies so that no one could order him to take them aloft.

Instead of new R-2s, however, the squadron received four Curtiss N-8s, which were nothing more than copies of JN-4s built for overseas delivery. Captain Foulois flew all four of them and declared them unfit for service.



Officers of the First US Aero Squadron pose in Mexico with one of their Curtiss Jennies. The airplanes were woefully inadequate for the task of tracking down Pancho Villa in rugged mountain territory and exposed their pilots to serious risks with every flight.



The Squadron's original eight JN-3 Jennies (above), low-powered and unsuitable for flying more than fifty miles from base, were replaced by four Curtiss R-8s and, eventually, by twelve new Curtiss R-2s. Although "every plane required alterations and replacement of vital parts" and "practically all were defective because of the climate," wrote Captain Foulois, the R-2s did get into the air to give General Pershing the first US aerial review.

Eventually, the R-2s did arrive, but for the next three months, said Foulois, "we had constant engine and construction troubles.

"Every plane required alterations and replacement of vital parts. The biggest problem turned out to be propellers, which had been manufactured all over the States and sent to us for testing. Practically all were defective because of the climate. As a result we never again were able to perform useful field service with the Pershing forces.

"However, we did manage to get a half-dozen planes in the air on August 22, 1916, and give General Pershing the first aerial review ever held by a United States air unit."

Risk to Life and Limb

Captain Foulois, who later rose to the rank of major general and in 1931 became Chief of the US Army Air Corps, made a summary report of the first American attempt to use airplanes in active field service. In pertinent part, it stated:

"Due to lack of aeroplanes with greater carrying capacity, all flying officers were continually called upon to take risks in every reconnaissance flight made while on duty in Mexico. All officers thoroughly appreciated the fact that the failure of their aeroplane motors, while flying through mountainous canyons and over rugged mountains, would invariably result in death."

Captain Foulois noted that the pilots also suffered physically. "Due to inadequate weight-carrying capacity of all aeroplanes," he wrote, "it was impossible even to carry sufficient food, water, or clothing on many of the reconnaissance flights. Pilots were frequently caught in snow, rain, and hail storms. . . . In several instances, pilots were compelled to make forced landings in desert and hostile country, fifty to seventy miles from the nearest troops.

"In nearly every case, the aeroplanes were abandoned or destroyed and the pilots, after experiencing all possible suffering due to lack of food and water, would finally work their way on foot, through alkali deserts and mountains, to friendly troops, usually arriving thoroughly exhausted as a result of these hardships."

Mexican bandits continued to conduct border raids against US targets, but the Carranza government insisted it could control Villa without US intervention. In January 1917, the US force was ordered out of Mexico, and the last American soldier crossed the border on February 5.

It had had no success finding Villa. To Captain Foulois, however, the plight of his eight-plane "air force" was a turning point in the development of American military aviation. "The machines were inadequate for the task assigned," he said. "Not only were they inadequate, they were downright dangerous to fly because of their age. Yet we did a great amount of scouting over country in which cavalry and infantry could not operate."

Despite all the difficulties, the First Aero Squadron chalked up 346 hours of flying time on 540 flights, covering more than 19,533 miles while performing aerial reconnaissance and photography and transporting mail and official dispatches. More important for the nation was the ultimate realization that the airplane was no longer an experiment or an oddity. ■

C. V. Glines is a regular contributor to this magazine. A retired Air Force colonel, he is a free-lance writer and the author of many books. His most recent article for AIR FORCE *Magazine, "The Cargo Cults," appeared in the January 1991 issue.*

AFA/AEF Report

By Daniel M. Sheehan, Assistant Managing Editor

Los Angeles Ball Tops $2 Million

AFA's 1990 Air Force Ball, held in Los Angeles in late October, has surpassed $2 million in funds raised for its designated charities: SCAMP (Scholarships for Children of American Military Personnel) and AFA's Aerospace Education Foundation.

The 1990 theme of the annual black-tie event was "Honoring the Past—Facing the Future." Actor Efrem Zimbalist, Jr., master of ceremonies for the event, recalled the people and technology that brought the Air Force to where it is today: founding fathers like "Hap" Arnold and Dr. Theodore von Kármán and classic aircraft like the B-17 and the C-47 "Gooney Bird." Slides and videotapes carried the theme through today and into the future, depicting the latest applications of stealth and other modern technologies, then focusing on space, particularly the numerous satellites on orbit providing support for a ready force.

Among those on hand, Chief of Staff Gen. Merrill A. McPeak, Assistant Secretary of the Air Force for Space Martin C. Faga, CMSAF Gary R. Pfingston, and other leaders of the enlisted and officer force were honored as today's leaders and tomorrow's examples.

The honorary chairman of this champion fund-raiser, which takes in thousands of dollars annually, Maj. Gen. Jeanne M. Holm, USAF (Ret.), gave eloquent testimony to the bright promise she observed during a recent trip to the US Air Force Academy. The event's general chairman, Robert H. Hood, president of Douglas Aircraft Co., gave his perspective on the importance of the nation's industrial base, emphasizing both its past successes and its future importance. He also praised participants in Operation Desert Shield and noted that their dependents will be eligible for future SCAMP scholarships.

Ninety-eight young Americans have received 283 grants from SCAMP. Initial grants are $3,500, and renewals (contingent on the recipient's remaining academically eligible) have been boosted this year to $3,000. Nineteen students are receiving ongoing awards. The SCAMP Board of Trustees, which screens applicants, is led by retired Sen. Barry M. Goldwater.

The seven students honored in 1990:

Sean D. Brunson, son of Army CWO-2 Jack W. Brunson, who was killed in action in July 1971. He attends the University of Central Florida in Orlando and majors in media and communication graphic art.

Kelly J. Crittenberger, son of Army Col. Dale J. Crittenberger, who was killed in action in September 1969. He is an accounting major at the University of Texas.

Kurt C. Friehauf, son of Air Force Capt. Charles H. Blankenship, who was killed in action in July 1967. He attends Stanford University, majoring in economic geology.

Amy M. Harber-Millette, daughter of Army Sgt. Stephen J. Harber, who was declared MIA in July 1970. She attends Gustavus Adolphus College in St. Peter, Minn., and majors in psychology.

Mark M. Wallace, son of Marine Lt. Col. Hobart M. Wallace, who was declared MIA in January 1968. A graduate of Florida State University, he is now pursuing his master's degree there. An AFROTC student, he is aiming toward a military career.

Christine D. Walters, daughter of Air Force Capt. Donovan K. Walters, who was killed in action in December 1972. She attends the University of Nebraska and majors in elementary education.

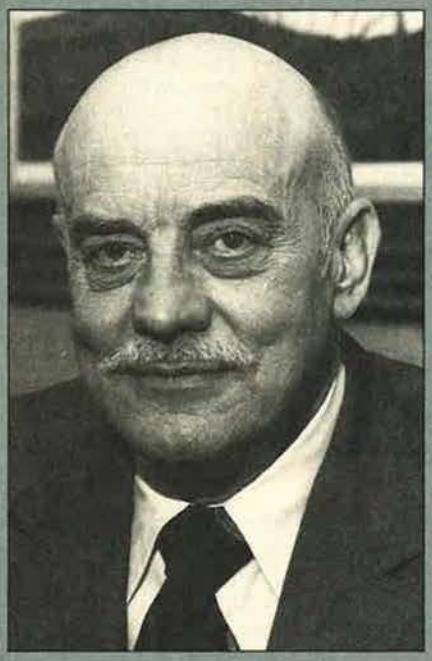
Carie C. Wilkinson, daughter of Air Force Capt. Dennis E. Wilkinson, who was killed in action in May 1973. A ceramics engineering major at Clemson University in South Carolina, she hopes to become a doctor specializing in ceramic prosthetics.

This year's Ball will be held on October 25, 1991.

—James A. McDonnell, Jr.

Four of 1990's SCAMP (Scholarships for Children of American Military Personnel) honorees—Christine Walters, Amy Harber-Millette, Mark Wallace, and Carie Wilkinson —pose with AFA President Oliver R. Crawford, SCAMP President Edward A. Stearn, and AEF President Gerald V. Hasler at last year's Los Angeles Ball.

Jim Straubel Dies



James H. Straubel, once described as "the man who put AFA together and made it work," died at his home in Fairfax Station, Va., December 15. He was seventy-five.

At the beginning of World War II, Reserve 2d Lieutenant Straubel was called to active duty and assigned by Gen. H. H. Arnold, Commanding General of the Army Air Forces, to establish and edit a professional service journal called AIR FORCE Magazine. That he did, and with some distinction.

After the war, the magazine was turned over to the newly founded Air Force Association. Naturally enough, its first editor was Jim Straubel, by then a civilian. In 1948, AFA named Straubel executive director, a position he held until his retirement in 1980.

Along the way, Straubel pretty much invented many of the programs that still define the Association. The Aerospace Education Foundation was his idea, for example, and so were the Aerospace Development Briefings and Displays, conducted annually in conjunction with the AFA National Convention. Among the special events he conceived and directed was the World Congress of Flight in 1959. It drew participants from fifty-one nations and was described by *Life* Magazine as "the world's greatest aviation and space show."

Of the numerous honors bestowed on him over the years, he was especially proud of the US Air Force's Exceptional Service Award, the highest award the service can make to a civilian. Straubel received it twice.

Until his death, Straubel continued to serve on AFA's Board of Directors, and his interest in Association affairs was as keen as ever. His own version of the Air Force Association story was told in his book, *Crusade for Airpower*, published in 1982.

Straubel was born in Green Bay, Wis., and graduated from Lawrence University, where he was captain of both the football and basketball teams. He had been a reporter and editor for various civilian publications before his long association with AIR FORCE Magazine and AFA began.

He is survived by his wife, the former Arlene Hanon, three daughters, Gay, Jean, and Judy, and four grandchildren. He was buried with military honors at Arlington National Cemetery.

Washington State Awards

The State of Washington has long been an energetic promoter of AFA programs, and that energy shows no sign of flagging. The state organization recently presented a slew of awards to deserving candidates in education, the Civil Air Patrol, recruiting, and industry.

AFROTC Det. 910 at the University of Washington was recognized during ceremonies at Fairchild AFB, Wash., for its excellent recruiting and retention, outstanding precommissioning training and education, effective innovations, and superb service to the university, AFA, and the surrounding civilian community. Also at Fairchild, AFJROTC Det. WA-83 of Washington High School received recognition for its high awareness of civic responsibility and service and its disciplined, motivated cadets.

The Civil Air Patrol rarely receives the recognition it deserves. Washington AFA sought to correct that injustice by presenting awards to Cadet Lt. Col. Douglas R. Faini of the Badger Mountain Composite Squadron as CAP Cadet of the Year and to Maj. Richard Killingsworth, the Washington CAP Wing's director of special operations, for his strenuous efforts in fighting the war on drugs.

Two recruiters were also honored. SSgt. Doug Jager of the 3561st Recruiting Squadron obtained an astonishing 231 percent of his production goal to earn his award. SSgt. Donald Stolicker of the 3568th Recruiting Squadron got the nod for his equally impressive accomplishments as the top nonprior-service recruiter, top recruiter in Eastern Washington, and best in his squadron, which covers seven states.

Two squadrons of the 92d Bomb Wing at Fairchild were also honored. The 43d and 92d Air Refueling Squadrons gave outstanding support to AFA and the Fifteenth Air Force Civic Distinguished Leader trip this past spring.

Finally, USAF-industry relations were not ignored as one of the pillars of the AFA community. Individually, Col. Robert H. Shipman, Jr., of Det. 9, Air Force Contract Management Division, the last Air Force Plant Representative at the Boeing Co. in Seattle, received kudos for easing the transition to the newly redesignated Defense Procurement Representative Office. Organizationally, the Air Force Plant Representative Office joined Colonel Shipman in reaping praise. The AFPRO at Boeing had been in continuous existence for seventy-nine years, the longest tenure of any AFPRO in the nation.

In other Washington news, the **Greater Seattle Chapter** has selected its officers for 1991: President Philip Giambri, First Vice President Richard D. Iversen, Second Vice President Paul S. Friedrich, Secretary Charles D. Bright, and Treasurer Roger Johnson.

Chapter News

One area hit particularly hard by current and future budget cuts will be the Air Force's Morale, Welfare, and Recreation programs. The **Thomas B. McGuire, Jr., (N. J.) Chapter** has joined other AFA chapters in helping to cushion that blow. Chapter President Frank Kula, along with National Vice President (Northeast Region) Bob Gregory, was happy to present a check for $6,900 to Col. Kirby Woehst, commander of the 438th Military Airlift Wing at McGuire AFB, N. J. The chapter raised the money, to be used for MWR activities, through the eleventh annual AFA Invitational Golf Tournament at McGuire.

The **Antelope Valley (Calif.) Chapter** got the word on two programs vital to the Air Force's future, the Advanced Tactical Fighter (ATF) and the C-17. Lt. Col. Bob Black, commander of the 6517th Test Squadron and director of the C-17 Combined Test Force at Edwards AFB, Calif., briefed the membership on the status of the program and the capabilities of the transport. Colonel Black, an experienced test pilot and acquisition program manager,

Maryland Gov. William Donald Schaefer (left) attends the College Park Airport Chapter's charter-signing ceremony. With the Governor are, from left, AFA National Director Charles Durazo, College Park Airport Chapter President Erwin B. Nase, National Chairman of the Board Jack C. Price, National Treasurer William Webb, and Maryland State President Ronald Resh.

has done much to foster good community relations. Later in 1990, Lt. Col. William J. Jabour, commander of the 6511th Test Squadron and director of the ATF combined test force, delineated the challenges of the ATF program at a chapter meeting. The Antelope Valley Chapter has shown unstinting support for the ATF, which the Air Force considers essential for future air superiority despite a diminished Soviet threat.

The chapter also experienced a changing of the guard in 1990. Sam Kilanowski passed the presidency to Vic Sternberg, who will do well to equal Mr. Kilanowski's record. The new leadership began with a rousing success, contributing $1,500 to help defray costs of a World War II Warbirds exposition at Edwards. The Edwards Federal Credit Union, represented by President Fred Hulme and General Manager Tom Craft, made a major contribution to the effort. Besides Mr. Sternberg, other new chapter officers are Herb Parsons, vice president; Tim Houston, treasurer; Debra White, secretary; and Ellen Crawford, head of programs.

Coming Events

May 10–11, **Maryland State Convention,** Andrews AFB, Md.; May 10–12, **North Dakota State Convention,** Minot, N. D.; May 17–18, **Alaska State Convention,** Anchorage, Alaska; May 17–18, **South Carolina State Convention,** Myrtle Beach, S. C.; May 31–June 2, **New York State Convention,** Niagara Falls, N. Y.; June 7–9, **New Jersey State Convention,** Atlantic City, N. J.; June 8, **Missouri State Convention,** Whiteman AFB, Mo.; June 15, **Georgia State Convention,** Atlanta, Ga.; June 21–22, **Ohio State Convention,** Vienna, Ohio; June 22, **New Hampshire State Convention,** Pease AFB, N. H.; June 28–29, **Louisiana State Convention,** Bossier City, La.; July 13, **Kansas State Convention,** Wichita, Kan.; July 19–20, **Colorado State Convention,** Lowry, Colo.; July 19–21, **North Carolina State Convention,** MCAS Cherry Point, N. C.; July 19–21, **Pennsylvania State Convention,** Pittsburgh, Pa.; July 19–21, **Texas State Convention,** San Antonio, Tex.; July 21, **Delaware State Convention,** Dover, Del.; July 25–28, **Florida State Convention,** St. Augustine, Fla.; July 26–28, **Virginia State Convention,** Crystal City, Va.; August 2–3, **Minnesota State Convention,** Hinckley, Minn.; August 15–17, **California State Convention,** Edwards AFB, Calif.; August 22–24, **Utah State Convention,** Ogden, Utah; September 6–7, **Washington State Convention,** Seattle, Wash.; September 16–19, **AFA National Convention and Aerospace Development Briefings and Displays,** Washington, D. C.

Also in California, members of the **General Doolittle/Los Angeles Area (Calif.) Chapter** showed the flag at the Hawthorne Airport Airfaire. Mr. and Mrs. Don Zweifel, Bruce Bauer, and Milt Feir staffed an AFA recruiting booth in cooperation with the 3569th Recruiting Squadron and Maj. Don Fincher and SSgt. Margaret Chu. They spread the word about USAF's efforts in Operation Desert Shield, spoke convincingly of the need for the C-17, and passed along reams of information, including copies of AIR FORCE Magazine and the AFA/USNI Military Database report "Lifeline in Danger," to the crowds at the show, who came to see vintage aircraft like the sixteen P-51 Mustangs and the half-dozen B-25 Mitchells. The Doolittle Chapter got an assist from industry representative W. A. "Al" Ogram of Rockwell International, who found a good location for AFA's booth, and from the **General B. A. Schriever Los Angeles (Calif.) Chapter,** which provided photos that greatly enhanced the display.

AEF Calendars

The Aerospace Education Foundation still has a limited number of 1991 calendars available for interested members in the continental US. Tens of thousands of AFA members have already supported the Foundation's Theodore von Kármán Graduate Scholarship program through calendar donations. The program, which aids newly commissioned 2d lieutenants in their pursuit of master's degrees, awarded the first ten of its $5,000 graduate scholarships last fall. Membership's response to this beautifully illustrated calendar has been very favorable.

If you wish to receive the calendar or replace a damaged copy, contact Art Hyland, AEF, 1501 Lee Highway, Arlington, VA 22209. Phone: (703) 247-5839.

Have AFA News?

Contributions to "AFA/AEF Report" should be sent to Dave Noerr, AFA National Headquarters, 1501 Lee Highway, Arlington, VA 22209-1198. ■

Bulletin Board

Seeking recollections, anecdotes, photos, and other artifacts relating to the **RCAF air training bases** in Huron and Middlesex Counties, Ontario, Canada: Port Albert airport, Sky Harbour EFTS Base, Centralia SFTS Base, Clinton Radar School, and Crumlin EFTS and air observers base. **Contact:** Jeanne Muldoon, Apt. 211, 303 Commissioners Rd. W., London, Ontario N6J 1Y4, Canada.

Seeking contact with anyone who participated in a January 5, 1943, raid against shipping in Rabaul Harbor. Especially seeking crew members of the six B-24s of the **319th Bomb Squadron,** 90th Bomb Group, Wards Drome, New Guinea, and six B-17s of the **64th Bomb Squadron,** 43d Bomb Group, Jackson Field (also called Seven Mile Drome), New Guinea. **Contact:** Gene M. Monihan, 4207 Sudley Rd., Haymarket, VA 22069.

Seeking to purchase a class book with photos of the cadets of **primary pilot training Class 43-I,** Darr Aero Tech., Albany, Ga. **Contact:** Daniel D. Wright, 8330 Lamar Ave., Overland Park, KS 66207.

Seeking contact with veterans of the following World War II units: **15th Tactical Reconnaissance Squadron, 10th Photo Group,** and **363d Reconnaissance Group** of the 19th Tactical Command. Also seeking contact with graduates of **USAAF aviator Class SE 44-C,** from Spence Field, Moultrie, Ga. **Contact:** Capt. William Yates, 344 Ransdall Ct., Indianapolis, IN 46227.

Seeking information on **Sgt. Linus L. Oakley,** USAF, who was lost on October 29, 1971, in South Vietnam. **Contact:** Thomas A. Valentine, Jr., P. O. Box 1291 RHIT, Terre Haute, IN 47803.

Seeking information on the whereabouts of members of the **554th RED HORSE Squadron,** which was stationed at Phan Rang AB, Vietnam, in 1965. Also seeking a 554th RED HORSE patch. **Contact:** M. L. Jones, Jr., 6266 Truman Dr., Fort Worth, TX 76112.

Seeking information, photos, and maps of **Estrella Army Air Field,** which was located near Paso Robles, Calif. I especially would like information on units assigned there. **Contact:** Dirk A. Hale, 1944 Vine St., Paso Robles, CA 93446.

Seeking contact with **1st Lt. Bill Cook** or other members of his B-17 crew who took part in the December 24, 1944, "Biblus Raid" and can confirm that my leg was burned after flak shot out the number three engine during a bomb run over a German grass airfield, causing our ammunition to explode. **Contact:** William H. Hoadley, 1270 Grove Rd., West Chester, PA 19380.

Seeking information on the whereabouts of the following members of the **381st Bomb Group,** 535th Bomb Squadron, based at Ridgewell, England, during World War II: Lts. Elmer Wulf, Hugh Robinson, and Harlan Kriete. **Contact:** Virgil Miller, 5100 Emerald Dr., Apt. 2, Lincoln, NE 68516.

Seeking information on the history of ***Twelve O'Clock High,*** the book, the movie, and the television series, for a college thesis on how the Army Air Forces of World War II was viewed through television and the movies. **Contact:** Allan T. Duffin, 46 Masssachusetts Ave., #410D, Cambridge, MA 02139.

Seeking information on a plane called **Skyfan,** or Skyvan, which I encountered in the Republic of Transkei in South Africa. **Contact:** Wesley Walker, 10065 Ontario, El Paso, TX 79924.

Seeking members of the **6th Bomb Group** who served on Tinian during World War II who would like to join the 6th Bomb Group Association. **Contact:** Newell W. Penniman, Jr., 6 Porter Ln., South Hamilton, MA 01982.

Seeking whereabouts of **William "Woody" Wood,** a pilot with the 42d Tactical Reconnaissance Squadron stationed at Spangdahlem AB, West Germany, in 1956–57. **Contact:** Frank Perri, 30 Aylesbury Cir., Madison, CT 06443.

Seeking information on and contact with personnel involved with **Swan Island,** West Indies, in 1985–88. Also collecting covers (whole envelopes) posted there from USN, SEAL, USAF, CB, or other postal routing. Also seeking Clipperton Island covers from World War II to present. **Contact:** Dr. Gale J. Raymond, P. O. Box 35695, Houston, TX 77235.

Seeking information and photos of the following **USAF/ANG aircraft**: B-52H #60-0001; C-131O #55-0301; F-100D #56-3141; F-100F #56-3760; F-105Ds #60-0526, #61-0086, and #62-4340; F-106A #59-0109; F-4C #63-7412; EC-135Ns #10891 and #10892; and RF-84Fs #51-1896 and #51-11262. **Contact:** Bill Reid, 1600 Prairie, Essexville, MI 48732.

Seeking the whereabouts of **SSgt. Danny J. Johnson** of Jackson, Tenn., who was stationed at Lowry AFB, Colo., and worked in the PME lab in 1960–61. **Contact:** MSgt. Guy K. Moore, USAF (Ret.), 104 N. Crescent Dr., Blytheville, AR 72315.

Seeking the whereabouts of **David W. Johnson,** USAFA Class of 1974, whose last known duty station was in Lubbock, Tex. **Contact:** Sharon Massey, 2720 Pine Lake Rd., Tucker, GA 30084.

A 9th Air Force Association recently formed in St. Louis, Mo., is open to veterans who served in the **9th Air Force** and to their immediate families. The Association is making plans for the fiftieth

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anniversary (1992) of the formation of the 9th Air Force. **Contacts:** Edward F. MacLean, 16 Oak St., Valley Stream, NY 11580. Marvin J. Rosvold, 600 S. 13th, Norfolk, NE 68701.

Seeking information on the whereabouts of **SSgt. Manny Colon,** whose last known assignment, in 1986, was with the 317th SPS, Pope AFB, N. C. **Contact:** MSgt. Eric Fjetland, SHAPE/ADPSG, APO New York 09055.

Seeking members of the **351st Bomb Group,** 8th Air Force, who were stationed at Polebrook, Northamptonshire, England, during World War II and would be interested in joining the 351st Bomb Group Association. **Contacts:** Kenneth L. Vaughn, 1 Shady Ln., Belleville, IL 62221. B. F. Cook, 339 Green St., Rockdale, TX 76567.

Seeking information, photos, and technical manuals on the **Hound Dog and Quail air-launched missiles. Contact:** Harold W. Arnold, Jr., 300 E. Paducah St., South Fulton, TN 38257.

Seeking information on aircraft of the **448th Bomb Group** during World War II and life at Seething Airfield, England. **Contact:** Lt. Jeff Brett, 257 Clay St., Columbus AFB, MS 39701.

Seeking a **pre-1961 airway and air communications service patch.** It depicts a single aircraft circling the globe. **Contact:** P. D. McDermott, 54 University Blvd. N., Mobile, AL 36608-3014.

Seeking contact with personnel involved with air corps **Project 19,** which involved a major aircraft overhaul facility in Gura Valley, Africa, to repair battle-damaged aircraft. **Contact:** John W. Swancara, 1002 E. Mariposa Ave., El Segundo, CA 90245-3114.

Seeking information on the **531st Tactical Fighter Squadron** stationed at Bien Hoa, South Vietnam, in 1969–70 and flying the F-100 Super Sabre. **Contact:** Burt W. Johnson, 2560 Newport Blvd., #18, Costa Mesa, CA 92627.

Seeking contact with air policemen who served with **A1C Thomas A. Fleming, Jr.** at K. I. Sawyer AFB, Mich.; Osan AB, Korea; or Plattsburgh AFB, N. Y. **Contact:** MSgt. Thomas A. Fleming, Jr., 1845 Tulpehocken St., Philadelphia, PA 19138-1210.

Seeking **O-1 Bird Dog FACs** who instructed or flew combat missions during the Vietnam War. **Contact:** International Bird Dog Association, 3939 C-8 San Pedro NE, Albuquerque, NM 87110.

Seeking information, drawings, and photos of **STOL airplanes,** especially the **Helio Stallion** turboprop airplane. **Contact:** Charlie W. Hayner, 5858 Pacific Coast Hwy., #13, Redondo Beach, CA 90277.

Seeking information on **World War II Army Air Fields,** especially Amarillo AAF and Pampa AAF. Also seeking information on current activities at Da Nang AB and Phu Cat AB, Vietnam. **Contact:** William E. Davis, 2846 Country Club Cir., Colorado Springs, CO 80909-1017.

Seeking contact with other **patch collectors** to trade patches. **Contact:** SSgt. Fred Schlenker, Operation Desert Shield, 354th TFW/MA/AGS, APO New York 09855.

I have a book, ***Air Force Airs,*** which was apparently published in the early 1940s. It contains some early Army Air Corps songs and a picture and letter from General "Hap" Arnold. Seeking information on the value of this book and on how many other copies may exist. **Contact:** Burnett W. Porter, Jr., 3225 Happy Hollow Rd., Hopkinsville, KY 42240.

Seeking information on the rejection of **William Faulkner** by the USAAF and Naval Aviation Service during World War II. Especially seeking information on the circumstances of an interview Mr. Faulkner had with a Maj. Bernard A. Bergman. **Contact:** Jesse R. Core III, 1315 Milan St., #4, New Orleans, LA 70115.

If you need information on an individual, unit, or aircraft, or if you want to collect, donate, or trade USAF-related items, write to "Bulletin Board," AIR FORCE Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Letters should be brief and typewritten. We cannot acknowledge receipt of letters to "Bulletin Board." We reserve the right to condense letters as necessary. Unsigned letters are not acceptable. Photographs cannot be used or returned.—THE EDITORS

Seeking information on the **Northrop B-2 Stealth bomber. Contact:** Nicholas Carruthers, 24 Cedar Ave., Towson, MD 21204.

Seeking information on how to purchase **baseball caps** and dark blue long sleeve cotton **sweatshirts** featuring Air Force commands, wings, squadrons, or bases, similar to the caps and shirts sold in military exchange stores. **Contact:** Philippe Cauchi, 420 Gloucester, Apt. 2309, Ottawa, Ontario K1R 7T7, Canada.

Seeking information on **Lt. William R. Habbyshaw,** who was a flight instructor in BT-14 aircraft at Independence AAF in 1943. **Contact:** Joseph W. Stephens, P. O. Box 3383, Abilene, TX 79604-3383.

Seeking contact with crew members of the **B-24 *Cherokee Maiden*** of the 756th Squadron, 459th Bomb Group, 15th Air Force, who can verify that, in spite of my 6'2" height, I was the ball turret gunner for all fifty missions. **Contact:** Dick Mailheau, 39285 Moronga Canyon Dr., Palm Desert, CA 92260-1325.

Seeking members of the **392d Bomb Group,** 2d Air Division, 8th Air Force, based at Wendling, England, during World War II. **Contact:** Teddy Egan, 392d Bomb Group Memorial Association, 2619 Lafayette Ave., Winter Park, FL 32789-1372.

Seeking contact with people who knew **Lt. John D. Logan,** who was stationed at Westover AFB, Mass., and was killed in a B-24 crash on Mount Holyoke on May 27, 1944. **Contact:** Col. Gordon A. Summers, 2234 Indian Trail, Topeka, KS 66614.

Seeking contact with former members of the **39th Troop Carrier Squadron,** known as the "Jungle Skippers." **Contact:** Fred A. Wolken, HCR 82, Box 179, Box Elder, SD 57719.

Seeking contact with the crew members of a **B-17** I saw in a farmer's field between Normandy and Rouen, France, near the end of World War II. The **tail number is 338715** with a large H above the numbers and a K below. **Contact:** David C. Rutherford, Suite 400, Washington Square, 214 Second Ave. N., Nashville, TN 37201.

Unit Reunions

ILPA
The International Liaison Pilot and Aircraft Ass'n (ILPA) will host the first worldwide "Gathering of L-Birds" on March 1–3, 1991, in San Antonio, Tex. **Contact:** Bill Stratton, 16518 Ledgestone, San Antonio, TX 78232. Phone: (512) 490-4572.

Moody AFB
Moody AFB, Ga., will hold a fiftieth-anniversary celebration on April 21, 1991. Former students, instructors, and units who served at Moody Field/Moody AFB and who are interested in organizing a reunion during this celebration should contact the address below. **Contacts:** Office of Public Affairs, 347th Tactical Fighter Wing, Moody AFB, GA 31699-5000. Phone: (912) 333-3395. Col. Frederic A. Stone, USAF (Ret.), 212 Green St., Watertown, NY 13601-4122. Phone: (315) 782-4291.

22d Fighter-Day Squadron
Officers of the 22d Fighter-Day Squadron who served between 1954 and 1958 will hold a reunion April 19–21, 1991, at the Marriott Hotel and Tennis Club in Newport Beach, Calif. **Contact:** Sam Henley, 197 Lupin Ln., San Bernardino, CA 92407. Phone: (714) 886-8352.

Class 45-A
Members of Class 45-A (Moody Field, Ga.) will hold a reunion in March 1991. **Contact:** Edmund R. Galli, 108 Putney Ln., Malvern, PA 19355. Phone: (215) 296-2499.

53d Fighter Group
Members of the 53d Fighter Group and attached squadrons will hold a fiftieth-anniversary reunion May 3–5, 1991, at the Holiday Inn in Tampa, Fla. **Contact:** Elmer E. Johnson, 1815 S. E. 6th Terrace, Cape Coral, FL 33990. Phone: (813) 574-4044.

73d Bomb Wing
Members of the 73d Bomb Wing and all assigned and attached units that served on Saipan during World War II will hold a reunion May 9–12, 1991, at the Wyndham Hotel in San Antonio, Tex. **Contact:** Glenn E. McClure, 105 Circle Dr., Universal City, TX 78148.

Readers wishing to submit reunion notices to "Unit Reunions" should mail their notices well in advance of the event to "Unit Reunions," AIR FORCE Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information.

96th Air Refueling Squadron
The 96th Air Refueling Squadron (Altus AFB, Okla.) will hold a reunion March 7–10, 1991, at the Holiday Inn in Pensacola Beach, Fla. **Contact:** Richard F. Lyon, 1037 Woodlore Cir., Gulf Breeze, FL 32561. Phone: (904) 932-0124.

99th Bomb Group
Members of the 99th Bomb Group will hold a reunion in April 1991 in Albuquerque, N. M. **Contact:** Bernice Barr, 7408 Vista del Arroyo, Albuquerque, NM 87109. Phone: (505) 884-7970.

449th Bomb Group
Members of the 449th Bomb Group will hold a reunion April 9–13, 1991, at the Sheraton Astrodome Hotel in Houston, Tex. **Contact:** Richard F. Downey, 4859 Stanhope Dr., St. Louis, MO 63128-2848.

450th Bomb Group
The 450th Bomb Group "Cottontails" will have a return trip to Manduria, Italy, for a memorial dedication on April 8–16, 1991. **Contact:** Col. Robert H. Gernand, USAF (Ret.), 1054 San Remo Rd., St. Augustine, FL 32086. Phone: (904) 797-7348.

496th FIS
The 496th Fighter-Interceptor Squadron will hold a reunion April 23–25, 1991, at the Rio Suite and Casino Hotel in Las Vegas, Nev. **Contact:** Jan W. Barmore, 4208 Arbordale W., Tacoma, WA 98466. Phone: (206) 564-9040.

820th Bomb Squadron
Members of the 820th Bomb Squadron, 41st Bomb Group, 7th Air Force, who served during World War II will hold a reunion April 4–7, 1991, at the Marriott Hotel in Charleston, S. C. **Contact:** William W. Childs, 3637 Patsy Ann Dr., Richmond, VA 23234. Phone: (804) 275-6012.

Air Commando Groups
For a 1991 reunion, The Australian Vietnam Veterans Association would like to contact members of the 311th or 315th Air Commando Groups who were based at Da Nang and Nha Trang. **Contact:** Ron Workman, 395 Newman Rd., Geebung QLD 4034, Australia.

Retired USAF Musicians
Seeking names and addresses of retired US Air Force musicians for a roster for future reunions and to plan a 1992 reunion. **Contact:** Louis C. Kriebel, 1521 East Boulevard., Maitland, FL 32751.

12th Tactical Recon Squadron
I am seeking former "Blackbirds," 12th Tactical Reconnaissance/12th Aero/12th Observation Squadrons, to complete my mailing list for a reunion scheduled in October 1991. **Contact:** Lindsay Hayes, 53494 Lynnham, Shelby Township, MI 48316.

Class 51-H
For the purpose of planning a reunion in 1991, I would like to contact former USAF pilot training Class 51-H. **Contact:** John E. Orr, Box 11071, Fort Worth, TX 76110. Phone: (817) 926-3827.

90th Bomb Squadron
I would like to hear from anyone who served in the 90th Bomb Squadron during the Korean War and who would be interested in organizing or attending a reunion. **Contact:** Gary R. Long, 6432 E. Bluebird Ln., Paradise Valley, AZ 85253. Phone: (602) 991-4757.

441st Troop Carrier Group
Seeking contact with former members of the 441st Troop Carrier Group (World War II) to compile a roster for future reunions. **Contact:** Stuart M. Dean, P. O. Box 108, RD #2, Altamont, NY 12009. Phone: (518) 861-8350.

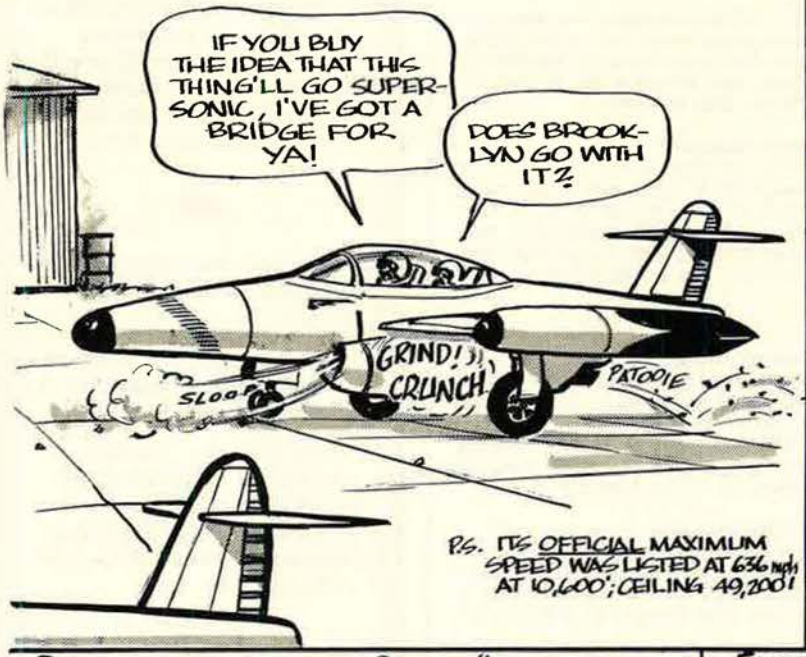
448th Bomb Group
I am seeking names and addresses of veterans who served in the 448th Bomb Group, 8th Air Force, in England during World War II to send them information on the 1991 reunion. **Contact:** Leroy J. Engdahl, 1785 Wexford Dr., Vidor, TX 77662.

Bob Stevens'

"There I was..."

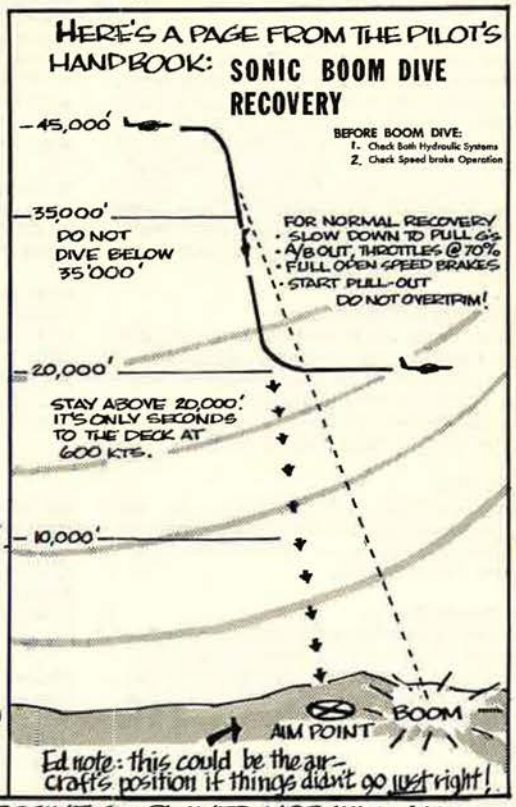
MAKING A SONIC BOOM WAS ALL THE RAGE IN THE EARLY '50s (YEAGER HAD MADE A SIEVE OF "THE BARRIER" IN 1947 WITH THE X-1). PRODUCTION JET FIGHTERS COULD ONLY "GO SUPERSONIC" IN A DIVE—A MANUEVER FRAUGHT WITH HAZARD TO LIFE and EQUIPMENT. ONE OF THE MOST UNLIKELY-LOOKING BIRDS TO PERFORM THIS STUNT WAS THE UNGAINLY F-89, THE "SCORPION."

CALLED THE "BOMBER-KNOCKER-DOWNER" BY ITS BUILDERS and "STANLEY STEAMER" (BIG WHEELS) OR THE "FOD VACUUM" (LOW INTAKES) BY PILOTS, IT WAS NO RAVING BEAUTY—



P.S. ITS OFFICIAL MAXIMUM SPEED WAS LISTED AT 636 mph AT 10,600'; CEILING 49,300'!

HERE'S A PAGE FROM THE PILOT'S HANDBOOK: **SONIC BOOM DIVE RECOVERY**

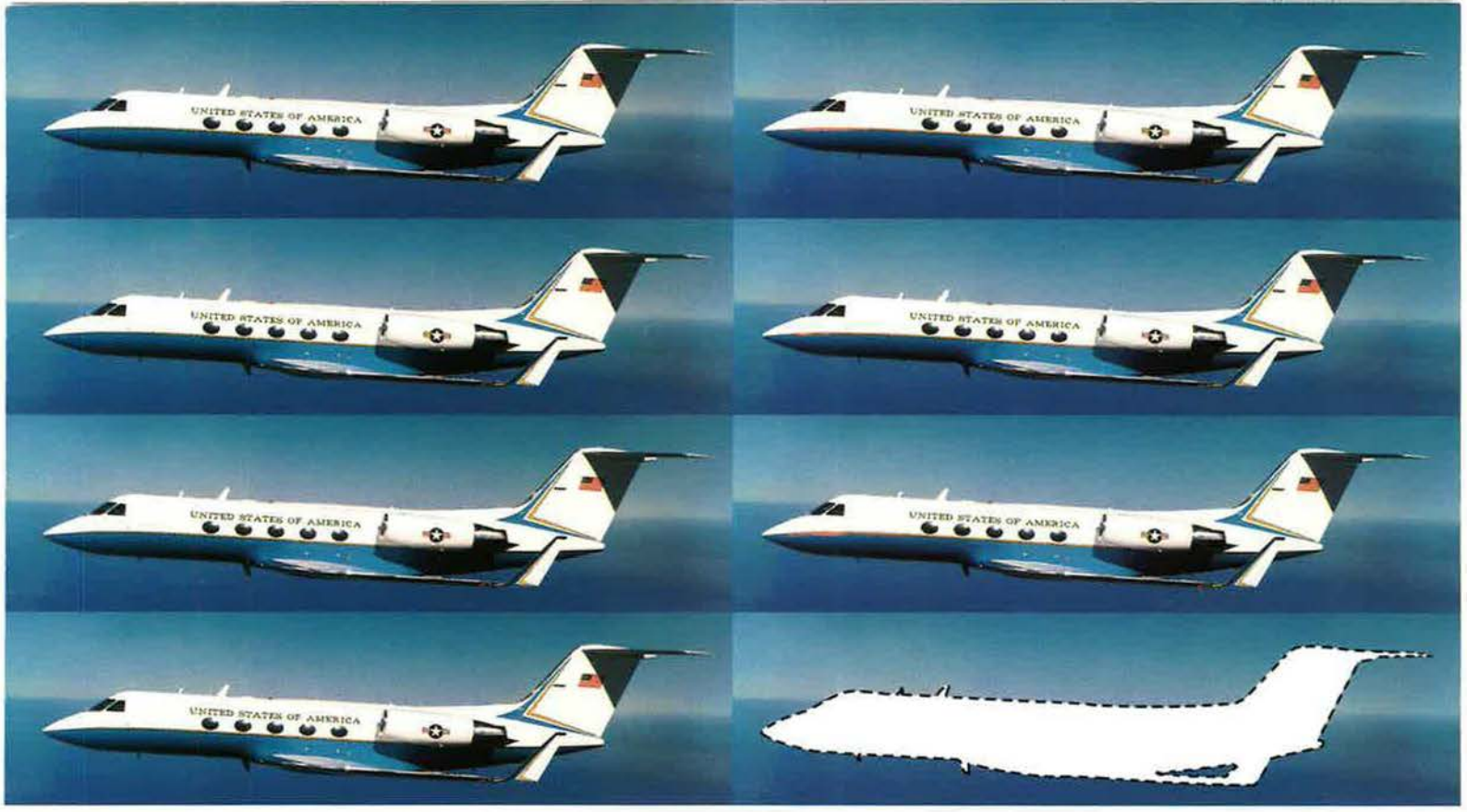


Ed note: this could be the aircraft's position if things didn't go just right!

ROLL IN WAS A 60° DIVE @ 45 M ft —

EXCESSIVE Gs PLAYED HOB WITH MAN and MACHINE—

THANKS TO PAUL STEBELTON, AGUANGA, CA. Bob Stevens



It's time to play it again, SAM.

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

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

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

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

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

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

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

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

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

The C-20F Gulfstream.

Uncommonly versatile, uncommonly productive.

Gulfstream Aerospace

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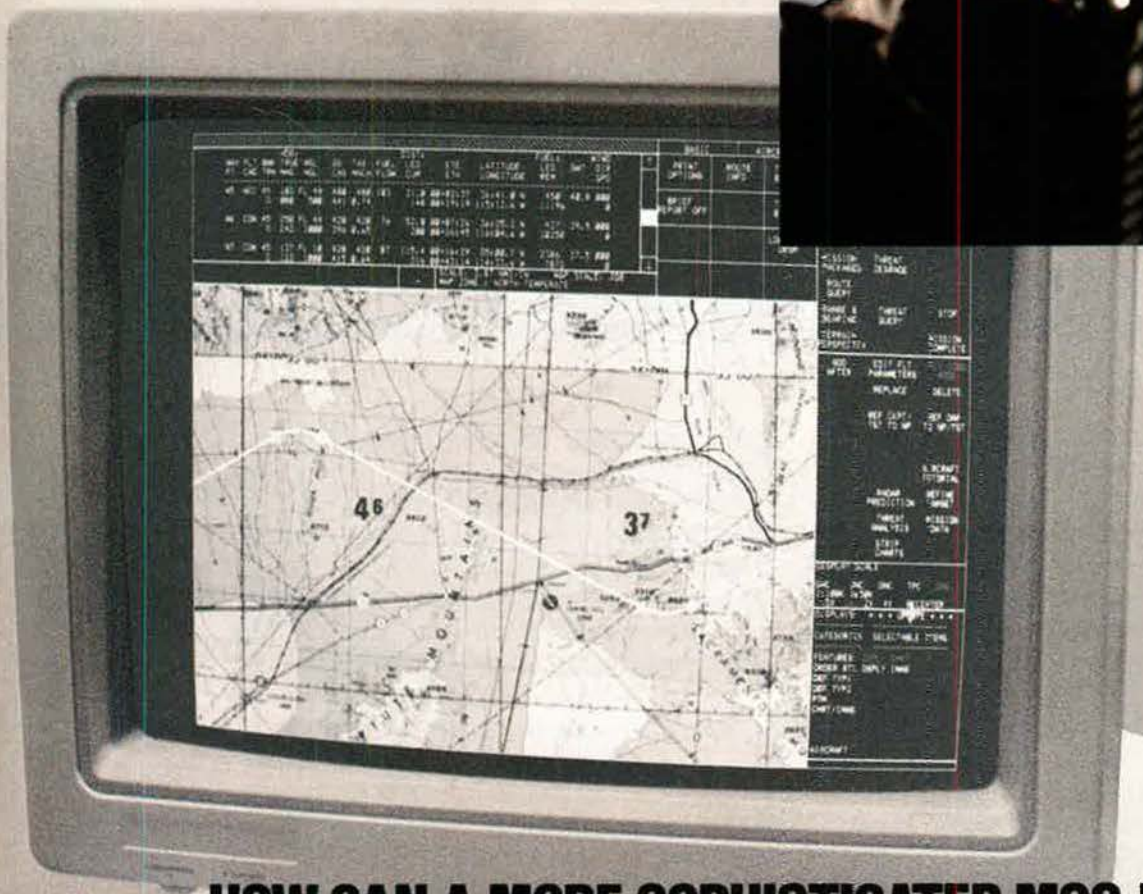
MDMSC: Smart choices for tough decisions.



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