

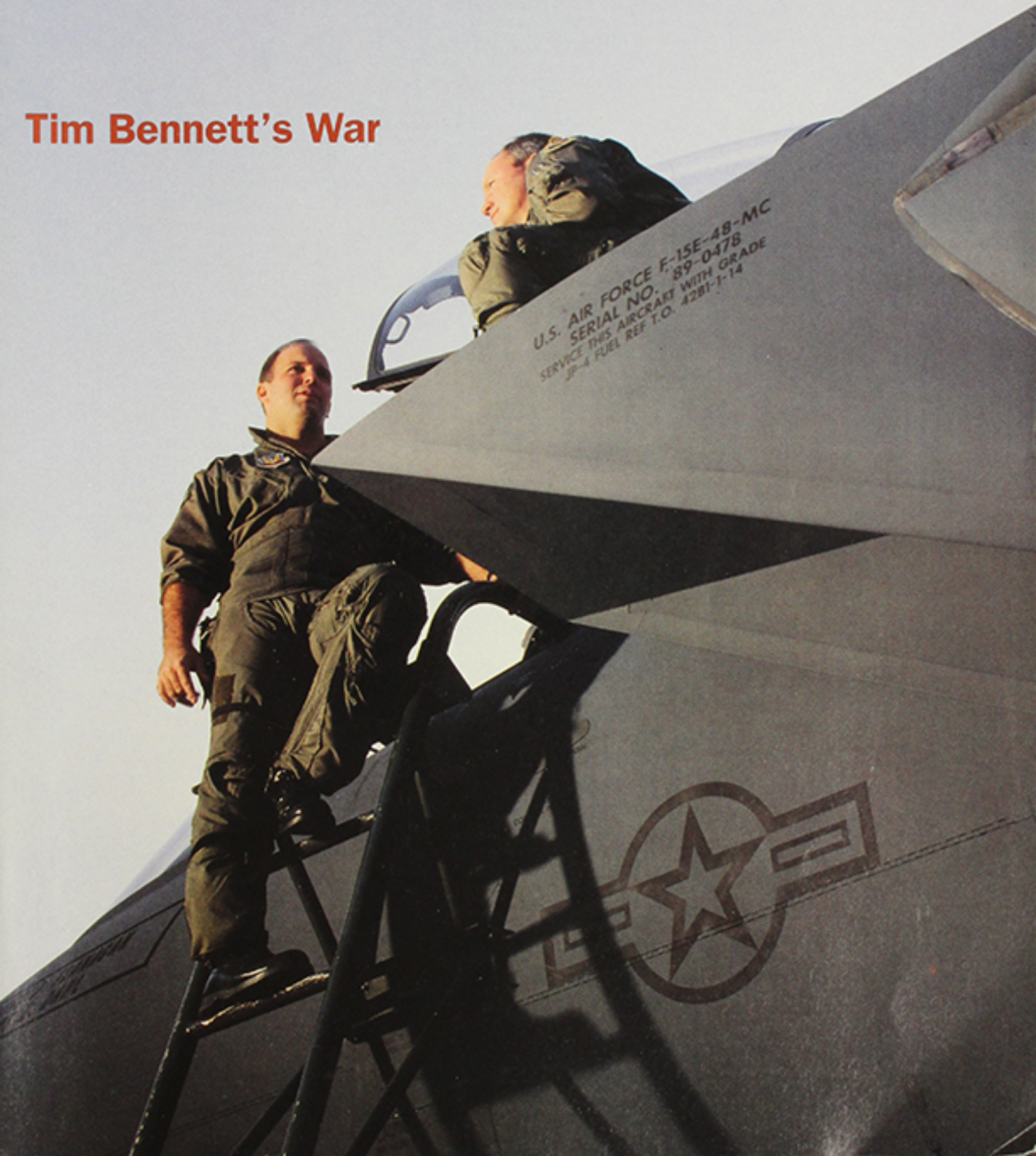
JANUARY 1993/\$3

# AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

## Tim Bennett's War





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# AIR FORCE

MAGAZINE

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**About the cover:** Capt. Tim Bennett (left) and Capt. Dan Bakke pose with their F-15E. They are members of the 335th Fighter Squadron at Seymour Johnson AFB, N. C. For more about the role they played in the Gulf War, see p. 34. Photo © Paul Kennedy.

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By John T. Correll, Editor in Chief

## Tinkering With Deadly Force

**I**F YOU believe the people who draw newspaper cartoons or march in peace parades, US military leaders are a hawkish bunch, always eager to go to war. At the same time, another group of critics accuses those same military leaders of being reluctant warriors, far too cautious about sending the troops to fight abroad.

The truth is that military professionals understand the realities of war and thus are seldom enthusiastic about getting involved in one. When a decision to fight is made, however, the armed forces can be counted on to raise their commitment level to 100 percent. They have little patience with the dilettantes back home who develop second thoughts when they witness the ensuing bloodshed and destruction.

Rep. Les Aspin (D-Wis.), chairman of the House Armed Services Committee, says the US officer corps has coalesced into an "All-or-Nothing" school of thought on the use of military force. Mr. Aspin says an opposing faction—the "Limited Objectives" school—is on the rise and may prevail.

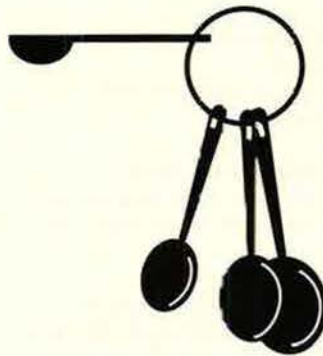
The Limited Objectives people were stirred to action, apparently, by the Bush Administration's refusal to order air strikes in the Balkans last summer. This group does not agree that use of military force necessarily leads to escalating conflict or deeper involvement. Neither does it agree that the sole purpose of combat is to win battles and wars.

The objective may be something entirely different, such as sending political signals to an adversary. "What we are really talking about here is striking military targets or assets to influence behavior elsewhere, most often air strikes in one place to convince someone to change their behavior in another place," Mr. Aspin explains.

According to Mr. Aspin, the military leaders in the "All-or-Nothing" camp are frozen on four propositions: Military force should be used only as a last resort. There should be a clear military objective. It should be clear enough to determine when we have

achieved it and the troops can come home. Force should be applied in "overwhelming" strength to get the job done decisively, quickly, and with few casualties.

Under those rules, Mr. Aspin observes, the armed forces would be employed "only very, very rarely" and "will not be a useful tool for achiev-



**The "Limited Objectives" school is not the first to think war can be regulated or that force can be used in measured doses.**

ing objectives." He warns that "people may not be willing to pay \$250 billion or even \$200 billion a year for a military that is not very useful."

Furthermore, he says, modern technology makes it possible to use military force—especially a power—with great precision and with limited risk of casualties or collateral damage. "These things tend to tilt the debate somewhat in favor of the Limited Objectives school," he concludes, although "I think we are still going to have to decide the use of force case by case."

All of this, of course, goes back to the old "Vietnam Syndrome" argument. The armed forces were supposedly demoralized and left combat-shy by the defeat in Indochina. Never

again, if they could help it, would they be bogged down in a war the nation had no heart to win.

In 1984, Secretary of Defense Caspar Weinberger proposed six tests to determine whether US troops should be sent into combat: Is a vital national interest at stake? Will we commit sufficient resources to win? Will we sustain the commitment? Are the objectives clearly defined? Is there reasonable expectation that the public and Congress will support the operation? Have we exhausted our other options?

The Persian Gulf War of 1991 met all of the Weinberger criteria. The results were so spectacular that they stimulated worry in some quarters about a "Gulf War Syndrome," in which military leaders, their confidence restored, might move in reckless and arrogant ways. What the various syndrome theorists tend to forget is that the armed forces do not decide which wars they will fight. When the President tells the troops to go, they go.

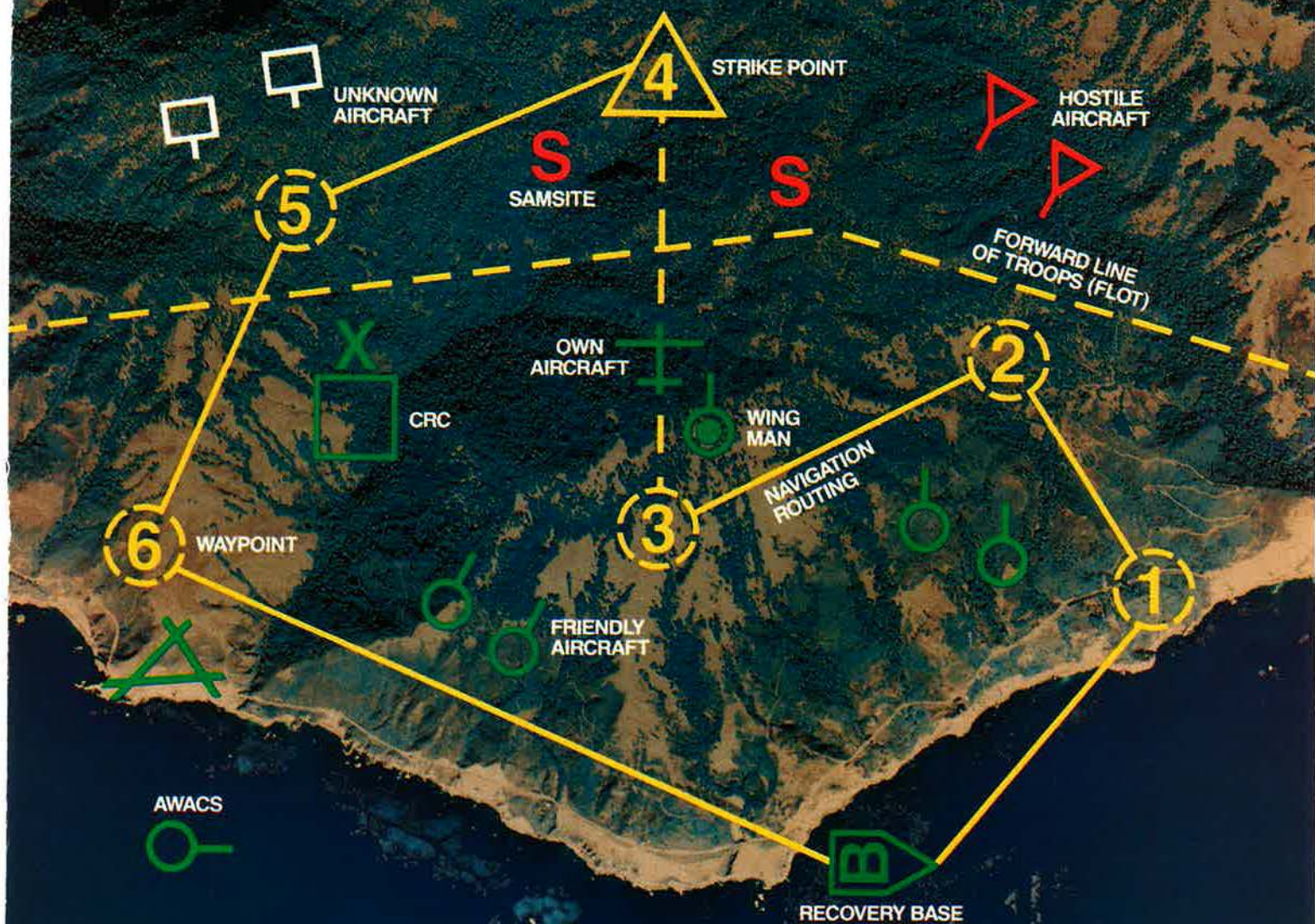
If elected leaders sign up to the Limited Objectives concept, they demonstrate a casual attitude toward a grim responsibility. Modern military power is awesome stuff to unleash if your objectives are unclear or your intentions are fuzzy.

The Limited Objectives doctrine sounds very much like open-ended commitment for uncertain purpose. The scholars of the Limited Objectives school are not the first to believe they can regulate war and use power in measured doses. Those who remember the Bay of Pigs, Vietnam, and Desert One might be forgiven if they think they've heard these ideas before.

If the approach breeds true to historical form, the next step is to have political aides cooking up military operations in the back rooms of Washington.

These people are not dealing in abstract concepts. They are tinkering with deadly force. If their notions become policy, we may learn all over again that it is much easier to get into a fight than it is to get out of one. ■

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## Masters of None

Bruce Callander's excellent "The Wall-To-Wall Training Review" [November 1992, p. 40] provided thought-provoking reading for anyone interested in the long-range future of our defense forces. However, I wish he had gone a few steps further and discussed some of the more radical changes being seriously proposed regarding the service academies.

I doubt that many readers are aware of the current efforts to mandate both a civilian Dean of Faculty at the US Air Force Academy and to require that at least half of all instructors be civilian instead of military. Lurking in the wings is an outlandish proposal to consolidate all the service academies into one "jack-of-all-trades" school for professional warriors. What will that give us? Masters of none?

While I am not a service academy graduate, I have attended many schools and am a strong believer in the philosophy that a student must respect the instructor as an authority in both the subject and its relationship to the career field being pursued. Can a civilian possibly relate to an occupation geared to preparing for war? Isn't it more likely that the aspiring fighter pilots in the classroom will be better inspired by the sight of an instructor wearing a uniform bedecked with wings and rows of ribbons showing that he's "been there"?

We applaud any effort to get the ultimate bang for the defense buck, but do we really want to see the education of our defense forces become hostage to the "lowest bidder" syndrome? Who would shop around for the cheapest surgeon for a needed heart operation? . . .

Joseph R. Kuhlman  
Kinston, N. C.

## Earning the Right

In your November 1992 issue, a letter from Col. Ruth Anderson, USAF (Ret.), about the "Photochart of USAF Leadership" [September 1992, p. 80] voices her concerns with what it shows about the present USAF senior commanders ["USAF's Glass Ceiling," November 1992 "Letters," p. 6].

Colonel Anderson seemed rather incensed with the fact that the people now in charge of the major Air Force commands are mainly white males. She refers to the increased presence of women and minorities in the Air Force and accuses the Air Force of maintaining a "glass ceiling" against them for senior command positions.

Much has been said in recent times about the glass ceiling, although mainly in the business world rather than in the military. There are certain salient facts that the proponents of the "glass ceiling conspiracy" have overlooked. Looking at the records of people who now occupy the senior command positions in the Air Force, the observer finds that these people have been in the Air Force since the 1960s, a time when relatively few women or minorities were members of the officer corps. Over the years, the present commanders have risen through the ranks, gathering the requisite training and experience with the best of the crop awarded the top command positions in the Air Force.

The number of Air Force officers who are women or minorities has greatly increased in only the last twenty years or so, and they are now rising through the ranks, just as the present senior commanders did before them.

Given these realities, it would be the height of folly to promote officers to senior command slots because of their gender or ethnicity before they have earned that privilege. . . . To use a hackneyed (but relevant) phrase, "Rome was not built in a day." However, consider the following.

**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**

Just a couple of pages away from Colonel Anderson's letter is a photograph of Capt. Amy Smellie, a C-130 pilot ["Aerospace World," November 1992, p. 13]. It will be people like Captain Smellie who will move into senior command positions in the years to come, which is as it should be. (Who knows? Maybe she will be the future AMC commander.) I have no doubt that she and her peers would not want to be handed a job because of a random mixing of genes, as opposed to their having earned their promotions, just as Captain Smellie has earned the right to sit in the cockpit of a multimillion-dollar aircraft.

Kenneth P. Myers  
Hockley, Tex.

## The Tomcat's Merits

Kudos to Frank Oliveri for "A New Tack for Naval Air" [October 1992, p. 46]. Since he was writing from the Air Force perspective, the intense controversy in the Navy regarding the F/A-18E/F vs. the F-14D did not receive extensive coverage. More details may prove of interest.

The controversy surrounding the F/A-18E/F does not stem from its being a bad airplane. F-18 models, for example, are more capable than their F-16 equivalents. The controversy relates to its cost vs. its capabilities. R&D for the F/A-18E/F is estimated to be \$5.5 billion to \$6 billion. To this must be added an extra \$7.87 billion to produce an unplanned 228 F/A-18C/Ds to keep the production line open until the E/F is ready. For this enormous cost, the Navy will receive in the early 2000s a fighter that is not as effective or powerful as the F-14D that was coming off the line in 1992.

The main benefit of the major re-vamping of the Hornet will be a range increase, which, if fully successful, will allow it in some cases to approach the range of an unmodified F-14D, but carrying fewer weapons.

Even with the E/F's improved avionics, it will not be capable of doing what the current Tomcat can do. The F-14D's APG-71 and its derivatives are very capable radar/fire-control systems. The F-14 also has passive



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## Letters

sensor (IRST, TV) capability beyond anything else in the West.

The sensor-fusion abilities of the F-14D will not even be matched by first-generation F-22s. The F/A-18E/F will be no match for the first-line adversaries it may have to face (Su-27, Su-35, and exported EFAs and Rafales). As the E/F replaces the Tomcat, the Navy's air-to-air capability will suffer a dramatic decrease.

The E/F will be an attack aircraft superior to an unmodified F-14D. However, an unmodified F-14D was not the alternative to the E/F. That alternative was the F-14D Quickstrike. This aircraft would retain all the F-14D's air-to-air abilities and would have strike modifications costing approximately \$250 million for R&D. This seems unrealistically low, until a few other facts are considered.

Unlike the Hornet E/F, no redesign of the F-14's airframe and powerplant is required. The APG-71 radar and fire control in the F-14D is a more powerful version of the APG-70 in the F-15E. As a result, much of the software already developed for the F-15E can be used in the F-14D Quickstrike. Improved forward-looking infrared and laser pods are already available from at least two manufacturers. As a result, the major development effort would be in software, mounting and testing the pods, and weapons integration and clearance trials.

The Navy would then have a strike aircraft with greater range than the F/A-18E/F's in most configurations, strike capability exceeding the F-15E's, and an aircraft that reportedly can carry an external payload faster than anything in the US inventory. *Anything.*

Of course, new production of F-14Ds has been terminated, and production of rebuilds (unlike the Hornet, older F-14s can be rebuilt to the new configuration) is scheduled to cease in 1993. Therefore, it would take longer to put the Quickstrike in service than originally estimated. It would still be available earlier than the F/A-18E/F. There would also be a cost to restart the F-14 line. In 1991, the estimated cost was \$166 million, but even if it were twice that today, it would be a fraction of the cost of bringing the F/A-18E/F on line. There would be no cost to keep the line open for F-14s until Quickstrike, since Quickstrikes are F-14Ds.

The less capable F/A-18E/F will cost less to maintain than the F-14D Quickstrike, partly because of its lower capability and partly because its flight-control systems will be more modern. The production costs of the two air-

craft might not be that different. A 1991 estimate, admittedly by Grumman, was that at an equal production rate, a Quickstrike would cost an average of \$2 million more than an F/A-18E/F. For this \$2 million, the Navy would get a much better fighter and a generally superior strike aircraft, sooner.

The other F-14s mentioned were not really considered against the F/A-18E/F. The Super Tomcat 21 was an upgrade of the F-14's airframe and avionics to produce an ATF-class aircraft. Compared to the F-22, it would not be nearly as stealthy, would supercruise Mach .2 slower (although it would have a higher top speed), would not be as maneuverable in certain regimes, and would be harder to maintain. On the other hand, it would have more sensors, be more heavily armed, be better for the Navy fighter mission than a maritime F-22 (but not as effective in the Air Force mission), have greater strike capability, and be a lot cheaper. The R&D for this Tomcat derivative would still be less than that for the F/A-18E/F.

The attack Super Tomcat 21 was the same aircraft optimized for the strike role with changed avionics and greater weapons carriage. F-14Bs and Ds could be rebuilt to Super Tomcat 21s, if desired. The Advanced Strike Fighter F-14 was a radical change, but its increase in capabilities over the Tomcat 21 was not considered worth its R&D. These aircraft's relevance to the controversy is that they're not feasible without continued F-14D production, which won't happen if there's an F/A-18E/F.

Other controversial issues regarding the F/A-18E/F are the effects its costs and range will have on the A-X. With the originally planned initial operational capability for the vital A-X (around 2001-03), its funding "bubble" would coincide with that of the F/A-18E/F. It was inconceivable that Congress would fund these two large programs simultaneously. In addition, the new Hornet's range would be much less than that planned for the A-X, so it would be unable to provide cover when needed. It may not be entirely coincidental that the A-X's IOC has been pushed back to after 2007 and its range has been reduced. The Navy could even lose the A-X entirely. . . .

Art Hanley  
Sacramento, Calif.

## Problem Pieces

Thanks for the publicity provided when you featured the "World Famous Highly Respected (WFHR) Triple



Nickel" patch on your October 1992 cover and in "Pieces of History" [p. 36]. There is a small error in your description of what is depicted in the photo, which is supposed to feature Vietnam-era memorabilia. The 555th's patch of that era had the plan form of an F-4 and the words "Phantom II" around the base. The patch in the photo was adopted when the Nickel began flying the F-15 (hence, the eagle on the depicted patch) on November 14, 1974. In addition, I believe the visor cover shown is a post-Vietnam item—most helmets were either all white or camouflage during that period.

Thanks again, and to all former Nickel flyers, we'd like you to know that the WFHR 555th is alive and well and flying the Air Force's newest fighter, the F-15E, at Luke AFB, Ariz.

Lt. Col. John W. Wyatt,  
USAF  
Luke AFB, Ariz.

Perhaps I missed one in "Pieces of History," [October 1992, p. 36], but I didn't see any artifacts directly tied to the many contributions made by mobility forces. A Berlin Airlift Medal, for example, would have been a nice addition.

Col. Michael R. Gallagher,  
USAF  
Scott AFB, Ill.

With reference to "Pieces of History," I note that p. 37 depicts a uniform displaying a 5th Air Force patch with no Korean service medal or Asiatic Pacific medal—only an ETO campaign ribbon? Never happen!

With regard to the caption on p. 40, I never saw K rations in Korea (1951–52), only C rations.

TSgt. Jon C. Campbell,  
USAF (Ret.)  
Columbus, Ind.

I served in the same wing as the guys in the 555th "Triple Nickel" Squadron at Udorn RTAFB, Thailand. I can assure you that, contrary to what's depicted on your cover, our flight suits were Nomex, not cotton, and our patches didn't say "Tactical Air Command."

Maj. David R. Lester,  
USAF (Ret.)  
Panama City, Fla.

■ *Colonel Wyatt is correct, and we apologize for the error, but we would like to assure Sergeant Campbell that the collages were not thrown together randomly. If our hypothetical Korea-era airman had served in the European theater during World War II and was in the midst of his service in 5th Air Force, wouldn't that explain the*

*"discrepancies" that Sergeant Campbell discovered? Regarding his other contention, there were plenty of K rations in Korea during 1950. By and large, Major Lester is correct regarding Nomex and patches, but because the average tour in Vietnam was so brief in comparison to the length of US involvement, it is only a slight exaggeration to say that everybody's experience (and uniform) there was different.*—THE EDITORS

### Sharing the Credit

I have been honored—but humbled—in being named the Chennault Award winner for my part in the recent development of A-10 night tactics [*"Top Crews," September 1992, p. 98*]. The full story is that a number of A-10 pilots have contributed to the development of innovative night tactics using the AGM-65D Infrared Maverick.

Much of the credit goes to the 354th Fighter Wing and 23d Wing, A-10 wings that turned these evolving night battlefield skills into successful results in Desert Storm. I accept this award on behalf of the entire A-10 community, especially the "Hog Drivers" who have mastered the dark, looking through the "Soda Straw" Maverick with their "Mark One" eyeballs.

Capt. Arden Dahl,  
USAF  
England AFB, La.

### Not the First

I am proud that you honored our seventy-fifth anniversary with the photo of four 36th Fighter Squadron F-16Cs carrying navigation and targeting pods, AIM-9s, and GBU-10s [*"Aerospace World," September 1992, p. 16*]. However, I need to clear up any confusion caused by the caption, which implied we were the first to incorporate the use of the targeting pod. Our F-15E brethren used the system with great success in Desert Storm. In fact, the 36th FS received some of their combat-proven pods in our initial allocation.

Some firsts for the 36th Fighter Squadron F-16s: first operational F-16 LANTIRN unit (navigation pod only)—November 1990; first fully operational F-16 LANTIRN unit—January 1992; first F-16 operational pilot to self-designate a GBU—Maj. Sal Collura, February 1992. . . .

Those are just a few. We are all proud of the men and women who helped make them happen.

Lt. Col. Tim Cantwell,  
USAF  
Osan AB, Korea

### The True Debut

I write in reaction to the "Aerospace World" announcement [*October 1992,*

*p. 19*] that falsely proclaimed the September debut of the USAF Thunderbirds' F-16Cs at the Cleveland Air Show. While it was a "first" for Cleveland, the team actually debuted its ninth different aircraft, the Block 30 F-16C, at the first air show of the 1992 season—March 21 at Homestead AFB, Fla.

The quote attributed to Captain Paquette, our maintenance officer, came directly from our January 1992 press package.

I imagine your credibility among the nearly three million air show enthusiasts who have seen the team perform in the F-16C since March is somewhat tarnished.

Capt. Eric W. Schnaible,  
USAF  
Nellis AFB, Nev.

### Not a V-2

Stewart M. Powell undermines his credibility in "Scud War, Round Three" [*October 1992, p. 32*] by stating that "the liquid-fueled rockets [Scuds]" were "derived from the Nazis' buzz bombs of World War II." The nickname "buzz bomb" referred to the V-1 cruise missile, distinguished by its buzzing pulse-jet propulsion system. The V-2 ballistic missile was, in fact, the antecedent of the Scud missile, but it had no nickname.

Michael J. Dunn  
Auburn, Wash.

### The First Commander

After reading Col. Gordon Bradburn's excellent "Air Commandos' Successors" letter in your November issue [p. 6], I must correct his contention that he was "the first commander of the 14th Air Commando Wing at Nha Trang."

On March 8, 1966, on orders from 2d Air Division, I activated the 14th Air Commando Wing at Nha Trang, assuming command as of that date. Colonel Bradburn, the Air Force's designated commander, arrived to relieve me April 20, 1966.

That was my first (and only) wing command. I enjoyed every day of that six weeks! To see the unit go from an air base squadron with 110 men in November 1964 to a 3,500-man combat wing with two Sandy/Spad squadrons, a "Puff" squadron, a "Gabby" outfit, plus the 20th Helicopter Squadron, in just seventeen months made me feel pretty good. . . .

I am proud to have flown with Air Commando units. I hope I'm still around when that designation gets back where it belongs.

Col. Robert J. Jones,  
USAF (Ret.)  
Roseville, Calif.

# The Chart Page

By Tamar A. Mehuron, Associate Editor

## Profiles of Guard and Reserve Forces



### Air National Guard Mission Shares

(Percentage of total Air Force)

CONUS interceptor	100
Tactical reconnaissance/RF-4C	100
Combat communications	69
Tactical airlift	39
Weather	38
Air rescue	32
Tactical fighters	31
Strategic tankers (KC-135)	28
Civil engineering	27
Support aircraft	27
Aerial port	15
Medical personnel	13
Strategic airlift	7
Special operations	6

### Air Force Reserve Mission Shares

(Percentage of total Air Force)


Aerial spraying cap	100
Weather reconnaissance	100
Aeromedical evacuation	71
Aerial port	63
Aircraft battle-damage repair	59
Strategic airlift	54
Tanker/cargo	44
Strategic airlift maintenance	40
Air rescue recovery	34
Aeromedical airlift	30
Tactical airlift	23
Strategic airlift	19
Civil engineering	16
Special operations	12
Tactical fighters	9

Source: Department of Defense

Among NATO's sixteen members, the US ranks thirteenth in use of reserves, expressed as a percentage of the total force. Only in Canada and Iceland (which has no forces) is the proportion lower. One reason European nations have been able to make such heavy use of reserves, however, is that the US has maintained a large active-duty presence on the Continent.

### NATO Armed Forces Reserves

(Percentage of total military establishments)



Norway	92
Denmark	83
Portugal	75
Greece	72
Germany	68
Turkey	66
Belgium	63
Italy	62
Netherlands	60
United Kingdom	54
Spain	49
France <sup>1</sup>	48
United States	46
Canada	43
Luxembourg <sup>2</sup>	0
Iceland <sup>3</sup>	0

**Note:** US figures denote ready reserves, which includes selected reservists in the Individual Ready Reserve but excludes standby reserves and retirees. This is regarded as comparable to the numbers given for other nations.

<sup>1</sup>France no longer participates in the NATO military command structure.

<sup>2</sup>Luxembourg has only an active-duty force of 800.

<sup>3</sup>A NATO member, Iceland has no military forces.

Source: Congressional Budget Office

By Brian Green, Congressional Editor

## Cushioning the Fall

Congress acts to soften the impact of the defense draw-down.

**W**ITH the armed forces being hard hit by austerity, Congress enacted a comprehensive package of programs and benefits designed to ease the impact of the defense draw-down on servicemen and -women, military industry, local workers, and communities. The Fiscal 1993 defense authorization bill includes measures to help the services manage the personnel drawdown, link the civilian and defense technology bases, and provide direct financial aid.

Congress authorized the Secretary of Defense to offer early retirement to personnel who apply, who are in job categories with a surplus of personnel, and who have at least fifteen but less than twenty years of active service. This temporary discretionary authority—which runs until October 1, 1995—is designed to help the services reduce overstrength specialties and year groups. The Defense Secretary may extend the early retirement option to those who already took advantage of early separation incentives last year. Congress authorized an early retirement option for selected reservists who also serve in surplus categories and fall within the fifteen-to-twenty-year service group.

### Money for Defense Conversion

Congress authorized \$1.5 billion for defense industrial conversion programs designed to sustain a fairly strong production capability. Rep. Bill Dickinson (R-Ala.), the recently retired ranking minority member of the House Armed Services Committee, criticized the defense conversion provisions as "little more than domestic spending dressed up to look like defense."

The provisions include:

- \$100 million for dual-use critical technology partnerships to help stimulate industry investment in what Congress considers vital defense technologies.

- \$50 million for commercial-military integration partnerships to foster com-

mercial technologies that could help meet defense needs.

- \$100 million for regional technology alliances to take advantage of regional manufacturing strengths.

- \$100 million for defense manufacturing extension programs to promote local, state, regional, private, and nonprofit organization manufacturing programs.

- \$200 million for dual-use technology extension programs to help defense-dependent companies.

Additional funds were provided for government-industry cooperative efforts in manufacturing technology, manufacturing engineering education programs, and the Small Business Innovative Research Program. Money was also earmarked to establish DoD's Office of Technology Transition, responsible for helping spread defense technologies to private industry.

Congress authorized \$350 million, \$216 million more than the Pentagon's original request, to share the costs of the development of a variety of technologies with commercial and potential defense value, including semiconductor manufacturing, multichip modules, and high-definition displays.

To help defense-oriented communities through difficult times, Congress authorized the addition of \$50 million to the \$4.9 million requested by the Pentagon for its Office of Economic Adjustment. The money would be allocated in the form of planning grants for communities hit by closure of military installations or the drawdown of defense business. The authorization bill also provided \$8 million for payments to local schools losing large numbers of DoD dependents because of base closures or realignments.

Congress authorized \$80 million to finance Economic Development Administration grants that will provide capital investment in communities suffering as a result of the drawdown.

### Education, Health-Care Assistance

Education and health care were a key part of a broad range of improved benefits to assist separating service members. Congress authorized DoD to provide \$50 million to worker relo-

cation and training programs under the Department of Labor's Job Training Partnership Act. It also authorized active-duty personnel who specialize in skills that are not transferable to the private sector to apply for up to one year of educational leave of absence to obtain civilian skill training. DoD civilian employees also are entitled to receive Job Training Partnership Act assistance for twelve months in advance of a base closure or realignment that will disrupt their employment. Furthermore, separated Selected Reservists, at the Secretary's discretion, may continue to receive GI Bill educational assistance.

Congress extended to eighteen months the period covered by transition health-care policies to service members affected by the force reductions. Beginning October 1, 1994, transitional medical coverage will be offered to anyone losing military health care. Congress also authorized DoD to pay, for up to eighteen months, the government contribution to federal health insurance plan for civilian employees involuntarily separated due to a reduction in force.

Along with all these initiatives, Congress tinkered with the Voluntary Separation Incentive (VSI) and Special Separation Benefit (SSB). The Fiscal 1993 defense bill authorizes the same transition medical care and employment benefits for VSI and SSB and adds travel and transportation allowances to both. Those opting for VSI can now participate in the Selected Reserve without the requirement that any active-duty or reserve pay be fully offset against the VSI annuity. VSI and SSB recipients can now also take advantage of GI Bill benefits.

One interesting option: Congress created a corps of former service members known as Volunteers Investing in Peace and Security (VIPS). Volunteers experienced in logistics, health care, engineering, nuclear plant safety, the environment, and communications would spend two years rebuilding the sagging infrastructure of the newly independent states of the old USSR. The annual stipend for each volunteer would be \$25,000. ■

# Washington Watch

By James W. Canan, Senior Editor

## From the Sea

The Navy's new vision of the future does not forsake blue water, but it does bring operations closer to shore.



In 1989, before the Berlin wall came down, the Air Force began to devise a strategy for adapting to the post-cold war world. That strategy surfaced in the white paper "Global Reach, Global Power" in mid-1990 and was soon validated by the Persian Gulf War, an airpower extravaganza.

The white paper came in handy right away. It set the stage for Air Force reorganization around two new operational commands—Air Combat Command for global power and Air Mobility Command for global reach—as the core of the service's combat operations. It also stated the case for the Air Force as the airpower service of choice.

The document went beyond the parochial to the ecumenical. "It lifted people's sights to the broader aspects of airpower—to how airpower can play with joint forces and in many peacetime and wartime roles," claimed Secretary of the Air Force Donald B. Rice.

Now comes the Navy with its white paper "From the Sea," which sets forth its startling new maritime strategy for the post-cold war world. Global reach and global power are left unsaid but are implicit throughout.

Strictly speaking, the Air Force and Navy white papers are unrelated to roles and missions reviews under way at the Pentagon and on Capitol Hill. In practice, though, they are all of a piece. The strategies in the white papers underpin the roles and missions that each service believes are rightfully its.

Airpower, the essence of both the Air Force and Navy game plans, is a major issue—maybe the biggest—in the running debates over roles and missions. The question is whether long-range, landbased airpower or carrier-

based airpower—and the planes and forces that go with each—should become the main instrument of US global power at a time when the nation can no longer afford, and may not need, its customary abundance of both.

### A Common Purpose

Although competitive from the roles and missions standpoint, the "Global Reach, Global Power" and "From the Sea" strategies serve a common purpose in a larger sense. Each makes the case for maintaining a powerful, though much altered, Air Force and Navy. Each, in its fashion, is a persuasive appeal for a strong national defense at a time of civic preoccupation with domestic affairs.

Lt. Gen. Steven B. Croker, vice commander of Air Combat Command, provided such a perspective not long ago in a speech at an AFA symposium in Los Angeles. These days, he said, "the toughest problem [for the US military] is an intellectual problem." Why? Because "when the cold war ended, we lost our common framework for debate, our common set of assumptions, our intellectual model. We lost what we were all about. . . . The old defense paradigm has been destroyed or largely discredited, and there has been none to take its place. There's no widely held model that everyone uses to talk about defense."

In its 1990 white paper, the Air Force "offered a new defense paradigm, a new way to frame the [defense] debate," General Croker said. "It has been largely successful. It hasn't been universally accepted yet, but things are getting a little easier in Washington because of it."

The Navy is now "adopting the same paradigm, the same kind of intellectual framework" as the Air Force in reshaping its organizations and operations to adapt to a fast-changing world, the ACC vice commander noted. "The Navy doesn't call it 'global reach, global power,' but they're talking about CONUS basing, expeditionary forces, doing away with large carrier battle groups [in some circumstances]," he said.

Roles and missions aside, what

matters most is that both services are preparing for the future in concert. Maintaining a strong national defense is "an important challenge for us all," General Croker said.

As things stand, he said, arguments can be advanced for cutting the defense budget every which way and by any number, and "they will all have equal credibility because there's no common set of questions, no common set of assumptions" on which to frame such arguments. "Until we have a commonly accepted defense paradigm that people believe in and can see working, we're going to have a very difficult time with the defense debate," the ACC vice commander declared.

He claimed that it is chiefly up to Air Combat Command to make the case for the Air Force. ACC is "where the rubber meets the road. . . . If we don't carry it through—put meat on its bones—that paradigm will be largely discredited, and we'll be in a period of intellectual vacuum for quite a while."

Traps lie ahead for both services. Their partnership in the larger purpose could come apart if their strategies become snarled in wrangling over roles and missions. Despite the best intentions of both, they may not be able to avoid falling out. If present trends persist, it is unlikely that there will be enough money for both to buy all the planes that they see in their futures.

### The Air Force Edge

There is a school of thought that the Air Force has the edge as the result of its running start with a game plan and airplanes to match. Its strategy and requirements for future combat aircraft to carry out that strategy were in place prior to the Persian Gulf War and came out of it all the more credible. Its development of the hot, stealthy F-22 air-combat fighter for the next century has had some rough spots but seems securely in place.

The Navy is running behind. Its new strategy and latest requirements for future aircraft grew out of the Gulf War and seem well justified in the hindsight of that war, but the strategy and the requirements may be somewhat out of sync.

The spotlight is on the A/F-X multirole aircraft that the Navy is counting on as its mainstay multirole fighter for the twenty-first century. The Navy is modifying its original requirements for the plane to tailor it to the new strategy, and the tailoring may prove troublesome. The Air Force has eyes for the A/F-X and has enthusiastically endorsed its proposed modifications thus far. But the plane is looking less and less like the long-range interdiction aircraft that the Air Force will need and more and more like the stealthy fighter that the Air Force will have plenty of.

If the A/F-X does not pan out, the Air Force can always turn to building an air-to-ground variant of its F-22. Such a variant has been a live, though understated, possibility in Air Force planning circles since the Advanced Tactical Fighter development program began, as the genesis of the F-22, more than a decade ago.

None of the above is a knock on the A/F-X or on the Navy's new maritime strategy as such. In performance alone, the stealthy, speedy A/F-X looks like a winner. So does "From the Sea." It is widely hailed as a well-reasoned document that makes a persuasive case for the Navy's break with its blue-water past, a break sharp enough to leave old salts incredulous. As a jolt to hidebound traditionalists, "From the Sea" ranks right up there with the Air Force's decision to scrap time-honored distinctions between strategic and tactical airpower and to merge SAC and TAC.

The new naval game plan, which postdates the Gulf War by almost two years, places much less emphasis on the open-ocean, big-fleet, so-called "blue-water" operations—always on the lookout for oncoming Soviet attack submarines and long-range bombers and cruise missiles—that were central to US maritime strategy through the cold war—indeed, all the way back to John Paul Jones. "From the Sea" does not take the Navy out of the blue-water business but brings it much closer to shore.

Signed by top officials of the Navy and the Marine Corps, "From the Sea" proclaims that both will place "far greater emphasis on joint and combined operations" while providing "unique capabilities of indispensable value in meeting our future security challenges."

Claiming for naval and Marine forces such natural attributes as powerful forward presence, strategic deterrence, sea control, power projection, and sealift, the white paper proclaims that "these maritime capabilities are particularly well tailored for the . . .

crisis-response missions articulated in the President's National Security Strategy."

#### Farewell to Blue Water

"From the Sea" postulates "a fundamental shift away from open-ocean warfighting on the sea [and] toward joint operations conducted from the sea. . . . Our ability to command the seas in areas where we anticipate future operations allows us to resize our naval forces and to concentrate more on capabilities required in the complex operating environment of the 'littoral,' or coastlines, of the earth."

It declares, "Mastery of the littoral should not be presumed. It does not derive directly from command of the high seas. It is an objective which requires our focused skills and resources."

"With the demise of the Soviet Union, the free nations of the world claim preeminent control of the seas and ensure freedom of commercial passage. As a result, our national maritime policies can afford to de-emphasize efforts in some naval warfare areas."

Thus, notes the white paper, "the answer to every situation may not be a carrier battle group." Some situations, it says, may call instead for an "amphibious readiness group" with a large amphibious assault ship, such as *Iwo Jima* (LPH-2), as its flagship, and/or a "surface action group" composed of warships with Tomahawk cruise missiles, such as those that struck strategic targets in Baghdad's environs with telling effect at the onset of Operation Desert Storm.

Or, says the white paper, a given mission may well require "the overwhelming power of a carrier battle group and an amphibious ready group with embarked Marines, operating with Air Force and Army forces." Withal, it asserts, "the key is continuously tailoring our forces to anticipate and support national needs."

Not long ago, Vice Adm. Layton Smith, Deputy Chief of Naval Operations for Plans and Operations, and Marine Corps Brig. Gen. Thomas Wilkerson, Deputy Assistant Commandant for Plans and Operations, joined in a discussion of "From the Sea" with defense writers in Washington. They predicted, among other things, tighter teamwork between Navy and Marines.

#### "The Fog of the Littoral"

Under the Navy's former strategy, war meant "war at sea . . . with the Soviet Union," Admiral Smith explained. Under its new strategy, he said, the Navy "will have to go into the battle scene . . . fight in the fog of the littoral."

"If we have the Marines ashore in a contested area, the [aircraft] carriers will be right in there with them, providing what they need in terms of cover, close air support, interdiction, or whatever," the Admiral declared. "We will have a very direct—not an indirect—effect on the war on land."

General Wilkerson predicted "much closer integration between [Marines] and the Navy, because they'll be spending more time in the regime of naval combat power where we've been all along and less time in the regime of the deep ocean."

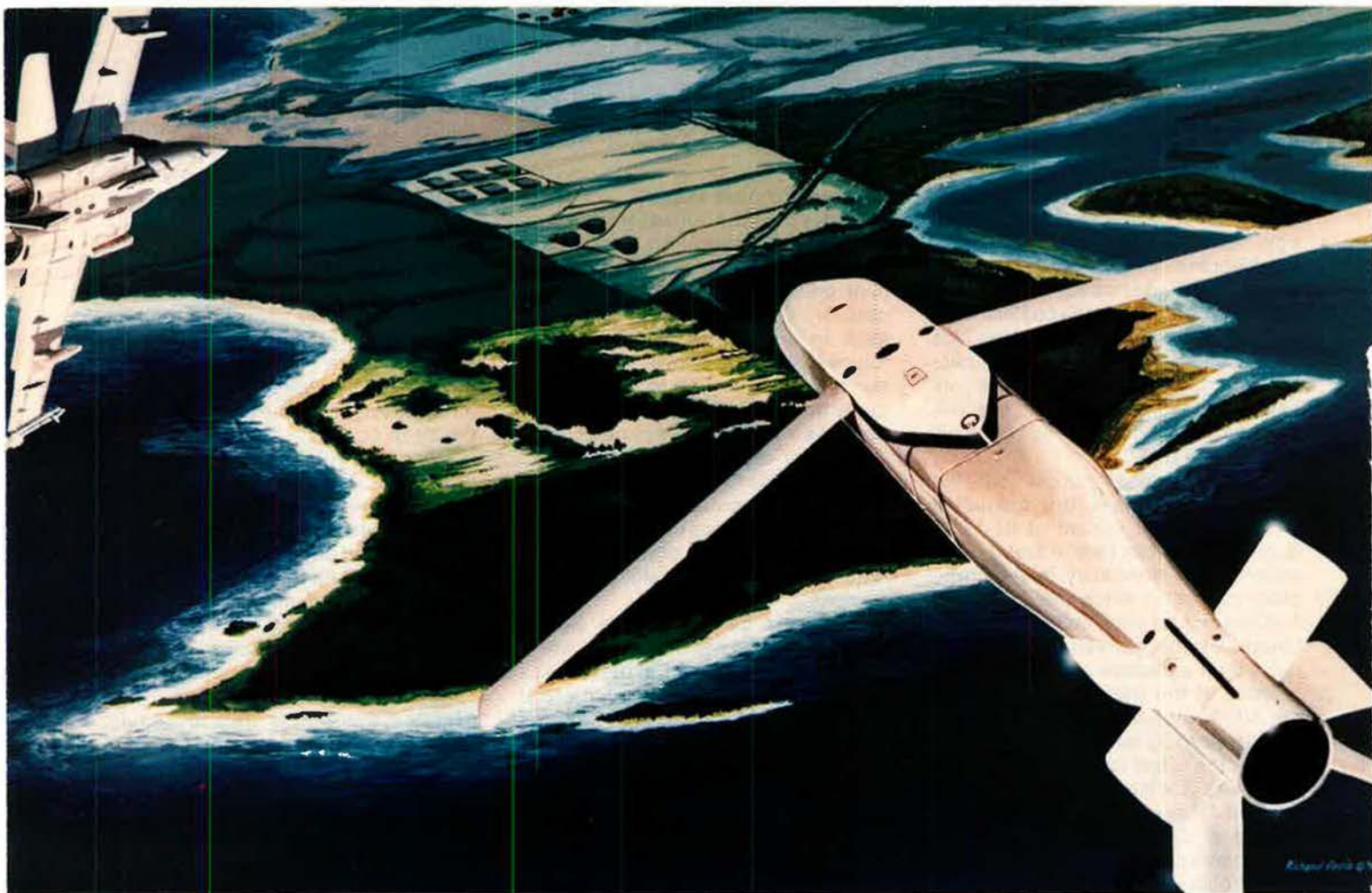
Rear Adm. Riley Mixson, the Navy's director of Air Warfare, emphasized at a US Naval Institute seminar on US airpower late last year that "From the Sea" is not an attempt to take the play away from the Air Force. The US "must maintain . . . a mix of long-range bombers, landbased interdiction aircraft, and seabased tactical aircraft," he declared.

Admiral Mixson contended, however, that the Navy is "unique" among the US military services and among the world's navies in its prowess for "projecting power ashore." He called this the Navy's "core competency," the capability that sets it apart from the other armed services and from all other navies as well. The Navy now plans to "put one of its feet on land" and must "maintain a very robust, seabased aviation force as a vital part of the air triad," he said.

The Admiral pictured future scenarios in which "naval aviation from aircraft carriers and, if required, land-based expeditionary aircraft will supply Marines ashore with sustained, high-volume tactical air support to extend the landward reach of our littoral operations." Navy aircraft, he explained, are "well-suited for expeditionary airfield operations ashore when additional landbased support is needed."

Near the end of 1992, the Navy moved to tighten its teamwork with—some would say, its hold over—Marine aviation. It announced a plan to disband two Navy squadrons on each of two aircraft carriers—*Theodore Roosevelt* and *Abraham Lincoln*—and replace them with four Marine squadrons of F/A-18 strike fighters and EA-6B electronic warfare planes. The Marine squadrons will operate off the carriers or from airfields ashore at the discretion of their carrier battle group commander, a Navy admiral. The Navy plans more of the same if the switch works out.

Meanwhile, the Navy is encouraging the Marine Corps to sign up, as the Air Force has done, for the planned A/F-X multimission fighter. The Navy



# JSOW: low risk and ready to meet the challenge



AIWS fit check on F-15E

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Texas Instruments – leading the team for JSOW development and production.



JSOW Dynamic Submunition Dispense Test

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01-JSW-922

needs all the A/F-X buyers it can get in order to achieve economies of scale and thus keep the plane's cost under control. The A/F-X may be the Navy's best and last hope for the urgently needed modernization of its carrier-based aircraft fleet in the long term.

### **Two Tracks, Two Crashes**

In the early 1980s, the Navy introduced a two-track plan to replace its aging A-6E carrier-based bombers. It proposed producing an updated variant called the A-6F and then, in the longer term, the stealthy Advanced Tactical Aircraft, later designated the A-12. Both the A-6F and the A-12 programs were subsequently canceled amid financial difficulties.

After the A-12 went off the boards in early 1991, the Navy came up with another two-track aircraft modernization plan with a somewhat different twist. This one dealt with fighters as well as bombers. It called for development of the F/A-18E/F "stretched Hornet" strike fighter to replace—and greatly improve upon—the F/A-18C/D in the near term, and for the A-X, as it was called at the time, to replace the A-6E as the fleet's mainstay, long-range, all-weather bomber.

Last summer, while putting the finishing touches on "From the Sea," the Navy switched signals on the A-X. Senior Navy officials announced that the plane would be designed as a multirole fighter-bomber, not exclusively as a bomber, to replace not only the A-6E but also, ultimately, the F-14 long-range interceptor and the F/A-18 strike fighter well into the next century. They began calling it the A/F-X.

The Navy's move caused a stir on Capitol Hill, where the Pentagon's aircraft-acquisition plans were already under fire. As the leader of a congressional move against roles and missions redundancies, Sen. Sam Nunn (D-Ga.), chairman of the Senate Armed Services Committee, claimed that the nation could not afford and would not need each and every airplane the services had on their shopping lists.

The central question to be resolved in sorting out superfluous airplanes, said Senator Nunn, is this: "What is the best and most cost-effective way to provide air interdiction in the future—with long-range bombers from the United States or with large numbers of aircraft carriers with medium-range bombers on their decks?"

He raised many related questions, such as: Will the Navy really need both the A-X (as it was still being called outside the service) and the stretched F/A-18E/F? Should the Navy

be required to relinquish its longer-range bombers like the A-6E and the A-X and make do on carriers with shorter-range strike fighters like the F/A-18?

Not long thereafter, at the Naval Institute's airpower seminar, Admiral Mixson said, "Could we make do with our existing aircraft, forgo the [F/A-18]E/F, and wait for [the A/F-X]? Yes, we could do it. But the problem is, we don't have much growth left in our current [F/A-18C/D] Hornet out there, and we would have to do some things to some other aircraft, which are also costly." He said the Navy "very much needs" the F/A-18E/F "to fill the void" until the A/F-X comes along.

The Navy is being careful not to pit its two premier aircraft programs against one another in terms of their future needs for annual funding. It recently slipped the A/F-X program schedule two years, thus deferring the plane's initial operational capability until 2007. One reason for this was to comply with a congressional requirement to develop competitive prototypes. Another was to put more distance between the A/F-X program's peak funding years and those of the F/A-18E/F.

The Navy seems to be out of options where the A/F-X is concerned. It urgently needs to replace its A-6Es, and time is running out. Though still admirable in many respects, those burly bombers are very old, relatively slow, and decidedly unstealthy. If the A/F-X program comes to grief, like the A-12 program before it, the Navy may have to default on its deep-strike bomber mission.

Some defense aficionados suspect that the Navy is already taking that very risk by turning the A-X into the A/F-X and tailoring it more to coastline operations. This means less emphasis on—and less built-in range for—the deep interdiction mission, and more emphasis on supporting amphibious operations in the air-superiority mission, now performed by F-14s and F/A-18s, and in close air support, a mission now dominated by F/A-18s.

### **Deep Interdiction Less Likely**

At a recent session with defense reporters, Secretary of the Navy Sean O'Keefe claimed that the Navy does not require the A/F-X to be "a long-range interdiction aircraft" because deep interdiction missions "are not the highest probability [for the service] in the years ahead." Thus, he said, it makes sense that the A/F-X "evolved" from its A-X beginnings as a straightforward replacement for the

A-6E bomber to become "an attack fighter aircraft, with primary focus on attack."

"We just don't need . . . this extraordinary 750-mile range" once earmarked for the A-X, said Secretary O'Keefe, "because nobody's going to be out there" for the plane to attack.

Adapting the A/F-X to littoral warfare may draw the Marine Corps into its program. Admiral Mixson predicted as much. However, the modifications, including a likely 100-mile reduction of the plane's required maximum range, seem risky for the Navy in other respects. They fortify the argument that the service has no need for both the F/A-18E/F and the A/F-X. And they may influence the Air Force to think twice, sooner or later, about buying the A/F-X to replace its deep-interdiction F-111 and F-15E.

The Air Force is not making waves at the moment. Gen. Merrill A. McPeak, the Chief of Staff, told an AFA symposium audience last October that the A/F-X is "as much a requirement for us as it is for the Navy" and that the Air Force is an "enthusiastic" partner in the program.

"I foresee a lot of problems yet to solve in the program, but we're in it for the long term . . . fully signed up," General McPeak declared. "This is not a sham, where we are half-hearted in our participation."

Secretary Rice took the same approach at the AFA symposium, but with a pointed reminder. He noted that the Air Force has the F-22 "in reserve" and asserted, "We can always fall back to an air-to-ground version of the F-22 if that's necessary."

Dr. Rice claimed that the Air Force still finds the A/F-X very much to its liking, even though it has lost weight and range in the reordering of its performance requirements. He said the multimission A/F-X designed for carrier launching "will probably provide us a little more capacity to adapt it to an F-111 or an F-15E-like mission off a long runway than will the F-22."

He explained that the Navy, in switching from bomber to multirole fighter, can now draw more fully from advanced fighter-engine technologies, as well as from the avionics and the materials, that the Air Force developed for the air-superiority F-22.

There is nothing phony going on. The Air Force and the Navy are clearly in this together—in their mutual quest of the A/F-X and in their promotion and implementation of new strategies for a strong national defense. The thing to watch is how well and how long both stay with the A/F-X. ■

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By Frank Oliveri, Associate Editor

## Women-in-Combat Panel Wraps Up

A Presidential panel recommended that the US continue to exclude women from ground combat and combat aircraft but voted to admit women to a number of combat assignments on warships at sea.

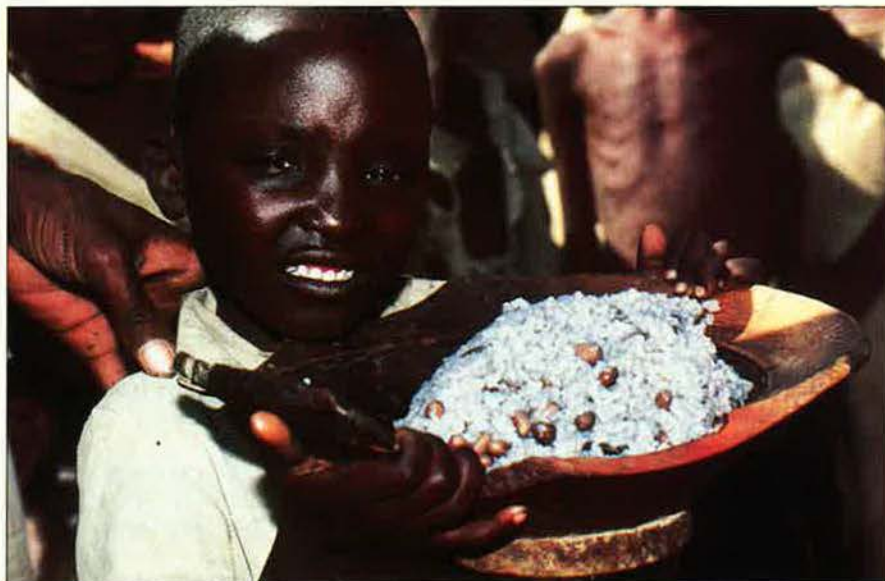
The Commission on the Assignment of Women in the Armed Forces issued its long-awaited report in November. The fifteen-member panel, whose creation was mandated by Congress, voted on twenty key issues. The conclusions it reached on these issues form the basis of the report. The panel worked for seven months, using surveys of military personnel and the public, comments from retired generals and admirals, and visits to thirty-one military bases. More than 11,000 statements and letters were received, and 300 persons testified before the panel.

The panel strongly supported banning women from ground combat—ten votes for exclusion and five abstentions. In the area of aerial combat, commissioners were less decisive. By an eight-to-seven vote, women were excluded from combat aircraft in the Army, Navy, and Air Force. Commissioners voted to allow women to serve in some combat roles on warships but sought to keep the ban on women in submarines and amphibious ships. In addition, by an eleven-to-three vote, women were not required to register for the draft.

## US, NATO Approve F-16 Update

The Bush Administration notified Congress of a planned sale to four European allies of \$1.85 billion in US goods and services to carry out an F-16 Midlife Update (MLU) program. Recipients would be Belgium, Denmark, the Netherlands, and Norway.

The controversial MLU program has been discussed in the US and the allied nations at the highest levels. The US originally planned to buy about 225 MLU kits for its F-16A/B jets but chose to limit its participation in the program to sharing the cost of the \$400 million MLU development effort.



USAF photo by SSgt. Dean Wagner

*A Somali boy smiles over rice and beans at a Feed the Children relief camp near Belet Huen. Air Force C-130 and C-141 transports continue to bring food and troops to the starvation-ravaged people of Somalia, where Operation Restore Hope, under UN control, is offering hope to the war-torn nation.*

The MLU, essentially an avionics retrofit program, comprises a central core computer, Block 50 cockpit design, digital terrain systems, Global Positioning System, APG-66 radar upgrade, integrated data modem, microwave landing system, night capabilities provisions, and an advanced Identification, Friend or Foe system. General Dynamics will be the prime contractor.

The four nations will receive modification kits, installation, support equipment, training and training devices, technical assistance, technical orders, systems drawings, spare parts, and other logistics elements for full program support. The Netherlands will purchase 170 kits for \$775 million, Belgium 110 kits for \$500 million, Denmark sixty-three kits for \$300 million, and Norway fifty-six kits for \$275 million.

## Controversy Grows About Gays in the Military

President-elect Bill Clinton encountered widespread resistance to his plan to eliminate a legal ban on homo-

sexuals serving in the armed forces. Current military law holds homosexual acts to be criminal offenses. The services have discharged gay troops whenever they have been identified.

Gen. Colin Powell, Chairman of the Joint Chiefs of Staff, and Sen. Sam Nunn (D-Ga.), the chairman of the Senate Armed Services Committee, expressed a desire to keep the ban in effect and warned the President-elect to move with extreme caution and consult with senior uniformed leaders.

Of the prospect of admitting homosexuals to the ranks, General Powell said, "It's a very big problem for us." The JCS Chairman maintained that lifting the ban carries "enormous" legal, administrative, and privacy implications. Senator Nunn said bluntly that he supported the current policy.

As a candidate, the President-elect vowed to lift the ban "immediately" after taking office. In post-election statements, however, he refused to give a timetable, saying that he would act early in his term.

In a November news conference, he pledged to consult with military

leaders and impose what he called a "strict code of conduct" to govern the behavior of all servicemen and -women.

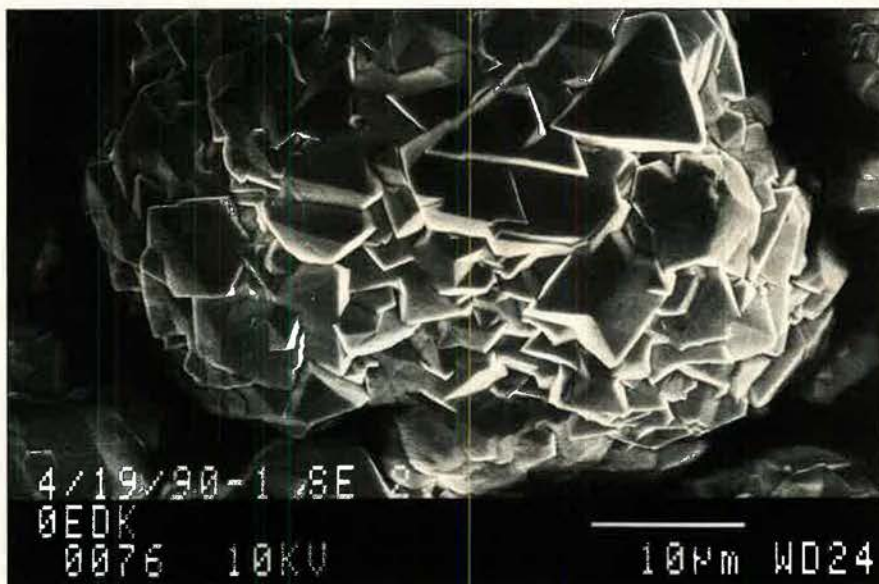
**Navy Foresees A/F-X Cost Rise**

The cost of developing the joint Navy and Air Force A/F-X fighter could increase by \$2 billion, and the airplane might miss its planned initial operational capability (IOC) date by one to two years, Navy officials said in November.

The Navy said that these problems would result from legislative action requiring the Navy to pick two contracting teams to build competitive prototypes. Navy officials used those same figures to dissuade Congress from changing the Navy's acquisition plan for the A/F-X.

Rear Adm. Philip S. Anselmo, the deputy director of Air Warfare, cautioned that the figures presented earlier this year were based on "a very preliminary assessment." That assessment was not nearly so thorough as the current work under way, he said. The Admiral added that the cost would depend heavily on the scope of the competition.

The Air Force and Navy signed the operational requirements document for the A/F-X on November 12, Admiral Anselmo said. The multimission jet is expected to have current-generation stealth, internal carriage of weapons, long range, night and all-weather capabilities, and avionics and sensors similar to those found in the Air Force



*Lockheed's Palo Alto Research Laboratories are turning hydrogen and methane into diamonds. Hundreds appear in this electron microscope image of a diamond "mountain" the width of a human hair. Military uses of the tiny diamonds could include infrared windows in missiles and thermal management for computer chips.*

F-22. It is also likely to have substantial air-to-air capability rivaling that of the best air-superiority fighters.

**SOF Crash Kills Twelve**

Twelve service members died and one was injured when their MH-60G Pave Hawk helicopter crashed into the Great Salt Lake in late October, US Special Operations Command said.

The helicopter, assigned to the 1st Special Operations Wing at Hurlburt

Field, Fla., was the fourth aircraft in a flight of four participating in a mobility and readiness training exercise. An investigation has been initiated.

The surviving serviceman was Maj. Stephan J. Lauchine, assigned to the 55th Special Operations Squadron, Eglin AFB, Fla. He was listed in fair condition following the accident.

The Air Force said that the dead were SrA. Derek C. Hughes, 23d Special Tactics Squadron, Hurlburt; SSgt. Steven W. Kelley, 55th SOS, Eglin; Sgt. Philip A. Kesler, 55th SOS; Lt. Col. Roland E. Peixotto, Jr., 55th SOS; Sgt. Mark G. Lee, 24th STS, Pope AFB, N. C.; Capt. Michael Nazionale, 24th STS; TSgt. Mark Scholl, 24th STS; Spc. Jeremy Byron Bird, 1st Battalion, 75th Ranger Regiment, Hunter AAF, Ga.; Sgt. Blaine A. Mishak, 1st/75th; Sfc. Harvey Lee Moore, Jr., 1st/75th; Lt. Col. Kenneth W. Strauss, 1st/75th; and Lt. Col. John Thomas Keneally, 3d Battalion, 75th Ranger Regiment, Fort Benning, Ga.

**EFA Becomes NEFA**

The European Fighter Aircraft (EFA) program took another unexpected turn in November when Britain provided Germany with a redesigned EFA which it claimed would cost less than DM100 million (approximately \$63 million) per production aircraft.

In 1992, Germany officially notified partners Britain, Spain, and Italy that it would withdraw from the EFA cooperative venture. However, interest in the EFA program revived under the



*USAF winners of the annual Top Scope air defense competition at Griffiss AFB, N. Y., which tests the mettle of air defense radarscope operators, are (left to right) Lt. Jon Grivakis, weapons director; A1C Ali Keffer, surveillance tracking technician; Col. Harvey Smith, sector commander; SSgt. Frank Locicero, surveillance tracking technician; and SSgt. Patrick Fitting, weapons director technician.*

new proposal. German officials said it takes sixty days for the withdrawal to take effect; another thirty-day grace period follows. German officials are referring to the new plan as the "New EFA," or "NEFA."

The German Air Staff seeks an air defense fighter. The price of the NEFA might dip below DM90 million per plane, well within German fiscal limits. Sources said that the new APG-65 radar systems being installed in older German F-4s could be installed in NEFAs, saving millions of marks. The NEFA would be a baseline fighter, to which each nation may add systems and capabilities.

### **USAF Hauls Food to Stricken Areas**

In November, the Air Force shipped more than 236 tons of flour to Armenia aboard Air Mobility Command C-5 Galaxies. Two C-5s from Dover AFB, Del., a C-5 from Westover AFB, Mass., and one from Travis AFB, Calif., left Kelly AFB, Tex., for Rhein-Main AB, Germany, and then flew to Yerevan, Armenia. During the same month, the US shipped 56,000 tons of wheat to Armenia.

Air Force C-130s airlifted about 5,000 tons of food and emergency aid into Kenya and Somalia through November. Aircrews supporting Joint Task Force Provide Relief flew up to twenty missions a day, delivering more than 200 tons of food to starving people in those countries.

### **Sales of Military Planes Drop**

The Aerospace Industries Association (AIA) reports that sales of military aircraft in the first half of 1992 dropped seventeen percent from the levels of a year earlier, while sales of missiles dipped by four percent.

In a November report, the association attributed the downward trend to declining US defense budgets, among other factors. The Pentagon's share of the total aerospace demand last year dropped to about forty-one percent, down from fifty percent in the mid-1980s.

However, AIA said that the US military's budget is still comparatively large and continues to fund substantial production activity. In addition, the US military continues to push for newer technology, bringing about greater research and development funding. This will keep military contractors in the forefront of technological development.

### **Bush Hails MIA "Breakthrough"**

President Bush claimed that the US achieved a "real breakthrough" in its quest to find and identify servicemen



*Cessna, Williams International, and FlightSafety International will team on a derivative of Cessna's CitationJet for the Joint Primary Aircraft Training System (JPATS) competition, Cessna said in November. The JPATS contract, for which seven teams are now competing, will be worth more than \$3 billion.*

and -women missing since the Vietnam War when Hanoi provided photographs, artifacts, and detailed records on Americans who fell into Vietnamese hands during the war.

Pentagon spokesman Pete Williams said photos of missing service members are being reviewed to resolve outstanding missing in action (MIA) cases. "We have received new information that is [significant enough] to warrant talking to the families and telling them what we've learned from these pictures," Mr. Williams said.

President Bush said, "Hanoi's records will at last enable us to determine the fate of many of our men."

A US delegation returned with 4,785 photos relating to Americans released by Hanoi. After eliminating duplications, the US was left with 1,750. They include 272 photos of live POWs, sixty-three of casualties and body parts, 710 of crash sites or wreckage, 325 of ID cards, 310 of media reports, 105 of personal effects, and ten of letters.

### **USAF Sets Retirement Board**

The Air Force announced it was convening a selective early retirement board (SERB) to begin work this month. The SERB will decide the fate of 3,348 lieutenant colonels with twenty or more years of service. A second board will meet later in the year to review the status of full colonels.

Excluded from the January SERB are colonel selectees, lieutenant colonels with a date of rank of May 1, 1992, or later, and officers with a mandatory retirement in Fiscal 1993 or 1994 or any approved retirement date.

The board will select no more than thirty percent of those eligible.

### **Law Raises Insurance Limit**

The Veterans Benefit Act of 1992, signed into law last October, permits service members to apply for Servicemen's Group Life Insurance (SGLI) coverage up to \$200,000. The new provisions took effect in December.

The new act raises the maximum coverage by \$100,000. The additional \$100,000 is optional.

The monthly cost of the coverage will remain at eight cents per \$1,000, with a maximum of \$16 per month for \$200,000 coverage. A 120-day conversion period began December 1. After March 31, all applicants will have to supply a statement of health, as required under the regular SGLI.

Veterans Group Life Insurance coverage also increased from \$100,000 to \$200,000. The act changes VGLI to a five-year, renewable term insurance option to convert to a permanent policy with one of the insurance underwriters. The old law provided five-year, nonrenewable insurance protection.

### **Air Force to Retrain NCOs**

The Air Force will retrain about 1,900 noncommissioned officers in 1993 to fill NCO shortages with people in overage positions, the Air Force said in November.

The NCO retraining program, which began in October, affects staff sergeant through master sergeant positions. It identified and notified those in Air Force Specialty Codes and grades at risk for involuntary retraining.

Over the last two years, retraining programs have had to rely on involuntary means to meet their goals.

### Problems Bedevil SDI Launches

The Strategic Defense Initiative Organization (SDIO) suffered three setbacks in October, prompting a review to identify any trends that may relate the three launch failures.

All three failures occurred in the launch boost phase, prior to deployment of the SDI experimental payload. "These problems led to the destruction of the boosters and termination of the experiments with no opportunity to conduct any of the tests," SDIO said. The launch vehicles were in no way related to the SDI tests to be conducted.

On October 16, a Brilliant Pebbles target demonstration test was terminated after a Castor IV-A test booster experienced some flight problems. The vehicle was destroyed seven minutes and fourteen seconds into the flight.

On October 22, an Aries I booster was launched to test and characterize the sensors, propulsion, and attitude control systems of a future interceptor. The first-stage booster motor failed, and the test flight was terminated about fifty-five seconds into the flight.

On October 24, a Minuteman I booster was launched to provide targets for the Airborne Surveillance Test-Bed aircraft to view and gather data. While the first and second stage of the booster fired flawlessly, during the third-stage burn, ground-based

optical sensors and telemetry reported that the third stage was conning erratically. The vehicle was destroyed two minutes and thirty seconds into the flight.

### Education Assistance to Rise

The Veterans Benefit Act of 1992 increased the basic educational assistance rates for the Montgomery GI Bill Active-Duty program. GI Bill rates increased to \$400 per month for full-time participants who initially served three years or more on active duty.

In addition, rates increase to \$325 per month for those who served two years of active duty and \$190 per month for full-time participants in the GI Bill Selected Reserve program. The rate increases go into effect on April 1, with mandatory increases thereafter based on the consumer price index.

### Firm Writes Off C-17 Loss

McDonnell Douglas Corp. reported in October that it wrote off a loss of more than \$269 million on the new C-17 airlifter program. McDonnell Douglas ended up posting a \$15 million loss for the third quarter of 1992. The \$269 million write-off represents the estimated cost of strengthening the C-17's wing (which in October was shown to be vulnerable to damage during stress tests) and cost growth in test, assembly, and procurement. The charge also provides increased reserves for the work that remains on the development contract.

### More Layoffs at P&W

Pratt & Whitney said in October that it expects to lay off an additional 4,800 employees between October 1992 and June 1993 in response to the downturn in the commercial spare-parts business and decline in commercial and fighter engine sales.

Earlier this year, P&W announced that it would eliminate 2,400 positions, bringing the total to 7,200. With the reduction, P&W will cut its operational cost base by nearly \$500 million, say company officials.

The reduction in personnel will be taken across the board but primarily in the manufacturing areas. Plants in Connecticut, Maine, and Georgia will be affected.

Pratt employs about 40,800 people worldwide and is one of two US fighter engine producers. Over the first six months of 1992, about \$9 billion in aircraft engine work was deferred by customers.

### EIA Sees DoD Budget Stabilizing

The Electronic Industries Association says the defense budget should stabilize by the late 1990s and that this newfound stability will reduce the strain on defense contractors.

EIA's ten-year forecast, released in October, says the defense budget will decline by more than \$80 billion from today's funding levels but that most of that decline will be felt in military personnel and operations and maintenance. Hardware procurement budgets for electronics are expected to be unchanged through the end of the decade.

EIA forecasts that the DoD budget, measured in constant Fiscal 1993 dollars, will decline from \$281 billion in 1992 to \$197 billion around 2000. Defense procurement budgets are expected to stabilize in the mid-1990s with slight increases near the turn of the century.

EIA forecasts that the Pentagon's science and technology funding will remain steady at current spending levels as it attempts to maintain a technological edge. Current development programs will begin to make the transition to production late in the decade, with few new starts coming in behind them.

### IFF Team Formed

Air Force Materiel Command's Electronic Systems Center has established the Combat Identification Integration Management team to serve as the single point of management to integrate and plan all Air Force air-to-air, air-to-ground, and ground-to-air combat identification activities.



The fifth USAF-McDonnell Douglas C-17 airlifter completed its first flight in December, landing at Long Beach Municipal Airport, Calif. The fourth production aircraft, designated P-4, is the first C-17 to fly without extensive test instrumentation. It will be the Air Force's primary operational test and evaluation C-17.

Team Leader Lt. Col. John Sciacca said, "Anything that requires sorting out the good guys from the bad guys falls under combat identification."

ESC said that its twenty-person team will develop an investment strategy to ensure that funding and resources are applied to these programs where most needed.

### **USAF Begins Underground Cleanup**

The Air Force has set aside \$400 million for the next five years to deal with environmental problems caused by underground fuel tanks. Federal requirements say all underground storage tanks must be upgraded to meet new tank standards by 1998.

The service owns about 10,000 tanks, most of which fall under the new regulations. The Air Force's policy is to remove underground tanks wherever possible and replace them with above-ground tanks or put them in vaults. Often petroleum or hazardous chemicals are stored in these underground tanks, which can leak and create severe contamination.

In 1984, Congress established measures to safeguard the nation's groundwater against leaking underground tanks. The Environmental Protection Agency followed in 1988 with regulations to protect against leaking tanks.

### **EMD Extended For TSSAM**

The Pentagon has approved a thirty-one-month extension sought by USAF for the engineering and manufacturing development phase of the Triservice Standoff Attack Missile (TSSAM).



*In October, GE Aerospace turned over to Kirtland AFB, N. M., the Inter Simulator Network, a simulator for mission training and rehearsal of Air Force special operations forces and rescue aircrews. Here is a view through night vision goggles of an MH-53J Pave Low helicopter, as depicted by a network computer.*

An acquisition decision memorandum said that the services support the program and that the Joint Requirements Oversight Council has validated the requirements for a highly survivable, highly accurate, high-payload, long-range, autonomous standoff capability. TSSAM is supposed to be a stealthy cruise missile, but little has been revealed about it.

The Defense Acquisition Board will convene in about a year to review TSSAM program status, assess the cost and operational effectiveness

analysis, and evaluate the unit cost analysis.

### **Rescue and Repair**

NASA should continue to perform rescue and repair missions with the space shuttle, but only when it is in the nation's best interest, in view of the inherent risks of such missions to the shuttle and crews, said a task force looking into the rescue and repair mission.

The NASA Advisory Council Group Task Force found that the shuttle's unique capability should not be forfeited but that some risks are too great. The task force was chartered to recommend a policy outlining criteria, design standards, and a pricing model to guide NASA in assessing the responsibilities for government and nongovernment satellite rescue and repair missions.

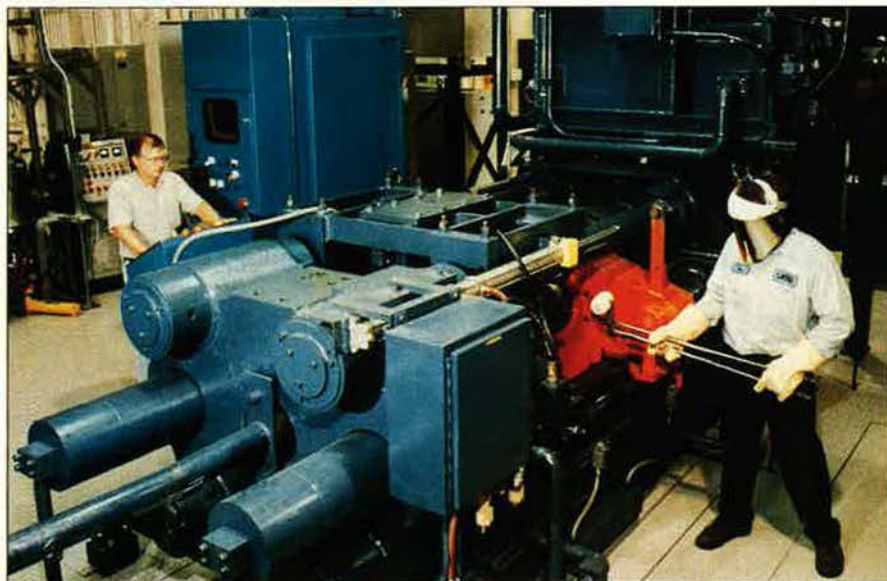
### **ATARS Contract Revised**

The Air Force and Martin Marietta Corp. have agreed on a revised development timetable for the Advanced Tactical Air Reconnaissance System (ATARS).

A new contract, worth \$186.5 million, calls for Air Force development, test, and evaluation (DT&E) to start this month. Schedule and performance requirements have been redefined to meet the needs of the Navy and Marine Corps F/A-18 program; the Navy, Marine Corps, and Air Force Medium-Range Unmanned Aerial Vehicle program; and the Air Force Joint Service Imagery Processing System program.

The system is already being flight-

USAF photo by Tim Boone



*Two UES, Inc., technical specialists operate an extrusion press at the new Experimental Materials Processing Laboratory at Wright-Patterson AFB, Ohio. The new facility will be used exclusively for improved research and development of advanced materials.*

tested by the contractor aboard an Air Force RF-4C and will begin testing on a Navy F/A-18D later in 1993. DT&E on the F-16R will start in early 1996. ATARS's digital imagery format will provide quality reconnaissance information within minutes. Current film systems require the pilot to land the aircraft, and the film must be processed before it can be delivered to the commander.

ATARS is managed by ASC's Electronic Combat and Reconnaissance System Program Office at Wright-Patterson AFB, Ohio.

**Awards**

Dr. Malcolm Currie, former chairman of the board and chief executive officer of Hughes Aircraft Co., was awarded the Air Force Academy's 1992 Thomas D. White National Defense Award for his role in creating radar and electronic systems and making other contributions to national defense.

The award, named for the former (1957-61) USAF Chief of Staff, was presented on November 14 by Lt. Gen. Bradley C. Hosmer, superintendent of the Academy. The Academy annually presents the award to the American citizen judged to have contributed most significantly to the national defense and security of the United States during the previous year.

**News Notes**

■ Great Britain and Russia signed a memorandum of understanding that aims to foster closer ties between the armed forces of the two nations. British Defence Minister Malcolm Rifkind and Gen. Pavel Grachev, the Defense Minister of Russia, signed the memorandum in November, paving the way for a range of high-level exchanges in 1993 and 1994. A second memoran-



*The Rockwell AGM-130 Standoff Weapon System joined the Air Force's missile inventory in November. The system, a powered derivative of the GBU-15, is an air-to-ground weapon for F-111F and F-15E tactical aircraft. It has a low-level stand-off range of fifteen miles and a high-altitude range of forty miles.*

dum formalizes arrangements for Britain to provide Russia with secure transportation of surplus nuclear weapons intended for dismantlement.

■ Texas Instruments' Defense Systems and Electronics Group was awarded the Malcolm Baldrige National Quality Award in October. The group was honored in the manufacturing category. The award is sponsored by the US Commerce Department and is awarded to US businesses that excel in customer-driven total quality management and achievement.

■ A C-17 arrived at Eglin AFB, Fla., in October to begin six months of climate testing. The aircraft will undergo temperature control ranging from -105° to 165°. Testing will be per-

formed at the Air Force Development Test Center's McKinley Climatic Laboratory at Eglin.

■ The Air Force promoted Lorraine K. Potter to colonel in November. She is the first female chaplain to attain that rank in DoD history. Colonel Potter received the promotion from Air Force Chief of Staff Gen. Merrill A. McPeak after nearly twenty years of service.

■ The Air Force Aid Society, based in Arlington, Va., awarded more than \$5 million in education grants for the 1992-93 school year. The education grant program, which began four years ago, provides \$1,000 grants to sons and daughters of active-duty, retired, or deceased Air Force members; of retired Reservists over age sixty; and of Title X Reservists on extended active duty.

■ Special operations are inherently high in electronic content, making such operations an excellent field for further growth in the electronics industry, according to an October Electronic Industries Association study. However, the study says that Asian nations of the Pacific Rim will remain a large but "flat" market for US defense electronics.

■ The introduction of an inordinate number of new systems to the F/A-18 greatly increases the risk of serious software problems on the aircraft, challenging the Navy's ability to manage software development effectively, a September General Accounting Office report found. The report said that twenty-eight new avionics, weapons,

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and subsystems programs are dependent on the F/A-18. The Navy said that it currently handles F/A-18 software development by deferring the correction of less serious problems.

■ Disabled veterans received a compensation increase of three percent in December, according to the Department of Veterans Affairs. The cost-of-living increase was signed into law by the President in October and will appear in January checks to veterans. About two million people are affected by the increase. Monthly payments range from \$85 for a single veteran with a ten-year disability rating to \$1,730 for a single veteran with 100 percent disability. About 312,000 survivors of service members who died from service-related causes are also affected.

A nationwide, toll-free number, (800) 827-1000, went into effect in October for information on Department of Veterans Affairs benefits.

■ The Navy's use of proceeds (\$44.4 million) from the sale of two TAV-8B aircraft to Italy to fund the purchase of radar for its AV-8B Harriers was not authorized, according to an October GAO report. In addition, the Navy sold three AV-8Bs to Italy, with Italy assuming responsibility for purchasing the aircraft that the Navy already had under contract. The Navy thus freed up appropriated funds that were used to purchase the radar systems. As a result, the Marine Corps will have five fewer aircraft than Congress had appropriated for. GAO recommended that the funds be returned to the Special Defense Acquisition Fund or to the Treasury as miscellaneous receipts. The Defense Department disputed GAO's findings.

■ Dassault Aviation's Rafale multi-role fighter completed its 1,000th test flight in late October. The first three aircraft, Rafale A, Rafale C 01, and Rafale M 01, have logged 708, 195, and ninety-seven hours, respectively.

■ Northrop announced in October that it would establish a Commercial Aircraft Division on January 2, 1993, in an attempt to expand its role as a designer and builder of commercial airliner structures. Northrop has a \$1.1 billion backlog in fuselage and other components for the Boeing 747. Its work on commercial aircraft produced \$540 million in revenues in 1991.

■ At NAS Point Mugu, Calif., a short-range attack missile (SRAM) was launched in October from a B-1B as part of an SDI experiment to test the feasibility of using the system as a booster for a kinetic kill vehicle against attacking missiles. The air-to-ground SRAM was modified to fly toward space rather than toward ground targets.

# SUPERIORITY



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Scientists from Phillips Laboratory said the test provided vital information. They hope to get the SRAM to maintain stability and control up to 115,000 feet. Up to seven SRAM launches are expected in this program.

■ The Defense Acquisition Board approved the Air Force's acquisition strategy for the Milstar satellite program in October. It also approved the expeditious development and acquisition of satellites to satisfy the requirements for midlatitude connectivity.

■ Senior Air Force leaders introduced a list of values and principles in October that exemplify a high-quality Air Force. The core values are integrity, courage, competence, tenacity, service, and patriotism. The basic principles are leadership involvement, dedication to mission, respect for the individual, decentralized organization, empowerment at the point of contact, and management by fact.

#### Purchases

The Air Force awarded Northrop Corp. a \$139 million face-value increase to a cost plus incentive fee contract for integration of the Joint Direct Attack Munition into the B-2 aircraft. Expected completion: July 1996.

The Air Force awarded Honeywell

Inc. an \$11 million firm fixed-price contract for thirty-six QF-106 full-scale aerial targets. Expected completion: July 1994.

The Air Force awarded PRC Inc. a \$7 million firm fixed-price contract for the acquisition of up to 1,700 superminicomputer systems and associated components to support the Navy, Army, Air Force, Coast Guard, Defense Logistics Agency, and other government agencies for a broad range of users worldwide. Expected completion: October 2001.

#### Senior Staff Changes

**RETIREMENT:** M/G James W. Meier.

**PROMOTION:** To be ANG Brigadier General: Wilfred Hessert.

**CHANGES:** B/G John J. Allen, from DCS/CE, Hq. PACAF, Hickam AFB, Hawaii, to DCS/CE, Hq. USAF, Ramstein AB, Germany, replacing retired Col. Dabney Craddock... B/G Walter S. Hogle, Jr., from Cmdr., 97th AMW, AMC, Altus AFB, Okla., to Dir., Public Affairs, Hq. USAF, Washington, D. C., replacing M/G (L/G selectee) Jay W. Kelley... B/G (M/G selectee) James E. McCarthy, from Dep. Civil Engineer, Hq. USAF, Washington, D. C., to The Civil Engineer, Hq. USAF, Washington, D. C., replacing M/G Joseph A. Ahearn. ■

**Tailless fighters, Cray-class computers the size of a soup can, and light, all-composite engines are in the works at USAF's Wright Laboratory.**

# Further and Faster in Aeronautics

By Frank Oliveri, Associate Editor

**T**HE Air Force's aeronautical scientists and engineers have embarked on a campaign to refine and greatly simplify some basic features of military aircraft, a low-key technological effort that could bring large benefits.

Wright Laboratory, the advanced research arm of Air Force Materiel Command's Aeronautical Systems Center (ASC), at Wright-Patterson AFB, Ohio, now is at work on an array of programs that may alter the look of fighters from flight controls to engine structure and the layout of avionics systems.

The technologies now in development would help produce ultralight-weight, powerful, less complicated fighters, increasing their performance and reliability across the board. Scientists and engineers agree that steps taken today promise major gains in the speed, endurance, range, agility, and stealthiness in the fighters of the future.

## Going Tailless

Wright Lab's Flight Dynamics Directorate has begun to look at creating a tailless fighter, an aircraft that would truly be the first of its breed. At present,



*New technologies like those on the supercruising Pratt & Whitney F119 F-22 engine (above) are helping shrink the weight and size of systems while increasing the range, agility, and stealthiness of future aircraft. One concept is the tailless swing-role fighter (opposite).*







**Although the tailless fighter still faces many hurdles, engineers are optimistic about tailless transports (above). The payoffs would be greater fuel efficiency, greater range, and lower observability. The concept has already been proven in the long-range, heavy-lifting B-2.**

there is only one tailless military airplane in the inventory of the US Air Force or any other air force: the B-2 bomber. No fighter has been built with such a radical design.

This effort, officials report, is intended in part to make possible a further reduction of the radar cross section of future generations of military aircraft. Low observability, or stealth, has become critical to Air Force plans. The less surface area to generate tell-tale radar returns, the better.

The pursuit of stealth, however, is not the only reason for developing tailless aircraft. Elimination of the surfaces would result in reduced weight and drag, which in turn would yield greater range and speed.

In addition, says Wayne Baldwin, an aerospace engineer in the Aeromechanics Division of the Flight Dynamics Directorate, there are basic aerodynamic reasons for dispensing with the tail.

First, says Mr. Baldwin, an aircraft with vertical tail surfaces loses its directional stability when it reaches an angle of attack of about thirty degrees. This phenomenon stems from the fact that, as the nose of the aircraft is raised, the body and wings block airflow over the stabilizer. An aircraft's directional stability drops precipitously as its Mach number increases because the aircraft is less susceptible to drag. At Mach 2, says Mr. Baldwin, a fighter with a vertical tail has minimal directional stability.

How do Air Force scientists and engineers plan to add stability to a tailless craft? The B-2 uses speed brakes at the wingtips to achieve directional stability. However, engineers point out that the B-2 has far greater wing area than a fighter and that a fighter's small surface area would make speed brakes, by themselves, insufficient for the task.

For engineers seeking other ways to achieve directional stability, the most promising technique seems to be installation of axisymmetric thrust-vectoring nozzles on the engine exhausts of the aircraft. Technologies for such equipment are being developed at several Wright Laboratory directorates.

One program seeks to develop technologies for design and manufacture of carbon-carbon two-dimensional, thrust-vectoring, thrust-reversing exhaust nozzles. Another pursues practical production of ceramic matrix composites for exhaust nozzle applications. The drawback of this particular means of control, however, is that a loss of engine power would mean a catastrophic loss of aircraft control.

There are other ways to address the stability problem. A basic fighter without a tail is directionally unstable in part because the canopy and engine inlets are located far forward to offset weight in the rear. In a tailless fighter design, those features could be moved closer to the center of gravity.

Overall, says Mr. Baldwin, the most

reasonable approach is to achieve aerodynamic control through a combination of systems and design factors. He believes that, though the proper mix is not yet known, there is no question it can be found.

### The Role of "Plastic"

Imagine taking a fighter such as the F-22, whose twin engines each will provide more than 29,000 pounds of thrust and which even at its current weight will cruise at supersonic speeds without afterburner, then cutting its overall weight in half. Such a fighter could fly further, with greater agility and acceleration, and at speeds that exceed Mach 3. Wright Lab is making clear strides in that direction.

Breakthroughs in weight reduction would come mostly through extensive use of new, advanced composite materials. One of these substances, an organic, lightweight matrix material dubbed AFR-700, is the first material of its kind able to withstand more than 700° Fahrenheit.

Engineers say that AFR-700 may be used in fighter surfaces and structures as a complement to older thermoplastics and thermosets, which would reduce overall aircraft weight. Equally eye-popping would be potential gains in propulsion. Experts claim that it will someday be possible to design engines made almost entirely of composites, a move that would yield extremely high thrust-to-weight ratios.

Wright Lab's Aeropropulsion and Power Directorate has helped initiate the development of lightweight ceramics and ceramic composites for use in the hot sections of engines and metal matrix and organic matrix composites for cooler sections.

Dr. Charles Browning, chief of the directorate's Non-Metallic Materials Division, says that AFR-700 would be able to replace many of the heavier titanium parts on current engines. The weight savings could run as high as forty percent. Dr. Browning says that the substance has an added bonus: It would last for hundreds of flying hours.

Scientists at Wright Lab explain that AFR-700 and similar materials will likely have some applications on aircraft in some high-temperature leading-edge areas. Dr. Browning says this use of the material soon will be flight-tested on the F-117 fighter.

Wright Lab's Materials Directorate has opened research into advanced metallic materials such as aluminum,

titanium, and magnesium alloys and metal matrix composites. It aims to produce alloys of superior strength and heat resistance.

### Magnets and Superconductivity

The quest for the powerplant of future fighters is most intense in Wright Lab's three-phase Integrated High-Performance Turbine Engine Technology (IHPTET) program, wherein scientists have begun to discover some startling things.

Take, for example, the possible role of superconductivity, which scientists are studying to increase the thrust-to-weight ratio of engines by reducing their weight. One concept calls for a superconducting magnet installed around the turbine of the engine, the idea being that the magnetism would counter the centrifugal forces on the turbine blades.

Currently, blades must be mounted on a disk strong enough to withstand tremendous centrifugal forces. With the magnet pushing on the blades, however, there would be no need for such a rugged, heavy disk. In fact, only a relatively lightweight shell would be needed to hold the blades.

Dr. James Petty, the IHPTET program manager, concedes that this is still very much in the conceptual stage and is not a program, but he adds that the forces needed for success have already been produced in the lab.

Another discovery is the possible use of magnetic bearings for engines. Dr. Petty says that ball bearings on the engine shaft, which must be very rugged and lubricated, would be replaced by magnetic bearings. When the area around the shaft is magnetized, the shaft will actually levitate, greatly reducing friction. The magnetic bearings would increase engine efficiency and would eliminate the need for a dedicated lubrication system, which weighs about forty pounds.

"Certainly you've got to have some kind of bearing there to catch the rotor when you turn the engine on and off," says Dr. Petty, "but it doesn't have to be lubricated because it doesn't take any load."

### More Electronics

On a broad front, Wright Lab is helping USAF eliminate, or at least minimize, the use of airborne hydraulic, pneumatic, mechanical, and accessory gearbox systems. All of these are prone to failure and add a lot of weight.

The Flight Dynamics Directorate is the focal point of this activity, which aims to replace many of the mechanical systems with electric substitutes—ultrareliable, solid-state electrical motor drives and controls arrayed in a "power-by-wire" format. Such systems would be more resistant to battle damage and less expensive. Most important, they would be lighter; their use could reduce a fighter's dry take-off weight by up to fifteen percent.

One key element of this effort is development of the metal oxide semiconductor control thyristor (MCT), a miniaturized, high-power, solid-state switch that would permit variable speeds and very fine control in flight systems. When combined with electric actuators, the MCT is expected to provide reliable electrical control of brakes and surfaces. The Flight Dynamics Directorate plans to test the system over the next two years.

The new internal electric starter/generator, located on the center shaft of a turbine engine, would do away with drive gear boxes, hydraulic pumps, constant speed drives, and starters. This new system would substantially reduce the diameter of the propulsion system, thus saving weight.

Of course, many mechanical systems will remain, and the Air Force wants a better way to manage and integrate them. It has begun an advanced systems integration program to do just that.

Al Burkhard, a technician with the

Vehicle Subsystems Division of the Flight Dynamics Directorate, says the goal is to get away from "optimized systems with lots of redundant hardware." Mr. Burkhard reports that one would see "tremendous" weight savings by reducing redundancy.

### Smart Skins and Structures

Air Force technologists are studying integration of avionics and electronics with the skin and structure of fighters.

Capt. Kevin Silva of the Flight Dynamics Directorate says that such "smart" skins and structures could be used to monitor the structural health of an aircraft. One payoff for this type of system would be the pilot's ability to detect a structural problem in flight and then deal with it.

Captain Silva says this could be particularly important in assessing an aircraft's ability to continue fighting with battle damage. "If you've got a maze of distributed sensors, you would know where you've taken a hit," he says. "Then you would be able to infer that you might have, instead of a nine-G airplane, a three-G-capable airplane."

In the long term, the Air Force could potentially move more sophisticated systems, such as radar, electronic countermeasures, and radar warning receivers, out of the heart of an aircraft and into the structures and skins. Dr. Jess Ryles, chief scientist at the Avionics Directorate, says that the smarter these areas of the plane



*Pilots will reap the benefits of many new cockpit technologies, including larger 3-D tactical situation liquid crystal displays, improved helmets, and data links with other fighters to provide a greater view of the outside world.*

become, the greater the chance that some apertures can be made multi-functional. Offensive systems (such as radars) and defensive systems (such as radar warning receivers) could function from the same unit.

The diminishing size of electronic components allows scientists to push systems out into the skin and structure, where airflow helps dissipate the heat they create.

Miniaturization increases the processing power available, allowing the placement of miniprocessors directly behind sensors to handle the information generated. Scientists call this approach the "Cray in a can," meaning that the power of one of the first supercomputers—such as the Cray, which was fairly large—can now be duplicated in a machine about the size of a soup can.

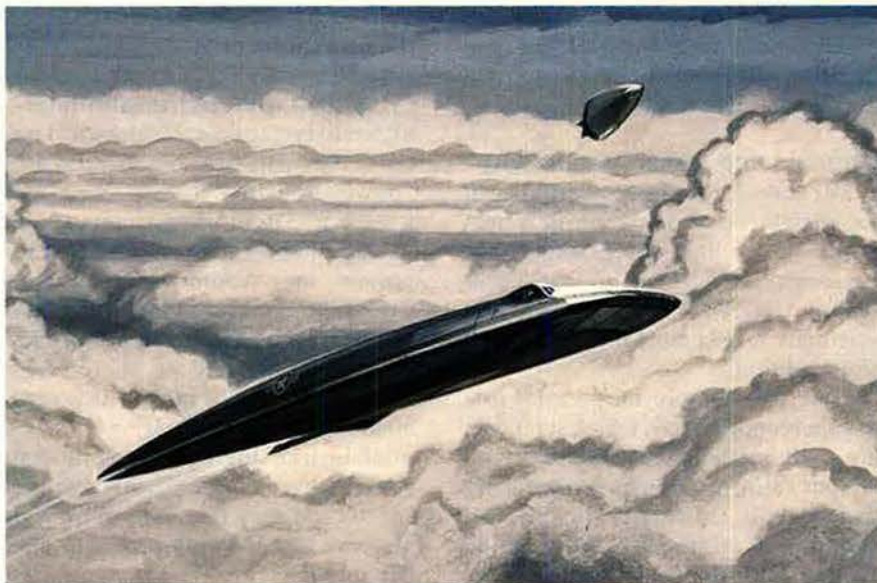
These can-sized computers will reduce the work load of the aircraft's main computer by making at least some decisions "at the wingtip," so to speak. "The more processing you can do at the sensor, the less information has to go through the pilot," says Kevin Geiger, project engineer for the Countermeasure Concepts Section of the Electronics Directorate. This also eliminates the need for heavy, bulky wire bundles that channel data to the central processing unit. It could also eliminate the weight associated with airborne cooling units.

"If you bury avionics in the structure, it would begin to disappear from racks," says Dr. Ryles.

This avionics architecture may not have greater capability than the most recent generation, based on the Pave Pillar architecture, which integrates radar, warning receivers, infrared and electro-optical sensors, jamming, infrared search and track, and other functions, but it would be less centralized and possibly less prone to failure.

Most of the skin-embedded sensors would be set up in an array configuration, says Mr. Geiger. That means that sensors with similar functions will be located all around the aircraft. Array configurations allow for what technicians call "graceful degradation," meaning that the failure of one part of the system would not cause the entire system to fail suddenly; failure would occur only over a relatively long period.

There are two schools of thought regarding the future of avionics and their configuration in an aircraft. One holds that planes should have an ex-



Concept by Erik Simonsen. Illustration by Stan Jones

**Lighter, stronger, and more heat-tolerant materials in engine and aircraft structures, new means of aircraft control, and other technologies could radically change designs for future aircraft.**

tremely powerful centralized avionics suite, with faster bus structures and massive integration. The F-22 will employ such a system. The other school calls for distributed processing, placing sensors and processors in and behind the skin.

The challenge might be resisting the temptation to continually add more functions as processing power grows. Dr. Ryles explains that, as electronics get smaller, more capability could be added, and reductions in size and weight could be negated.

### The Future Cockpit

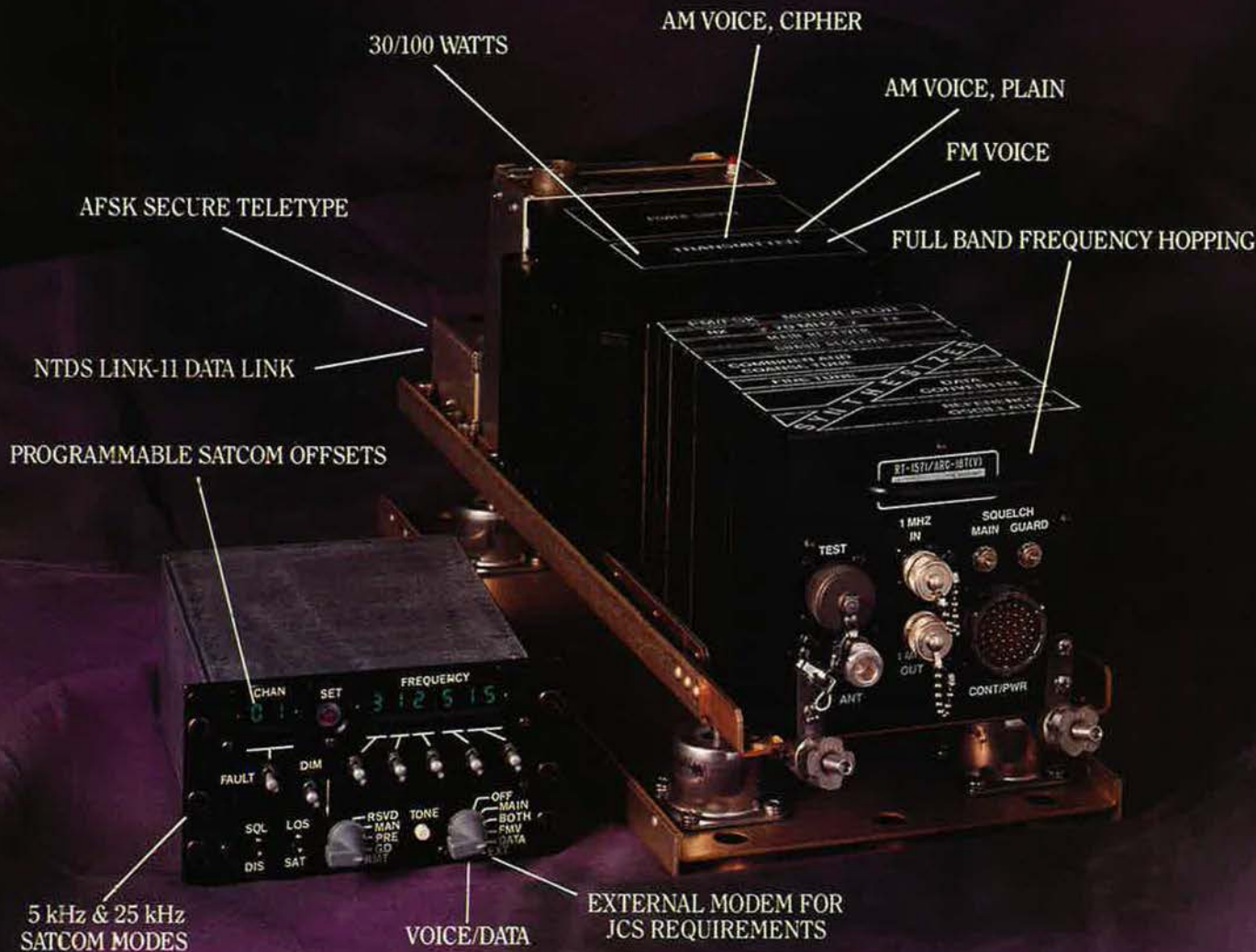
Paul Blatt of the Cockpit Division of Wright Lab's Flight Dynamics Directorate says that the future will see much larger cockpit displays, or even panoramic displays, which will provide greater situational awareness "by overlaying a fused set of sensor and flight information over a digital map." This will contain "an entire world database—or at least the area [the pilot] will be flying in."

The screens would likely be touch-sensitive and employ autostereoscopes, or three-dimensional presentation, without requiring special glasses or lenses. "It's built right into the display for those things where depth is very important, like a 3-D tactical situation display," Mr. Blatt says. The displays would be active-matrix, color, liquid-crystal displays and powerful projection-type displays unaffected by sunlight.

Information on the cockpit display would be supplemented by data on a large, binocular, helmet-mounted display, which would give the pilot guidance command cuing of ground or airborne threats. The helmet would also provide forward-looking infrared or millimeter-wave imagery and 3-D sound effects cuing, which provides a tipoff to the direction of the threat. Such helmets have dropped in weight from ten to only three pounds.

One cockpit program seeks the technical means to permit an aircraft to detect when its pilot is incapacitated and initiate an automatic flight-control sequence. Other programs would help the pilot avoid collision. The Pilot's Associate system would aid in the decision-making process and keep an eye on the world outside the cockpit. Mr. Blatt says the system would make recommendations in tactics or help in case of on-board emergencies.

The power of each fighter would be increased through the sharing of data with other friendly fighters, all of which could be made more practical by the use of "low-probability-of-intercept" data links. "What we'd do in the fighter world is share sensor knowledge from whatever position the other aircraft are in and integrate that fully to give a complete tactical picture," Mr. Blatt says. Each fighter flying in a formation would "see" everything that any other fighter detected through any of its sensors. ■



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The old adversary may be under new management,  
but it still does many things well.

# Images of Russia's Air Force

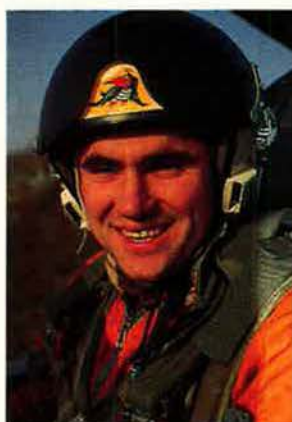


*In the twelve months since the USSR vanished, Soviet Air Forces have regrouped under Russia's flag and set a new course. Events have hurtled along at breathtaking speed; many Russian aircraft, such as this electronic command and control Ilyushin A-50 (NATO "Mainstay") still sport the Soviet red star because the troops have had no time to replace it with Russian markings. For all the problems that face the new air force, few doubt its residual strengths, which are manifest in the capabilities of this advanced aircraft (Russia has about twenty-five) and in the pride and professionalism of the pilot who commands it.*



Photo © Sergey Skymnikov / Arms Communications





Photos © Sergey Skrynnikov / Arms Communications

*Komsomolsk-on-Amur, an air defense base in the Russian Far East, is fighter country, home of high-performance Su-27 fighters (NATO "Flankers") like the fully armed one at top. Western analysts still have high regard for Soviet-trained pilots like Capt. Valery Romanov, a Flanker pilot at Komsomolsk (above, climbing aboard his Su-27 to start the day's mission). Despite his recent promotion to captain (no mean feat in a force shrinking dramatically), Captain Romanov wonders whether to continue his career in the military or pursue civilian business opportunities in his native Kuban, in southern Russia.*





*A pilot and crew member at Komsomolsk-on-Amur (left) take some time out for ice fishing on a hard-frozen lake. The climate of the Russian Far East greatly resembles that of Alaska—cold, icy, and dark much of the year. Recreation and creature comforts are rare indeed, and members of the Russian Air Force have to get by as best they can. In remote parts of Russia, hunting and fishing are popular pastimes for military personnel.*

*Life at a Russian base has its routines and rhythms. Maintenance is an important task on any air base, in Russia no less than in the United States. At right, an Su-27 Flanker undergoes routine inspection and repairs. This fighter's Lyulka AL-31F turbofan engine has been fully checked out by maintenance crews and has been moved into position for reinstallation. Below, Capt. Alexander Sednev (left) and Capt. Alexander Parfenov, both Flanker pilots, play chess to pass the time as they wait to be cleared for their next mission.*



Photos © Sergey Skrynnikov / Arms Communications



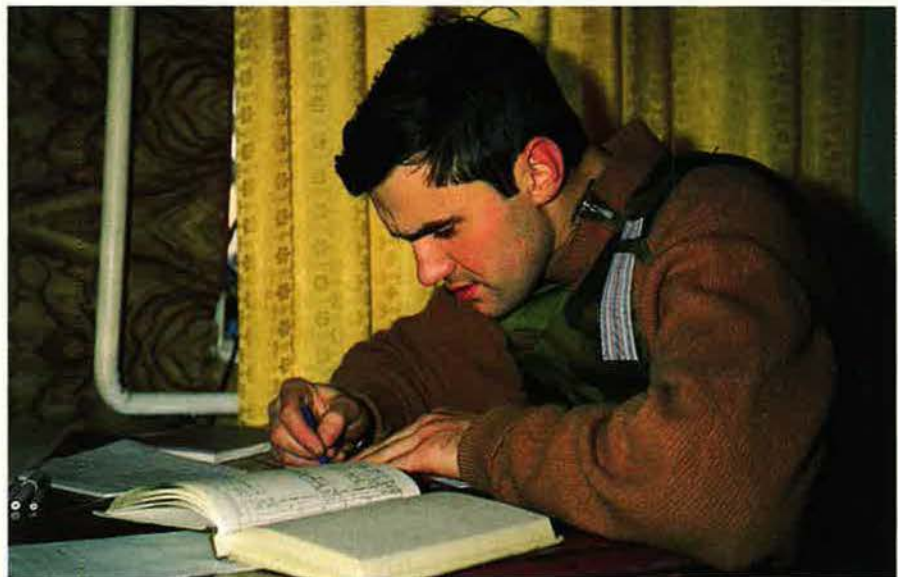


Photos © Sergey Skrynnikov / Arms Communications

*The Il-76TD transport (above) is the workhorse of Russia's heavy-lift business, carrying out missions that range from flying supplies to oil-drilling sites in remote Siberia to transporting Russian airborne forces on exercises and deployments. At top, a Russian airborne unit operating in Uzbekistan near the town of Andizhan loads an armored personnel carrier into an Il-76 airlifter. Above left, a heavy truck dropped from the sky approaches touchdown, slowed by its four gigantic parachutes. Russian airlift specialists sometimes use retrorockets to help slow the fall of outsize cargo and allow it to settle into a drop zone.*



*Sweeping political upheaval brought dramatic change, sometimes verging on chaos, within the armed forces. Western analysts believe that the Russian military now is sorting itself out and adjusting to the new era. One sign of the times: the reappearance, after three-quarters of a century, of the Russian flag and two-headed eagle, shown here on an Mi-8 helicopter used for search and rescue. The emblems are becoming more and more common on bases around Russia.*



Photos © Sergey Skrynnikov / Arms Communications



*Above, Captain Romanov studies in what little spare time he has after meeting his obligations as an Su-27 pilot. Keeping abreast of the political changes in his country while he maintains his proficiency as an interceptor pilot occupies a great deal of his time.*

An F-15E flight leader describes how it was on fifty-eight combat missions in the Persian Gulf War.

Photo by Paul Kennedy

# Tim Bennett's War

Capt. Tim Bennett (standing) and Capt. Dan Bakke flew most of their missions against Iraqi Scuds during the Persian Gulf War.

*During Operation Desert Storm, Air Force Capt. Tim Bennett served as a flight leader with the 335th Tactical Fighter Squadron, flying a total of fifty-eight combat missions in the F-15E dual-role fighter. Captain Bennett recounted the experience to Barry D. Smith.*

**W**E WERE based at Al Kharj AB in central Saudi Arabia. We lived in tents the whole time. The base was home to five squadrons of F-16s and F-15Es, so there were flight operations twenty-four hours a day. The noise and cold made it hard to sleep. After a while, I would get into a routine where I went to bed about 5:00 or 6:00 a.m., slept for eight hours, got up, took a shower, ate, and then went over the squadron plan for that night's mission. We were slightly undermanned in our unit and, if you were a flight leader or an IP [instructor pilot], you flew a lot.

On the first night of the war, when you were stepping out to your plane, you thought, "Holy —, here we go." You are obviously scared, but you know you have a job to do. We knew we were going to get shot at, but, at the same time, we didn't know what that would feel like and whether or not they were going to be able to hit us. Once you got into the airplane, you had so much to do that things just flowed along.

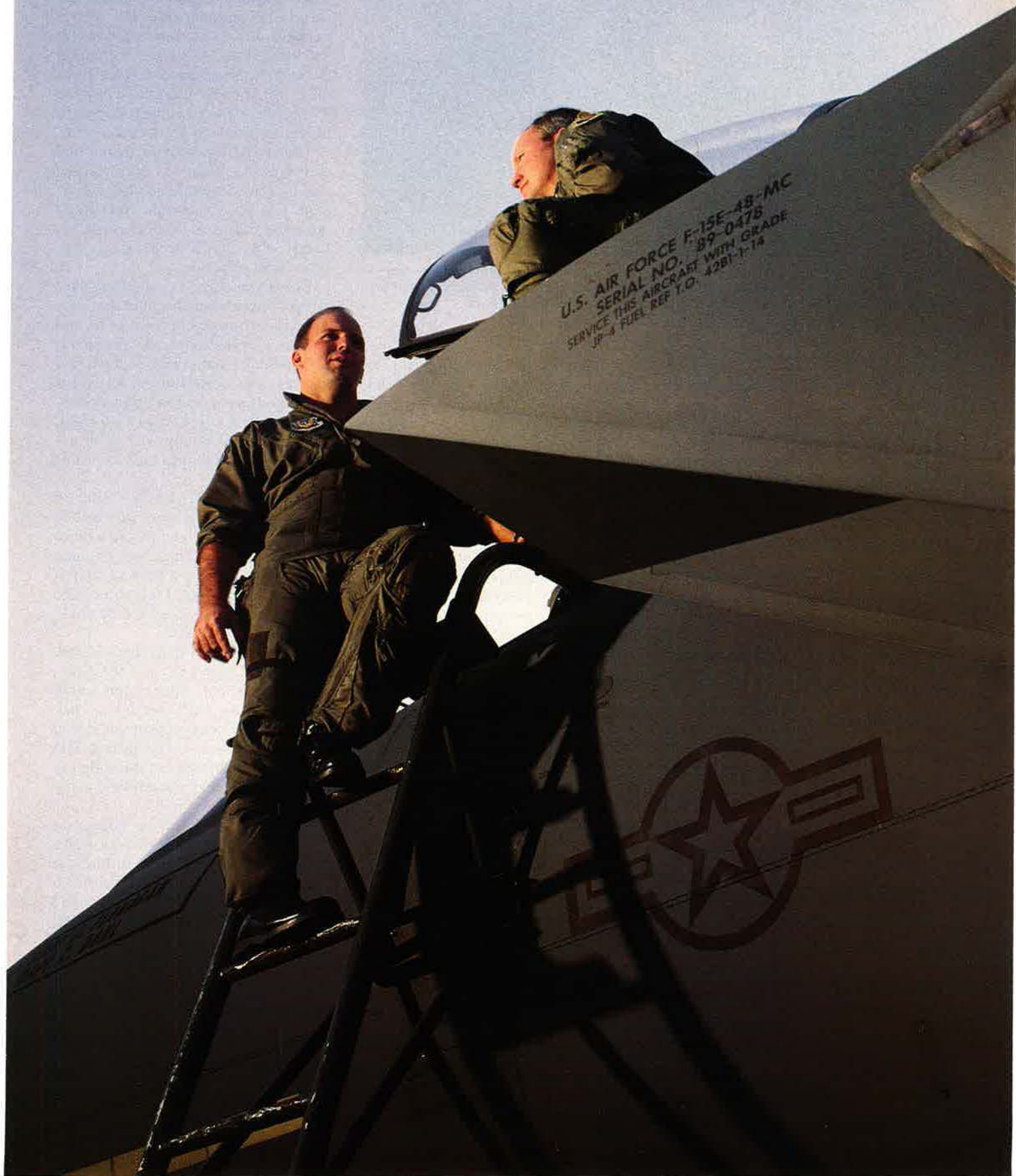
I remember hitting the tanker and going across the border; everything just seemed—not routine, but these were things we had been doing over and over. The thing I remember most

was going over the border just after the F-117s had hit and all the AAA [anti-aircraft artillery fire] coming up. I looked out at that damn AAA, and my mouth instantly went dry. I just couldn't believe the amount of stuff that was in the air. I thought to myself, "And I'm only seeing every eighth bullet!"

We went past Baghdad, to an airfield called H-2, to hit fixed Scud sites. We wanted to hit all the fixed sites before they could launch against Israel. H-2 was looking real bad because they put up some fighters that night to try to get us. We had twelve planes going in there. My wingman was about two miles behind, using his FLIR [forward-looking infrared] to keep us in sight. About eighty miles out from H-2, we got some radar contacts from some MiG-29 "Fulcrums" and MiG-23 "Floggers." They knew where we were and were moving to get us.

## Spiked by a Fulcrum

We got spiked by a Fulcrum radar, which was picked up on our radar warning receiver. We could see them coming down. They knew there were more than one of us and were trying to find the end of the train to work up the



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**Captains Bennett and Bakke talk over the day's flying at their home base, Seymour Johnson AFB, N. C. Their Gulf War experience includes the downing of an Iraqi helicopter; they are the only F-15E crew with that distinction.**

rear of the formation. We got spiked and lost it, got spiked again, and lost it again.

Everybody in our formation could keep pretty good track of them on radar and would lock a missile on to them as they approached. We didn't want to shoot unless we had to so we wouldn't give our positions away. We figured there were two Fulcrums and three Floggers out there.

One MiG-29 came down the left side of the formation. We could see him on the radar. He was beginning to move across our formation. I could begin to see his image in the head-up display [HUD], which displayed the FLIR image from the navigation pod. This gave me a small window to see the sky and terrain in front of me as if it were daylight. He didn't know I was there, but he was trying to roll in on the F-15E about six miles in front of me. Then, all of a sudden, he just hit the ground and exploded. I could see the wreckage spread out along the ground.

It is unbelievably disorienting to fly low at night and work off of radar with only yourself in the cockpit. The MiG pilot was trying to converge on an aircraft moving at 600 knots at 100 feet altitude. He just got too low. It was pitch black, with no moonlight or lights from any cities. We would not even have seen him if not for our FLIR systems. We could see that it was a MiG-29 Fulcrum and that he just flew into the ground trying to maneuver behind the guy in front of me.

Another F-15 crew in the front of the formation had seen another MiG-29 come down on the right side. He took a shot at that one because the MiG had a radar lock on him. He was afraid the MiG was going to shoot missiles head-on at him at low altitude. The AIM-9 missile went stupid and missed the MiG.

After the mission, we put all the HUD FLIR tapes together to figure out what happened next. We think this MiG-29 came around and got into a beam position on us and lost his radar lock, but we think his radar was in automatic acquisition mode and locked onto one of the Iraqi MiG-23 Floggers. The Floggers didn't have the systems to get down low with us and were up about 2,000 feet trying to get an infrared lock from the heat of our exhaust. The MiG-29 then shot a missile and destroyed the Flogger.

#### **No Fun at All**

There were some nights over there, especially during the first two weeks, when the AAA and SAMs [surface-to-air missiles] were really bad. I was on both missions when we had F-15Es shot down. Those weren't fun at all.

The most memorable night for me was February 16, when we went into the Basra region with twenty-four airplanes. The first eight-ship was going north of Basra to hit bridges. Our eight-ship was in the middle, with our squadron commander, Lt. Col. Steve Pingle—a Vietnam vet and about as

cool as they come—in the lead. Our target was a powerplant up a river near the coast. The last eight-ship was going to hit a petroleum refining and storage area in northern Kuwait.

We dropped off the tanker and went to low altitude to get down under the early warning radar. We flew just to the west of Kuwait, continued north, and turned east. As soon as we turned the corner, about fifteen miles from the target, after we had gotten past the SAM sites, we were going to pop up to medium altitude to get over the AAA.

The AAA was heavier than I had ever seen it. What we didn't know was that two Republican Guard divisions had moved onto the road along our route of travel. I will never, ever, forget what that looked like. It was just a wall of AAA.

Down low, there was an illusion of going down a tunnel because the AAA just kind of parted in front of us and passed over the top of the aircraft. It was so thick I just squeezed down into my seat and waited to get hit. What else could I do? I couldn't turn around. I couldn't go left, couldn't go right. My whole philosophy was, "I'm going to get through this stuff as fast as I can."

You could tell when a strand of tracer was heading your way by the look of it, and you just jinked a bit to get out of its way. There was so much muzzle flash on the ground that it looked like daylight. I felt vulnerable as hell because I was sure they could see me in all that light.

Then we popped up to about 16,000 feet and got above most of the AAA. The 57-mm and bigger guns could still get to us, but it wasn't as bad. Luckily, they never shot any SAMs at us. We were each carrying five Mk. 84 2,000-pound bombs. We rolled in and pounded that powerplant using the FLIR targeting pods.

When we turned to go home, we were only about six or seven miles from the southern group hitting the petroleum facility. Those guys had a really hard time because they had SAMs shot at them as well as AAA. That was where we had an airplane shot down and lost a crew. They were headed toward two SAM sites and did a loft delivery, where they use the energy of a climb to toss the bombs onto the target. We think they got hit in the climb. When the others got back and reviewed the FLIR tapes, the guy who was behind [the airplane shot

down] had him on the FLIR and showed him taking a hit, rolling over, and going into the ground.

### Bombing the Helicopter

On one flight, we used a laser-guided bomb [LGB] to shoot down a helicopter. This occurred on February 14, Valentine's Day. The mission was a Scud CAP [combat air patrol] in northwestern Iraq. During the Scud CAPs, we would look around with either the FLIR targeting pod or the radar to find the mobile Scuds. My wingman had twelve Mk. 82s, and I had four GBU-10s—2,000-pound LGBs—four AIM-9s, and two external fuel tanks. I was leading the flight.

Our CAP time on this mission was 1:00 to 3:00 in the morning. We went up and hit the tanker and then proceeded north. Our patrol area started up at Al Qaim, near the Syrian border,



Staff photos by Guy Aceto

*Despite murderous AAA and plenty of MiGs to contend with, the 4th Wing's F-15Es, forty-eight of which took part in Operation Desert Storm, proved durable, reliable attack aircraft, delivering up to 24,500 pounds of ordnance per sortie.*



and ran east about halfway to Baghdad, south to just beyond H-2, and then back to the Syrian border.

The weather was bad that night, with clouds from about 4,000 feet to about 18,000 feet. We were cruising above the weather, waiting for AWACS [an E-3 Airborne Warning and Control System aircraft] or someone else to pass us some coordinates on some Scuds.

AWACS gave us a call and said that a Special Forces team was in trouble. They had been found by the Iraqis, who were moving to cut them off. We had ten to fifteen Special Forces teams in the general area looking for Scuds.

This team was about 300 miles across the border.

Five Iraqi helicopters were in their area—about fifty miles to our west. As we headed in their direction, I put my wingman in a four-mile trail formation behind me because I had to go down through the weather. When I was about fifty miles from the team, Capt. Dan Bakke, my back-seater, began working the radar to look for the helicopters. We got contacts on them moving west to east, just like the AWACS had said.

Dan and I started talking about what we were going to do. We knew there were helicopters down there, but if we

were going to shoot them down, we wanted confirmation that they were bad guys. We called up AWACS, call sign Cougar, and asked them if there were any friendly helicopters in the area. The AWACS controller said, "We don't have any friendlies in the area. Any helicopters you find, you are cleared to shoot."

We got a little closer and kept going down to get below the weather. I wanted to confirm, one more time, before we lost contact with AWACS, that these were definitely bad guys and not some of our Special Forces helicopters coming to get the team. We had a few based in Syria that would have been following the same general course and could have gotten to the area fairly quickly. AWACS confirmed there were no friendlies in the area.

We continued to press in and were down to about 2,500 feet along the major road between Baghdad and the Syrian border. That area was always hot with a lot of AAA. I was working the radar, and Dan was working the high-resolution FLIR in the targeting pod to find the helicopters. When we popped out of the clouds fifteen to twenty miles from the team, Dan could see the helicopters with the pod. They were moving pretty much abreast, with the lead out in front in the middle. They were still moving west to east. They were moving and stopping at regular intervals.

There was also a group of troops on the ground to the east of the team. We

started getting AAA fire from these troops. To us, it looked as if they were trying to herd the team with the helicopters into the troops to the east. The helicopters were keeping an even distance from each other, and we figured they might be dropping off troops to help herd the team.

The image on the pod was good enough to identify the helicopters as probable [Mi-24] "Hinds," five to ten miles out. Hinds can carry troops and are heavily armed with rockets and machine guns. As soon as the helicopters picked up and started moving, we were getting hits off them on the radar. The radar would stay locked on them when they were on the ground because the moving rotor blades were picked up.

Dan and I discussed how we wanted to conduct the attack. We decided to hit the lead helicopter with a GBU-10 while he was on the ground. If we hit him, he would be destroyed. If he moved off before the bomb landed, it would still get the troops he just left on the ground. It would also give the other helicopters something to think about, which might give the team a chance to get away in the confusion. We would then circle around and pop the others as we could. We passed our plan to our wingman and told him to get the first helicopter he saw with an AIM-9.

By this time, we were screaming over the ground, doing about 600 knots—almost 700 mph. The AAA was still coming up pretty thick. Our course took us right over the top of the Iraqi troops to the east of the team. We didn't know exactly where our team was, but it was looking to us like things were getting pretty hairy for the Special Forces guys.

Dan was lasering the lead helicopter. We let the bomb go from about four miles out while the leader was on the ground. Because of our speed, it had a hell of a range on it—more range than an AIM-9. I got AIM-9 guidance going and uncaged a Sidewinder. I was ready to fire the missile as soon as we were in range.

Just as we released the bomb, the airspeed readout on the radar showed the target at 100 knots and climbing. The lead chopper had picked up and started moving. I said, "There's no chance the bomb will get him now," even though Dan was working hard to keep the laser spot on him. I got a good lock with my missile and was about to pickle off a Sidewinder when



Staff photo by Guy Aceilo

**Captains Bennett and Bakke have more than 1,000 hours each in the F-15E and have been flying together for more than four years. Their teamwork and experience helped them through some dicey moments in the skies over Iraq.**

the bomb flew into my field of view on the targeting IR screen.

There was a big flash, and I could see pieces flying in different directions. It blew the helicopter to hell, damn near vaporized it.

We sat there for a few seconds, just staring. By that time, the AAA was getting real heavy and the other helicopters were starting to scatter. I told my wingman to put three Mk. 82 500-pounders on that same spot to get any troops that the helos dropped off.

We beat up the area with bombs and were going to circle around and come down on them again. I popped up above 10,000 feet and talked to AWACS to tell them what was going on. They said, "I understand you visually ID'ed that as an Iraqi helo."

I said, "No, it's still dark out here, but I saw a FLIR image of what I took to be a Hind."

At that point, my stomach hit the floor. I told AWACS to get the AWACS commander on the radio. Dan and I were thinking, "We hit a friendly helo." But when we got the AWACS commander on the air, he confirmed that there were no friendlies in the area.

With that confirmed, I told Dan, "OK, let's go back down and get the rest of the helos." We got down low and the AAA was just as bad as before. The helicopters scattered and were running north. My wingman and I were

sorting them out and waiting to get within AIM-9 range. We were about ten miles behind and closing fast.

I was running in on them and getting ready to be a hero and knock a few more down when, all of a sudden, I started seeing flashes on both sides of us. I thought, "What have they done? Here we are in the middle of a bunch of SAMs!"

Then it hit me: Those weren't SAMs. They were bombs! AWACS had sent another flight in and told them to drop bombs on a set of coordinates. Those coordinates happened to be us!

I figured we had pushed our luck far enough, and we got the hell out of there. AWACS gave the orders to that other flight on another frequency. If it had been on ours, I would have heard the bombers' side of the conversation and could have canceled the drop. I decided we had had enough for one day, but our night wasn't over yet. We still had fifteen minutes left on our Scud CAP and were directed to a site near H-2. We found a mobile Scud on a launchpad, attacked it, and then headed home.

The Special Forces team got out OK and went back to Central Air Forces headquarters to say thanks and confirm our kill for us. They saw the helicopter go down. When the helos had bugged out, the team moved back to the west and was extracted. ■

Barry D. Smith is a free-lance military writer in California.



**1992 saw the emergence of "Option C," the roles and missions review—and more budget cuts.**

# The Defense Year in Review

By Larry Grossman

**A** YEAR ago, Rep. Les Aspin unveiled a new concept for sizing post-cold war US armed services. The chairman of the House Armed Services Committee added up the forces of potential foes and expressed them in terms of "Iraq Equivalents." He parsed US forces into "Desert Storm Equivalents." When he compared the two sets of data, the Wisconsin Democrat concluded that the Pentagon could cut another 233,000 troops from its planned force structure of 1.6 million in 1995.

Gen. Colin Powell bluntly rejected the Aspin method. The Chairman of the Joint Chiefs of Staff warned that world threats cannot be quantified with such specificity. "I am more inclined toward [maintaining] the world-leader, superpower role than I am toting up individual scenarios as equivalents of Iraqis," said General Powell. US force structure, he added, "isn't some inanimate object waiting to be multiplied against Iraqi Equivalents."

That sharp, philosophical debate—the first of the new year—became the model for 1992, not only for Representative Aspin and Chairman Powell, but also for Defense Secretary Dick Cheney and Sen. Sam Nunn (D-Ga.),

chairman of the Senate Armed Services Committee, and the scores of Pentagon and congressional defense experts involved in policymaking.

These first-principles debates were fueled by the wind-down of the cold war, election-year politics, fears about the federal deficit, the weakness of the economy, and a general public desire to cash in a "peace dividend" after decades of confrontation with the Soviet Union. Each factor played a role in the year-long clash over the future size and shape of US armed forces and their proper level of funding.

President Bush set the tone early. In his State of the Union address, he proposed to carry out a \$50 billion cut in planned defense budgets over six years. Moreover, he challenged Congress to accept his judgment on how deep to cut the military. "No deeper," he warned.

## "Too Dangerous"

The President's message was echoed by Secretary Cheney who, in an appearance before the Senate Armed Services Committee, warned that some individuals in Congress sought budget cuts that were "simply too steep and too dangerous."

The President proposed to spend \$281 billion for the Department of Defense and various other agencies with a hand in national defense operations. The cuts incorporated into the President's budget were real; the plan proposed a one-year drop in procurement from \$58.5 billion to \$54.4 billion and less severe cuts in personnel, operations and maintenance, and construction.

The Bush plan took a hard-line stance in favor of maintaining the "Base Force"—that is, the planned 1995 military force containing 1.6 million soldiers, sailors, airmen, and Marines. While rumors of deeper cuts

to the Base Force ran rampant in the months prior to the release of his budget, President Bush and his defense team elected to avoid more rapid reductions in uniformed manpower. Such a move, they argued, would have required morale-shattering discharges on a grand scale.

In the end, Congress chose not to challenge the will of the Pentagon on this issue. The Administration's preferred level of personnel stayed the same despite months of debate.

However, the President accelerated his planned cuts in weapons procurement. Because Russian President Boris Yeltsin and leaders of the other former Soviet republics agreed to radical reductions in nuclear weapons, the Pentagon proposed a sharp cutback in the production of US strategic arms. Brought to early and unexpected ends were production of B-2 Stealth bombers (after a final purchase of four aircraft), long-range, bomber-launched advanced cruise missiles, and powerful W88 warheads for Trident II submarine-launched ballistic missiles.

The Pentagon's planners no longer faced a massive Soviet program aiming to achieve superiority in conventional weapons. As a result, Secretary Cheney's budget embraced a fundamental shift in weapons acquisition policy. Under the new approach, DoD would continue to fund development of weapon prototypes but would bring few, if any, to production—and none in haste. Among the planned casualties of the new strategy were the Army's RAH-66 Comanche helicopter and the Navy's SSN-21 *Seawolf*-class nuclear attack submarine.

Representative Aspin countered the Pentagon by proposing his own acquisition strategy, one more congenial to US defense industry. It emphasized long-term innovation, improvements to current-generation systems, and a go-slow approach to new procurement. It called for "selective upgrading" of current weapons to strengthen the US without the expense of procuring new weapons. He further called for selective purchases of current weapons if needed to preserve the production base.

Representative Aspin took the position that the Pentagon should not be permitted to produce a new system until it demonstrated mastery of the new technology, a need to counter an emerging threat, and proof that the new system represented a breakthrough

that would alter the outcome of a battle.

Representative Aspin also proposed greater use of "silver bullet" procurements, small production runs of weapons that would give the US maximum leverage. He cited as an example the Air Force's fleet of F-117s, whose relatively small number (only fifty-nine operational models were produced) belied their impact on the Persian Gulf War.

### "Sobering" Estimates

Powerful officials of the Pentagon and Congress debated acquisition strategies and long-range weapons-buying plans for most of the year. Starting in the spring, however, the capital was overrun with arguments about the proper level of defense spending for 1993. The White House and Congress worried nonstop about what Senator Nunn termed "very sobering" estimates that cuts in arms spending would cost two million military and civilian workers their jobs even if the White House kept budget-cutters at bay.

Secretary Cheney—in what would become a central theme in the Pentagon's election-year defense of its spending blueprint—urged Congress to pay attention to the nation's fragile economy. "The nation faces a number of economic problems . . . and proposals to undertake defense cuts beyond the President's programs won't solve those problems," the Pentagon chief warned. "They will, however, endanger the force." He didn't need to add that the cuts would also lengthen unemployment lines.

The lawmakers, too, were acutely aware of the economic consequences of their work prior to the November elections. Even before the President's State of the Union address, many members from California were prepared to do battle to prevent further cuts in the B-2 program and hence in California's labor force.

In a letter to President Bush, nineteen members of the California delegation reported, "We cannot over-emphasize the significance of this program to the depressed economy of California." USAF's controversial bomber "sustains more than 36,000 jobs and generates over \$1.2 billion in our state on an annual basis. . . . Nearly 3,900 vendors in 218 communities support B-2 manufacturing activities, and sixty percent of these small firms fall into the category of small, disadvantaged businesses."

Those eager to spend the peace dividend faced a major legislative obstacle, which remained intact despite more than a few attempts to shove it aside. This was the "wall" erected between defense and domestic spending as part of the 1990 Administration-Congress budget deal. That deal stipulated that money generated via cuts in Pentagon spending could be used only to reduce the deficit, not finance popular domestic programs.

Rep. John Conyers (D-Mich.), who chairs the House Government Operations Committee, and Sen. Jim Sasser (D-Tenn.), who chairs the Senate Budget Committee, led a number of unsuccessful attempts to bring down the wall. The 1990 deal, however, runs only through Fiscal 1993. This leaves top Pentagon officials queasy about the possible fate of future budgets. As Chairman Powell said last March, "The fight we are having now is just a warm-up for the real fight next year."

### Option C

Congress did eventually cut the defense budget, using the savings for deficit reduction. Led by Representative Aspin, the House adopted the chairman's "Option C" force-reduction scheme, which was one of a menu of potential cuts. Option C proposed trimming defense spending by about \$50 billion over five years, a cut about four percent below the President's plan. In March, Senator Nunn broke with fellow Democrats and endorsed the Bush budget, putting him at odds with Representative Aspin and his call for a \$7.6 billion cut in Fiscal 1993. Congressional negotiators eventually agreed on a defense bill of \$274.3 billion, \$7.2 billion below the request.

President Bush's decision to halt B-2 production at twenty planes ended several years of congressional stalemate over the issue. Under increasing political pressure, the Pentagon had cut its planned fleet from 132 to seventy-five planes in mid-1990. Even so, there was no political agreement between the House, which wanted to cancel the bomber, and the Senate, which generally supported Air Force plans. The two chambers simply deferred decisions from year to year, approving funds to keep the B-2 line open. The President's decision resolved the issue.

In 1992, Congress approved the Air Force's request of \$2.7 billion for the final four planes. Two-thirds of the

money will not be released until the Pentagon meets certain conditions, including certification of the plane's ability to evade radar. House and Senate conferees required Congress to vote again on the B-2, after those conditions are met, before releasing the final \$1.8 billion in funding.

The bomber force of B-1s and B-52s already in service is clearly in need of modernization. Congress agreed to approve \$409 million of the \$446 million the Air Force requested for such upgrades and adopted a Senate provision requiring certain testing of B-1s and B-52s in conventional bombing against simulated air defenses.

Nuclear systems were not the only types to run afoul of the sudden collapse of cold war rivalry. The reduction of tension also sparked a debate over cost and priorities in the Pentagon's plans for a new generation of combat aircraft.

The President's budget requested procurement of two dozen more Air Force F-16 fighters and continued production of the Navy's F/A-18 strike fighter. It also included \$2.2 billion to develop the Air Force's F-22 fighter, \$1.1 billion to develop a bigger, faster version of the F/A-18, and \$166 million for development of a new Navy fighter, the A-X (now the A/F-X). The House and Senate agreed that anticipated defense budgets cannot cover the cost of all three new programs and a new USAF multirole fighter, but the two chambers proposed very different solutions.

Representative Aspin's plan for tactical aircraft was the most radical aspect of his reordering of Pentagon priorities. He won funding of the F-22 at \$2 billion and provided \$615 million for the F-16s and \$68 million for F-16 long-lead procurement. The House cut back to \$599 million the Navy's request to develop the uprated F/A-18 and ordered the service to test prototypes before deciding whether to build in quantity. It approved \$741 million for A/F-X development, more than four times the Navy's request.

### Roles and Missions

While Representative Aspin based his spending levels for tactical aviation on his new weapon-buying scheme, Senator Nunn chose to address the problem in the context of the fundamental issue of service roles and missions. "We can't afford to have every one of our tactical aircraft replaced," said Senator Nunn,

noting that the total price tag for all planned modernization programs could reach \$400 billion.

The Senate bill included \$2.2 billion for the F-22 in Fiscal 1993 but ordered the armed forces to choose among several other proposed new combat planes to eliminate duplication. The Senate approved \$944 million for development of the F/A-18E/F and ordered the Air Force to buy these models rather than MRFs. The Senate also zeroed funding for the F-16.

After a long and difficult conference, Congress ordered the Department of Defense to conduct two detailed studies, one on roles and missions and the other on the affordability of the Air Force's and Navy's tactical aircraft acquisition plans. The roles and missions examination will have to determine whether one service can take over certain specialized missions—such as radar jamming—that require expensive aircraft. It will also look at whether one type of aircraft could be used by all services to perform similar combat missions. Worried about the expense of future aircraft plans, Congress asked DoD to consider both declining defense budgets and future service budget allocations to aircraft procurement in drafting the affordability study.

Capitol Hill negotiators adopted Senator Nunn's roles and missions themes in forcing the Pentagon to choose between the Air Force's EC-135s and Navy EP-3s for electronic intelligence-gathering missions. Congress directed the Defense Secretary to pick which plane would be used by both services and spend all the money on that platform. The Senate also tried to force the Pentagon to choose between the Air Force's EF-111 or the Navy's EA-6B radar jammers. However, Congress decided to wait before moving on this issue.

For the second year, the Strategic Defense Initiative proved to be the most contentious policy and spending issue for congressional defense experts. Last year, Congress cobbled together a fragile bipartisan compromise supporting a limited ballistic missile defense. During Senate de-

bate on SDI spending priorities for 1993, that coalition began to unravel.

Senator Nunn and others had criticized SDI chief Henry Cooper for allegedly putting too much emphasis on space-based systems and canceling programs that, Senator Nunn argued, were essential to quick deployment of a ground-based system. Republicans, led by Sen. Malcolm Wallop (R-Wyo.), fought for Mr. Cooper's priorities. Eventually Congress sent the White House a defense bill with \$4.05 billion for SDI, which emphasized rapid deployment of a ground-based defense of US territory against a small number of missiles.

The Pentagon's annual effort to cut the number of troops in the Guard and Reserve was again sharply curbed by lawmakers determined to protect these politically popular organizations. Congress imposed a ceiling on National Guard and Reserve membership at 1,095,080, a reduction of fewer than 40,000, about one-third the 116,000-member cut that the Pentagon sought.

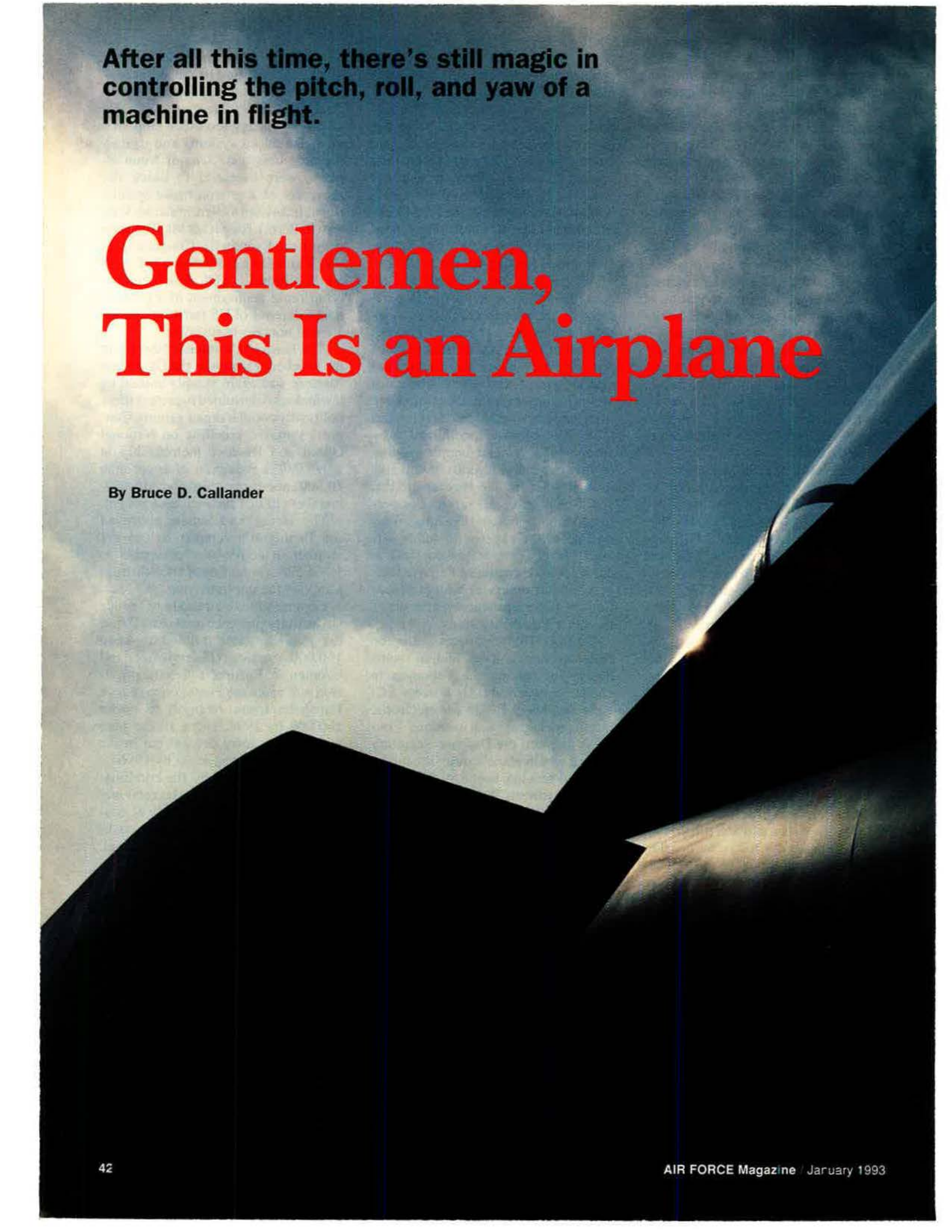
The House and Senate approved the Pentagon's request to cut the number of active-duty personnel to 1,766,500, a reduction of 100,400 from a cap set the previous year.

Congress moved quickly to reduce US military presence overseas. While the President had argued to keep 150,000 American US servicemen and -women in Europe, a Senate provision will force the Pentagon to reduce European troop strength to under 100,000 by 1996, and a House plan will direct a forty percent cut in the total overseas troop level by 1996.

The pain created by the combination of defense cuts and a flat economy led to a \$1.51 billion panoply of economic conversion programs to cushion the impact on military personnel, defense industries, and local economies of the downturn in military spending. This included nearly \$700 million for technology programs to help defense contractors adapt to the commercial marketplace, \$132 million to help communities affected by the end of the cold war, and \$686 million for transition assistance to personnel leaving the armed forces. ■

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After all this time, there's still magic in controlling the pitch, roll, and yaw of a machine in flight.

# Gentlemen, This Is an Airplane

By Bruce D. Callander



**A** pilot in those days was the only unfettered and entirely independent human being that lived on the earth," Mark Twain said of the men who had steered the big stern-wheelers on the Mississippi in his youth. When he wrote those lines, the day of the proud river pilot was almost over. In twenty years, the flying machine would introduce a new breed of pilot.

The flying pilot, like his Mississippi River counterpart, would command his vessel, cope with the hazards of the voyage, and revel in his environment. Gustave Ehrmann was one of the first to put it into words that Twain would have understood. After a 1910 flight, he said, "When I am in the air, I feel myself no longer a mere worm of the earth. . . . I am a superior being. I am ennobled."

A generation later, Charles A. Lindbergh said of his first flight, "I lose all conscious connection with the past. I live only in the moment of this strange, unmortal space, crowded with beauty, pierced with danger."

Pilot-astronaut Virgil Grissom recalled looking from his Gemini space capsule: "From nowhere else can you realize so fully the majesty of our Earth and be so awed by the thought

that it is only one of untold thousands of planets.”

The man who started it all rarely waxed poetic about the flying experience. Near the end of his life, Orville Wright was asked if his biggest moment had been making the world's first powered flight. “No,” he said, “I got more thrill out of flying *before* I had ever been in the air at all—while lying in bed thinking how exciting it would be to fly.”

If Orville found the anticipation more thrilling than the event, it may have been because flying an early Wright machine was such a chore. The craft was launched from a wooden rail with a drop-weight catapult that helped it reach takeoff speed. In the air, it was controlled by a variety of levers like those used to steer a bulldozer. Even Orville sometimes pulled the wrong lever and ended his flight prematurely.

The second Wright machine had wheels and was more user-friendly, but landing remained an adventure. A foot throttle was pushed down to cut the power, but the engine continued to pump gasoline, which collected in a pan under the machine. When the operator added power to taxi, the spilled fuel often caught fire. For some early students, the biggest thrill was surviving.

At least the Wright machines could carry an instructor and student. Those supplied by Glenn Curtiss were single-seaters, so student pilots first practiced

on ground trainers with throttles tied back. Once they had learned to taxi and make short hops, they went up alone. The two plane types were so different that a pilot who had trained on one could not necessarily fly the other.

Army pilots finally brought some order to the cockpit. Lt. Benjamin Foulois rigged a seat belt so he wouldn't fall out. Lt. Frank Kennedy devised a hand throttle like that on the Model T Ford. Lt. H. H. “Hap” Arnold stumped for the kind of standardized controls that are used today. The improvements made flying a little safer, but learning had been costly. From 1908 to late 1915, crashes killed more than a dozen Army pilots and injured many more.

Aviation was barely a decade old when World War I erupted in Europe and lured a new crop of youngsters into flying. Nineteen-year-old Edmond Genet joined other Americans in the Lafayette Escadrille. In 1916, he wrote his brother, “Fourth of July morning, I made my first attempt to fly off the ground. I only went up a very little bit but did finely. It's simply great, but one has to be attentive to what he's doing.” Less than a year later, Genet was downed by German archies.

New pilots faced combat with the same bravado they brought to flying. After wiping out a German gun position, Capt. Eddie Rickenbacker said, “It was the most amusing little party I ever attended.” The “party” ended

quickly for many, but the survivors learned not to dwell on their losses. A more sober Rickenbacker said later, “I steeled my heart against the intimate kind of friendship with my comrades.”

Lt. Norman Archibald, who flew with both British and US forces, recalled, “Death was omnipresent in this game; only its time of arrival was unheralded. When a comrade was killed, we never discussed it. No time had we, nor strength, to spend in grieving. . . . Steady nerves and confidence were our only salvation. To falter was suicide.”

Downing an enemy plane was treated just as casually, but sometimes death came too close to be ignored. German ace Ernst Udet, after going through the effects of an Allied pilot he had brought down and finding a letter from the man's mother, said, “Somehow, one had to try and get rid of the thought that a mother wept for every man shot down.”

### The Introduction

Whatever the losses, young men were eager to train on Curtiss Jennies and move on to Spads and Nieuports. The war set the ritual for future training: Students met their instructor. They walked to the machine. The instructor said, “Gentlemen, this is an airplane.”

The introduction may seem superfluous, but it had its purpose. Whether the students were novices or experi-

*Waiting in line for gas is a little less mundane for this F-15 driver than for the earthbound motorist. Spectacular panoramas are just one of the fringe benefits for anyone who takes flight and lives, in the words of Charles Lindbergh, “only in the moment of this strange, immortal space, crowded with beauty, pierced with danger.”*



Photo © Randy Jelly / Arms Communications

#### **Microelectronics Manufacturing Science and Technology**

Program to demonstrate new, low-cost semiconductor manufacturing techniques using modular, vacuum processing chambers in clusters with reactive ion etching, plasma-enhanced chemical vapor depositions, and in-situ sensors with expert system process control for low-volume, military, semiconductor products. **Contractor:** TI with Stanford U subcontract. **Status:** Ongoing.

#### **PDES Application Protocol Suite for Composites**

Initiative to develop and refine a neutral data exchange technique for the USAF aircraft structural composites component community. **Contractor:** South Carolina Research Authority. **Status:** Manufacturing technology.

#### **Repair Technology for Printed Wiring Assemblies**

Effort to establish an automated repair capability for advanced printed wire assembly boards at Air Force ALCs. **Contractor:** Westinghouse. **Status:** Manufacturing technology.

#### **Spare Parts Reproachment and Production Support**

Program to automate and integrate the enormous volume of spare parts, technical information, and data required to support advanced weapon systems. **Contractor:** General Atomics. **Status:** Manufacturing technology.

### **Wright Laboratory/Plans and Programs Directorate**

#### **Enhanced Surface-to-Air Missile Simulation**

Simulation model of interaction between a single airborne target and a specified surface-to-air missile fired from a designated location. **Contractors:** Many. **Status:** Development.

#### **Fighter Airframe/Propulsion Integration Predesign Studies**

Assessment of the benefits and penalties of individual technologies and integration concepts for future multimission fighter aircraft as well as upgrades to and derivatives of current aircraft. Areas of interest: advanced aerodynamic controls; thrust-vectoring nozzles; signature control; acquisition and operations cost; reliability, maintainability, and supportability; and weapons integration. **Contractors:** Boeing, GD, GE, MD, P&W, Rockwell. **Status:** Continuing.

#### **Flight Vehicles Technology Plan**

Development of a broad range of technologies that enable improved aeronautical systems (*i.e.*, aircraft and their conventional armament and their supporting infrastructure). **Contractor:** In-house. **Status:** Continuing.

#### **Future Fighter Technology Transition**

Assessment of high-value technologies needing development for future fighters, identification of technology application windows and needed technology maturity, and development of technology transition strategy. **Contractor:** None. **Status:** Continuing.

#### **Future Theater Airlift Studies**

Study to address design, operational analysis, and technology issues for a posited twenty-first-century theater airlifter. **Contractors:** Many. **Status:** Research, exploratory and advanced development.

#### **Special Operations Forces Technology Transition**

Assessment of high-value technologies having application to SOF mission needs. Identification of technology application windows and needed technology developments. Development of technology planning and transition strategy for Chapter 7 of Air Force Special Operations Command Weapon System Roadmap, AFSOC Technology Base. **Contractor:** None. **Status:** Continuing.

#### **Special Operations Aircraft Study**

Long-term planning project to support development of system requirements and technology for future SOF airlift aircraft. Areas of investigation include power operation, navigation, aircrew-vehicle interface, sensors, fire control, air vehicle, and armament. **Contractor:** None. **Status:** Continuing.

#### **Within Visual Range Air-Superiority Technology Evaluation**

Part of a broad-based initiative to assure the lethality and survivability of USAF systems in the Within Visual Range combat arena. Technology areas under evaluation include aircraft and weapon airframe, propulsion, flight control, and sensors as well as situational awareness, fire control, and countermeasures. **Contractors:** Many. **Status:** Continuing.

### **ASC Development Planning Directorate**

#### **25K Standard and Tactical Loader Replacement**

Study of replacement options for an improved reliability, availability, and maintainability 25K loader for palletized cargo. **Contractors:** In-house, TBD. **Status:** Proposed new start.

#### **AC-130 SOF Gunship Standoff Weapons**

Study to identify increased standoff and effectiveness enhancements to the AC-130, ranging from guided/unguided 105-mm options to a Hellfire missile option. **Contractors:** AAI Corp., Loral Defense Systems, MM, Nichols Research, Rockwell. **Status:** Concept evaluation.

#### **Advanced Aerial Refueling Capability**

Program to assess current aerial refueling capabilities and future requirements. The goal is to develop a comprehensive plan to meet future needs through current force modifications such as multipoint and boom receptacle upgrades and new acquisitions options. **Contractor:** In-house. **Status:** Ongoing.

#### **Advanced Direct Strike Munitions**

Project to study the advantages of enhancing aircraft capabilities and munitions performance through the application of advanced technologies. **Contractor:** In-house. **Status:** Continuing.

#### **Advanced Multirole Combat Aircraft Design Analysis**

Development of configuration alternatives for a future lightweight, multirole aircraft with emphasis on the integration of advanced weapons and reduced signatures. **Contractor:** In-house. **Status:** Continuing.

#### **Aircraft Data Insertion Retrieval (ADIR) Study**

Program to determine the practicality and contents of an architecture required to reduce resource demands of ADIR. **Contractor:** ARINC. **Status:** Continuing.

#### **Air Force Avionics Roadmap**

Annual publication of Air Force research, development, and modification projects that respond to current Air Force avionics requirements. The Roadmap provides a consolidated source of information for Air Force decision-makers and managers responsible for Air Force programs. **Contractor:** ARINC. **Status:** Continuing.

#### **Air Force Mission Area Development Plans**

Annual publication of Technical Planning Integrated Product Team Mission Area development plans for air-to-surface, air-superiority, special operations, training, and mobility mission areas. **Contractor:** In-house. **Status:** Ongoing.

#### **Air Force Weapons Roadmaps**

Annual publication of air-to-air, air-to-surface, and special operations twenty-year master plans that are cooperative efforts among users, planners, and technologists. **Contractor:** In-house. **Status:** Ongoing.

#### **Air Interdiction Design Analysis**

Analyzes operational capabilities and design alternatives for future USAF interdiction aircraft. **Contractor:** In-house. **Status:** Ongoing.

#### **Air-to-Surface Combat Identification Technology Study**

Study to investigate technologies and concepts to distinguish friendly from enemy ground forces (cooperative IFF, noncooperative sensors, and C<sup>2</sup> enhancements). **Contractor:** In-house. **Status:** Initial planning.

#### **Avionics Integration in Design**

Project to develop concepts that consider the interaction of avionics with the airframe and armament elements to ensure a balanced, effective design. **Contractor:** In-house. **Status:** Ongoing.

#### **Avionics Interface for Common Data Transfer System**

Project to determine the requirements and system capability for a common data loading system to interface with avionics subsystems. Investigating the two-way data transfer through a single interface system. **Contractor:** In-house. **Status:** Concept definition.

#### **Avionics Planning Baseline**

Annual publication of all pertinent avionics planning information available on each model of aircraft in the Air Force inventory. Includes data on existing, ongoing, and planned avionics. **Contractor:** Atlantic Research Corp. **Status:** Continuing.

#### **Bomb-Damage Assessment (BDA)**

Study to identify options to improve BDA—a critical need highlighted during Operation Desert Storm. **Contractor:** TBD. **Status:** Initial planning.

#### **Bomber/Fighter Training System**

Development of concepts for a basic pilot training system that will prepare students for eventual duty in bomber or fighter aircraft. Study will help define requirements for replacement of or avionics upgrades to the T-38. **Contractor:** Draper Laboratory/JWK. **Status:** Pre-concept definition.

#### **DoD Avionics Standardization Program Plan**

Plan developed by Air Force Lead Standardization Program. **Contractor:** In-house. **Status:** Draft coordination.

#### **Enhancements to the Advanced Air-to-Air System Performance Model**

Program to update the Pilot Decision Logic (PDL) with enhanced aerodynamic/flight mechanics model that improves the ability of AASPEM to model close-in-combat between highly agile, high thrust-to-weight fighter aircraft armed with all-aspect IR and radar missiles and guns. **Contractor:** Eidetics International. **Status:** Continuing.

#### **Extended Coverage Antimateriel Submunition**

Development of preliminary concepts and effectiveness analysis for an

improved antimateriel submunition that can be used as a payload for either guided standoff weapons or unguided weapons. **Contractor:** In-house. **Status:** Ongoing.

#### **Fighter Force Planning Parametrics**

Program to develop an analysis tool for tactical fighter force planners and decision-makers that provides robust analytical products using the strategies-to-task framework. **Contractor:** SR Corp. **Status:** Continuing.

#### **Foreign Comparative Testing**

Evaluation of foreign-developed penetrating warheads/submunitions, multi-functional fuzes, and gunship ammunitions for USAF applications. **Contractors:** Rafael, Matra, Thorn EMI, Bofors. **Status:** Ongoing.

#### **Functional Avionics Life-Cycle Cost Model for Hardware**

Program to develop an avionics life-cycle cost model for hardware that provides estimates of acquisition, operations, and support costs at the subsystem level with breakout to LRU, SRU, or module level. **Contractor:** Research and Management Technology, Inc. **Status:** Continuing.

#### **Future Systems Cost Analysis**

Development of cost-estimating relationships and estimates for future theater airlift system concepts. **Contractor:** Axion Corp. **Status:** Ongoing.

#### **Future Theater Airlift Studies**

Development of comprehensive database, performance trades, and sensitivity analyses to support AMC definition of next-generation theater airlifter. **Contractors:** In-house, Ball Systems, Douglas, Lockheed, Boeing. **Status:** Pre-Milestone 0.

#### **Hard-Target Munitions**

Program to develop an advanced penetrator weapon and intelligent fuze for the next generation of hardened target munitions. **Contractors:** Motorola, ARA. **Status:** Pre-concept definition.

#### **High-Temperature Superconductivity Delay Lines and Filter Banks**

Program consists of two development demonstrations: a delay line assembly and a switchable, band reject filter bank. **Contractor:** Superconductor Technologies, Inc. **Status:** Concept definition.

#### **IR/EO Sensor Trends and Requirements**

Investigation to provide an assessment of performance capability and availability of specific IR and EO technology. **Contractor:** MacAulay-Brown, Inc. **Status:** Continuing.

#### **Innovative Concepts**

The Innovative Concepts Division searches out concepts that might be applied to future defense needs, evaluates their potential utility, and advocates development for those with the highest potential. **Contractor:** In-house. **Status:** Continuing.

#### **Lighter-Than-Air Technology**

Effort defines USAF and non-USAF, including commercial, missions that may be performed effectively and with reduced resources by a small, remotely piloted CycloCrane. **Contractor:** Mission Research Corp. **Status:** Expected completion January 1993.

#### **Low Probability of Intercept/Detection Data Link Technology Evaluation**

Study will evaluate needs and potential concepts for jam-resistant LPI/LPD data links to enhance intraformation communication and data-sharing. **Contractors:** In-house, SAIC. **Status:** Investigation.

#### **Multirole Fighter Mission Needs Analysis**

Analysis to provide the quantitative basis for a Mission Needs Statement leading to a Milestone 0 decision on the Air Force's next Multirole Tactical Fighter. **Contractors:** In-house study houses and major airframers and engine companies. **Status:** Pre-Milestone 0.

#### **Planning for Hypersonic Weapons and Aerospace Vehicles**

Prepare mission area/mission needs analyses, concept assessment packages, cost estimates, schedule estimates, and other pre- and post-Milestone 0 hypersonic systems development planning for major command mission needs for space launch, global force projection, and quick response. **Contractors:** In-house, various. **Status:** Continuing.

#### **Precision Guided Munitions**

Study to identify the cost-effective solutions for an all-environment precision guided munition effective against a wide variety of targets. **Contractor:** TBD. **Status:** Concept evaluation.

#### **Protective Countermeasures for Large Aircraft Study**

Study to investigate specific technologies for active/passive warning soft-kill/hard-kill countermeasures for C-141, C-5, B-1, B-52, AWACS, Joint STARS, and C/AC/MC-130 aircraft. **Contractor:** In-house. **Status:** Initial planning.

#### **Requirements for an Automated HMPT Planning Tool**

Investigation to determine requirements for an automated human factors,

manpower, personnel, and training planning tool to use in meeting human resources requirements early in the acquisition cycle. **Contractor:** Vector Research, Inc. **Status:** Continuing.

#### **Special Operations Aircraft**

Definition of long-range survivable system concepts and needed capabilities for a new special operations airlift vehicle. **Contractor:** In-house. **Status:** Pre-Milestone 0.

#### **STOVL Design Analysis**

Evaluation of design concepts for short takeoff and vertical landing air vehicles. **Contractor:** In-house. **Status:** Continuing.

#### **Systems Analysis Quality Metrics**

A program to develop an extensive set of quality metrics for the evaluation of IDEF-model quality. **Contractor:** Androit Systems, Inc. **Status:** Continuing.

#### **T-38X**

Application of technologies to enhance the T-38 to meet Bomber/Fighter Training System (BFTS) mission needs. **Contractor:** Eidetics Int'l. **Status:** Ongoing.

#### **Transatmospheric Aeronautical Systems**

Preliminary design analysis to identify requirements and capabilities of transatmospheric systems. **Contractor:** In-house. **Status:** Pre-concept definition.

#### **Warfighting Effectiveness for Theater Airlift**

Program to develop a warfighting effectiveness evaluation system for assessing how theater airlift system alternatives/mixes contribute to the outcome of a ground battle. Tied to Future Theater Airlift Studies project. **Contractor:** Vector Research, Inc. **Status:** Continuing.

#### **Weapons Planning Information Management System**

Program to provide the Technical Planning Integrated Product Teams a capability to readily access, display, and analyze data for long-range munitions procurement planning. **Contractor:** TASC. **Status:** Development.

### **ASC Integrated Engineering and Technical Management Deputate**

#### **Aircraft Structural Integrity Program**

Program to link all aspects of structural design, analysis, test, and operational use of aircraft to establish service life and track it constantly. **Contractor:** None. **Status:** Continuing.

#### **Avionics Integrity Program**

Provides a disciplined engineering process for the development of avionics to enhance system reliability and safety. **Contractor:** In-house. **Status:** Continuing.

#### **Engine Structural Integrity Program**

Provides organized approach to structural design, analysis, test, and life-cycle management of gas turbine engines. **Contractor:** None. **Status:** Continuing.

#### **Industrial Modernization Incentive Program**

Program to provide incentives for contractors to bring together advanced productivity-enhancing technologies and the investments necessary to modernize their organizations and facilities. **Contractors:** Many. **Status:** Ongoing.

#### **Integrated Product Development**

Initiative in support of "concurrent engineering," a method to combine development and qualification of all system elements. Integrates design, manufacturing, support, and training. **Contractors:** Many. **Status:** Ongoing.

#### **Mechanical Subsystems and Equipment Structural Integrity Program**

Program to adapt integrity-assurance process to air and ground mechanical systems and such equipment as hydraulic, pneumatic, and secondary power systems. **Contractor:** None. **Status:** Continuing.

#### **MIL-PRIME Program**

Initiative to streamline acquisition by improving quality of specifications and standards placed on contracts and to eliminate overspecification of program requirements. **Contractor:** None. **Status:** Continuing.

#### **Senior Engineering Technology Assessment Review**

Program for review and assessment of objectives, approach, and possible payoffs of advanced technology development programs. **Contractor:** None. **Status:** Continuing.

#### **Software Development Integrity Program**

Initiative to improve operational capability and supportability of aeronautical weapon systems software. **Contractor:** None. **Status:** Continuing.

#### **Value Engineering**

Program to reduce acquisition and support costs while maintaining or improving performance by implementing high-payoff changes to such system features as design and production processes. **Contractor:** None. **Status:** Continuing. ■

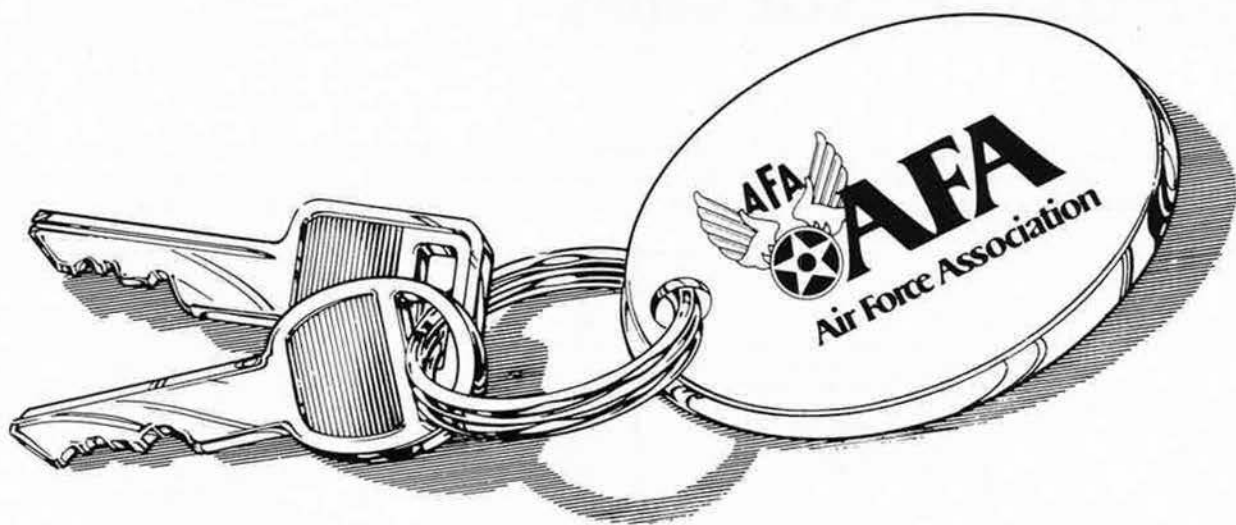


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**First the budget cutters said active-duty units were too costly. Now they're asking how ready the Guard and Reserve must be.**

# The Force Mix Fight Heats Up

By John T. Correll, Editor in Chief

**I** MAGINE this. A few years from now, international accord is deteriorating. Early warning signs point to a coming conflict that may be too much for the pint-size US armed forces to handle.

About a third of the Navy and fully half the Army and the Air Force are in mothballs. Of the combat units available and ready, more than forty percent are in the National Guard or the Reserve. Altogether, the Air Force has only a dozen fighter wings.

The President mobilizes the Individual Ready Reserve. As Air Force Materiel Command pulls fighter aircraft out of storage, the recalled pilots begin a concentrated training program to requalify for cockpit duty.

It's easy to poke holes in this strategy and its shaky reliance on "stored" fighter wings, "cadre" divisions, and "nested" ships. Nevertheless, just such an option—called "Alternative III"—was seriously floated for discussion in September by the Congressional Budget Office.

CBO, like others exploring ways to cut the defense budget, begins with the assumption that a much smaller active-duty force will be sufficient, now that the global threat posed by the Soviet Union is gone. It also sees the possibility of different (and cheaper) forces in the National Guard and Reserve.

"If the United States would have years of warning before a major war, then today's selected reserves—those who are paid to train or drill in peacetime—may actually be more ready for war than necessary," CBO says. "They may also be too costly."

Alternative III is a radical application of the "flexible readiness" concept introduced in 1990 by Sen. Sam Nunn (D-Ga.), chairman of the Senate Armed Services Committee. Senator Nunn told defense leaders three years ago they would take heavy losses in force structure if they insisted on traditional readiness levels for all units. He

suggested that some forces be assigned the mission "to be ready to get ready."

The mothball strategists might also claim some support from the Pentagon's latest Joint Military Net Assessment, which postulates extended warning time for a major crisis and cites "cadre-type units and stored equipment" among the assets that would allow a "reconstitution of forces."

When making that assessment, of course, the Joint Chiefs presumed the standing force would be substantially larger than Alternative III would allow and that there would be considerably more capability in both the active-duty and Selected Reserve components for the reconstitution units to build on. The presumption of long warning time was already factored into the Base Force calculation.

The real point of Alternative III, however, is not strategy. It's money. CBO estimates this option would cost about thirteen percent less than the projected Base Force, and that will appeal to politicians seeking new ways to cut more from the battered defense budget.

## Experiments in Progress

Current Pentagon plans call for the creation of two cadre divisions in the

## Mobilizing From Mothballs: Air Force Fighter Wing Equivalents

	Force in 1991	1997 Base Force	Aspin's Option C	Alternative III (CBO)
Active-duty wings	22	15	10	7
Selected Reserve wings	12	11	8	5
Stored wings	—	—	—	14
<b>Total</b>	<b>34</b>	<b>26</b>	<b>18</b>	<b>26</b>

Although fighter wings constitute only part of the operational Air Force, their total is used routinely by the Pentagon, Congress, and others as a shorthand for describing the force structure. The Base Force is the Bush Administration's plan for reductions by 1997. The main challenge to it has been Option C, proposed by Rep. Les Aspin. Alternative III is a recent—and radical—force mix concept laid out by the Congressional Budget Office.

Army. These units would be manned at about twenty-five percent of full strength in peacetime and fleshed out in wartime by Reservists.

The Navy, prodded by Congress, is considering a nested ship concept for seventeen percent of its frigate fleet. These vessels, manned at ten percent, would be based alongside fully crewed "mother ship" frigates for maintenance and support in peacetime.

So far, proposals for "teamed" squadrons and "stored" wings in USAF have not gone beyond informal discussion. The teamed squadron approach would store aircraft at the home base of an Air Guard or Reserve unit, manned at a higher level than usual to provide a cadre in the event of mobilization.

The stored wing approach would go further, mothballing aircraft wholesale. A variation on this idea, CBO says, would be for pilots in the remaining wings to fly all of the aircraft, including the stored ones, in rotation as an aid to keeping the entire fleet in working order.

Crews for the stored wings would be drawn not from the Selected (or drilling) Reserve but from the Individual Ready Reserve. They would be veterans who served in the armed forces at some point in the last few years and who can be called back in a declared national emergency.

CBO speculates that the new units might be ready for combat in a matter of months. The average pilot would

need about six weeks of intensive flying to requalify, the analysts figure, but more time would probably be required, depending on the number of Reservists activated, the availability of practice ranges, and other factors.

There is no realistic chance that Alternative III will be adopted outright, at least not in the near future. Its real effect is to set a new bottom option in the force structure debate that is likely to play out this year between Congress and the Clinton Administration.

### Size and Mix

The bedrock force-structure issues are how large the armed services need to be and how the units and personnel should be distributed among the active-duty, National Guard, and Reserve components.

The Bush Administration's plan, called the "Base Force," was to reduce active-duty troop strength from a high of 2.3 million in the 1980s to 1.6 million by 1997 and to make commensurate reductions in the Guard and Reserve.

The principal challenge to the Base Force plan has been "Option C," proposed last year by Rep. Les Aspin (D-Wis.), chairman of the House Armed Services Committee. It would reduce active-duty forces to 1.4 million and put more of the force structure in the Guard and Reserve. This is basically the approach Mr. Clinton advocated in his election campaign.

From beginning to end, the Bush Administration clashed with Congress on the question of Guard and Reserve forces in the total mix.

Secretary of Defense Dick Cheney complained often that Congress demanded sweeping force cuts but blocked his ability to reduce the Guard and Reserve. One of his favorite examples is the drawdown of the Army's VII Corps, which used to keep two divisions deployed to Europe.

VII Corps had 100,000 active-duty troops, backed up by another 140,000 in its Guard and Reserve components. The entire active-duty component was eliminated, and VII Corps closed its headquarters, but, Mr. Cheney said in October, "I've still got the 140,000 Guardsmen and Reservists backing it up, and they no longer have a mission."

Mr. Cheney said the Defense Department is forced to keep troops it does not need because "my friends in Congress don't like to shut down Na-

### The Base Force and Option C: Troop Strength in Active and Reserve Components

	Bush's Base Force		Aspin's Option C	
	Active-Duty	Reserve Component	Active-Duty	Reserve Component
<b>Air Force</b>	430,000	200,000	364,000	193,000
<b>Army</b>	536,000	567,000	476,000	550,000
<b>Navy</b>	501,000	118,000	432,000	112,000
<b>Marine Corps</b>	159,000	35,000	137,000	49,000
<b>Total</b>	<b>1,626,000</b>	<b>920,000</b>	<b>1,409,000</b>	<b>904,000</b>

The Base Force plan, proposed by the Bush Administration, would cut active-duty strength to 1.6 million by 1997. Rep. Les Aspin's Option C, endorsed by Bill Clinton in his election campaign, would lower the total to 1.4 million. Alternative III, introduced by the Congressional Budget Office, would cut active-duty strength to 1.25 million and the Reserve Component to 845,000.

tional Guard armories back home in their districts."

For its part, Congress accused Mr. Cheney's Department of cooking the books when it computed force requirements. According to Sen. John Glenn (D-Ohio), chairman of the Senate Armed Services Committee's Manpower and Personnel Subcommittee, a 1991 Defense Department Study that pointed to greater reliance on Reserve forces was "watered down" and its conclusions were "reversed 180 degrees."

In the defense budget adopted in October, Congress agreed readily to cut another 100,400 active-duty troops in 1993 (bringing to 309,900 the total cut in a three-year period), but balked at the proposal to take 115,997 troops out of the Reserve Component. The Senate and the House finally agreed in conference to approve a reduction of 39,617.

The Air Force has not been much involved in the Reserve Component dispute for several reasons. Far more so than the other services, the Air Force embraced the Total Force Policy early and relies heavily on the Air National Guard and the Air Force Reserve—both of which are superb—to perform core missions in peacetime as well as wartime. Neither the Air Guard nor the Air Force Reserve was projected to lose much in the Base Force reductions. Even a projected decrease in Reserve Component fighter wings will be offset by an increase in air refueling units, leaving the personnel structure essentially unchanged.

The Army's case is different. Its Base Force configuration was twelve active-duty, six Reserve, and two cadre divisions, down from sixteen active-duty and ten Reserve divisions in 1991.

The National Guard Association attacked the Pentagon's plan, calling instead for a force of ten active divisions and ten National Guard division equivalents. It also urged that, as a rule of thumb, *all* forces should be in the Guard or Reserve unless there are "compelling reasons" why their mission must be performed by active-duty personnel.

"There is no need for additional National Guard divisions in the structure," Gen. Colin Powell, Chairman of the Joint Chiefs of Staff, told the Senate Armed Services Committee, which asked him about the National Guard Association's counterproposal.

"If we don't need twelve active divisions in the structure and we can take it down to ten—I don't think we can—but if we don't need twelve and have to go lower, we should not compensate for it by adding more, less-ready National Guard formations. We do not need more National Guard structure strength."

The next round in the debate will draw upon a new Total Force study that Congress directed the Pentagon to conduct and provide to Congress by December 1992. Secretary Cheney and General Powell were also told to submit by February 15 their assessment of the study group's findings.

eral types of Reserve Component units as a percentage of the cost of comparable active-duty units: Army Guard mechanized division, thirty-five percent; Army Guard infantry division, thirty percent; Marine Corps infantry battalion, thirty percent; Marine helicopter squadron, seventy percent; and Air Force F-16C/D squadron, seventy-five to eighty percent.

These savings, however, aren't a patch on what CBO claims might be achieved by moving both active-duty and Reserve Component forces into cadre, nested, or stored status. An active-duty F-16 wing based in Europe costs \$3 million a year, CBO

### Selected Reserve Strength (in Thousands)

Component	1980	1988	1991	1993	1997*
Air National Guard	96.3	115.2	117.8	119.3	118
Air Force Reserve	59.8	82.1	84.5	82.3	82
Army National Guard	366.6	455.2	446.1	422.7	338
Army Reserve	213.2	312.8	309.7	279.6	229
Navy Reserve	97.1	149.5	151.5	133.7	118
Marine Corps Reserve	35.4	43.6	44.9	42.3	35
<b>Total</b>	<b>868.4</b>	<b>1,158.4</b>	<b>1,154.5</b>	<b>1,079.9</b>	<b>920</b>

\*Base Force

Sources: Department of Defense, Congressional Budget Office, 1993 Defense Authorization Act.

### The Cost Difference

One of the strongest arguments for Guard and Reserve units in the force mix is that they cost less than active-duty units do. The flat assertion that Reserve ground component units operate for twenty-five percent of the cost of active-duty units, however, is too simplistic, General Powell told the Senate Armed Services Committee last spring.

"The cost figures vary," General Powell said. "I've seen numbers as low as twenty-five percent, [but] if you take a more sophisticated unit like an attack helicopter battalion, you will find that it starts to cost you up to seventy-five to eighty percent of the cost of an active-duty unit."

In a memo to members of the House Armed Services Committee in May, Chairman Aspin cited the cost of sev-

says. A similar F-16 wing in the Air National Guard costs \$2 million. In a teamed configuration, the expense drops to \$1.6 million, and a stored F-16 wing would cost only \$330,000.

The Alternative III planners note that the Air Force now stores and maintains aircraft in contingency status for the Navy at Davis-Monthan AFB, Ariz. These aircraft get some monthly maintenance and an annual engine test. The average cost to keep an airplane in this condition is \$20,000.

To estimate the cost of stored Air Force wings, CBO assumed an annual cost of \$100,000 to "permit stored aircraft to be maintained at significantly higher levels of readiness than today's contingency planes."

Summing up the yield from all services, CBO figures the Alternative III force could be budgeted at \$205.9

billion annually in 1993 dollars—or \$32.1 billion less than the expense of the Base Force forecast by the Bush Administration.

### The Total Relationship

"The Air Force Reserve is not a force in reserve. We contribute daily to the Air Force mission and are measured to the same standards as our active-duty counterparts," declares Maj. Gen. John J. Closner III, Chief of Air Force Reserve.

He has a point. The Air Force has been cited repeatedly as the service most committed to integrating and employing Reserve forces in the way the framers of the Total Force policy intended.

The Air Guard and the Air Force Reserve are both heavily tasked for numerous operational missions, even in peacetime. They handle more than half of the airlift work load and large shares of such other missions as rescue, reconnaissance, and aeromedical evacuation. Counting continental air defense interceptors flown by the Air National Guard, Reserve Component pilots will fill forty-eight percent of USAF's fighter cockpits by 1995. The prospect of assigning some of the heavy bomber mission to Reserve units has been discussed.

The Army experienced a bad bounce when a few of its National Guard roundout brigades were judged not ready to deploy when they were activated during the Persian Gulf War. Other ground units performed with distinction in the conflict. The Air

Guard and Reserve began operations on the first day of the crisis and carried their full share of the wartime missions in admirable fashion.

Most of the time, when Total Force planners refer to "the Reserve Component," what they really mean is the Selected Reserve, whose members train at least forty days a year, usually much more than that. Nearly all of the pilots and many of the other personnel are veterans of the active-duty component.

At any given point, about 9,000 members of the Air National Guard and the Air Force Reserve will be serving tours of active duty that may last several years. Air Guard and Reserve units have some 35,000 "military technicians," members who work full-time for their units while also maintaining their status as drilling Reservists.

Also counted as part of the Ready Reserve—although the designation does not fit as well—are some 600,000 Individual Ready Reservists. These are people who served a tour in either the active-duty force or the Selected Reserve but who have not yet reached a combined total of eight years' active and inactive service. They can be called up in wartime or a declared national emergency. The Army, in fact, did mobilize about 17,000 Individual Ready Reservists during the Gulf War. The Air Force recalled a few of its Individual Ready Reserve medical personnel to fill specific skill shortfalls.

Another large segment of manpower is in the Retired Reserve, about 1.8 million retired military members from all services. They, like Individual

Ready Reservists, are seldom called on, but, during the Gulf War, the Air Force mobilized about 1,250 retirees and the Marine Corps recalled 700.

The Air Force has no qualms about the caliber of its Guard and Reserve units, but reducing the active-duty component any lower than prescribed in the Base Force mix would probably meet stiff objection. The Bush Administration plan, attacked as insufficiently ruthless, cut the active-duty Air Force by thirty percent from its peak strength in the 1980s but left the Reserve Component levels essentially intact.

Alternative III would eliminate eight active-duty wings and six Reserve Component wings that were forecast in the Base Force. All together, the active-duty Air Force and the Selected Reserve would have only a dozen wings left to operate, with the other fourteen tucked away in storage.

It is difficult to imagine such a force having any quality edge on opponents in combat. The stored wing concept seems to assume implicitly that an effective fighting unit can be created by pulling individuals and pieces of equipment together in the same location. It further assumes that a stretch of refresher training is all that Individual Ready Reservists will need before going into battles where people bleed real blood.

Nobody is likely to invest much in new aircraft or system upgrades for a force in storage, so the hastily re-qualified crews could not expect to be flying top-of-the-line equipment. How well the aircraft would be maintained in storage is another question.

CBO theorists acknowledge that the mothballed force might need a lot of time to prepare. They estimate that some stored units, especially those in the ground forces, could require 720 days or more after mobilization before they are ready to deploy.

A critical assumption is the amount of warning time and what use the nation and its stored combat units would make of it. Given 720 days (or more) of strategic warning, there is no assurance that they would be devoted to mobilization and reconstitution of forces.

The politicians might view such preparation as provocative, increasing the likelihood of war. Or they may regard it as too great a financial burden for the voters to bear. It is entirely plausible that they would expend most of the warning interval making speeches to each other and dithering about. ■

## What's What in the Reserve Component

### The Ready Reserve

**Selected (or drilling) Reserve.** Units and individuals who train regularly and are responsible for significant portions of Total Force mission in peacetime.

**Individual Ready Reserve.** Veterans of active-duty, Guard, or Reserve service who have a residual obligation until they attain eight years' total active and inactive service.

**Inactive National Guard (Army only).** Guardsmen who do not participate in training but who would report to units in a mobilization.

**The Standby Reserve** Persons removed from the Ready Reserve for circumstances of civilian employment, ineligibility for mobilization, temporary hardship, or disability.

**The Retired Reserve** Retired military members who are still subject to call-up in an emergency.

**Military Technicians** Dual-status individuals who work full-time as civilians for Guard or Reserve units and also part-time as drilling Reservists or Guardsmen.

By John L. Frisbee, Contributing Editor

## Ace Among Aces

When James "Sully" Varnell's squadron moved to an area where enemy fighters abounded, he rapidly became one of USAAF's top aces.

**T**HINK of the top Air Force aces of World War II and the names most likely to come to mind are Francis S. "Gabby" Gabreski, Bob Johnson, or George Preddy of Eighth Air Force in Europe and Richard I. Bong, Thomas B. McGuire, or Gerald R. Johnson of Fifth Air Force in the Pacific. It often is overlooked that of USAAF's three dozen highest scorers, four flew with the less publicized Fifteenth Air Force in the Mediterranean Theater of Operations (MTO).

The leader in that theater was Capt. John Voll, with twenty-one victories in five months, followed by Maj. Herschel Green, who shot down eighteen enemy planes in fifteen months (four of them Ju-52 transports), and Capt. James Sullins "Sully" Varnell, with seventeen confirmed. Other high-scoring but little-noted MTO aces are Maj. Samuel J. Brown and Robert C. Curtis, with 15.5 and fourteen victories, respectively. Of these men, Varnell's achievement was the most spectacular. All his victories came within sixty-seven days. We believe that only Capt. Don Gentile of Eighth Air Force's 4th Fighter Group surpassed that record.

Varnell, a twenty-one-year-old native of Charleston, Tenn., graduated from flying school at Marianna, Fla., in February 1943. Early that summer, he joined the 2d Squadron, 52d Fighter Group, in North Africa after the German surrender in May 1943. His squadron, equipped with older model Spitfires, then moved to Sicily. In December 1943, it moved to Corsica as part of XII Tactical Air Command. The group's primary mission was to support ground forces, with infrequent opportunity for air combat. Shortly before moving in May 1944 to Madna on Italy's Adriatic coast under Fifteenth Air Force, the group began converting to P-51 Mus-

tangs. Its primary task now became escorting bombers on long-range missions to targets in southern Germany, Austria, Romania, and the Balkans, where enemy fighter opposition was intense, especially around Munich, Vienna, and Ploesti.

A few days after the 2d Squadron became operational in Italy, 2d Lieutenant Varnell launched his string of victories with a double on May 30. The following day, he attacked thirty enemy fighters bound on intercepting Fifteenth Air Force bombers in the Ploesti area, some 600 miles from Madna—the equivalent of the distance from UK bases to Berlin. Again he shot down two Luftwaffe fighters, and nine days later his fifth confirmed.

What kind of person was this rising young ace? Fred Ohr, another 2d Squadron ace, now a practicing dentist in Chicago, describes him as a laid-back southerner, an outstanding pilot and marksman liked by everyone. Varnell, who had exceptional eyesight, could spot enemy aircraft long before other pilots could. Dr. Ohr says the squadron pilots accused Varnell of carrying binoculars in his cockpit, a charge he stoutly denied.

When Varnell climbed into his P-51,

he left behind his laid-back demeanor to become one of the most aggressive and skilled combat leaders in the theater. On June 16, the 2d Squadron tangled with more than fifty enemy fighters over Czechoslovakia. Varnell got his third double that day. Then, when his guns jammed, he continued to attack the enemy fighters, driving them off the tail of a crippled bomber. He would, as Dr. Ohr recalls, come to the aid of anyone in trouble, no matter what the odds—a good man to fly with.

One of Varnell's two triples came on July 9, again over Ploesti. Diving on a large formation of enemy fighters that were about to attack the bomber stream, he shot down an Me-109, then pursued another through enemy flak and falling bombs, directly over the target. As the enemy fighter burst into flames, Varnell made a climbing 180 to get out of the falling bombs and picked up a third Messerschmitt, which he damaged. Trailing smoke, the Me-109 continued its attack on the bombers until Varnell pulled around in a tight turn, got on its tail, and finished it off. His score now stood at fifteen—a tie with Major Green as leading ace in the theater.

Varnell's final victory came on August 4 while returning from a shuttle escort to the USSR. Over Romania, he saw a Ju-52 below, dived down, and destroyed it. Added to the sixteen fighters he had shot down, that final tally established him as the tenth-ranking Mustang ace of World War II, all in the span of less than ten weeks. It is interesting to speculate on what his final score might have been had he flown an extended tour like most of the high-scoring aces in Europe and the Pacific.

That was not to be. Varnell, now a captain twice awarded the Silver Star, was sent home to instruct fledgling fighter pilots. On April 9, 1945, a month before V-E Day, Capt. James S. Varnell was killed when his fighter plane crashed near Pinellas, Fla. His brilliant combat record never has had the recognition it deserves. He was one of the great, if little remembered, fighter pilots of that long-ago war. ■



**Colonel Whitley's wife didn't know what his real assignment was—or that he had been the first operational Air Force pilot to fly the F-117A.**

Lockheed photo by Eric Schufzinger

# The Secret Doings at Tonopah

By James Kitfield

**O**N NOVEMBER 10, 1988, Col. Al Whitley was relaxing in front of the television with his wife, Ann, after a long day at Nellis AFB, Nev. On the evening news, the network's anchor was running down the lead stories. The Pentagon, he reported, had officially confirmed the existence of a supersecret squadron of "stealth" aircraft based in Nevada.

Suddenly, Colonel Whitley wasn't relaxing anymore.

As a blurry photo of the exotic F-117A appeared on the screen and the news anchor recalled previous reports of an aircraft that had been the subject of years of wild media speculation, Whitley began to fidget. His wife was casting increasingly pointed looks in his direction.

Ann Whitley didn't know that she was sitting next to the first operational Air Force pilot to fly a war-ready F-117A. She could not have guessed that, in about two years, her husband would lead the 37th Fighter Wing into combat in the first sustained wartime test of stealth. All she knew was that, for five years, he left for work early Monday morning and returned Friday afternoon. She understood that she must never ask where

he had been. Maybe her children believed that all fathers only appeared for three days at a time.

F-117 pilots like Colonel Whitley called themselves "Night Hawks," and they led double lives. They came out only at night and could not divulge their true identities even to their families or closest friends. Thus the official confirmation the Whitleys watched on television marked the end of an extraordinary chapter in the fielding of an Air Force weapon system, among the most closely guarded since the development of the atomic bomb. Colonel Whitley had been in on it almost from the beginning, yet even now he could do no more than nod at his wife's implicit question. Both of them knew there was nothing to say.

Whitley's participation began in the fall of 1980, with a knock on the door of Room 10 in visiting officers quarters Building 545 at Nellis. Whitley, then a major, was an A-10 instructor at the Fighter Weapons School on base. He had been asked to report to this room at a specific hour. Nothing else was explained.

The door opened a few inches.

"Are you Whitley?"

"Yes, sir."

"Let me see your ID card."

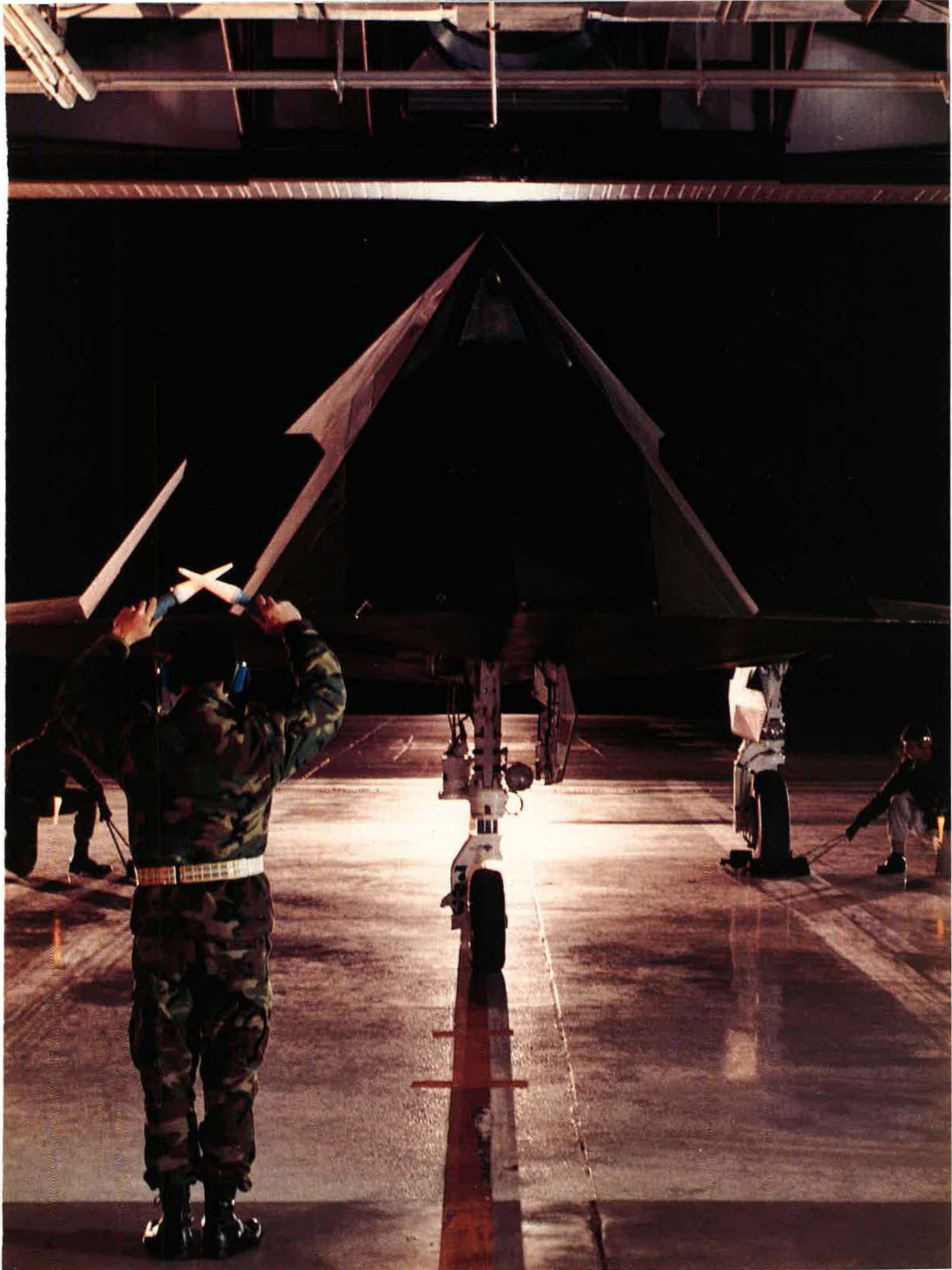
The door shut. It opened again a few minutes later. "Well, it looks good. I guess you can come in."

## Fly A-7s Again?

In this way was Major Whitley introduced to Col. Bob "Burner" Jackson, a former Thunderbirds pilot on the requirements staff at Hq. Tactical Air Command (TAC), Langley AFB, Va. Colonel Jackson already knew that Whitley had flown F-100s and A-7s in Vietnam and that he was scheduled to leave soon to attend the Army Command and General Staff College at Fort Leavenworth, Kan. Could Whitley postpone school, Jackson wanted to know, and stay at Nellis flying A-7s again?

A host of questions occurred to Whitley. Chief among them: Why in the world would the Air Force want to bring back the A-7, a converted Navy plane well on its way out of the inventory? Colonel Jackson made clear, however, that he was asking all the questions, and Major Whitley would have to come up with his answer before leaving the room. There would be no mulling over the options or talking it over with his wife.







*For the first seven years of its existence, the F-117 flew only at night. The "Night Hawks" coped with the nocturnal life with the aid of blacked-out windows to facilitate daytime sleeping. Tonopah's isolated location kept distractions to a minimum.*

In the end the decision was simple. The Whitleys wouldn't have to sell their house in Las Vegas, Ann wouldn't have to quit her job, and Major Whitley wouldn't have to trade a cockpit for a classroom. "Where do I sign up?" he responded.

The first home for the 4450th Tactical Group (TG), which would become one of the most secretive units in the Air Force, was an isolated corner of Nellis known as the Lake Mead Base, officially designated Nellis Area Two. A handful of officers and enlisted men recruited into the program by early 1981 were told that they were laying the groundwork for a unit whose mission would be to run avionics tests and evaluations for A-7 weapon systems. The A-7s were coming from England AFB, La., which was converting to the A-10. The first order of business was to set up acceptance procedures for the aircraft and develop an A-7 training program.

If it seemed strange to the pilots that the Air Force was spending so much money on security and classified communications capability for an isolated little building on the old Lake Mead Base, no one said anything. Everything in Colonel Jackson's instructions and demeanor emphasized security. Loose lips and speculation, even among group members, would not be tolerated. There was a sense of expectancy, as well as a feeling that they were all still on some sort of probation. As pilots recruited to the

program from all over the Air Force began showing up at Lake Mead, however, Major Whitley noted that, except for a few young pilots who came with the A-7s from England AFB, most of these men were combat veterans. Someone was clearly assembling an inordinately experienced group of flyers.

#### No Fanfare

The pilots were read into their real mission one at a time and without fanfare, whenever someone higher up decided they were ready. A few months into the assignment, Lt. Col. Jerry Fleming, the director of operations, finally briefed Major Whitley on what was really going on at the Lake Mead Base. As Whitley looked at drawings and a photograph of a ground-test model of the F-117A Stealth fighter, the whole operation at Nellis Area Two came into focus. He had heard rumors about a revolutionary, radar-defying technology called "stealth." Indeed, the technology had become a topic in the 1980 Presidential campaign the previous fall after Secretary of Defense Harold Brown confirmed its existence. Though Secretary Brown's remark referred to an advanced technology bomber, not a fighter, here was an actual photo of a model of a stealthy aircraft.

"How fast do you think it will go?" Colonel Fleming asked. Major Whitley closely studied the picture of the strange aircraft, noticing its sharp an-

gles and apparent lack of flaps or even an engine intake. It looked like an old-fashioned household iron. "Well, I'd guess somewhere between subsonic and Mach 3," Whitley said, and they both laughed.

Learning that Lockheed's "Skunk Works" had been working since November 1978 to produce five flight test F-117s, Major Whitley realized just how big a challenge the 4450th TG faced. A typical program followed a linear sequence of development—production, training, and workup to operational capability—over a decade or more. Yet here they were at Nellis Area Two, forming an operational unit and already training pilots to fly an aircraft that hadn't even been produced and would be unlike any ever flown. The schedule called for reaching initial operational capability in less than three years from that day.

The Air Force called the overlap in the F-117A program "concurrency." It was a direct by-product of the intensification of the cold war. Behind the scenes, Colonel Jackson and the rest of the 4450th TG raced to keep up. As they would soon discover, the unprecedented level of concurrency and secrecy would color nearly every aspect of the F-117 program.

By the summer of 1981, the A-7s of the 4450th were a common if puzzling sight along the Nellis flight line, as were the two off-limits house trailers that served as the group's operational and maintenance headquarters. The pilots were forbidden to discuss the program with anyone. Outside their ranks, the only person on Nellis read into their true mission was the Fighter Weapons Center commander, a two-star general. Colonel Jackson continued to report to the director of operations at Hq. TAC at Langley.

#### A Dilapidated Desert Base

The officers of the 4450th were beginning to feel badly stretched by the demands of the program. Colonel Jackson and a number of senior staff were spending an increasing amount of time at Tonopah, a remote and largely abandoned facility in central Nevada that had been used for pilot training during World War II. There they began the long and laborious process of preparing facilities and infrastructure to bed down the F-117s once deliveries began in the summer of 1982. The Night Hawks remaining at Nellis

focused on getting new pilots in the program current in the A-7.

The A-7 had been chosen as an interim trainer because its cockpit layout and avionics were considered similar to those in the planned F-117. Training demands, however, soon forced the 4450th to delegate initial A-7 training and checkouts to a Tucson, Ariz., National Guard unit, which was responsible for training Guard pilots in the aircraft. Thus, pilots arrived at Nellis already proficient in the A-7 and spent roughly six months flying profiles similar to those projected for the F-117.

Meanwhile, Major Whitley was spending more time in Lockheed's Building 311, a hangar-like facility at the company's Burbank, Calif., plant, the site of the Skunk Works. He had been designated to establish the flight training regimen for an aircraft he had never seen, and he was anxious to hear from the engineers about the likely flight characteristics of the F-117. Behind the opaque green windows of what was once a World War II airplane factory, Major Whitley got a firsthand look at the technology that would dramatically reshape the future of military aircraft.

The future looked like nothing he had ever seen. It was larger than he had imagined, roughly the size of an F-15. There were no visible flaps. Even though the F-117 was there in the radar-absorbent flesh, the engineers spoke as if it were still a theory.



Lockheed photo by Eric Schulzinger

**The isolation of Tonopah had other advantages. Not only could pilots concentrate solely on their work (twelve-hour work days were commonplace), but they were free from the aggravating pressure of paper-pushers and the media.**

When discussing its flight profiles, handling, and stealth characteristics, they often used such phrases as "ought to," "should," or "probably." It was clear that the program was a radical departure for all concerned.

Though radically different in shape and design, the F-117 had a cockpit with a surprisingly familiar look and feel. Because they concentrated on breakthrough technologies associated with stealthiness, the Skunk Works engineers were forced by the pace of the program to rely to an unusual

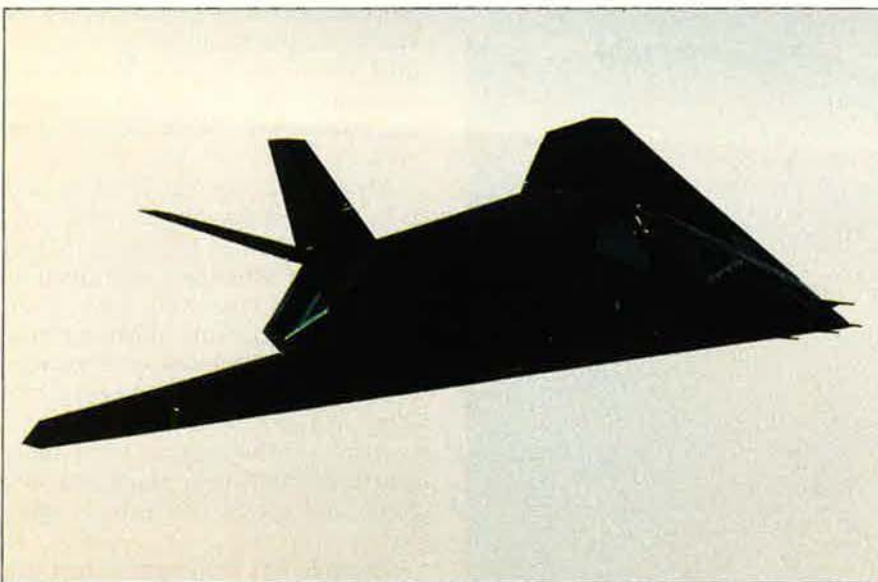
degree on off-the-shelf hardware. Many on-board systems, as well as the General Electric F404 engines, were borrowed from the Navy F/A-18 Hornet strike fighter. The B-52 contributed its navigation system, the F-16 its fly-by-wire flight-control computer, and a Gulfstream jet its wheels and brakes. A question on the minds of everyone associated with the program was exactly how these disparate components would work with the F-117's radical design.

### Devastating News

An important answer was expected to come with first flight of an operational F-117 fighter in June 1982. Everyone aware of the top-secret flight waited with an expectancy reminiscent of the early space launches. Then came the devastating news that the aircraft, flown by a Lockheed pilot, had crashed on takeoff.

Several months later, it was time for another try. Though Major Whitley could remember scrambling from an alert pad at night as a young lieutenant in Vietnam, it is doubtful that he was any more keyed up in combat than he was on the night of October 15, 1982, sitting in an operational F-117A at the end of the runway at Tonopah. The flinty sparkle of the stars in the desert sky seemed to accentuate the vast blackness, reminding him that night operations were always scary.

Major Whitley had ground-aborted



**The outside world got its first glimpse of the F-117 when this blurry, heavily retouched photo was revealed at a Pentagon press conference in 1988. Even after the jet was shown publicly, its capabilities remained shrouded in secrecy.**

on several previous takeoff attempts, with a hydraulic problem or flight computer failure always appearing at the last moment. Of course, the maintenance guys were as unfamiliar with the aircraft as Whitley was, and no one was taking any chances. That was one major advantage of working in an entirely covert program: There was no pressure from the paper-pushers or media to get on with it, nor was there ridicule for aborted takeoffs or launches. Still, the delays were agonizing.

Then there was the matter of the crash of the first operational plane. The Lockheed engineers had discovered that the crash was caused by a mix-up in the pitch and yaw controls and had fixed the problem for subsequent flights. It was not the kind of omen, however, that filled a pilot with confidence on the eve of his maiden flight in a new aircraft with a revolutionary design. Any college engineering student with a slide rule and calculator could figure out that, given this aircraft's shape and relatively anemic thrust-to-weight ratio, a last-second problem on takeoff could quickly turn an F-117 into the world's fastest tricycle.

Finally cleared for takeoff, Major Whitley pushed the throttles forward and scanned the F-117's instruments for any warnings as the aircraft lumbered noisily down the runway. After passing the point of no return, he gripped the controls hard, willing the F-117 into the air. Then, as he climbed

into the darkness, he thought about the small American flag he had stuffed into the pocket of his G-suit for this historic occasion. He would be the first Night Hawk to go aloft in an F-117. It would make a great story for his grandkids. As far as Major Whitley could tell, his children might be grown before he could tell them about it.

### White-Knuckle Trips

Because there was neither a simulator nor a two-seat trainer for the F-117, all of the original pilots went through similar white-knuckle first flights. It was a key reason why the Air Force had front-loaded the program with experienced pilots. Combat-tested pilots and those with many hours in a variety of aircraft could offset with cockpit savvy the lack of an orderly training regimen. At least initially, there was also a feeling that a more mature mix of officers and enlisted men could better cope with the extraordinary security demands of the program.

Those demands became increasingly difficult to meet as the program grew. The first operational aircraft was delivered by Lockheed in June 1982, only forty-three months after design go-ahead. From that point, the Skunk Works began delivering roughly eight aircraft per year, with production winding down in 1989-90. The 4450th achieved initial operational capability with ten aircraft

in October 1983, only fifty-nine months after the inception of the program.

As more F-117s were delivered, younger, less experienced pilots joined the program. Major Whitley immediately became responsible for developing an academic and flight training program for the newcomers. Lt. Col. Sandy Sharp, among the first to fly the plane, became commander of the first operational squadron. Pilots continued to join the unit as seconds. Maj. Charlie Harr followed Major Whitley from the Fighter Weapons School and became the second operational pilot.

All of the pilots soon recognized one of the drawbacks to such a highly concurrent program with an extremely low production rate. Under a continuous improvement program initiated at Lockheed to incorporate the suggestions of both pilots and maintenance personnel at Tonopah, fixes that normally would have been implemented in the development phase or in pre-planned block upgrades began appearing in successive production models. That meant that while all the aircraft would have looked alike to the casual observer (had there been any), there were actually subtle differences among them.

The aircraft were unique enough, in fact, that the pilots felt they had to know exactly which F-117 they were climbing into each night before taking the aircraft up. That individuality seriously aggravated already daunting training and maintenance problems. One of the advantages of the remote basing, the pilots soon discovered, was that it allowed all of them to concentrate totally on the program, and twelve-hour work days became commonplace.

Meanwhile, deliveries of F-117s from Lockheed kept pace (the fifty-ninth model was delivered in July 1990), and Tonopah continued to grow. What was once a desolate desert outpost soon became a bustling base, with new construction split between the two areas known as the Industrial Area and the Man Camp. Modern, two-story brick dorms were built, where enlisted men slept two to a room and officers in private quarters.

Eventually a recreation center was built, with a bowling alley, gymnasium, racquetball courts, and weight room, as well as a book and video

Staff photo by Guy Acefio



**Pilots and maintainers made the trip every week from Nellis AFB (shown here) to Tonopah, keeping their families and virtually everyone else in the dark about what went on at the formerly abandoned base almost 200 miles northwest.**

library. Tonopah became much like any other isolated Air Force base, but it lacked dependents, and nights in the Man Camp were punctuated by the distant sound of jet aircraft taking off and landing.

### “Night Hawk Spirit”

At Nellis, meanwhile, passenger jets sitting in the shadow of the foothills bordering the flight line became a common sight each Monday morning and Friday afternoon. If the base personnel knew—and many of them did—that the contractor aircraft were there to ferry most of the 2,500 inhabitants of Tonopah to work, they didn’t talk about it much. It was part of what became known as the “Night Hawk spirit,” the devotion to a secret worth keeping. It pervaded Tonopah and its sister base at Nellis, where thousands of family members knew not to ask where their loved ones went for four days each week.

Members of only a few professions fully understand the discipline that such activity required, or the toll that it took, especially on the Night Hawk pilots. On leaving the program, these pilots were forced to sign what were essentially pledges to forget what for many had been one of the most memorable times in their lives.

The first serious crack in the wall of secrecy came in July 1986, when an F-117 crashed on a night training mission near Bakersfield, Calif. The crash site was immediately proclaimed a national security area, and the Air Force refused to comment on what type of aircraft the pilot had been flying or where the flight had originated. In an article not long afterward, the *Washington Post* quoted unnamed defense sources as saying that roughly fifty stealth aircraft were operational and combat-ready, though the true figure was about half that large. Within days, the *Sacramento Bee* published an article describing the facilities at Tonopah.

In October 1987, a second operational stealth aircraft crashed. Soon afterward, an A-7 crashed, and media curiosity rose quickly when it was discovered that the pilot of the A-7 was assigned to the 4450th TG—



Photo by Jeff Rhodes

**The F-117 made its public debut in April 1990, nine months before it saw action in the Persian Gulf War, where the planes flew 1,300 missions and dropped 2,000 tons of ordnance without losing an aircraft or even sustaining damage.**

identified as the home unit of the pilot killed in the 1986 Bakersfield crash. Noting that the unit apparently flew the only A-7s left in the active forces, a number of experts publicly speculated that the A-7s were being flown to sharpen daytime attack skills, since the stealth aircraft were known to fly only at night.

By November 1988, with so much about the program being discussed and speculated upon, the Department of Defense decided it could no longer justify spending so much money to keep the program totally under wraps. The day after the Pentagon’s official confirmation, the front page of the *Tonopah Times-Bonanza* proclaimed, “Surprise, Surprise—It Exists.”

The official confirmation had little impact on Tonopah operations. Pilots began occasionally flying the F-117A during the day, but base personnel were still ferried to and from work each Monday and Friday, everyone was still forbidden to talk about what they did for a living, and the program remained shrouded in secrecy. The crews of KC-135Q tankers, which refueled the F-117As on the first stage of their journeys to the Persian Gulf in 1990, were not even given the airplane’s refueling data.

Experts will long debate whether all of the early, extraordinary secrecy was justified, but the Night Hawks certainly saw great value in keeping the outside world guessing about the characteristics of stealth for as long as possible. The F-117A is not fast, particularly agile, or loaded with defensive weapons. It’s just hard for the enemy to see and to track.

Colonel Whitley took command of the 37th Tactical Fighter Wing on the eve of Operation Desert Storm. As the pilots of this unit made preparations to attack heavily defended Baghdad, Whitley and his men, defended by stealth and little else, prayed that there were no radar operators out there somewhere who could actually see them. Colonel Whitley remembers hearing more than once that night, “God, I sure hope this stealth stuff works.”

It did. In forty-three days of war, F-117A aircrews flew 1,300 missions, dropping more than 2,000 tons of ordnance on high-value targets without losing an aircraft or even sustaining damage. When he returned to Nellis, Colonel Whitley was photographed in his cockpit waving a tiny American flag, taken along to mark what he knew was another historic occasion—the first sustained test of a stealth aircraft in combat.

Unlike in 1982, however, he was able to present it to his wife on his return, along with an adequate explanation. ■

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*James Kitfield is a free-lance defense writer in Washington, D. C. He is now at work on a book, from which this article is drawn. His most recent article for AIR FORCE Magazine was “Look What the Labs are Cooking Up” in the December 1992 issue.*

# Books

By Frank Oliveri, Associate Editor

*After Tet: The Bloodiest Year in Vietnam*, by Ronald H. Spector. Drawing on recently declassified government documents, accounts by GIs, and his experiences as a Marine in Vietnam during the year after the 1968 Tet offensive, the author gives a harrowing account of events that rarely reached US television viewers but, he contends, largely determined the war's course and outcome. The Free Press, 866 Third Ave., New York, NY 10022. Including photos, notes, and index, 390 pages. 1992. \$24.95.

*Brave Men, Dark Waters: The Untold Story of the Navy Seals*, by Orr Kelly. This is a complete history of the US Navy's SEAL (sea-air-land) teams from the days of underwater demolition and frogmen during World War II through the Vietnam War and into operations in Panama and the Persian Gulf. The author, a former military editor of *US News & World Report*, analyzes the rigorous training of the SEALs and conjectures on the future of the Navy's elite special operations outfit. Presidio Press, 505 B San Marin Dr., Suite 300, Novato, CA 94945-1340. Including photos, bibliography, and index, 288 pages. 1992. \$22.95.

*Flying the Hump: Memories of an Air War*, by Otha C. Spencer. Here is a rich tale of the men who flew allied transports over the high Himalayas during World War II to resupply US and allied forces in the China-Burma-India theater. In some cases, C-47s and C-46s, which normally flew at altitudes between 12,000 and 14,000 feet, had to fly over elevations of 17,000 feet. On a single night, fourteen aircraft and forty-two crew members and passengers were lost. Texas A&M University Press, Drawer C, College Station, TX 77843-4354. Including photos, notes, bibliography, and index, 217 pages. 1992. \$24.50.

*Hitler's Diplomat: The Life and Times of Joachim von Ribbentrop*, by John Weitz. This first full-length English language biography of Joachim von Ribbentrop, the Nazi foreign minister under Adolf Hitler, relies on its author's lifetime of research and firsthand experience to provide a narrative history of the people, events, and social currents that animated Hitler's regime. Ticknor and Fields, 215 Park Ave. S., New York, NY 10003. Including photos, notes, bibliography, and index, 376 pages. 1992. \$25.00.

*Moving Mountains: Lessons in Leadership and Logistics From the Gulf War*, by

Lt. Gen. William G. Pagonis with Jeffrey L. Cruikshank. The Army's Deputy Commanding General for Materiel Readiness, General Pagonis was a key figure in Operation Desert Storm in 1991. He was responsible for one of the largest logistics operations in history. Here is his account of behind-the-scenes activity that led to success in the Persian Gulf War. Harvard Business School Press, Boston, MA 02163. Including photos, notes, and index, 248 pages. 1992. \$24.95.

*Over the Front: The Complete Record of the Fighter Aces and Units of the United States and French Air Services, 1914-1918*, by Norman L. R. Franks and Frank W. Bailey. As the title suggests, the authors detail the lives of the top American and French pilots of the Great War. University Press of Kansas, Seven Hills Book Distributors, 49 Central Ave., Cincinnati, OH 45202. Including photos and bibliography, 230 pages. 1992. \$49.95.

*Refighting the Last War: Command and Crisis in Korea, 1950-1953*, by D. Clayton James with Anne Sharp Wells. This book looks at command in the Korean War, the first of America's limited wars undertaken in an effort to halt communism. The war, fought on unfamiliar terrain against peasant soldiers, became a prototype for later conflicts. However, the doctrine, weapons, and other equipment were largely left over from World War II. Free Press. Including photos, notes, and index, 282 pages. 1993. \$24.95.

*Six Days in June: How Israel Won the 1967 Arab-Israeli War*, by Eric Hammel. Israel's decisive victory stunned the world. In this book, Mr. Hammel contends that this seeming "miracle" resulted from almost two decades of meticulous planning and preparation. Macmillan Publishing Co., 866 Third Ave., New York, NY 10022. Including bibliography and index, 452 pages. 1992. \$30.00.

*We Were Soldiers Once and Young: Ia Drang—The Battle That Changed the War in Vietnam*, by Lt. Gen. Harold G. Moore, USA (Ret.) and Joseph L. Galloway. This book documents the first major battle during heavy US involvement in the Vietnam War: the Battle of the Ia Drang Valley, also known as "The Valley of Death." Both authors were present at the 1965 battle in South Vietnam, one as the commanding officer of US troops, the other as a correspondent for Unitec Press International. Random House, Inc., 201 East 50th

St., New York, NY 10022. Including photos, appendix, notes, index, and bibliography, 412 pages. 1992. \$25.00.

*Women in the Military: An Unfinished Revolution*, by Maj. Gen. Jeanne Holm, USAF (Ret.). Ten years after the first edition of this work, the author updates it with coverage of controversy surrounding women's service in the military today, discussing women's roles in the invasions of Grenada and Panama and the Persian Gulf War. Presidio Press. Including bibliography and index, 544 pages. Revised 1992. \$27.50.

*Yellow Ribbon: The Secret Journal of Bruce Laingen*, by Ambassador L. Bruce Laingen. Mr. Laingen, former chargé d'affaires of the US Embassy in Tehran, was the highest-ranking American diplomat in captivity in Iran during the 444-day hostage crisis from November 1979 through January 1981. He recorded his thoughts and emotions on scraps of paper and had visiting diplomats smuggle them to safety. Brassey's (US), Inc., 8000 Westpark Dr., McLean, VA 22102. Including photos and index, 305 pages. 1992. \$23.00.

## Other Titles of Note

*Duty, Honor, Company: West Point Fundamentals for Business Success*, by Gil Dorland and John Dorland. How to transfer the basic principles of military leadership to the business world. Henry Holt and Company, Inc., 115 West 18th St., New York, NY 10011. Including annex, bibliography, and index, 238 pages. 1992. \$22.50.

*The Origins of SDI, 1944-1983*, by Donald R. Baucom. History of the Strategic Defense Initiative program and a case study of President Reagan's decision in March 1983 to pursue strategic defense. University Press of Kansas. Including photos, notes, bibliography, and index, 276 pages. 1992. \$29.95.

*Understanding the Former Prisoner of War: Life After Liberation*, by Guy J. Kelnhofer, Jr. Eight essays on the ex-POW's life after liberation and the challenges of adjusting to the everyday world. Banfil Street Press, 244 Banfil St., St. Paul, MN 55102. 1992. Including photos, appendix, and notes, 178 pages. \$19.95.

*The World Fact Book, 1991-1992*, prepared by the Central Intelligence Agency. Published annually, a wealth of unclassified information on every country in the world. Brassey's (US), Inc. Including maps and index, 405 pages. 1992. \$28.00. ■



By Daniel M. Sheehan, Assistant Managing Editor

## More Than Talk

Although there has been no lack of talk about methods for helping the victims of America's troubled economy, constructive action has been in considerably shorter supply. Connecticut AFA, under the leadership of the **Central Connecticut Chapter**, has sought to rectify that imbalance with a worthwhile program to assist the homeless.

Terming it "a hand up, not a hand-out," National Vice President (New England Region) Robert N. McClesney lauded the initiative, which delivered help to more than 500 veterans experiencing dire economic circumstances.

Led by State President John McGrath and Central Connecticut Chapter Vice President John McCormack, the dozen AFA volunteers, including Chapter President Ed Portaluppi and **Sergeant Charlton Heston Chapter** President Joe Gosselin, worked overtime to deliver information and tangible support to the veterans. Volunteers arranged transportation for the homeless veterans and greeted them as they arrived at the facility. Topics discussed included employment as-



*Brig. Gen. Eldon W. Joersz, commander of the 4th Wing, Seymour Johnson AFB, N. C., accepts a citation from National President Jim McCoy on behalf of the wing, which was cited for making a successful transition to composite status. In 1976, in an SR-71, General Joersz set an absolute speed record that still stands.*

sistance, legal aid, drug and alcohol abuse treatment, and Veterans Administration benefits. Clothing, showers, shaves, and haircuts were also made available.

The chapter and state organizations expressed their thanks to Bob Getman, executive director of the Rocky Hill Veterans Home and Hospital, who provided the facilities for the two-day event, and Connecticut Deputy Commissioner of Veterans Affairs John Levitow, who helped coordinate the event. Mr. Levitow is the only USAF enlisted man to receive the Medal of Honor for gallantry during the Vietnam War.

## Texas Executive Committee

The Executive Committee of Texas AFA enjoyed a particularly fruitful meeting in Galveston, Tex., last October. Dr. Richard E. Thomas, director of the Center for Strategic Technology at Texas A&M University, was the featured speaker. His talk on the "Current Strategy of Aerospace Research in Russia" detailed the patterns of defense spending in the former superpower. The conferees, including National Board Chairman O. R. Crawford and Texas ANG Assistant Adjutant General (Air) Brig. Gen. Lester McIntyre, also toured the nearby aviation museum, which has a P-40 Warhawk and a PB4Y



*Edward C. "Pete" Aldridge, Jr. (left), president and CEO of The Aerospace Corp., presents a Jimmy Doolittle Fellowship to James W. Plummer, the company's board chairman and former Under Secretary of the Air Force. Former Air Force Secretary Aldridge made the presentation at an awards ceremony last fall.*



**Shuttle astronaut G. David Low lectures participants in the Young Astronauts Program under the auspices of the Paul Revere (Mass.) Chapter. Mr. Low praised the US space program during his fact-filled presentation: "The space shuttle is a phenomenal capability that America has developed. No one in the world has come close to it."**

ter sponsored the luncheon and the participation of the more than thirty schoolchildren who are members of its Young Astronauts Program, designed to encourage youngsters' interests in space research and programs. Mr. Low, who has flown on both the *Columbia* and the *Atlantis*, had the audience's rapt attention as he described all phases of a shuttle mission, including such sights as "spectacular large storms on Earth," a sunrise every ninety minutes, and, on his August 1991 flight, a huge plume of smoke over the burning oil fields of Kuwait.

The **Tri-County (N. J.) Chapter** also has a thriving Young Astronauts Program. With visual aids on loan from NASA, Glen Ridge school teacher Lis Ellersick sought to introduce the children to the wonders of space exploration. The program participants were able to examine moon rocks, space shuttle tiles, and equipment used by the shuttle astronauts. Chapter President Cy La Manna expressed gratitude on behalf of the chapter for Ms. Ellersick's presentation.

**Robert A. Munn (1921-1992)**

AFA suffered a loss last October with the death of newly elected National Director Robert A. Munn. After serving with distinction in World War II and the Korean War, Mr. Munn joined Hughes Aircraft, retiring as an executive in 1987 with thirty-three years of service. He served AFA as National Vice President (Far West Region), Arizona State President, and

Privateer among the many vintage aircraft in its collection.

**Chapter News**

Members of the **Richard D. Kising (Iowa) Chapter** got a close look at the Total Force in action on a recent trip to the Air Force Museum at Wright-Patterson AFB, Ohio. Chapter members, along with participants from the Mid-America Air Museum and the SiouxLand Military Affairs Committee, traveled to Wright-Patterson on a KC-135 from the 126th Air Refueling Wing (ANG), O'Hare AFFF, Ill. En route, the KC-135 refueled two F-16s from the 185th Fighter Group (ANG), Sioux Gateway Airport, Iowa.

After arriving at Wright-Patterson, the group repaired to the Officers Club for a get-acquainted dinner, with members of the three organizations finding much to talk about. The next day, the group took an extensive tour of the museum, followed by a return flight in the KC-135. Noting the professionalism of the ANG officers and enlisted personnel, Chapter President Donald E. Persinger was particularly impressed by the sight of eight F-16s refueling from the KC-135 at night during the return trip.

Young Astronauts Program participants in Massachusetts got a special treat when they received an address by shuttle astronaut G. David Low at the Hanscom AFB Officers Club. The **Paul Revere (Mass.) Chap-**



**The Langley Chapter matched the Aerospace Education Foundation's \$250 Eagle Scholarship Grant to SSgt. Shannon Bullman (right). Here, past Chapter President George D. Golden (right) and Bill Russell congratulate the Sergeant. Eagle Grants go to outstanding graduates of the Community College of the Air Force.**



Tucson Chapter President, among other offices. He received AFA's Medal of Merit, Presidential Citation, and Exceptional Service Award, and he was active in the Wright Flight Program and many programs at Davis-Monthan AFB, Ariz. Mr. Munn is survived by his wife Beth, two daughters, five grandchildren, and one great-grandchild.

#### Erratum

In the "Professional, Civilian, and Educational Awards" section of the November 1992 issue's convention coverage, the location of Brigham Young University was incorrectly stated. It remains in Provo, Utah.

#### Have AFA/AEF News?

Contributions to "AFA/AEF Report" should be sent to Dave Noerr, AFA National Headquarters, 1501 Lee Highway, Arlington, VA 22209-1198. ■



*National Board Chairman O. R. Crawford (left) and Brig. Gen. Lester McIntyre, assistant adjutant general (Air), Texas Air National Guard, took time out during a recent Texas Executive Committee meeting in Galveston to tour the local aviation museum, which features this beautifully restored P-40 Warhawk.*

## Unit Reunions

#### Aeromedical Evac Ass'n

Current and former members who served in Aeromedical Evacuation will hold a reunion May 19-23, 1993, at the Radisson Hotel in Sacramento, Calif. **Contact:** John H. Stephens, 3910 E. Palfrey Dr., San Antonio, TX 78223-3456.

#### Air Force Gunners Ass'n

Former Air Force gunners will hold a reunion July 15-19, 1993, at the Holiday Inn Hotel in Bethesda, Md. **Contact:** James Zaengle, 3644 Elk Grove Ct., Land O'Lake, FL 34639. Phone: (813) 996-4932.

#### Bataan and Corregidor

The American Defenders of Bataan and Corregidor will hold a reunion May 28-31, 1993, at the Hilton Hotel in Pittsburgh, Pa. **Contact:** John Crago, 615 Lehmeyer St., Huntington, IN 46750.

#### CBI Veterans Ass'n

Veterans who served in the CBI theater will hold a reunion August 11-15, 1993, in Salt Lake City, Utah. **Contact:** Homer C. Cooper, 145 Pendleton Dr., Athens, GA 30606.

#### GEEIA/MDA

Former Ground Electronics Engineering Installation Agency (GEEIA) and Mobile Air Depot Activity (MDA) personnel will hold a reunion June 11-13, 1993, in Oklahoma City, Okla. **Contact:** Sophia Bronson, 13501 S. E. 29th St., P. O. Box 83, Choctaw, OK 73020. Phone: (405) 736-5201. DSC: 336-5207.

#### Great Bend AAB

Former B-29 ground-training veterans who served at Great Bend AAB, Kan., between 1943 and 1945 will hold a reunion April 20-21, 1993, in Las Vegas, Nev. **Contact:** Edward R. Hood, 2670 Rosehill, Escondido, CA 92025. Phone: (619) 746-2496.

#### RAF Station Manston

RAF Station Manston units will hold a seven-day

reunion cruise starting May 9, 1993. **Contact:** Maj. Milton J. Torres, USAF (Ret.), 11200 S. W. 99th Ct., Miami, FL 33176. Phone: (305) 238-3342.

#### 2d Bombardment Ass'n

Veterans of the 2d Bomb Group and 2d Bomb Wing, 15th Air Force, will hold a reunion September 9-12, 1993, in Houston, Tex. **Contact:** Kemp F. Martin, 8433 Katy Fwy., Suite 102, Houston, TX 77024-1997. Phone: (713) 467-5435.

**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.**

#### 8th Air Rescue Squadron

Veterans of the 8th Air Rescue Squadron who served between 1950 and 1954 will hold a reunion May 21-23, 1993, at Cavanaugh's Inn at the Park in Spokane, Wash. **Contact:** Curtis L. Messex, S. 15615 Salnave Rd., Cheney, WA 99004. Phone: (509) 299-4821.

#### 9th Photo Technical Squadron

Veterans of the 9th Photo Technical Squadron (World War II/Guam) will hold a reunion April 2-4, 1993, in Fort Worth, Tex. **Contact:** Emory W. Parrott, 2307 Maxwell Dr., Midland, TX 79705-4911. Phone: (915) 682-0718.

#### 13th Squadron Ass'n

Veterans of the 13th Bomb Squadron, 3d Bomb Group, 5th Air Force, will hold a reunion April 7-10, 1993, at the Stouffer Hotel in Mobile, Ala. **Contact:** Vernor J. Main, Jr., 1024 Harding Dr., New Orleans, LA 70119. Phone: (504) 488-4848.

#### 19th Bomb Group Ass'n

The 19th Bomb Group will hold a reunion April 1-3, 1993, at Warner Robins AFB, Ga. **Contact:** James A. Kiracofe, 274 Quinn Rd., West Alexandria, OH 45381. Phone: (513) 839-4441.

#### Class 42-B

Members of Cadet Pilot Training Class 42-B will hold a reunion March 31-April 4, 1993, at the Hawthorn Suites Hotel in Charleston, S. C. **Contact:** Chandler Estes, 8004 Loch Ln., Columbia, SC 29223. Phone: (803) 788-4917.

#### Class 43-F

Members of Pilot Training Class 43-F (Luke Field, Ariz.) will hold a fiftieth-anniversary reunion June 21-22, 1993, in Phoenix, Ariz. **Contact:** Ed Pawlak, 629 Delano, Prescott, AZ 86301. Phone: (602) 445-5746.

#### 44th Air Refueling Squadron

Veterans of the 44th Air Refueling Squadron are planning to hold a reunion the weekend of May 7, 1993. **Contacts:** Jack F. Pearson, 402 Woodway Forest, San Antonio, TX 78216. Phone: (512) 490-6323. Marv Schavrien, 1809 Dennis, Bossier City, LA 71112. Phone: (318) 746-7346.

#### Classes 44-H/I/J

Members of Pilot Classes 44-H, 44-I, and 44-J will hold a reunion September 16-20, 1993, in Reno, Nev. **Contacts:** Robert A. Stemnock, 10485 Palm Desert Dr., Sparks, NV 89436. Phone: (702) 673-0771 or (309) 796-1934 (Leo Foust).

#### Class 53-B

Members of Class 53-B will hold a reunion October 1993 in Las Vegas, Nev. **Contact:** Lt. Col.

## Unit Reunions

Frank J. O'Brien, USAF (Ret.), 6 Westham Ct., Palmyra, VA 22963. Phone: (804) 589-5839.

### 69th Fighter-Bomber Squadron

Veterans of the 69th Fighter-Bomber Squadron who served in Korea will hold a reunion June 3-6, 1993, in Louisville, Ky. **Contact:** Roger Warren, 7550 Palmer Rd., Reynoldsburg, OH 43068. Phone: (614) 866-7756.

### 73d Bomb Wing Ass'n

Veterans of the 73d Bomb Wing and assigned units, which included the 497th, 498th, 499th, and 500th Bomb Groups and the 65th, 91st, 303d, and 330th Service Groups, will hold a reunion May 13-16, 1993, at the Clarion Hotel in Cincinnati, Ohio. **Contact:** Glenn E. McClure, 105 Circle Dr., Universal City, TX 78148.

### 90th Bomb Squadron Ass'n

Veterans of the 90th Bomb Squadron who served in Korea will hold a reunion May 7-9, 1993, in Slidell, La. **Contact:** Gary Long, 6432 E. Bluebird Ln., Paradise Valley, AZ 85253. Phone: (602) 991-4757.

### 95th Bomb Group

The 95th Bomb Group will hold a reunion September 28-October 2, 1993, in Wichita, Kan. **Contact:** Robert Carter, 2244 George Washington Dr., Wichita, KS 67218-4831. Phone: (316) 652-0202.

### 99th Bomb Group

Veterans of the 99th Bomb Group will hold a reunion April 28-May 1, 1993, in Dayton, Ohio. **Contact:** Jim Smith, 9801 Richmond Dr., Kansas City, MO 64134. Phone: (816) 761-0588.

### 388th Fighter-Bomber Wing

**CONTACT CHANGE:** The reunion notice published in the October 1992 issue for the 388th Fighter-Bomber Wing has a new point of contact. The reunion will be held October 21-25, 1993, in Phoenix, Ariz. **Contact:** Jan Koen, 108 W. Balboa Dr., Tempe, AZ 85282-3512. Phone: (602) 967-5852.

### 394th Bomb Group

Veterans of the 394th Bomb Group, along with the 586th and 587th Bomb Squadrons (World War II), will hold a reunion May 1-8, 1993, in Sun City West, Ariz. **Contact:** J. Guy Ziegler, 2039 E. Solano Dr., Phoenix, AZ 85016. Phone: (602) 956-4316.

### 404th Fighter Group

Veterans of the 404th Fighter Group will hold a reunion September 16-19, 1993, at the Hyatt Regency Hotel in Knoxville, Tenn. **Contact:** James D. Moulton, 9325 Briarwood Blvd., Knoxville, TN 37923-2116. Phone: (615) 690-7180.

### 444th Fighter-Interceptor Squadron

The 444th Fighter-Interceptor Squadron will hold a reunion April 23-25, 1993, at the Airport Holiday Inn in North Charleston, S. C. **Contact:** Lt. Col. Wallace Mitchell, USAF (Ret.), 535 Mimosa Rd., Sumter, SC 29150. Phone: (803) 469-3297 (home) or (803) 775-1281 (work).

### Nha Trang AB

For the purpose of organizing a reunion, I am seeking contact with personnel who were assigned to Nha Trang AB, Vietnam. **Contact:** MSgt. Charles R. Timms, USAF (Ret.), 1616 Rex Dr., Marietta, GA 30066.

### Class 43-E

For a reunion in May 1993, I am seeking contact with members of Class 43-E who were trained at the Southeast and West Coast Training Commands. **Contact:** Paul J. Murphy, 7013 Bellrose N. E., Albuquerque, NM 87110. Phone: (505) 884-5687.

### Class 44-A

Seeking contact with members of Class 44-A (Luke Field, Ariz.) for a reunion in January 1994. **Contact:** Brig. Gen. Jack La Grange, Jr., USAF (Ret.), P. O. Box 783, Fall River Mills, CA 96028. Phone: (916) 336-5877.

### Class 44-G

For a reunion in summer 1994, I am seeking contact with members of Pilot Class 44-G (Western Command) and assigned to Fort Sumner or La Junta. **Contact:** Maj. E. J. "Bud" Albers, USAF (Ret.), 620 Virginia Dr., Winter Park, FL 32789. Phone: (407) 644-3345.

### Class 45-G

I would like to hear from members of Class 45-G interested in holding a reunion. **Contact:** E. L. "Gene" Turner, Rte. 4, Box 115AB3, Grandview, TX 76050. Phone: (817) 783-5350.

### Class 53-10

I would like to hear from members of Class 53-10 (Ellington AFB, Tex.) interested in holding a fortieth-anniversary reunion. **Contact:** Lt. Col. Irwin R. Ziff, USAF (Ret.), 3719 Prosperity Ave., Fairfax, VA 22031. Phone: (703) 280-5637.

### 340th Fighter Squadron

For a reunion in September 1993 in Atlanta, Ga., veterans of the 340th Fighter Squadron (World War II) are seeking former members who served in southeast Asia. **Contact:** Lt. Col. James F. Yealy, USAF (Ret.), 331 Yacht Club Dr., Fort Walton Beach, FL 32548. Phone: (904) 244-3954.

### 735th AC&W Squadron

In order to organize a reunion, I am seeking contact with personnel assigned to the 735th Aircraft Control and Warning Squadron who served in Mechra Bel Ksiri, Morocco. **Contact:** William K. Clark, 411 Meadow Ridge Dr., Kerrville, TX 78028-3824. Phone: (210) 895-2817.

### 839th Eng Av Bn

Seeking former members of the 839th Engineer Aviation Battalion, Special Category Army with the Air Force (SCARWAF), who served in Korea and were stationed at Osan AB (K-55) between 1951 and 1954, who are interested in a reunion in 1993. **Contact:** Don K. Tomajan, P. O. Box 90457, Los Angeles, CA 90009.

## Bulletin Board

Collector seeks **patches** from the following AFBs: Eglin AFB, Fla.; Ramstein AB, Germany; Kadena AB, Japan; RAF Alconbury, UK; RAF Bentwaters/Woodbridge, UK; RAF Lakenheath, UK; and RAF Upper Heyford, UK. **Contact:** Jimmy Fallon, 3025 S. E. Burton St., Topeka, KS 66605-2100.

Seeking information on **Stanley F. Stanczkiewicz** (Kelly), radio operator on John M. Kendrick's crew from the 564th Bomb Squadron, 389th Bomb Group, at Hethel, England, shot down on second Berlin raid March 8, 1944, in B-24 #42-99975. **Contact:** Allen Seamans, 1610 Bunker Hill Rd., Pueblo, CO 81001.

Seeking contact with members of the **776th or 779th Bomb Squadrons** who served in 1944 who have not joined the 464th Bomb Group Association. **Contact:** J. B. McLaughlin, 4456 AuSable Dunes, East Tawas, MI 48730.

Seeking contact with former members of the **49th Fighter-Interceptor Squadron** at Hanscom Field, Mass. The Florida Military Aviation Museum is restoring an F-86D and needs information to paint the aircraft in 49th FIS colors. **Contact:** Ray Cartmell, Florida Military Aviation Museum, P. O. Box 17332, Clearwater, FL 34622.

Seeking information on WACs **Johnnie Maxine Dexter** and **Mildred Bernstein**, stationed at Jefferson Barracks, Mo., during World War II. **Contact:** A. Fred Bailey, P. O. Box 324, Mounds, OK 74047.

Seeking information on **1st Lt. Elston H. Colgan**, stationed at Cambrai, France, 1944-45 with the 587th Bomb Squadron, 394th Bomb Group. **Contact:** Lt. Col. C. Crecellius, USAF (Ret.), 1710 Kimberly Pl., Colorado Springs, CO 80915.

Seeking **photos and memorabilia** relating to USAAF and USAF since 1942 for a display at Ramstein AB, Germany, commemorating fifty years of USAFE history. **Contact:** Capt. Charles E. Hughes, Hq. USAFE/DOOF, APO AE 09094.

Seeking contact with former members of **D. B. Heinrichs's** crew, 711th Squadron, 447th Group, who served in 1944. **Contact:** Dave Ellis, P. O. Box 60301, Reno, NV 89506.

Seeking information on **World War II USAAF** air base located in Torrance, Calif. It was a P-40 or P-38 base tasked with the air defense of nearby Fort MacArthur. **Contact:** Gus Morfis, 4709 Green Meadows Ave., Torrance, CA 90505-5507.

Seeking information on **Donald Wren**, survivor of a B-26 Martin Marauder shot down in the European theater May 31, 1944. Aircraft #4131763 was assigned to the 386th Bomb Group. **Contact:** Leon Croulebois, 41 Rue Brancion, F75015, Paris, France.

Historian preparing technological history of recently **deactivated Minuteman II** system at Ellsworth AFB, S. D., seeks information and material. **Contact:** Michael S. Binder, 6107 Palo Pinto Ave., Dallas, TX 75214-3615.

Seeking contact with anyone who knew **2d Lt. Edward L. Mills**, a navigator on a B-24D, with the 373d Bomb Squadron (H), 308th Bombardment Group (H), at Yangkai, China, in September 1943. **Contact:** Lt. Col. Robert J. Mills, USAF (Ret.), 16315 Craighurst, Houston, TX 77059.

Historian collecting USAAF memorabilia from World War I and World War II. Interested in **leather flight jackets, uniforms**, photo albums, and flight equipment. **Contact:** Jon Cerar, 425 John St., Carlinville, IL 62626.

Seeking information on **Jennifer Glover**, who was in London in 1952. **Contact:** Lt. Col. Henry

Delaney, USAF (Ret.), 68 Ave. of the Oaks, Beaumont, TX 77707.

Seeking contact with owner of two books, the July–October 1940 **Operational Log Book** and the **Signal Office Diary**. **Contact:** Group Capt. C. R. Fowler, RAF, Uxbridge, Middlesex UB10 0RZ, Great Britain.

Seeking information on **Stanley Griffiths**, who served as a bombardier in USAAF in the 1940s. **Contact:** Pamela J. Flaherty, Pilgrim Cottage, High St., Blockley, Moreton-in-Marsh, Gloucestershire GL56 9EX, UK.

Seeking information on **Aubrey Hector Herring** of Elkton, Va. He was stationed at Halton or Bovingdon, Hertfordshire, UK, and returned to the US in 1945 or 1946. **Contact:** Gloria M. Warner, 25 The Ridgeway, Berkhamsted, Herts. HP4 3LB 74674, England.

Seeking information on **FO Wilfred C. Wells**, Columbia, S. C., lost in July 1945. He was a navigator on a B-24 flown by Jack Schmierer, copiloted by Mark Green, flying out of Assam Valley, India, with the 375th Bomb Squadron, 308th Bomb Group. **Contact:** W. H. Houston, 2302 Miller Oaks Dr. S., Jacksonville, FL 32217.

Seeking contact with anyone who knew **Rubin Levy**, an airplane pilot and engine mechanic on Boeing 747s. He served in the Pacific theater and toured in Australia, New Guinea, and Luzon during World War II. **Contact:** Allen Levy, 4324 Sendero Dr., Austin, TX 78735-6322.

For an oral history of airpower, Ph.D. student seeks information from **USAF pilots** who served in the Korean War. **Contact:** John Sherwood, Department of History, George Washington University, Washington, DC 20052.

Seeking patches from the **42d Tactical Reconnaissance Squadron**, Spangdahlem AB, West Germany, and RAF Chelveston, England, 1957–60. **Contact:** CMSgt. Robert Adams, 3320 Wall Blvd., Apt. 11-204, Gretna, LA 70056.

Seeking **photos of captured German aircraft** that crashed from February 24 to November 7, 1945. They are needed to illustrate events told in the book, *War Prizes*, soon to be published. **Contact:** Norman Malayney, 519 Semple St., Pittsburgh, PA 15213-4315.

Seeking information on **Arthur Hawkinson** (Minneapolis), **Richard Jamieson** (Chicago), and **Henry Prewoznik** (Trenton) for a B-17 crew reunion planned for spring 1993. The crew was with the 359th Squadron, 303d Bomb Group, at RAF Molesworth, UK. **Contact:** Bob Stauffer, 2912 Elmhurst, Royal Oak, MI 48073.

Seeking information on the **865th Bombardment Squadron** of World War II. **Contact:** Capt. Andrew L. Butts, AFROTC, Det. 865, St. Michael's College, Colchester, VT 05439-0260.

Seeking contact with **World War II veterans** of the **305th Bomb Group** stationed at RAF Chelveston, England, St. Trond, Belgium, and Lechfeld, Germany, who are not members of the memorial association. **Contact:** Don A. Reuber, S. 3019 Clinton St., Spokane, WA 99216-0179.

USAF squadron **patch collector** living in Canada would like to trade with other collectors. Interested in all USAF squadron and competition patches, especially from William Tell and Gunsmoke. **Contact:** Ken A. McLaren, 41 Erin Crescent, Ottawa, Ontario K1V 9Z3, Canada.

Seeking information on and contact with **Robert Warren Cole**, approximately 44–46 years old. He served with USAF in Marlow, Buckinghamshire, England, in 1966–67. **Contact:** Michael Mangion, 82B Brixton Hill, London SW2 1QN, England.

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Seeking contact with anyone who knew **Lt. Gerald C. Stull**, USAF, whose F-102 went down in Madison, Wis., May 5, 1958. **Contact:** Dr. Clark Stull, 2175 Vineville Ave., Macon, GA 31204.

Seeking contact with veterans of the **414th Night Fighter Squadron** who operated at Elmas Airfield, Sardinia, from late 1943-44 and members of USAAF and RAF units at Monserrato, Decimomannu, and Alghero airfields during World War II for a history project. **Contact:** Alessandro Ragatzu, Via Sulcitana 13409034, Elmas Ca. Sardegna, Italy.

Will give away a September 15, 1944, framed picture of the **#4 Physical Reconditioning Class**

graduation at Washington and Lee University. I also have a picture of an April 1943 OCS graduation in Miami Beach, commanded by Robert Preston. **Contact:** T. E. Anderson, P. O. Box 1575, Poughkeepsie, NY 12601.

Seeking information on **Daniel Sykes**. In 1954, he was twenty-six years old and serving with USAF in England. **Contact:** Mrs. C. Roberts, Palm Close, Main Rd., Sulby, Isle of Man, UK.

Seeking contact with other **patch collectors** who are interested in trading USAF, ANG, or AFRES patches or patches from flying units of any country. **Contact:** Richard Rochon, 36 de Sauternes #3, Gatineau, Quebec J8R 2P9, Canada.

## Bulletin Board

Seeking World War II Army Air Forces **Technician Badge** and two qualification bars: Cryptographic and Carbine M. **Contact:** Don Ross, RR #4, Box 17, Peru, IN 46970.

For reference purposes, editor and photographer seeks to trade **35-mm slide photographs** of current modern military aircraft (1980 to present). Also interested in trading military patches and decals. **Contact:** Renato E. F. Jones, P. O. Box 73403, Puyallup, WA 98373.

Seeking members of the two **9th Air Force B-24** groups (376th and 98th), based in North Africa, and the B-24 groups from 8th Air Force (93d, 44th, and 389th) moved from their UK bases to Benghazi, Libya, for a Ploesti, Romania, mission on August 1, 1943. Interested in original books and publications or photocopies telling of USAAF's missions over Romania during World War II. **Contact:** Capt. Doru Varlan, P. O. Box 18-115, Oficiul Postal 18, Sectorul 1, 71500 Bucharest, Romania.

Seeking people interested in taking part in a **memorial service** on April 4, 1993, to mark the sixtieth anniversary of the crash of the US Navy dirigible USS *Akron* (ZRS-4). The service will be held at Cathedral of the Air, Naval Air Engineering Center, Lakehurst, N. J. **Contact:** CMSgt. Eugene C. Lamkin, Jr., USAF (Ret.), 27728 Mount Pleasant Rd., Columbus, NJ 08022-1801.

Seeking photographs of **B-26s of the Missouri ANG** (1947-52); patches belonging to the 180th Bomb Squadron (M), Mo. ANG; photos of B-36s, Carswell AFB, Tex., and photos and patches from the Ohio ANG, Toledo Express Airport, Maumee, Ohio, 1963-64. Also seeking full-size sterling engineer wings. **Contact:** J. R. Detrick, 6916 Winchester Pl., Fort Worth, TX 76133.

Seeking information on **Harvey B. Kramer**, navigator, and **Douglas A. Chisnell**, flight engineer, who flew on Rip Rohrer's crew of the 398th Bomb Group. They were shot down over Berlin on June 21, 1944. **Contact:** Anton A. Sistek, 2143 W. 4th St., Port Angeles, WA 98362.

Seeking information on **Jack Clark's** grave and his living relatives. He served during World War II in Talakag Bukidnon, the Philippines. He is believed to have perished during the early 1960s. **Contact:** Pansy Weidmann, 721 Alder St., #101, Honolulu, HI 96814.

Seeking information on retired officer **Thomas Ingram** for important medical history. He served in the Air/Sea Rescue Operations at Sidi Slimane AB, Morocco, in 1959. **Contact:** Katherine Dermoutz, 23749 Canyon Dr., Calabasas, CA 91302.

**If you need information on an individual, unit, or aircraft, or if you want to collect, donate, or trade USAF-related items, write to "Bulletin Board," AIR FORCE Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Letters should be brief and typewritten; we reserve the right to condense them as necessary. We cannot acknowledge receipt of letters. Unsigned letters, items or services for sale or otherwise intended to bring in money, and photographs will not be used or returned.—THE EDITORS**

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CHAMPUS is a federally-funded health benefits program designed to help service families pay for medical care in civilian medical facilities, including doctors' charges. However, with CHAMPUS there is a gap between the percentage of medical expenses which are reimbursed and the amount you have to pay out-of-pocket. That's why you need **CHAMPLUS**<sup>®</sup>. As a member of the Air Force Association, you are eligible to purchase one of the best CHAMPUS Supplements available, with competitively low rates.

### **FEATURES THE NEW EXPENSE PROTECTOR BENEFIT**

This benefit limits out-of-pocket expenses (expenses beyond CHAMPUS-allowable charges) for covered services in any single calendar year to \$1,000 for any one insured person (or \$2,000 for all insured family members combined). Once those out-of-pocket expense maximums are reached, **CHAMPLUS**<sup>®</sup> will pay 100% of excess reasonable and customary charges for the remainder of that year.

### **An example of how the Benefit works:**

You are hospitalized for 35 days and the hospital charges you \$330 per day — \$95 per day more than allowed by CHAMPUS. Your out-of-pocket expense would be \$3,325. With the Expense Protector Benefit your cost would be limited to \$1,000. All reasonable and customary costs over this amount — for the entire calendar year — would be paid.

### **ELIGIBLE APPLICANTS**

All AFA members under age 65 who are receiving retirement pay based on their military service, spouses under age 65 of active duty or retired members and their unmarried dependent children under age 21, or 23 if in college, are eligible. Upon reaching age 65, your coverage may automatically be converted to AFA's Medicare Supplement Program.

### **RENEWAL PROVISION**

Your coverage will continue as long as you remain eligible for CHAMPUS benefits, the Master Policy with AFA remains in force, your membership continues, and you pay your premiums.

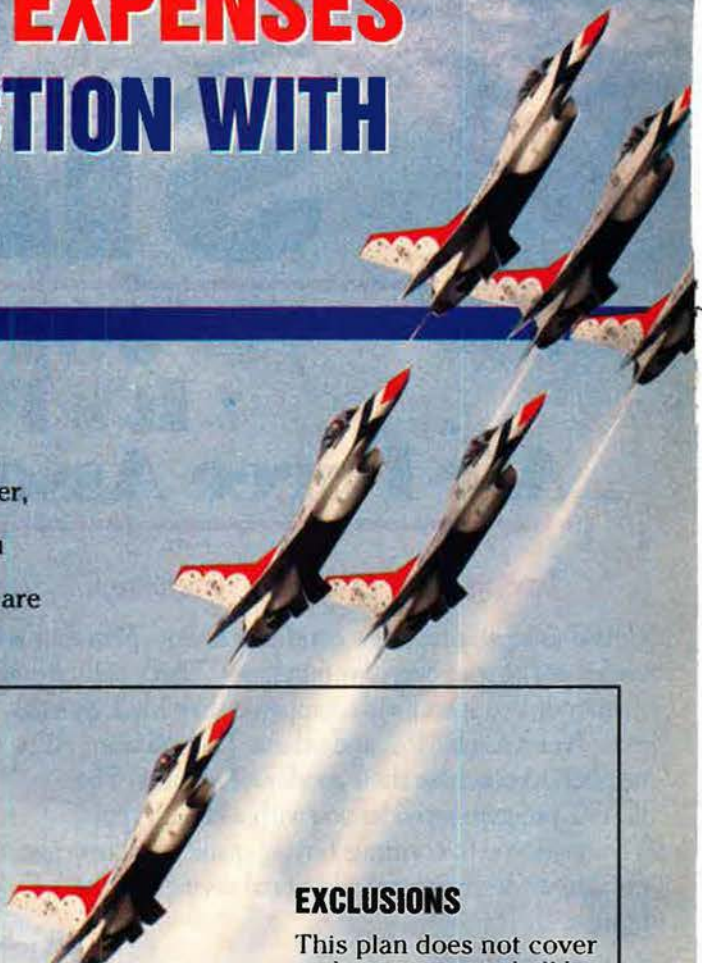
*There is no waiting period for active duty members who enroll within 30 days of retirement if their dependents have been insured for two years previously.*

### **EXCEPTIONS AND LIMITATIONS**

Coverage will not be provided under this plan for pre-existing conditions (conditions which were treated during the 6 months prior to the effective date), until the expiration of 6 consecutive months of coverage during which time no further treatment is received for the condition. After the coverage has been in effect for 12 consecutive months, ALL pre-existing conditions will be covered. Children of active duty members over age 21 (age 23 if in college) will continue to be eligible if they have been declared incapacitated and if they are insured under **CHAMPLUS**<sup>®</sup> on the date so declared. Contact AFA for details.

### **EXCLUSIONS**

This plan does not cover and no payment shall be made for: routine physical examinations or immunizations; domiciliary or custodial care; dental care (except as required as a necessary adjunct to medical or surgical treatment); well-baby care after the age of 2 years; injuries or sickness resulting from declared or undeclared war or any act thereof or due to acts of intentional self-destruction or attempted suicide, while sane or insane; treatment for prevention or cure of alcoholism or drug addiction; eye refraction examinations; prosthetic devices (other than artificial limbs and artificial eyes), hearing aids, orthopedic footwear, eyeglasses and contact lenses; expenses for which benefits are or may be payable under Public Law 89-614 (CHAMPUS).



## LOOK AT WHAT AFA CHAMPLUS® PAYS

### Care

**Inpatient civilian hospital care**

### Retired

the 25% of allowable charges not paid by CHAMPUS, plus 100% of covered charges after out-of-pocket expenses exceed \$1,000 per person (or \$2,000 per family) during any single calendar year

### Active Duty

the greater of the total daily subsistence fees, or the \$25 hospital charge not paid by CHAMPUS

**Inpatient military hospital care**

the daily subsistence fee

the daily subsistence fee

### Outpatient care

(covers emergency room treatment, doctor bills, pharmaceuticals, and other professional services; see exclusions for limitations)

the 25% of allowable charges not paid by CHAMPUS, after the deductible has been satisfied, plus 100% of covered charges after out-of-pocket expenses exceed \$1,000 per person (or \$2,000 per family) during any single calendar year

the 20% of allowable charges not paid by CHAMPUS after the deductible has been satisfied, plus 100% of covered charges after out-of-pocket expenses exceed \$1,000 per person (or \$2,000 per family) during any single calendar year

**CHAMPLUS®** offers many attractive benefits. For a complete description of the Plan, including exceptions and limitations, please refer to the Certificate of Insurance, or call our Insurance Division toll-free at

**1-800-727-3337**

**x4905**

To enroll in the program complete the application. →

### APPLICATION FOR AFA CHAMPLUS®

Group Policy 4609—G1  
Metropolitan Life Insurance Co.,  
Home Office: New York

Full name of Member \_\_\_\_\_  
Rank Last First Middle

Address \_\_\_\_\_  
Number and Street City State Zip Code

Date of Birth \_\_\_\_\_ Current Age \_\_\_\_\_ Height \_\_\_\_\_ Weight \_\_\_\_\_ S.S.N. \_\_\_\_\_  
Month/Day/Year

This insurance coverage may only be issued to AFA members. Please check the appropriate box below:  I am currently an AFA Member  I enclose \$21 for annual AFA membership dues. (includes subscription (\$18) to AIR FORCE Magazine)

#### PLAN & TYPE OF COVERAGE REQUESTED

Plan Requested (check one)  AFA CHAMPLUS® PLAN I (for military retirees & dependents)  AFA CHAMPLUS® PLAN II (for dependents of active-duty personnel)

Coverage Requested (check one)  Inpatient Benefits Only  Inpatient and Outpatient Benefits

Person(s) to be insured (check one)  Member & Spouse  Member Only  Member & Children  Spouse Only  Spouse & Children  Children Only  Member, Spouse & Children

#### PREMIUM CALCULATION

All premiums are based on the attained age of the AFA member applying for this coverage. Plan I premium payments are normally paid on a quarterly basis, but, if desired, they may be made an annual (multiplied by 4) basis. Plan II premiums are payable annually ONLY.

Quarterly (annual) premium for member (age \_\_\_\_\_) \$ \_\_\_\_\_  
Quarterly (annual) premium for spouse (based on members' age) \$ \_\_\_\_\_  
Quarterly (annual) premium for \_\_\_\_\_ children @ \$ \_\_\_\_\_ \$ \_\_\_\_\_  
Total premium enclosed \$ \_\_\_\_\_

If this application requests coverage for your spouse and/or eligible children, please complete the following information for each person for whom you are requesting coverage.

Names of Insured Dependents Relationship to Member Date of Birth (Month/Day/Year)

(To list additional dependents, please use a separate sheet.)

In applying for this coverage, I understand and agree that (a) coverage shall become effective on the last day of the calendar month during which my application together with the proper amount is mailed to AFA, (b) only hospital confinements (both inpatient and outpatient) or other CHAMPUS-approved services commencing after the effective date of insurance are covered and (c) any conditions for which I or my eligible dependents received medical treatment or advice or have taken prescribed drugs or medicine within 6 months prior to the effective date of this insurance coverage will not be covered until the expiration of 6 consecutive months of insurance coverage without medical treatment or advice or having taken prescribed drugs or medicine for such conditions. I also understand and agree that all such preexisting conditions will be covered after this insurance has been in effect for 12 consecutive months.

Date \_\_\_\_\_, 19\_\_\_\_ (Member's Signature)

1/93

Application must be accompanied by a check or money order. Send remittance to:  
Air Force Association, Insurance Division, 1501 Lee Highway, Arlington, VA 22209-1198



### RATES

#### Plan I: For Military Retirees QUARTERLY PREMIUM SCHEDULE

*In-Patient Benefits Only*

Member's Age	Member	Spouse	Each Child
Under 50	\$ 34.11	\$ 73.10	\$24.25
50-54	\$ 50.97	\$ 79.69	\$24.25
55-59	\$ 74.72	\$ 85.29	\$24.25
60-64	\$ 89.27	\$107.54	\$24.25
65 & over*	\$116.66	\$148.51	

#### Plan I: For Military Retirees and Dependents QUARTERLY PREMIUM SCHEDULE

*In-Patient and Out-Patient Benefits*

Age	Member	Spouse	Each Child
Under 50	\$ 52.85	\$107.08	\$55.13
50-54	\$ 69.18	\$117.90	\$55.13
55-59	\$ 95.64	\$155.69	\$55.13
60-64	\$120.15	\$179.28	\$55.13
65 & over*	\$156.37	\$246.29	

\*Not eligible for Medicare

Rates for incapacitated children who reach the limiting age for coverage will still be based on the sponsoring member's rate for the coverage.

#### Plan II: For Dependents of Active Duty Personnel ANNUAL PREMIUM SCHEDULE

*In-Patient Benefits Only*

All Ages	Member	Spouse	Each Child
All Ages	N/A	\$17.40	\$10.42

*In-Patient and Out-Patient Benefits Only*

All Ages	Member	Spouse	Each Child
All Ages	N/A	\$69.55	\$52.12



Bob Stevens'

# "There I Was..."

"NEVER BUY A HORSE WITHOUT FIRST RIDING HIM THROUGH THE BRUSH"—A WISE WESTERN SAYING THAT COULD BE APPLIED TO OUR EARLY ATTEMPTS AT AIR-LAUNCHED MISSILES. THE FIRST CRUDE "BAZOOKA" TUBE LAUNCHERS APPEARED ON FIGHTERS IN 1944.

HENGYANG, CHINA: P-40s OF THE 14<sup>TH</sup> AF ARE BEING RETROFITTED WITH THESE "AWESOME" WEAPONS—



SINCE THE FINS DID NOT IMPART SPIN TO THE ROCKETS, THEY WERE UNGUIDED MISSILES—



...and BENT FINS COULD RESULT IN YOUR FLYING FORMATION WITH YOUR OWN ROCKET(S).





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Jackie Scialabba

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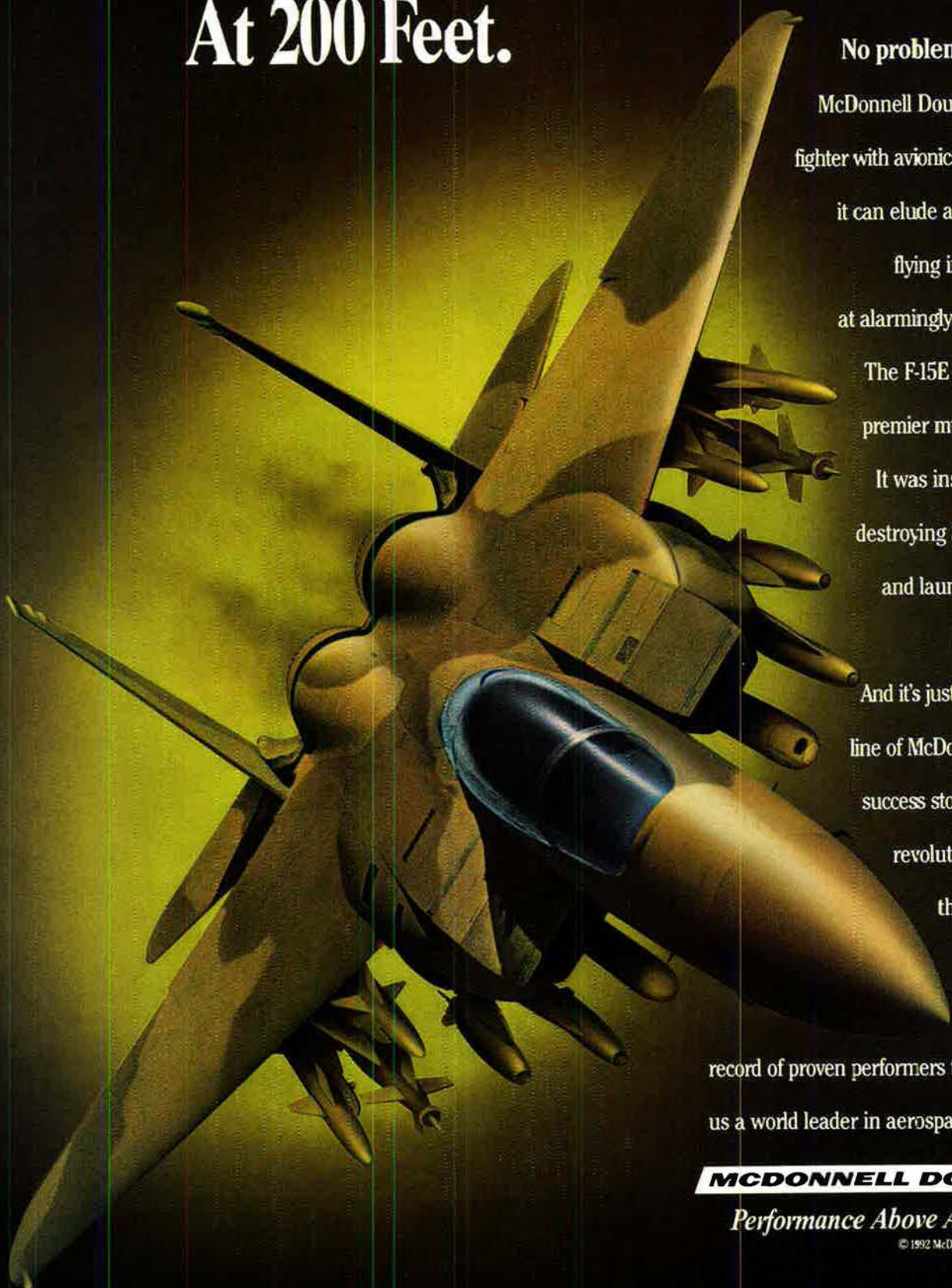
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