AUGUST 1996/$3

AIR FORCE MAGAZINE

PUBLISHED BY THE AIR FORCE ASSOCIATION

★ Space Almanac Issue

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August 1996, Vol. 79, No. 8

AIR FORCE MAGAZINE

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About the cover: This composite satellite view of the western hemisphere was taken from space, a medium that has been the object of almost 1,500 US payloads since 1958. See "Space Almanac," p. 28.

AIR FORCE Magazine (ISSN 0730-6784) August 1996 (Vol. 79, No. 8) is published monthly by the Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Phone (703) 247-5800. Second-class postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** $30 per year; $75 for three-year membership. **Life Membership:** $450 single payment, $475 extended payments. **Subscription Rate:** $30 per year; $25 per year additional for postage to foreign addresses (except Canada and Mexico, which are $9 per year additional). Regular issues $3 each. Special issues (USAF Almanac issue and Anniversary issue) $5 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send changes of address to Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air Force Association.

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LOCKHEED MARTIN

Editorial

By John T. Correll, Editor in Chief

Joint Vision

THE Pentagon, eager to enhance the tradition of jointness, says that combined arms have been a regular thing for us since the American Revolution, when the Continental and French armies, supported by French seapower, defeated the British at Yorktown. The Army and Navy worked together in numerous instances during the Civil War. In the coordinated land, air, and sea campaigns of World War II, joint operations reached unprecedented levels.

Jointness in the modern sense of the term, however, dates from the Defense Reorganization Act of 1958. That was when the individual services lost operational control of their own forces. From that point on, the main charter for the service departments was to organize, train, and equip their units. The services retained their roles as established by law, but the missions were assigned to unified and specified commands on a geographic or functional basis. As they used to say at Air Command and Staff College, the warmaking powers of the United States are now vested in the national command authorities and nine warlords—meaning the commanders in chief of the nine unified commands. (No specified commands exist today.)

Jointness was tightened further by the Goldwater-Nichols Act of 1986, which gave theater CINCs firm control over the deploying forces of all services. Even when one service is dominant in a given conflict, as USAF was in the Persian Gulf War, it still operates as an element of the joint command. Gen. Ronald R. Fogleman, USAF Chief of Staff, often refers to the Air Force as "a team within a team," providing air and space capabilities as part of a joint team.

The Commission on Roles and Missions of the Armed Forces said last year that the "vision documents" of the services—USAF's "Global Reach, Global Power," the Army's "Force XXI," the Navy's "Forward . . . From the Sea"—were "valuable" but that they left out the need for a "joint warfighting vision."

Gen. John M. Shalikashvili, Chairman of the Joint Chiefs of Staff, is filling that gap with "Joint Vision 2010," which has been through multiple drafts since the beginning of this year. It is presented as a "conceptual template," concentrating on expectations about warfare of the future. It will no doubt have considerable influence on the quadrennial strategy review coming up in 1997.

It anticipates future operations based on *information superiority:* the collecting, processing, and disseminating of an uninterrupted flow of information while exploiting or denying an adversary's ability to do the same. This sets up the employment of four operational concepts—dominant maneuver, precision engagement, full-dimensional protection, and focused logistics—leading to *full-spectrum dominance.*

What jointness does is integrate service capabilities. There is a synergistic gain from the combination, but it adds no new working parts.

"Dominant maneuver" means applying superior force throughout "the breadth, depth, and height of the battlespace" to compel an enemy to either react from a position of disadvantage or quit. "Full-spectrum dominance" refers to overpowering an opponent across the entire range of military operations.

"By 2010," the document says, "we should be able to change how we conduct the most intense joint operations. Instead of relying on massed forces and sequential operations, we will achieve massed effects in other ways." If US forces have information superiority, precision targeting, greater range, effective self-protection, and increased results per weapon, they will be able to tailor combat power to specific objectives "with less need to mass forces physically than in the past."

The objective of full-spectrum dominance is consistent with General Fogleman's principle of "asymmetric power," and the operational concepts point toward considerable reliance on airpower and space power. "Joint Vision 2010" puts primary attention on the capabilities that joint commanders will need to conduct joint operations. To its credit, the document is not preachy about the relationship of the services and the joint structure.

The current debate on military roles and missions began more than four years ago. We have been reminded repeatedly that the goal is what is best for the nation, not what is best for the individual services. We have been reminded also that the role of the services is to draw on their "core competencies" in order to provide combat capabilities to a joint force commander. Both of these propositions are sound.

Despite assurances to the contrary, however, the rise of jointness has been accompanied, inevitably, by some decline in the power of the services. In some instances, this is interpreted to mean that the services are of peripheral importance in the joint scheme of things, and that is not so.

As Maj. Gen. Charles D. Link, USAF assistant deputy chief of staff for Plans and Operations, said in a widely circulated memorandum, the services are the "keepers of operational art." General Link, USAF's point man on roles and missions for the past several years, expressed his concern about "the prevailing perception that the four services are somehow the complicating factors in an otherwise harmonious world." He said that "there is no 'joint' competence which one acquires in place of 'service' competence" and that the services "are the fundamental sources of American military competence in the land, sea, air, and amphibious mediums."

What jointness does—all jointness does—is integrate service capabilities. The combination yields a synergistic gain, but it adds no new working parts. That, too, is part of the joint vision. ■

Letters

May Issue Miscues

On p. 121 of the May Almanac issue, a minor error appears in the list of records set by the SR-71 *["Absolute Aviation World Records," May 1996 "Records, Trophies, and Competitions"].* The records for "altitude in horizontal flight" and for "speed over a straight course" were, in fact, set on July 28, 1976, as shown. However, John Fuller and I made the flight that set the record for "speed over a closed circuit" one day earlier—July 27, 1976.

Col. Adolphus H. Bledsoe, Jr., USAF (Ret.)
Renton, Wash.

Your much-anticipated 1996 USAF Almanac was excellent, as usual. On p. 63, "Awards and Decorations," the photo of awards most likely worn by USAF members neglected to include the new Military Outstanding Volunteer Service Medal, which recognizes many Air Force members for voluntary community service. The medal would be worn after the Humanitarian Service Medal and before the Air Force Overseas Ribbon–Short.

Maj. Jeffrey D. Church, AFRES
Reno, Nev.

I was elated to see the SR-71 included in the May Almanac, under "Gallery of USAF Weapons" *[May 1996, p. 131],* because the Air Force does currently possess two of them. So that your readers are up-to-date, the aircraft inventory of reconnaissance aircraft, p. 56, should also reflect two SR-71 aircraft. Under the "Guide to Air Force Installations Worldwide" *[p. 109],* the listing for Beale AFB, Calif., should note that the 9th Reconnaissance Wing has the SR-71 aircraft under its command there.

Col. Richard H. Graham, USAF (Ret.)
Plano, Tex.

■ *Readers Bledsoe, Church, and Graham are correct. In addition to the errors noted by our readers, on p. 106, "The Air National Guard by Major Command Assignment," the 193d Special Operations Wing, Harrisburg IAP, Pa., which flies EC-130E aircraft and is assigned to Air Force Special Operations Command, was omitted. We regret the errors.*—THE EDITORS

Managing Precious Dollars

Did any other readers choke on their dinner while reading "The Housing Problem" *[June 1996, p. 36]?* I refer to Maj. Gen. Eugene A. Lupia's description of performing "major renovation" on older base houses. Just think: For only $100,000 (the median cost of a new home in the US), we're going to renovate the kitchen, change the old heating and ventilation mechanical systems, and upgrade the wiring!

No disrespect to General Lupia, but if this is how his folks are managing precious budget dollars, he needs to hire some new staffers.

I own a fairly new, two-story, Victorian-style house in Virginia, which is no low-cost area. It's on lakefront property in an upscale neighborhood, has more than 2,400 square feet, a large family room with fireplace and a cathedral ceiling, a deck, and a two-car garage. It cost $160,000.

With the exception of a few generals' houses on Langley AFB, Va., not many government houses are of this size or quality. If I can purchase a fine house on the local economy at this price, how does USAF rationalize spending $100,000 to upgrade an aging but nonhistoric base house?

With more careful solicitation of contractor bids, those houses could be upgraded at half the cost and in about half the time it will take USAF to complete the upgrade process. More to the point, I'd bet that a quantity order on brand-new houses of 1,600 to 1,800 square feet would bring them in at the same price the General proposes to spend on upgrades. . . .

Lt. Col. Ellis W. Sharadin, USAF (Ret.)
Yorktown, Va.

Starlifters in Action

In "Perspectives on Air Warfare" *[April 1996, p. 24],* there were two glaring mistakes caused either by misinformation on the part of AMC Commander Gen. Robert L. Rutherford or misquotes on your part. I am referring both to the Bosnia-Hercegovina operations described on p. 25, during which "crews had to rely on the C-130's radar altimeter and the C-17's GPS 'to get down to 400 feet' in visibility that was typically only one mile," and to the quotation on p. 26: "The dozen C-17s moved '17,000 short tons in a thirty-day period.' . . . Also participating were ten C-141 Starlifters and two C-5 Galaxys, but they had to operate at sites more distant from the action."

In reference to the first error, anyone who flies knows that all the airplanes involved had radar altimeters. The two C-130s were flying airborne radar approaches to get down close to the field, and the C-17s did not go in, as did the rest of us, until a portable nav aid or precision approach radar, brought in by a C-130, was put on the fields (Tuzla and Sarajevo). Not long after the C-17s arrived in theater, they were prohibited from going where the action was unless they had a third person on board, be it a navigator or a pilot, because of the task saturation some of the crews were experiencing. C-141 crews in that country could have gone into those fields blacked-out with just as much accuracy as any plane there, bar none, but for whatever reason they were not used.

Speaking of action, I am mystified by the statement that the C-141s could not go where the "action" was. I am

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

assuming that this means Tuzla and Sarajevo. This angers me because I was in Tuzla on December 25, 1995, along with other C-141 crews. I was also there when the Tuzla field was shut down by ground fire directed not at C-17s but at C-130s and C-141s.

I am very proud to have flown the C-141 and to have participated in Operation Joint Endeavor. Although there is still a lot of rivalry between the C-17 and C-141, just about all C-141 guys realize that the Starlifter's time is quickly fading and it is time for the new dog on the block. However, people do deserve a pat on the back once in a while for a job well done. After more than thirty years of service that continues every hour of the day, even as the C-17 is still cutting its teeth, the C-141 and its crews deserve better than to get kicked down the road like an old dog.

Capt. Ken Greenstreet,
USAF
Ramstein AB, Germany

Billy Mitchell's Spirit

"The Spirit of Billy Mitchell" *[June 1996, p. 66]* was excellent reading but left one nagging thought: Is it possible that the same attitude and behavior exhibited by members of the Mitchell-era War Department and Navy have permeated our Air Force?

During the latter stages of my twenty-year career, which ended in the late 1980s, and up through the present, I have seen few service leaders willing to take risks and make the sacrifices necessary to oppose those bureaucrats making unsound decisions adversely affecting the military and its members. Most of those who did follow Billy Mitchell's example were forced out by Selective Early Retirement Boards, which USAF used to rid itself of the "rebels" in its ranks during the force drawdown.

What is left are plenty of senior officers willing to avoid confrontation and make sure their march to the top is not jeopardized. . . .

The spirit of Billy Mitchell still wanders through the ranks of today's airmen, shaking his head, wondering what happened to the scrappy aviators who risked everything to get airpower in its proper place.

Lt. Col. James V. Kelso III,
USAF (Ret.)
Peachtree City, Ga.

"The Spirit of Billy Mitchell" was informative but left out one important fact that most people are not aware of. Every officer on the court-martial board voted General Mitchell guilty—except one. That one was Gen. Douglas MacArthur.

Col. William Lichtman,
USAF (Ret.)
Chicago, Ill.

"The Spirit of Billy Mitchell" was excellent otherwise, but why did the author say that the Gary Cooper film treatment was a "grainy black-and-white movie"? In fact, the 1956 movie was in full color. . . .

W. B. Larew
Falls Church, Va.

Moral Obligations

The obligation to fulfill the promises made about lifetime medical care *["Military Hospitals and Medicare," June 1996, p. 63]* belongs to the Department of Defense. Medical care is part of the cost of fielding our nation's military forces. It appears unseemly, at best, for the Pentagon to hide behind not having Medicare Subvention as a justification for dumping military retirees at age sixty-five.

Recent revelations from Capitol Hill make it clear that Medicare is rapidly going broke and has little ability to take on additional obligations. DoD should step up to its financial and moral obligations by eliminating the age-sixty-five cap on CHAMPUS and Tricare for eligible retirees and their dependents.

Col. Michael R. Gallagher,
USAF (Ret.)
Sacramento, Calif.

Departure From Claptrap

"Military Hospitals and Medicare" was a refreshing and encouraging departure from the claptrap dealt out by some of the so-called "service journals."

In reading the articles in these journals, it doesn't take long to realize that the authors have been inside the Beltway long enough to become completely imbued with the party line and never transgress against it.

As one who first enlisted in the mid-1930s and is now well within the Medicare group, I deeply appreciate

Air Force Association Balance Sheet

	December 31, 1995			December 31, 1994		
Assets	**General Fund**	**Life Membership Fund**	**Total**	**General Fund**	**Life Membership Fund**	**Total**
Current assets						
Cash plus marketable securities at lower of cost or market	$ 3,783,926	$9,310,751	$13,094,677	$ 2,868,627	$9,304,494	$12,173,121
Receivables, prepaid expenses, etc.	1,772,246	310,723	2,082,969	2,605,622	399,652	3,005,274
Fixed assets (land, building, etc.)	11,199,820		11,199,820	11,482,974		11,482,974
Funds on deposit and other assets	8,545,794		8,545,794	7,402,420		7,402,420
Total assets	**$25,301,786**	**$9,621,474**	**$34,923,260**	**$24,359,643**	**$9,704,146**	**$34,063,789**
Liabilities and fund balances						
Current liabilities (including payables, accrued expenses, etc.)	$ 3,198,205		$ 3,198,205	$ 3,014,928		$ 3,014,928
Deferred revenue (including advance membership dues and magazine subscriptions)	915,993		915,993	1,136,296		1,136,296
Long-term debt	4,795,000		4,795,000	4,990,000		4,990,000
Fund balance						
Unrestricted	14,640,158		14,640,158	13,495,861		13,495,861
Designated	1,752,430		1,752,430	1,722,558		1,722,558
Restricted		$9,621,474	9,621,474		$9,704,146	9,704,146
Total liabilities and fund balances	**$25,301,786**	**$9,621,474**	**$34,923,260**	**$24,359,643**	**$9,704,146**	**$34,063,789**

Some 1994 amounts have been restated for comparative purposes.

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BPA Circulation audited by Business Publication Audit

Letters

the forthright presentation of the problem.

Col. Frank M. Schnekser, USAF (Ret.)
Las Vegas, Nev.

The Capable F-111

After reading the letters of both Maj. James E. Rotramel, USAF (Ret.) *[" 'Replacing' the F-111," October 1995 "Letters," p. 6],* and Maj. Douglas O. Fingles, Jr., USAF *["Dialing Long Distance," February 1996 "Letters," p. 9],* I thought I would add a bit from Down Under.

In 1963, the Menzies government ordered twenty-four F-111C aircraft, which had the capability to take off from Australia, bomb Jakarta, and return without refueling. The aircraft had to be able to fly in all conditions at high or low altitudes, carry heavy combat loads, and last until well into the twenty-first century. The Royal Australian Air Force (RAAF) has operated the F-111s from Amberley AB since they were first delivered in 1973. . . .

The Australian government also bought four former F-111As and modified them to RAAF F-111C standard. In 1993, the Australian government announced the purchase of fifteen former USAF F-111G aircraft—one being #69-6514, the last F-111A built for Strategic Air Command.

For the last twenty-three years, the F-111 has served the Australian Defence Force well, and even though the aircraft was ordered during the cold war with Indonesia in 1963, the decision has been vindicated. Even though we had only the F-4E Phantom II for two years while waiting for the delivery of the F-111, I don't think anyone would say buying the F-111 was a mistake.

The Australian defense budget is small compared to that of the US. We don't have a large population to support a large air force, but we have a large country to protect, so buying defense equipment has to be spot on from the start. With the F-111, it has been quality not quantity, and, even

Air Force Association
Comparative Statement of Revenues and Expenses

	Year ended	
General Fund	**Dec. 31, 1995**	**Dec. 31, 1994**
Revenue		
Aerospace development briefings	$ 995,472	$ 1,058,347
Building operations	778,053	738,426
Convention	302,359	313,642
Industrial Associates	128,000	142,450
Insurance programs	4,642,851	4,848,460
Investment	267,434	196,100
Magazine	1,533,851	1,487,447
Membership	3,523,964	3,379,513
Patrons	224,993	209,348
Other	487,084	616,795
Total revenue	**$12,884,061**	**$12,990,528**
Expenses[1]		
Aerospace development briefings	$ 500,345	$ 522,915
Building operations	598,498	582,988
Convention	805,607	757,392
Industrial Associates	138,918	141,367
Insurance programs	3,977,658	4,176,679
Magazine	1,524,424	1,445,735
Membership	3,935,111	3,676,661
Patrons	229,331	234,531
Total expenses	**$11,709,892**	**$11,538,268**
Excess (deficit) of revenue over expenses	**$1,174,169**	**$ 1,452,260**
Life Membership Fund		
Revenue from investments	$ 688,803	$ 544,643
Less: transfer to General Fund for annual dues and other costs	1,003,528	807,523
Net income (loss), Life Membership Fund	**$ (314,725)**	**$ (262,880)**

Treasurer's note: The figures presented herein have been extracted from audited financial statements submitted previously to the Board of Directors of the Air Force Association.

[1] Expenses include chapter commissions, state commissions, and other direct support for field units totaling $500,715 in 1995 and $483,054 in 1994.

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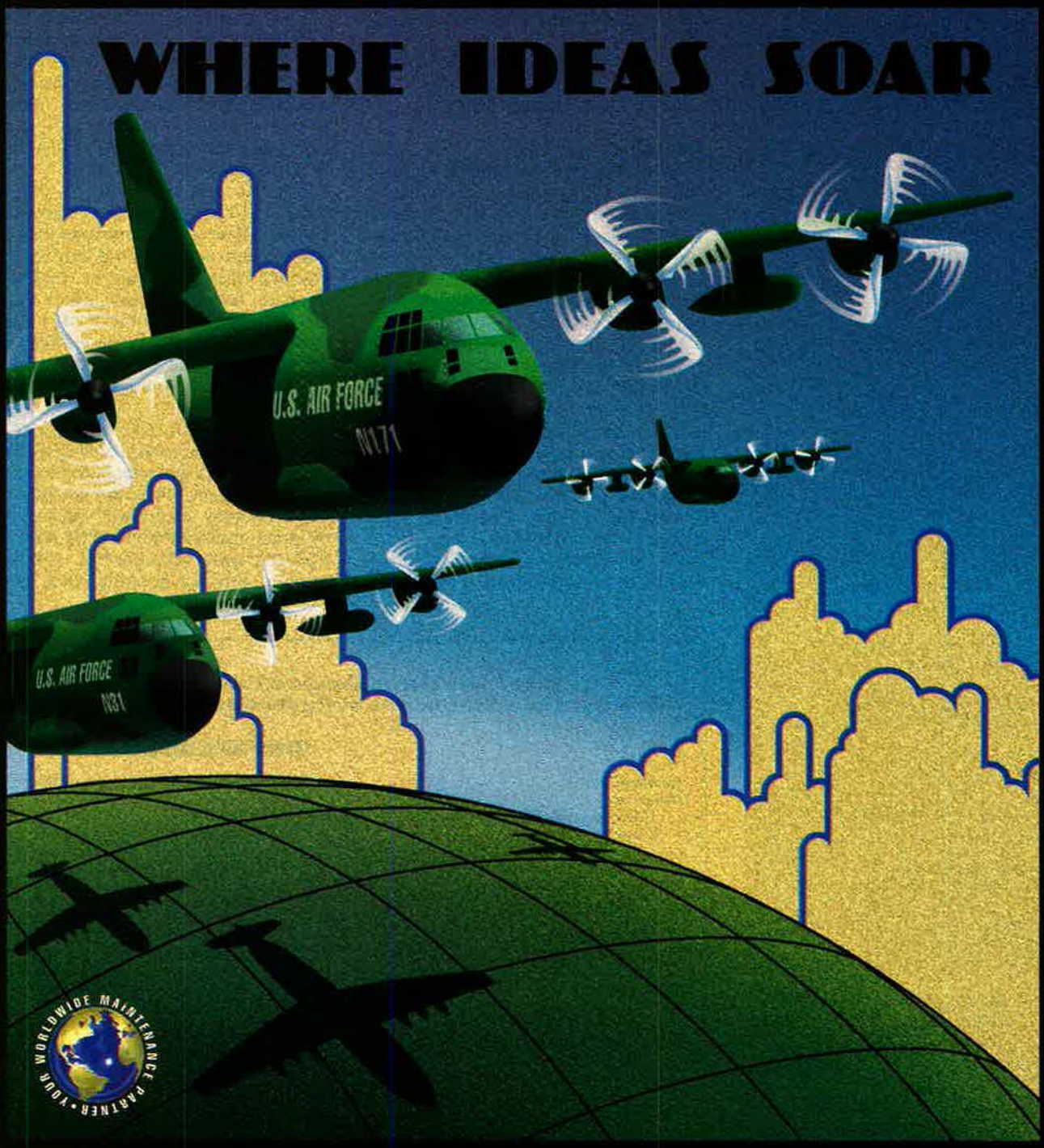

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though we have increased the fleet by fifteen F-111Gs, we are still far short of the number required to keep the airframe hours low and to have attrition replacements.

Many people will argue that the F-111 has passed its use-by date, that we must look to the future, and that sentiment shouldn't be a factor when replacing "out-of-date" aircraft, but how far do you go? B-2s cost about $600 million apiece. That money could save thousands of jobs, pay for medical research, and still keep a squadron of F-111s flying. If or when a B-2 is lost, that cost will have to be justified. If another Persian Gulf War or Libya raid comes along, will the F-15E and the F-16C/D fill the gap? I don't think so. If lives are at stake because of the early—or should I say hasty—retirement of the F-111 or even the A-6 Intruder, who is going to stand up and take the flak?

Australia purchased the first twenty-four F-111Cs for $24 million each, plus support equipment, in 1968. In 1993, we purchased the F-111Gs for $5.5 million each, and, even though the aircraft are secondhand, we got a bargain. If good secondhand equipment is only going to rust at Davis-Monthan AFB, Ariz., keep sending lists of equipment you have for sale.

After witnessing many exercises against the F-111s, I can imagine nothing more frightening than an F-111 down low, going flat out past your position on the ground to kick butt. I am sure that in the final washup you will miss them in some way until a replacement comes along. . . .

Sgt. Bill Thurley,
RAAF
Townsville, Australia

The Muddy Lake Doctrine

I was impressed by the editorial in the May issue of *Air Force* Magazine *["The Lake Doctrine," May 1996 "Editorial," p. 3].* Mr. Correll points out the important concept that military force used loosely, without conceiving significant overall results, is not in keeping with our national interests.

The concept of just doing "good" in the world arena will not stand up as sound military doctrine.

Military theorist Karl von Clausewitz viewed war as a rational instrument of national policy. The three words he used, "rational," "instrument," and "national," should be considered before undertaking any military intervention.

Lt. Col. Harry T. Hance,
USAF (Ret.)
Lowell, Ore.

The Remembered Forty-Second

Thank you for the news item about the EF-111 Ravens' deployment record in the Persian Gulf region *["EF-111s Mark 2,000 Days," May 1996 "Aerospace World," p. 29].*

Back when there was a 42d Electronic Combat Squadron and a 42d Aircraft Maintenance Unit (AMU), my husband was proud to be a part of the group of men and women who maintained the Ravens at RAF Upper Heyford, UK, and on deployments to the Persian Gulf region. The wing commander told them they had the distinction of surviving the most deployed man-hours per capita of any Air Force unit ever. They also had the best flying numbers in the AMU history in terms of mission capable rates. Most of these maintainers moved on to Cannon AFB, N. M., continuing this high rate of deployment for another four years and counting.

Back then they called themselves "The Forgotten Forty-Second." I am happy to see that someone has finally recognized their efforts.

Judith M. Sutterfield
San Antonio, Tex.

Two Perspectives on Johnson

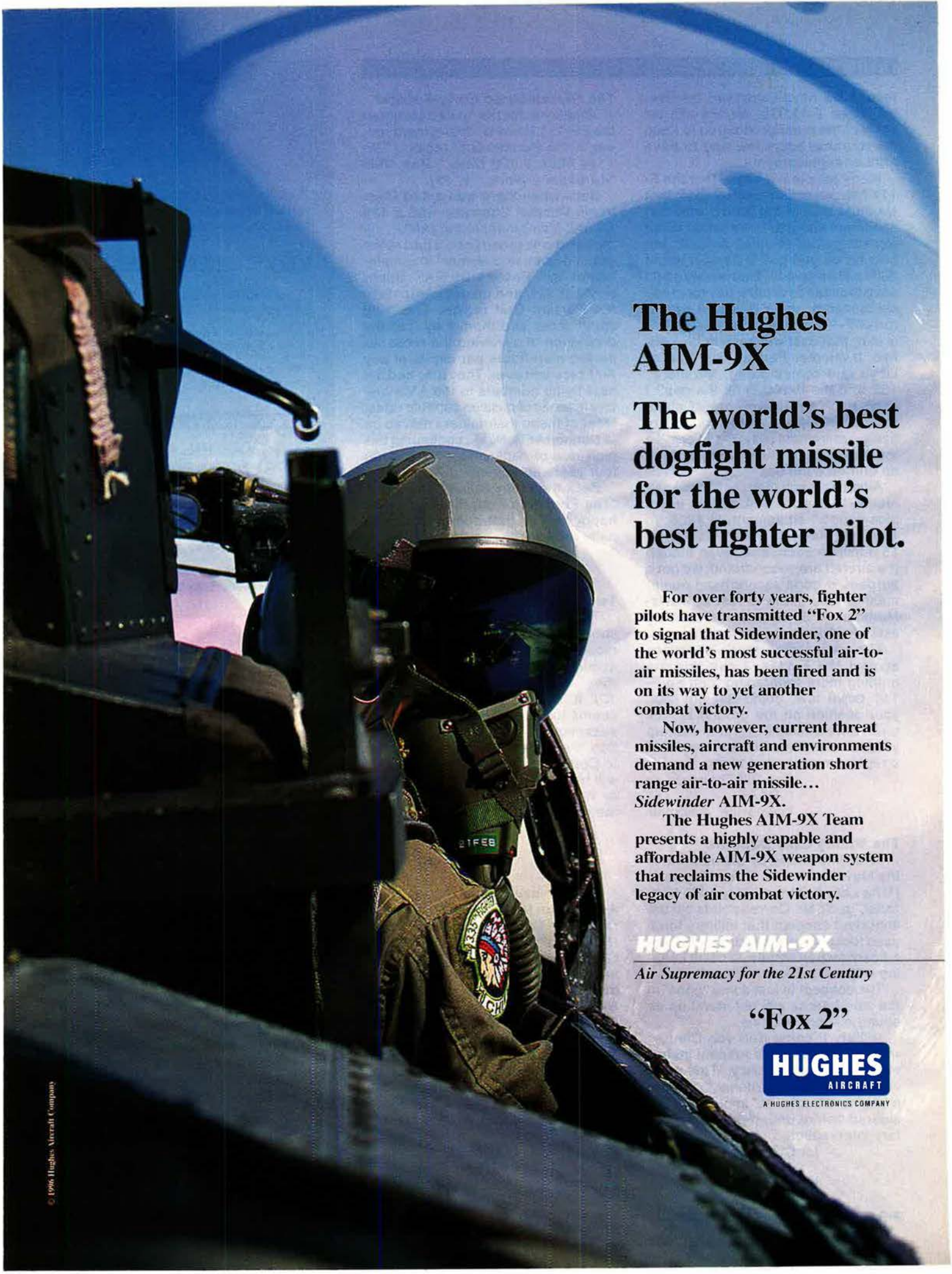
Texas Republican Rep. Sam Johnson's analysis of the "major weapon modernization problems" is deadly accurate *["Sam Johnson's Perspective," June 1996 "Capitol Hill," p. 12].* It is most unfortunate that he seems to be almost alone in his assessment of the Capitol Hill situation. Perhaps his "fierce resistance to Communist torture" while a POW will help him continue on his course in Washington. We certainly need men like him.

Col. John F. Taylor,
USAF (Ret.)
Novato, Calif.

I was amazed to see the Air Force Association lending credibility to the ravings of Col. Sam Johnson, USAF (Ret.), in your June issue. President Clinton has to administer many departments, and he doesn't need prior military experience to know how many B-2s or F-22s to buy. His "weak" Pentagon advisors are supposed to provide the requirement data. Then they hope that Congressmen from Texas, California, and Georgia do not try to pump up procurement beyond all reason.

Less politics and more facts and history, please.

Lt. Col. G. V. Smith,
USAF (Ret.)
Williamsburg, Va.



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For over forty years, fighter pilots have transmitted "Fox 2" to signal that Sidewinder, one of the world's most successful air-to-air missiles, has been fired and is on its way to yet another combat victory.

Now, however, current threat missiles, aircraft and environments demand a new generation short range air-to-air missile... *Sidewinder* AIM-9X.

The Hughes AIM-9X Team presents a highly capable and affordable AIM-9X weapon system that reclaims the Sidewinder legacy of air combat victory.

HUGHES AIM-9X

Air Supremacy for the 21st Century

"Fox 2"

HUGHES AIRCRAFT

A HUGHES ELECTRONICS COMPANY

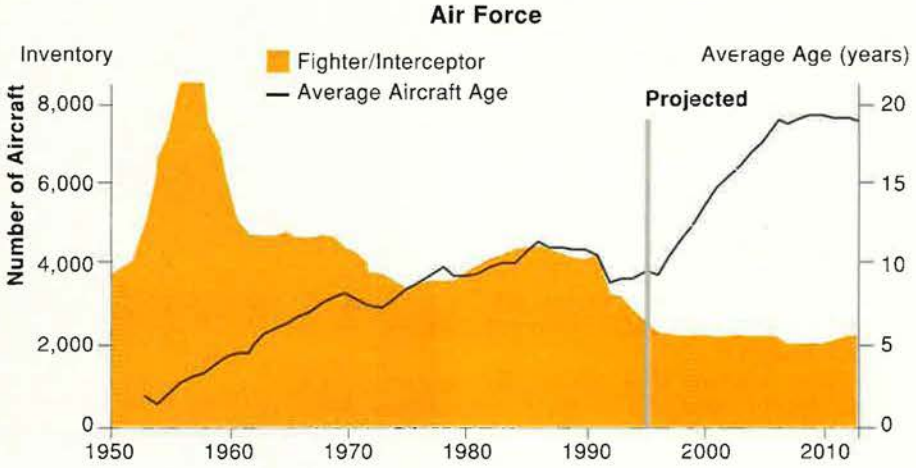
The Chart Page

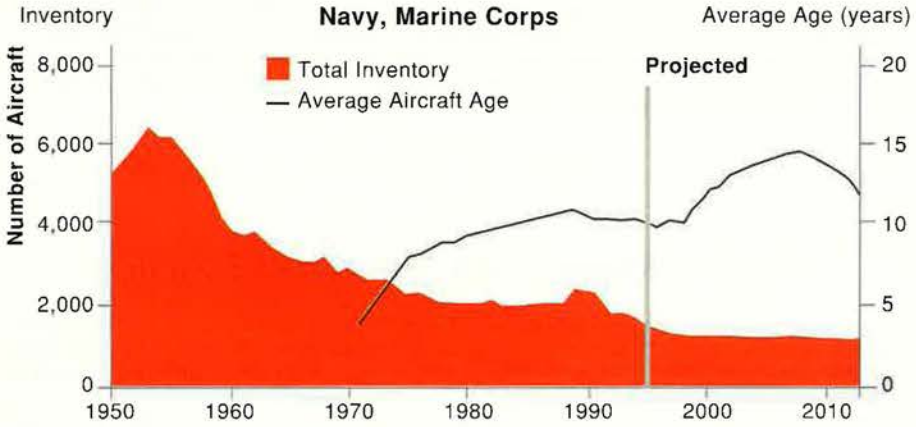
By Tamar A. Mehuron, Associate Editor

Older, Smaller Fleets

Well into the next century, the Air Force, Navy, and Marine Corps will confront the twin challenges of aging and dramatically reduced numbers of fighter/attack aircraft.

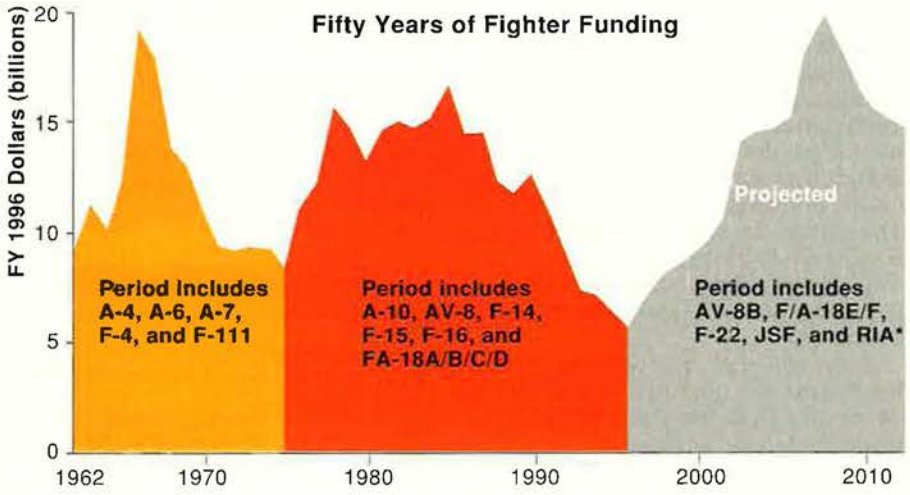
Figure 1 shows that the average age of USAF fighter/attack aircraft, after declining for six years, began to rise in 1992, even as cuts in the inventory began to accelerate. USAF projects that the average age will climb steeply for a decade, peaking in 2006 at almost twenty years.





The average age of Navy and Marine Corps fighters rose slowly in the 1970s and 1980s, leveled off around 1990, and has begun to increase again in 1996. DoD expects the trend to continue for a decade, as seen in Figure 2.

The projected aging of the fleets underscores the need for sustained modernization, as occurred in previous cycles. Figure 3 tracks plans for major increases in funding for fighter programs, such as the F-22 stealth fighter, Joint Strike Fighter, F/A-18E/F strike fighter, and other aircraft.



Source: "Annual Report to the President and the Congress," William J. Perry, Secretary of Defense, March 1996.

*Replacement Interdiction Aircraft

Aerospace World

By Suzann Chapman, Associate Editor

FY 1997 Brings Smallest Cut

As evidence that the bulk of the drawdown is over, Air Force officials said that in Fiscal 1997 the service needs to drop only 850 officers and no enlisted members. That is the smallest reduction since entering the post–Cold War drawdown—possibly the last.

The Air Force expects to cover just over half of the officer force reduction, about 430, under its Voluntary Early Retirement Program. The remaining 370 will come from the Limited Active-Duty Service Commitment Waiver Program.

Lt. Gen. Michael D. McGinty, Air Force deputy chief of staff for Personnel, said that the service is "entering an era of stability." He added, "In the absence of any significant end-strength reductions, I anticipate fewer, if any, additional force reductions will be needed through FY 1999."

Those in the eligible categories include almost all line captains, majors, and lieutenant colonels; Medical Service Corps captains and deferred majors; most Nurse Corps officers; deferred majors and lieutenant colonels in Biomedical Sciences and Judge Advocate General Corps; and most chaplains. Exceptions include pilots who have not been deferred for promotion, navigators, air weapons directors, Medical and Dental Corps officers, operating room nurses, nurse anesthetists, pediatric nurse practitioners, and Catholic chaplains.

JASSM Competitors Chosen

Lockheed Martin and McDonnell Douglas will compete in the program definition and risk reduction (PDRR) phase of the Joint Air-to-Surface Standoff Missile (JASSM) program, USAF officials announced June 17. The companies scored over Hughes, Raytheon–Northrop Grumman, and Texas Instruments in the USAF-Navy joint program, ultimately worth about $3 billion.

They will now compete head-to-head over the next two years, after which the Defense Department will select a single winning contractor. Lockheed Martin received $110.9

US and Saudi military personnel survey the damage to Khobar Towers from the June 25 truck bomb that exploded outside the security fence, about 100 feet from the facility on King Abdul-Aziz AB, Saudi Arabia. Since the attack, workers constructed a new boundary of concrete barriers about 400 feet from the US forces' residential complex.

USAF Members Killed in Terrorist Bombing

Nineteen Air Force personnel were killed and 300 Americans injured in the June 25 bombing of the Khobar Towers near King Abdul-Aziz AB, Saudi Arabia. It was the worst terrorist attack targeting the US military since 241 American servicemen were killed in the 1983 bombing in Beirut, Lebanon.

Most of the 2,900 servicemen living in the two-building complex were Air Force members on temporary assignment to the region to support Operation Southern Watch. The following Air Force personnel were killed:

Assigned to Eglin AFB, Fla.:

SSgt. Daniel B. Cafourek, Watertown, S. D.
Sgt. Millard D. Campbell, Angleton, Tex.
SrA. Earl F. Cartrette, Jr., Sellersburg, Ind.
TSgt. Patrick P. Fennig, Greendale, Wis.
MSgt. Kendall K. J. Kitson, Yukon, Okla.
A1C Brent E. Marthaler, Cambridge, Minn.
A1C Brian W. McVeigh, De Bary, Fla.
A1C Peter J. Morgera, Stratham, N. H.
TSgt. Thanh V. Nguyen, Panama City, Fla.
A1C Joseph E. Rimkus, Edwardsville, Ill.
SrA. Jeremy A. Taylor, Rosehill, Kan.
A1C Joshua E. Woody, Corning, Calif.

Assigned to Offutt AFB, Neb.:

SSgt. Ronald L. King, Battle Creek, Mich.

Assigned to Patrick AFB, Fla.:

Capt. Christopher J. Adams, Massapequa Park, N. Y.
Capt. Leland T. Haun, Clovis, Calif.
MSgt. Michael G. Heiser, Palm Coast, Fla.
SSgt. Kevin J. Johnson, Shreveport, La.
A1C Justin R. Wood, Modesto, Calif.

Assigned to Wright-Patterson AFB, Ohio:

A1C Christopher B. Lester, Pineville, W. Va.

New Air and Space Director Says, "Tomorrow Will Be a New Day"

Following a search that lasted more than a year, the Smithsonian Institution June 13 appointed Donald D. Engen, a retired Navy vice admiral, as director of the National Air and Space Museum. Admiral Engen, a former naval aviator who served in three wars and a former head of the FAA, succeeds Martin O. Harwit, who resigned as director in May 1995 in the heat of the *Enola Gay* controversy.

That controversy began in April 1994 when the Air Force Association and *Air Force* Magazine reported the museum's plans to use the *Enola Gay,* the B-29 that dropped the first atomic bomb on Hiroshima, as a prop in a politically rigged horror show. Reaction by Congress and the public eventually forced the museum to cancel that program in favor of a straightforward display without the political trappings.

Admiral Engen was to assume duties at the museum in July. Meeting with reporters in June, he declined to comment on management of the museum under his predecessor, but he said pointedly that "tomorrow will be a new day." He also expressed his regard for the revised *Enola Gay* exhibition, which has logged well over one million visitors, to become the most popular special exhibition in the museum's history.

Ironically, during World War II, Admiral Engen took part in the air and sea battles for Guam, the Philippines, Iwo Jima, and Okinawa—the Pacific campaign that culminated with the mission of the *Enola Gay* in 1945.

The Smithsonian announced June 27 the appointment of Donald S. Lopez as deputy director of the Air and Space Museum. He is a World War II USAAF fighter pilot—having flown P-40s in China—a former test pilot, and a combat veteran of the Korean War. He served previously as deputy director from 1983 to 1990.

million and McDonnell Douglas $126.5 million for the PDRR phase.

Both contractors came in with a proposed unit price of less than $500,000 per missile, against an average threshold price of $700,000 per copy. The Air Force expects to purchase 2,400 missiles. The Navy is still evaluating its buy.

Assistant Secretary of the Air Force for Acquisition Arthur L. Money said that the JASSM program employed "an aggressive acquisition approach using virtually every acquisition reform initiative known to date." Forgoing endless military specifications, the program had only three key requirements: range, missile mission effectiveness, and carrier operability. Mr. Money said all other requirements were subject to tradeoffs to stay within the threshold price.

He added that prior performance had been given equal weight with technical proposal in the choice of contractors.

At press time, Hughes had filed a protest with the General Accounting Office. USAF officials must evaluate the protest and report to GAO this month. GAO's decision is due by October 30.

C-17 Nets Longest Multiyear Contract

The longest and largest multiyear government contract became official May 31 when Air Force Secretary Sheila E. Widnall signed letters of transmittal to McDonnell Douglas and Pratt & Whitney for eighty C-17 Globemaster III aircraft and 350 F117 engines.

McDonnell Douglas will receive $14.2 billion for the aircraft, and Pratt & Whitney will get $1.7 billion for the engines. Another $100 million goes for spare engines, and $200 million goes for contract termination if the Air Force does not complete the eighty-plane buy. The seven-year contracts will save the Air Force about $1.03 billion.

The contracts also include a six-year buy option, which Congress feels would save an additional $359 million. The Air Force maintains that the seven-year buy is the most affordable under the current budget plan.

However, according to a report in *Aerospace Daily,* USAF told Congress in early June that, under a six-year option, the service would prefer to fund the final five aircraft in the Fiscal 1997 budget, calling for an increase of $684 million. Otherwise, the six-year profile is not affordable.

Regardless of which plan survives, Secretary Widnall said that the C-17 program has shattered decades-old paradigms of how the military develops and buys weapon systems. The Air Force has already negotiated annual savings of more than $4.4 billion from production efficiencies and acquisition streamlining and reform initiatives.

Scott Leads Off "One Plus One"

Officials at Air Mobility Command's Scott AFB, Ill., broke ground June 11 for the Air Force's first dormitory built under DoD's new "one plus one" standard for single airmen.

The 50,000-square-foot, three-story brick structure will have 132 private rooms, each sharing a small kitchen and bathroom with one neighbor. The project will cost $8.5 million and should be completed by mid-1997.

Defense Secretary William J. Perry approved the one plus one standard

F-22 Team photo by John Rossino

Lockheed Martin Aeronautical Systems, Marietta, Ga., recently completed another key step on the forward fuselage of USAF's first F-22. Major body mate—joining of the aft fuselage, built by Boeing in Seattle, Wash., to the mid-fuselage, built by Lockheed Martin in Fort Worth, Tex.—is scheduled for fall.

Lockheed Martin photo by John Rossino

USAF's first new C-130J completed its maiden flight June 4. Lockheed Martin test pilot Lyle Schaefer flew the aircraft to 35,000 feet during a six-hour, fourteen-minute flight from Dobbins ARB, Ga. He said, "Its control response is like a conventional C-130, but the propulsion system is more powerful . . . and a lot quieter."

in November 1995, but defense officials cautioned that the change would not happen overnight. The Air Force expects to have eighty to ninety percent of its airmen in the new configuration by 2010. *[See "The Housing Problem," June 1996, p. 36.]*

Minuteman Enters NMD Fray

A Cold War mainstay could see new life if an Air Force proposal to field a viable emergency response national missile defense system prior to 2003 gets the green light.

The option "entails deploying twenty modified Minuteman missiles armed with defensive kinetic-kill vehicles in existing silos at a single site in the central United States," USAF Chief of Staff Gen. Ronald R. Fogleman told a defense industry and military audience May 16. He said the option "leverages existing components and infrastructure providing the required defensive capability at the earliest time, for the lowest cost, and with the least risk."

The idea originated last year with a Ballistic Missile Defense Organization "tiger team." The team charter was to look for ways to develop a national missile defense system that could deploy at the earliest possible date to counter the developing missile threat posed by rogue nations, according to Maj. Gen. Robert E. Linhard, USAF's director of Plans, who pitched the option to a House National Security Committee subcommittee June 18.

General Linhard testified that converting the Minuteman to a defensive role would be "relatively straightforward." He said it would involve using all three stages of the missile, changing some computer software, plus integrating a kinetic-kill vehicle and associated kick stage.

The Air Force estimates it would cost between $3.5 billion and $4.5 billion and take at most four years to deploy the option.

The Army has also developed an emergency response option. Lt. Gen. Jay M. Garner, commanding general of US Army Space and Strategic Defense Command, testified that the Army's emergency response option—which includes use of a commercial booster variant—could be fielded within six years at a cost of $5.2 billion. However, he added that the Army also has a second, higher-risk option that could be deployed in four years for about $4.8 billion.

Neither the Air Force's nor the Army's cost estimates have received DoD validation. The former director of the Ballistic Missile Defense Organization, Army Lt. Gen. Malcolm R. O'Neill, has publicly challenged the Air Force estimate.

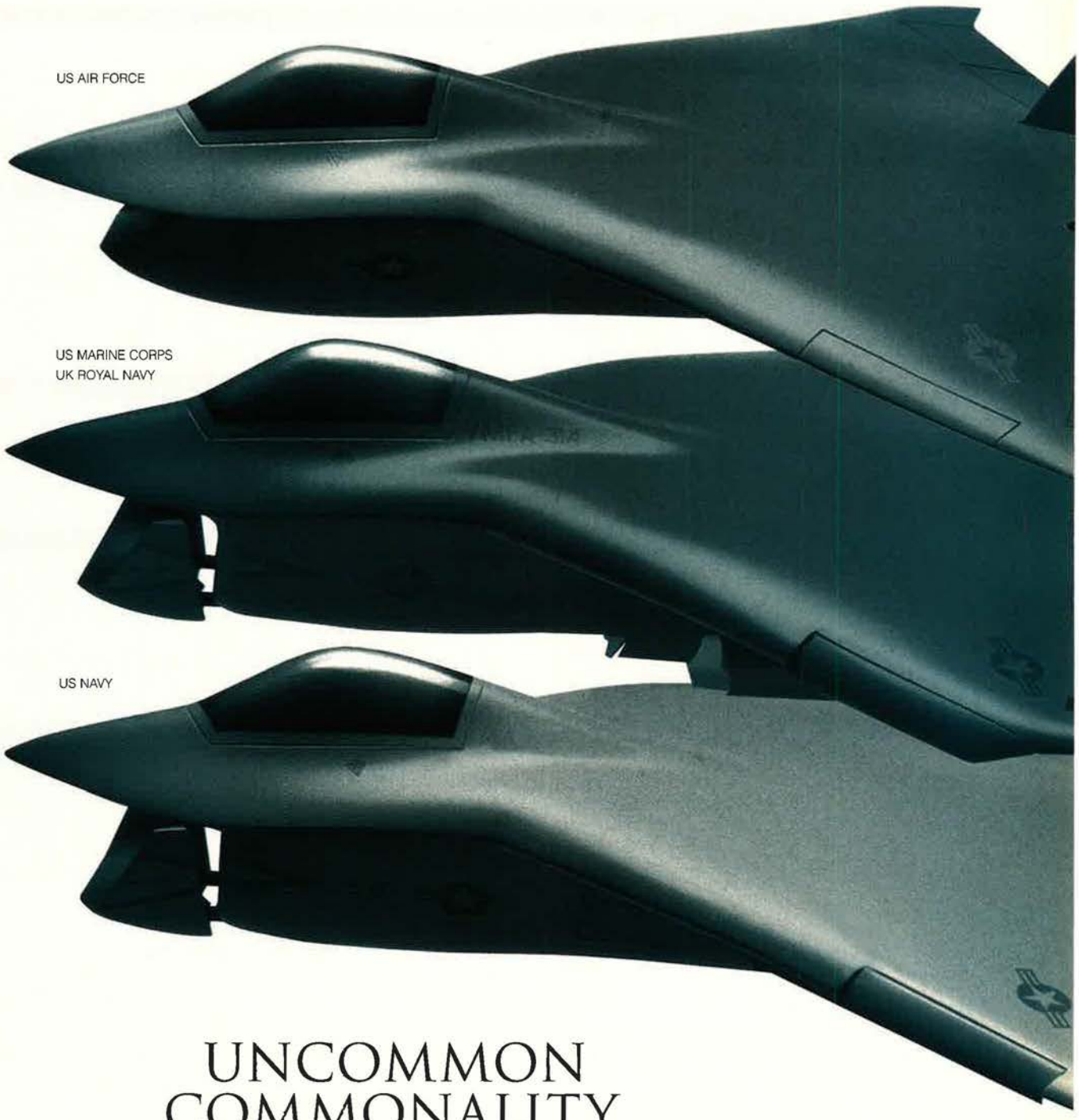
Flying Again

The last fourteen of the Air Force's "banked" pilots entered requalification training June 12, a year ahead of schedule, according to 86th Flying Training Squadron officials at Laughlin AFB, Tex. The 86th FTS is retraining the last airlift/tanker group of "pilots without cockpits."

Since the program started in 1991, the service banked 1,092 newly trained pilots in nonflying positions. These pilots had to wait to fly during the years of cockpit shortages.

"With the number of pilots needed today, all of those who were banked are able to fly again," stated Capt. Frederick "Woody" Royal, banked pilot program manager at Laughlin. "The

A Mississippi Army National Guard helicopter at NASA's Stennis Space Center helped conduct a lift test of the full-scale propulsion module for Boeing's "partially reusable" Evolved Expendable Launch Vehicle on June 7. The module would return to Earth for a parachute water landing after each launch.



UNCOMMON COMMONALITY.

From the beginning, we designed the Boeing Joint Strike Fighter to be the fighter each customer needs, without compromise. Yet, because of our innovative approach, the three variants have more than 90 percent commonality. This will keep the costs down for everyone.

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Trends in Propensity To Enlist

DoD's Youth Attitude Tracking Study, a computer-assisted telephone interview of 10,000 young men and women, shows the percentage of youth who state that they plan to "definitely" or "probably" enlist in the next few years.

16–21-Year-Old Males

Service	1988	1989	1990	1991	1992	1993	1994	1995
Army	16	17	16	17	13	13	11	12
Navy	12	13	11	12	11	10	9	10
Marine Corps	12	13	11	13	13	11	11	11
Air Force	16	17	15	16	14	14	12	12
Any Service	31	33	32	34	29	29	26	28

16–21-Year-Old Males by Race (Any Service)

Service	1988	1989	1990	1991	1992	1993	1994	1995
White	25	26	27	29	25	25	22	23
Black	48	54	42	49	36	37	32	32
Hispanic	41	47	47	46	45	42	39	44

16–21-Year-Old Females

Service	1988	1989	1990	1991	1992	1993	1994	1995
Army	6	6	6	7	5	5	7	6
Navy	5	5	5	6	4	3	5	5
Marine Corps	3	4	3	3	3	4	4	4
Air Force	8	8	7	9	7	7	5	7
Any Service	13	14	13	15	12	12	13	13

16–21-Year-Old Females by Race (Any Service)

Service	1988	1989	1990	1991	1992	1993	1994	1995
White	8	8	9	9	9	7	9	7
Black	28	30	24	28	16	23	20	24
Hispanic	18	23	21	28	22	21	25	25

program kept the Air Force from losing qualified pilots."

Once a Sleepy Hollow

American-run Aviano AB, Italy, dates from the mid-1950s when USAF built temporary facilities there for about 1,800 people of Det. 1, 17th Air Force. Its aviation history, though, started with the Italians in 1911, when they opened a military flying school there.

The base saw a lot of action in World War II as a home for both Italian and German aircraft, but for years USAF used Aviano only to stage flying units on a rotational basis. It was a "sleepy hollow." Bosnia-Hercegovina changed all that.

NATO forces began using Aviano in 1992 to support the United Nations no-fly zone under Operations Deny Flight and Decisive Edge. USAF transferred F-16s and the 555th Fighter Squadron to the base and activated the 510th FS in 1994. During Operation Deliberate Force, the NATO bombing campaign from August 29 to September 21, 1995, the base population peaked at 10,500.

The population and mission boom created serious overcrowding. About $300 million to $500 million in new and upgrade construction will change that, according to Brig. Gen. Charles F. Wald, 31st Fighter Wing commander.

The General predicts, "In about five years, this base will be . . . the kind of base you'd expect for a premier fighter wing in the Air Force." He said that from fifty to seventy-five percent of Aviano's facilities need work, but he is confident the construction will take place because funding is coming from a variety of sources.

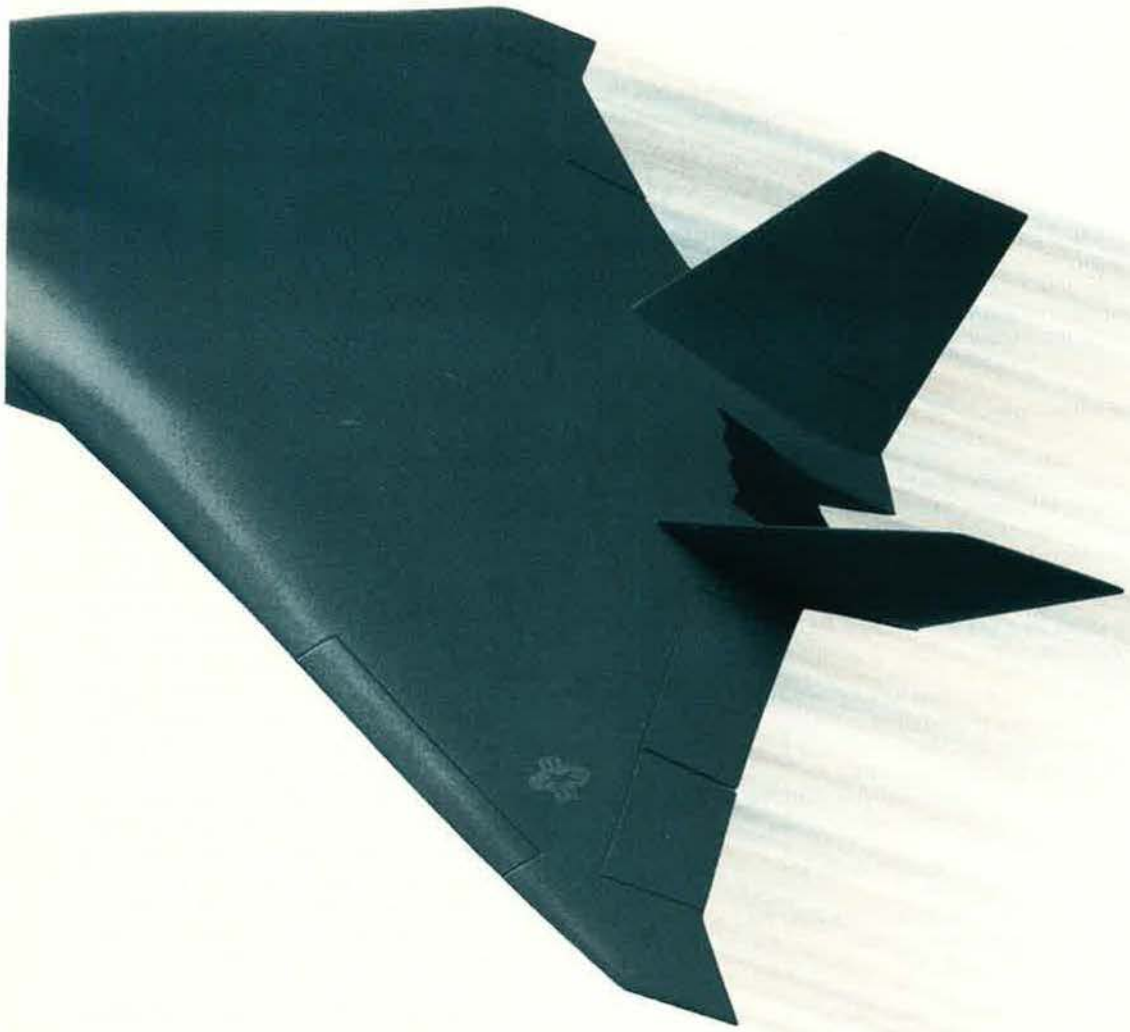
General Wald said that NATO is funding a majority of projects, including upgrades to the flight line, a new school, and a large dormitory. The base was due to open a new multimillion dollar, 550-person dorm and a child-care center this month.

Army, Navy Gain in Propensity Poll

The propensity of young men aged sixteen to twenty-one—the military's key target population—to enlist in the Army and Navy is slightly higher than it was last year, according to the Pentagon's annual youth survey. Their interest in the Air Force and Marine Corps, however, is the same. (See chart, above.)

The 1995 Youth Attitude Tracking Study also showed a rise from twenty-six percent in 1994 to twenty-eight percent in 1995 in the propensity of members of that same group to enlist in any service.

The results by race for that age group showed an increased interest over 1994 among white and Hispanic males, while the interest level of black males remained the same. However, a steady level for black males may be a positive sign in what many have called a disturbing trend among young black men to turn away from military service. Some forty percent fewer young black



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New Priorities, Funny Figures

Thirty-nine executives banded together as "Business Leaders for New Priorities," called a press conference/ice cream social, and expressed their unhappiness about the defense budget.

BLNP claimed that DoD spends "more today in inflation-adjusted dollars than President Nixon spent in the 1970s at the Cold War's height." However, according to the following government statistics:

- The peak Nixon year (1969) saw $363.9 billion in national defense outlays (1997 dollars). The Clinton request for 1997 is $258.7 billion—twenty-nine percent lower.
- In the top Reagan year (1986), outlays hit $403.5 billion. Thus, Clinton's request is thirty-six percent lower.

BLNP kicked off its campaign with a full-page ad in the June 23 New York *Times* and a June 27 press conference. The latter featured Ben Cohen, co-chairman of Ben & Jerry's Homemade—an ice cream firm—who spooned out some of his product to participants.

Business Leaders for New Priorities

Steve Berger, president, NYF Properties
Francie Brody and John Weiser, partners, Brody & Weiser
John B. Caron, president, Caron International
Ben Cohen and Jerry Greenfield, co-chairmen, Ben & Jerry's Homemade
Sophia Collier, president, Citizens Trust
Paul E. Dolan III, president, Fetzer Vineyards
David Edward, chairman, The Body Shop, Inc. (USA)
Terry Ehrich, publisher and editor in chief, Hemmings Motor News
Richard Foos, president, Rhino Records
Howard Fuguet, partner, Ropes & Gray
Alan Hassenfeld, chairman and chief executive officer, Hasbro, Inc.
Arnold Hiatt, chairman, The Stride Rite Foundation
Louis Kane, co-chairman, Au Bon Pain Co., Inc.
Earle W. Kazis, president, Earle W. Kazis Assoc., Inc.
Bruce Klatsky, chairman, president, and CEO, Phillips–Van Heusen Corp.
Alan E. Kligerman, CEO, Lactaid Inc./AkPharma Inc.
Kevin Lynch, CEO, Lynch Jarvis Jones, Inc.
Peter L. Malkin, Esq., senior partner, Wien, Malkin & Bettex
Ken Miller, vice chairman, CS First Boston Corp.
Henry Nasella, chairman and CEO, Star Markets Company, Inc.
Deanna Nord, president, Nord Communications, Inc.
Harry Quadracci, president, Quad/Graphics, Inc.
Will Raap, president, Gardener's Supply
Kenneth Richard, president, LatinRep Associates, Inc.
Don Rose, president and co-founder, Rykodisc USA
Mort Sand, chairman, Merit Oil Corp.
Ron Shaich, CEO and co-chairman, Au Bon Pain Co., Inc.
Joan Shapiro, executive vice president, South Shore Bank
Jacqueline Slater, managing director, Chase Manhattan Bank
Clifton S. Sorrell, Jr., president and CEO, Calvert Group
Susie Tompkins, co-founder and co-owner, Esprit
John H. Watts III, owner, Eagle Nest Ranch Inc.
Ted Williams, CEO, Bell Industries
Marilyn and Jerry Wilson, owners, Soloflex, Inc.
Peter Workman, president, Workman Publishing
Robert Zevin, senior vice president, US Trust Co. (of Boston)

men would choose military service today than would have chosen it in 1989. About twelve percent fewer young white men would enlist.

On the other hand, propensity to enlist in any service among black females in the sixteen- to twenty-one-year-old age group showed a marked increase—from twenty percent in 1994 to twenty-four percent in 1995. At the same time, the interest of white females in that age group dropped. Hispanic females' interest remained the same.

When asked about interest in a particular service, females aged sixteen to twenty-one said they preferred the Air Force and had less interest in the Army. Their interest in the Navy and Marine Corps was unchanged from the previous year.

Overall, the percentages are still low, compared with predrawdown numbers. The Pentagon credited the low enlistment propensity to cuts made in recruiting personnel and dollars, which helped feed the idea that the military was not hiring.

Frederick F. Y. Pang, assistant secretary of defense for Force Management Policy, said that the decline in the propensity may have abated because DoD increased recruiting dollars in 1994 and 1995. He urged continued "investment in recruiting and advertising resources."

USAF Opens Sim Facility

The Air Force created a new agency in June to coordinate its growing requirement for simulation and modeling to offset a shrinking budget. The Air Force Agency for Modeling and Simulation (AFAMS) will leverage new technologies that will pay the service major dividends in budget savings and readiness, said the agency's first commander, Col. Jimmy H. Wilson.

AFAMS will work for the Air Force director of Modeling, Simulation, and Analysis in the Pentagon but is located in Orlando's Central Florida Research Park, which hosts other similar joint, service, contractor, and educational facilities.

Proximity to other agencies engaged in simulation and training implementation will offer the Air Force the "maximum advantage of the newest technologies and what they can do for us in terms of providing ready forces," said Colonel Wilson.

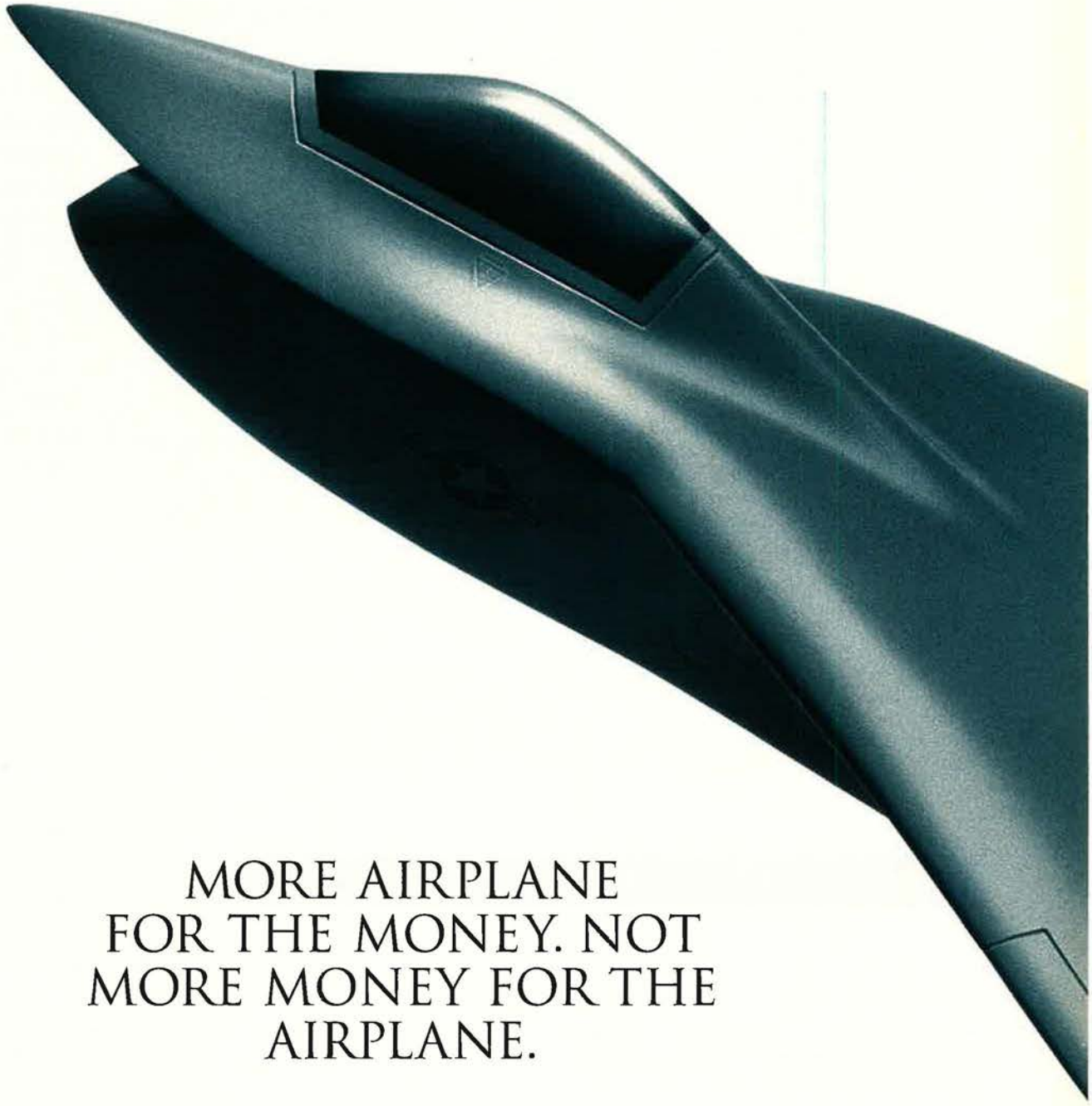
First Joint EA-6B Crew Graduates

The first USAF aircrew graduated June 6 from Navy training at NAS Whidbey Island, Wash., on the EA-6B Prowler under the joint-service initiative to consolidate the airborne threat radar-jamming mission. The EA-6B will be the sole tactical radar-jamming platform, as USAF retires the EF-111.

The Air Force crew—a pilot and three electronic warfare officers—will be assigned to one of five consolidated Tactical Electronic Warfare Squadrons. Over the next two years, USAF will build up to a total of twenty-four aircrews. Currently, seven more crews are in training.

USAF Lt. Col. Ronald Rivard of the Joint Operations Staff at Whidbey Island anticipates setting numerous benchmarks with the joint venture. The "success or failure of the jamming consolidation may well prove to be a forerunner of similar efforts," he said.

The Navy announced in *Commerce*



MORE AIRPLANE FOR THE MONEY. NOT MORE MONEY FOR THE AIRPLANE.

Because of its unique design, the Boeing Joint Strike Fighter offers superb agility and combat radius. Compared to existing fighters, it will also be more lethal and survivable. Yet, it will cost less than today's fighters, and it will be easier to support.

THE BOEING JOINT STRIKE FIGHTER

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Business Daily June 13 that it plans an avionics warfighting upgrade for all 126 EA-6B aircraft. The effort would begin in 1999, with an initial operational capability in 2003. It is also possible, according to the announcement, that the Navy might accelerate development to begin in mid-1997, with an IOC in 2001.

USAF is pressing the Navy to fund all 104 deployable EA-6Bs, adhering to the agreement between the two services that led the Air Force to retire its EF-111s and transfer $500 million in electronic warfare funds to the Navy. The Navy's 1998 budget request includes only ninety-nine deployable EA-6Bs.

NATO Women Seek Equity

"Women are force-multipliers for NATO and will significantly enhance NATO's ability to accomplish its mission," stated Women in NATO Forces Conference officials in summing up their primary goal to ensure that NATO capitalizes on women's capabilities.

However, military women from fourteen nations who gathered at Randolph AFB, Tex., June 2–7 to discuss the role of women in the military are sensitive to the fact that many still feel a military career is for men only. In fact, the Italian delegate to the conference was a man, because Italy has no women in its military.

Except in the United States and United Kingdom, the NATO delegates said, equity remains a serious problem.

The German delegate noted that in her country, women may participate only in the medical and musical corps. The Greek delegate reported that Greece now has 6,000 women in the military, which is only 3.75 percent of its force. Delegates from France and Spain said that real success would only come when a woman entered the high rank of general officer.

Maj. Gen. Marcelite J. Harris, USAF's director of Maintenance, said that to maintain readiness and effectiveness, the US and its NATO Allies will need to draw more and more from the pool of talented women who want military careers. As conference chair, she urged delegates not to be passive in the fight for equity. The General is the first African-American woman to reach two-star rank in the US armed forces and was the first female aircraft maintenance officer in the Air Force.

For Air Commodore Cynthia Fowler, the Royal Air Force's top female officer, it took thirty-two years to reach her rank, the equivalent of a US brigadier general. She said it was not easy, but the glass ceiling for women in the British military is breaking. Although she feels it will continue to be a struggle in NATO, Commodore Fowler added, "We're almost there."

Breaking Medical Ground

Wilford Hall USAF Medical Center, the Air Force's largest medical facility, located at Lackland AFB, Tex., recently has made "breakthrough" medical news on several fronts.

In May, the center became the first military hospital in the nation and the first hospital in San Antonio to achieve the status of "level-one trauma center." The status denotes the capabil-

Internet Addresses

Site	Address
AFROTC	http://www.rotc.af.mil/home.html
Air Command & Staff College	http://wwwacsc.au.af.mil/
Air Force Institute of Technology	http://www.afit.af.mil/
Air Force Historical Research Agency	http://www.au.af.mil/au/afhra/
Air Force Quality Institute	http://www.au.af.mil/au/afqi/afqihome.htm/
Air Force Fellows Program	http://www.hq.af.mil/XO/fellows.html/
Air University	http://www.au.af.mil/
Air War College	http://www.au.af.mil/au/awc/awchome.htm
National Archives and Records Administration	http://www.nara.gov/
National Center for Education Statistics	gopher://ed.gov:10000/1
National Defense University	http://www.ndu.edu/
NATO	http://www.nato.int/
US Air Force Academy	http://www.usafa.af.mil

Senior Staff Changes

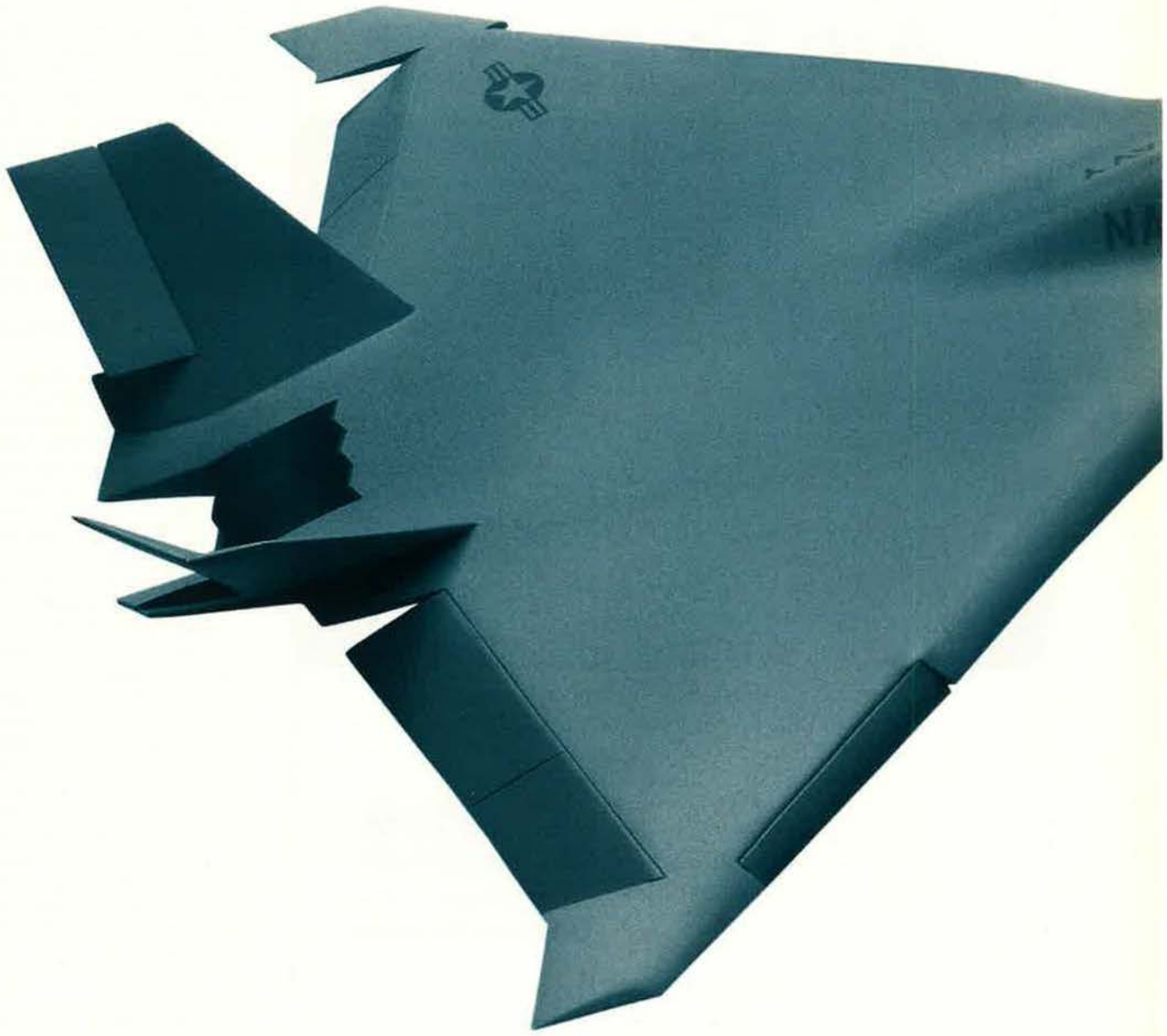
RETIREMENTS: M/G John L. **Borling,** B/G James I. **Mathers.**

PROMOTIONS: To be **General:** Howell M. **Estes** III.
To be **Brigadier General:** Gilbert J. **Regan.**
To be **ANG Brigadier General:** Christopher J. **Luna.**

CHANGES: Col. (B/G selectee) John D. Becker, from Vice Cmdr., Tanker Airlift Control Center, Hq. AMC, Scott AFB, Ill., to Cmdr., 6th Air Base Wing, ACC, MacDill AFB, Fla., replacing Col. Charles T. Ohlinger III . . . **B/G John W. Brooks,** from Comdt., AC&SC, AU, Hq. AETC, Maxwell AFB, Ala., to Cmdr., 86th Airlift Wing and Cmdr., Kaiserslautern Military Community, Hq. USAFE, Ramstein AB, Germany, replacing B/G William E. Stevens . . . **L/G (Gen. selectee) Howell M. Estes III,** from Dir., Ops., J-3, Jt. Staff, Washington, D. C., to CINC, Hq. NORAD; CINC, Hq. USSPACECOM; Cmdr., Hq. AFSPC; and DoD Mgr. for Space Transportation Sys. Contingency Support Ops., Peterson AFB, Colo., replacing retiring Gen. Joseph W. Ashy . . . **M/G John B. Hall, Jr.,** from Dir., East Asia and Pacific Region, Office of the Ass't Sec'y of Defense for Int'l Security Affairs, Under Sec'y of Defense for Policy, Washington, D. C., to Dir., Plans, Hq. PACAF, Hickam AFB, Hawaii, replacing B/G Rodney P. Kelly . . . **B/G Gary M. Rubus,** from Spec. Ass't to Dir., J-5, Former Soviet Union Affairs, J-5, Jt. Staff, Washington, D. C., to Dep. Dir., Int'l Negotiations, J-5, Jt. Staff, Washington, D. C.

SENIOR EXECUTIVE SERVICE CHANGES: Brent R. Collins, to AFPEO, Space Systems, Hq. USAF, Washington, D. C. . . . **Tommy B. Jordan,** to Dir., Privatization and Realignment, San Antonio ALC, AFMC, Kelly AFB, Tex. . . . **Horst R. Kelly,** to Associate DCS/Personnel, Hq. USAF, and Chief, AFPOA, Washington, D. C. ■

NO FOLDING NECESSARY.



The Boeing Joint Strike Fighter uses the same shape for all the services. It's light in weight. And it's compact enough that the Navy version doesn't need folding wings. So it takes up less carrier deck space than other aircraft. Small size, however, doesn't mean small performance. Compared to today's fighters, the Boeing JSF is more lethal and survivable. And it has a greater combat radius.

THE BOEING JOINT STRIKE FIGHTER

BOEING

ity to provide the highest level of complete care around the clock, stated a USAF release.

In 1995, Wilford Hall treated 10,418 patients with trauma-related injuries—injuries caused by physical force, the number one cause of death for those aged one to forty-four. Of those patients, more than 800 were civilians. The Lackland facility is one of the few military hospitals that participates in a civilian trauma health-care system.

"Wilford Hall's trauma services have made it the Air Force's leading center for research and train ng in the treatment of wartime injuries, and the level-one designation certainly gives you credibi ity," said Lt. Col. (Dr.) David Kissinger, director of trauma-care services at the center.

Wilford Hall is also one of 218 facilities participating in the National Cancer Institute's Prostate Cancer Prevention Trial to test the usefulness of the drug Finasteride in preventing the disease. The study began in 1993, and since then, Wilford Hall has enrolled 1,443 participants, far more than any of the other facilities (the next largest has 438 participants).

The key to this high enrollment, according to Maj. (Dr.) Jeffrey Allerton, is the excellent database of addresses maintained by the center's wellness program. The program has enrolled thousands of healthy, retired men over the age of fifty-five and stays in contact with them. The study, which will last seven years, uses Finasteride for half the participants and gives placebos to the other half.

However, Major Allerton said that the nationwide study is still short of its 18,000-participant goal.

Commands Test Aeromedical Evacuation

Two Air Force major commands started new programs in June to help train aeromedical evacuation personnel for real-world contingencies.

Air Combat Command added medical participation to exercises at the Joint Readiness and Training Center at Fort Polk, La., including an air-transportable clinic to help provide realistic bare-base operations. Command officials hope the training will prepare Army and Air Force medical personnel to work together during patient evacuation.

Air Mobility Command included aeromedical competition for the first time in its biennial Rodeo competition, which exercises airlifters and aerial refuelers. Twenty-two aeromedical evacuation teams of six persons each tested their skills in three timed events: loading and starting up required medical equipment, various in-flight medical scenarios, and loading patients on an aircraft according to patient injury.

AMC officials said the medical portion used on-the-ground aircraft this year because the competition's flying hours had already been allocated but that Rodeo '98 would have actual in-flight medical scenarios.

News Notes

■ Lt. Gen. (Gen. selectee) Howell M. Estes III, formerly joint staff director for Operations at the Pentagon, will replace retiring Gen. Joseph W. Ashy as commander in chief, North American Aerospace Defense Command and US Space Command, and commander, Air Force Space Command, headquartered at Peterson AFB, Colo.

■ June 22 was the fortieth anniversary

of Operation Sixteen Ton, which ran until September 15, 1956, and demonstrated the first sustained operational mission by the Air Force Reserve, according to a USAF news release. Reserve aircrews flew 164 sorties and airlifted 856,715 pounds of cargo, flying from NAS New York to Miami IAP, Fla., then on to either Puerto Rico or the Bahamas. Today, they can do the same mission with one C-5 in only four trips.

■ Air Force Special Operations Command MH-53J Pave Low III helicopters from RAF Mildenhall, UK, and Hurlburt Field, Fla., recently surpassed 5,000 flying hours supporting NATO operations in Bosnia from Brindisi, Italy. AFSOC crews have provided continuous combat search-and-rescue support for more than three years, stated a USAF release.

■ DoD has consolidated the offices of peacekeeping and humanitarian and refugee affairs under the deputy assistant secretary of defense for Peacekeeping and Humanitarian Assistance. The new office, headed by Sarah B. Sewall, will work under the assistant secretary of defense for Strategy and Requirements.

■ The Air Force Command, Control, Communications, and Computer Agency became the Air Force Communications Agency June 13. The agency retains the same mission, but its name change helps "to reduce the fog," according to Col. Patrick M. Ryan, AFCA commander. AFCA also incorporates the information management function.

■ The RAF Mildenhall air show in May featured a historic formation flyby by a MiG-29, an F-15C, and an F-15E—the first time these aircraft had flown in formation together. The MiG-29 came from the Slovak Republic and the two F-15s from RAF Lakenheath, UK.

USAF photo by SSgt. David Shoemaker

Marya Warr tries out one of the playgrounds at the new child-development center at Shaw AFB, S. C. Officials consider the 24,000-square-foot facility a "benchmark for all new Air Force CDCs," with its skylights and windows as key elements. The facility, which cost $3.6 million, offers room for "everyone on the waiting list."

■ The Air Force Combat Ammunition Center, Beale AFB, Calif., celebrated its tenth anniversary in June. Run by the 9th Munitions Squadron, it is the only munitions training facility of its kind in the Air Force. The school trains not only munitions troops but also squadron, group, and wing commanders who need an orientation in combat-ammunition planning and production.

■ In June, the Air War College, Maxwell AFB, Ala., graduated its fiftieth class, and Lackland AFB, Tex., celebrated fifty years of basic military training.

■ The 27th Fighter Squadron, Langley AFB, Va.—one of the oldest fighter squadrons in the Air Force—won the Hughes Achievement Trophy as the best air-to-air squadron, USAF Chief of Staff General Fogleman announced May 21. In 1995, the 27th FS had eighteen real-world commitments, including support for Operation Southern Watch, and flew more than twice the normal flying hours allocated by Air Combat Command, while it still maintained a "perfect operational safety record."

■ Marilyn S. Wells, formerly a stenographer at Vance AFB, Okla., won the 1995 Air Force Environmental Restoration Award for Individual Excellence. She is now responsible for ensuring remedial action is in place for twenty-four sites by 1998. The base credits her with cost saving in hazardous-waste disposal and in identification of underground water contamination sources.

■ Another environmentalist, Heidi Hirsh at Andersen AFB, Guam, won USAF's General White Natural/Cultural Resources Management Award for individual excellence and the DoD Natural Resources Conservation Award for an individual for her work over the past three years. She established the first marine resources preserve in Micronesia and helped Andersen win the first Tree City USA award in the Pacific by, among other projects, planting the official tree of Guam, the ifil, on base.

■ Capts. Gregory Clawson, Timothy G. Fay, and James J. Kisch were selected to attend foreign universi-

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ties for a two-year advanced studies program, after which they may return for one year to a US university to complete an advanced degree. Captain Clawson, from Dover AFB, Del., will go to Greece; Captain Fay, from Minot AFB, N. D., will go to Argentina; and Captain Kisch, at Pope AFB, N. C., will go to Italy.

■ A KC-135 crew from the 384th Air Refueling Squadron, McConnell AFB, Kan., won AFA's 1995 Brig. Gen. Ross G. Hoyt Award for refueling a crippled KC-135 from Altus AFB, Okla., on March 16, 1995. The McConnell crew, Capts. Glenn Farrar, Mike Leighton, Nick Meyers, Tom Wood, and Bradley Wright, and MSgt. Bricker Martin, were airborne within forty-six minutes after receiving a call for assistance. They completed multiple reverse-refueling hookups, flying at thirty knots below normal refueling speed, to provide fuel to the Altus tanker, which had lost its entire left main landing gear truck assembly. With the extra fuel, the damaged tanker managed to land at White Sands Space Harbor, N. M.

■ The Hanford Health Information Network, Seattle, Wash., has issued a notice of possible radiation exposure for military personnel stationed at units in Washington, Oregon, and Idaho within range of the Hanford Nuclear Weapons Facility in southeastern Washington state between 1944 and 1972. The network, a collaboration of state health departments, was mandated by Congress to inform people about this situation and available research. The network central number is (800) 959-7660.

Obituaries

Retired Army Air Forces **Col. John Riley Kane** died May 29 at the Veterans Affairs Nursing Home in Coatesville, Pa., at age eighty-nine. He received the Medal of Honor for his "intrepidity at the risk of his life above and beyond the call of duty" in the August 1, 1943, low-level bombing raid by Ninth Air Force B-24s "against the vitally important enemy target of the Ploesti oil refineries," according to the award citation. Allied planners thought the destruction of Romania's Ploesti refineries, which produced about thirty-five percent of Germany's oil and aviation gasoline, might force Germany out of the war. The plan called for five groups of 177 B-24s to simultaneously strike seven heavily defended refineries in and around Ploesti—a 2,400-mile round trip from North Africa. Flying under radio silence, the groups became separated by bad weather and missed turns. When Colonel Kane's 98th Bomb Group arrived, their target area was already in flames and enemy defenses fully alerted. Despite that, he led his group through "intensive antiaircraft, enemy fighter planes, . . . exploding delayed-action bombs, . . . oil fires, and explosions" to successfully attack the refinery. The Colonel was one of five to win the Medal of Honor for that raid, from which forty-four planes and nearly 500 men did not return.

Retired Navy **Vice Adm. Thomas F. Connolly** died May 24 in Holland, Mich., at eighty-six. Admiral Connolly, as deputy chief of naval operations, directed development of the Navy's F-14, nicknamed "Tomcat" in his honor. He was a fighter pilot in the Pacific during World War II, one of the first test pilots at NAS Patuxent River, Md., and helped establish the test pilot school there. He also commanded two carriers and the Naval Air Force in the Pacific. ■

It's Been Around the Block

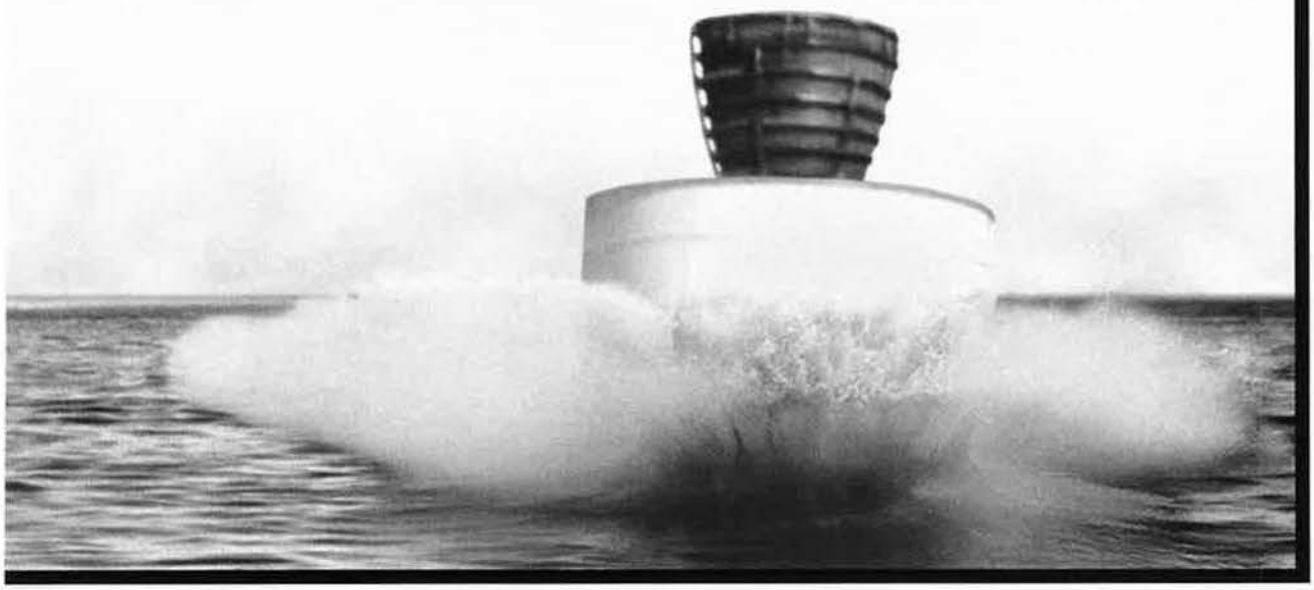
Photo courtesy Jeffery Etheil via Edward Richie

The fenders used to be fuel tanks. The plexiglass windows and sheet metal once flew in the skies above Europe. Nothing was wasted at Debden, UK, during World War II. A war-weary jeep and parts of several aircraft wrecked on the field were brought together and given a new life by members of the 4th Fighter Group, Eighth Air Force, when they put together this snazzy runabout. "The Eagles" of the 4th Fighter Group were accustomed to innovation. The group had been formed out of the RAF's Eagle Squadrons, composed in large part of Americans who had joined the fray before the US entered World War II in late 1941.

WHOEVER HEARD OF THROWING AWAY AN ENGINE WITH TWENTY MILES ON IT?

The most costly component of any launch vehicle is the propulsion system. With today's expendable launch vehicles, the engines are used once. That's expensive. Especially when you consider the scores of communication, navigation, intelligence and weather satellites the U.S. Air Force must launch in the next 20 years. Partial reusability is the answer. The Boeing Evolved Expendable Launch Vehicle is the only EELV design that uses a recoverable propulsion module to

keep costs at an absolute minimum. Boeing has invested twelve years of research and development in this concept. It will use many of the systems integration solutions pioneered on our Space Station, 777 jetliner, and Inertial Upper Stage programs. And it will introduce to space transportation a variety of innovations and economies we use in jetliner manufacturing. Tests of the Boeing EELV hardware, such as our prototype propulsion module, are nearing completion now. Results give every indication this innovative design will exceed all Air Force performance, reliability, and cost requirements.



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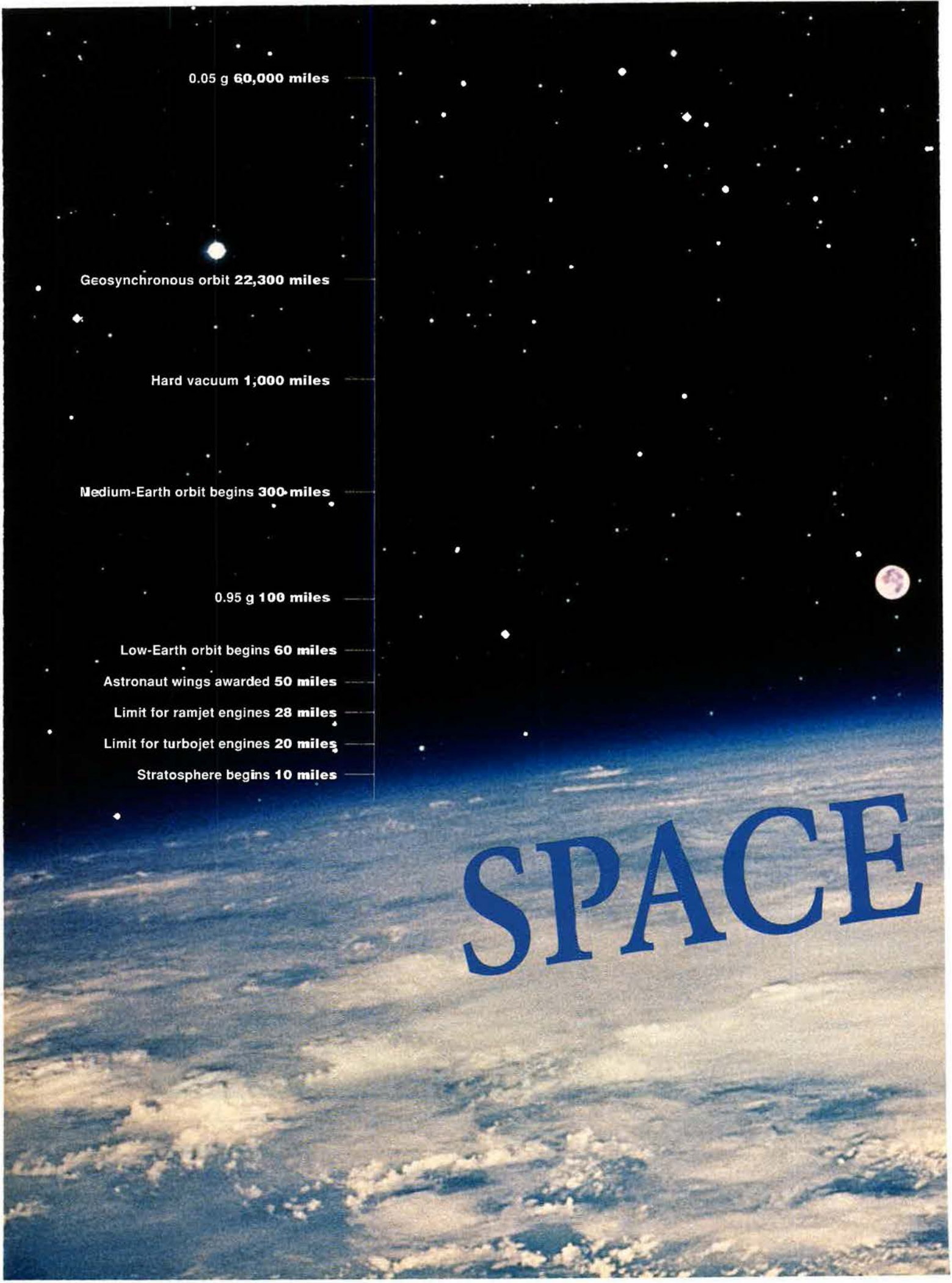
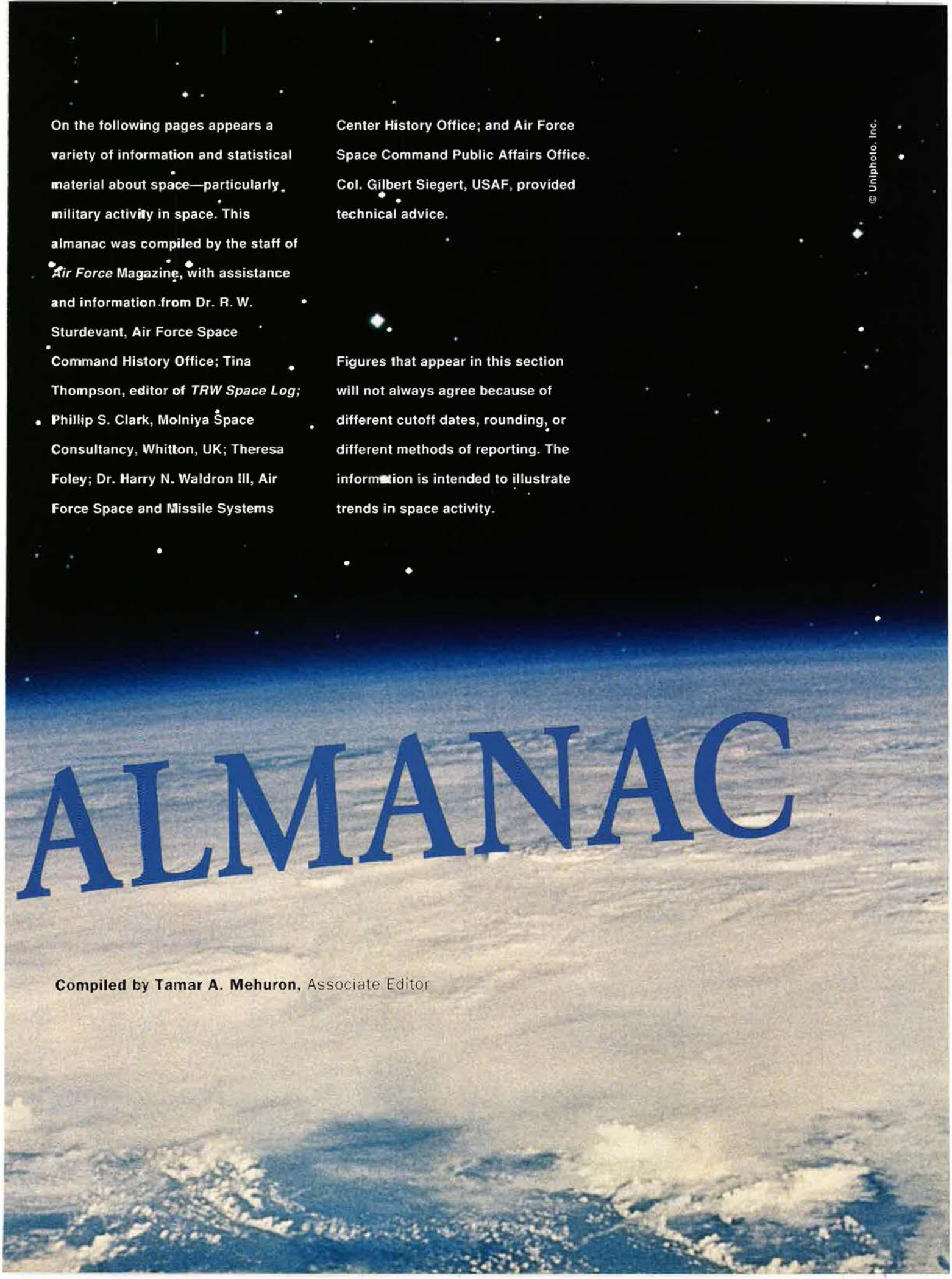

0.05 g 60,000 miles
Geosynchronous orbit 22,300 miles
Hard vacuum 1,000 miles
Medium-Earth orbit begins 300 miles
0.95 g 100 miles
Low-Earth orbit begins 60 miles
Astronaut wings awarded 50 miles
Limit for ramjet engines 28 miles
Limit for turbojet engines 20 miles
Stratosphere begins 10 miles
SPACE



ALMANAC

On the following pages appears a variety of information and statistical material about space—particularly military activity in space. This almanac was compiled by the staff of *Air Force* Magazine, with assistance and information from Dr. R. W. Sturdevant, Air Force Space Command History Office; Tina Thompson, editor of *TRW Space Log;* Phillip S. Clark, Molniya Space Consultancy, Whitton, UK; Theresa Foley; Dr. Harry N. Waldron III, Air Force Space and Missile Systems Center History Office; and Air Force Space Command Public Affairs Office. Col. Gilbert Siegert, USAF, provided technical advice.

Figures that appear in this section will not always agree because of different cutoff dates, rounding, or different methods of reporting. The information is intended to illustrate trends in space activity.

Compiled by Tamar A. Mehuron, Associate Editor

Space Terms

Aerospace. A physical region made up of Earth's atmosphere and the space beyond.

Aerospace plane. A single spacecraft able to operate effectively in both the atmosphere and space. Also known as a "transatmospheric vehicle."

Apogee. The point of greatest distance from Earth (or the moon, a planet, etc.) achieved by a body in elliptical orbit. Usually expressed as distance from Earth's surface.

Atmosphere. Earth's enveloping sphere of air.

Boost phase. Powered flight of a ballistic missile—*i.e.*, before the rocket burns out.

Burn. The process in which rocket engines consume fuel or other propellant.

Circumterrestrial space. "Inner space" or the atmospheric region that extends from sixty miles to about 50,000 miles from Earth's surface.

Constellation. A formation of spacecraft orbiting for a specific combined purpose.

Deep space. All space beyond the Earth-moon system, or from about 480,000 miles altitude outward.

Eccentric orbit. An extremely elongated elliptical orbit.

Ecliptic plane. The plane defined by the circle on the celestial sphere traced by the path of the sun.

Elliptical orbit. Any noncircular, closed spaceflight path.

Exosphere. The upper limits of Earth's atmosphere, ranging from about 300 miles altitude to about 2,000 miles altitude.

Expendable launch vehicle (ELV). A launch vehicle that cannot be reused after one flight.

Ferret. A satellite whose primary function is to gather electronic intelligence, such as microwave, radar, radio, and voice emissions.

Geostationary Earth orbit. A geosynchronous orbit with 0° inclination in which the spacecraft circles Earth 22,300 miles above the equator and appears from Earth to be standing still.

Geosynchronous Earth orbit (GEO). An orbit at 22,300 miles that is synchronized with Earth's rotation. If a satellite in geosynchronous orbit is not at 0° inclination, its ground path describes a figure eight as it travels around Earth.

Geosynchronous transfer orbit (GTO). An orbit that originates with the parking orbit and then reaches apogee at the GEO.

Ground track. An imaginary line on Earth's surface that traces the course of another imaginary line between Earth's center and an orbiting satellite.

High-Earth orbit (HEO). Flight path above geosynchronous altitude (22,300 to 60,000 miles from Earth's surface).

High-resolution imagery. Detailed representations of actual objects that satellites produce electronically or optically on displays, film, or other visual devices.

Inertial upper stage. A two-stage solid-rocket motor used to propel heavy satellites into mission orbit.

Ionosphere. A region of electrically charged thin air layers that begins about thirty miles above Earth's atmosphere.

Low-Earth orbit (LEO). Flight path between Earth's atmosphere and the bottom of the Van Allen belts, *i.e.*, from about sixty to 300 miles altitude.

Magnetosphere. A region dominated by Earth's magnetic field, which traps charged particles, including those in the Van Allen belts. It begins in the upper atmosphere, where it overlaps the ionosphere, and extends several thousand miles farther into space.

Medium-Earth orbit (MEO). Flight path between low-Earth orbit (about 300 miles in altitude) and geosynchronous orbit at an average altitude of 22,300 miles.

Mesosphere. A region of the atmosphere about thirty to fifty miles above Earth's surface.

Orbital decay. A condition in which spacecraft lose orbital altitude and orbital energy because of aerodynamic drag and other physical forces.

Orbital inclination. Angle of flight path in space relative to the equator of a planetary body. Equatorial paths are 0° for flights headed east, 180° for those headed west.

Outer space. Space that extends from about 50,000 miles above Earth's surface to a distance of about 480,000 miles.

Parking orbit. Flight path in which spacecraft go into LEO, circle the globe in a waiting posture, and then transfer payload to a final, higher orbit.

Payload. Any spacecraft's crew and/or cargo; the mission element supported by the spacecraft.

Perigee. The point of minimum altitude above Earth (or the moon, a planet, etc.) maintained by a body in elliptical orbit.

Period. The amount of time a spacecraft requires to go through one complete orbit.

Polar orbit. Earth orbit with a 90° inclination. Spacecraft on this path could pass over every spot on Earth as Earth rotates under the satellite's orbit (see "orbital inclination").

Remote imaging. Images of Earth generated from spacecraft that provide data for mapping, construction, agriculture, oil and gas exploration, news media services, and the like.

Rocket. An aerospace vehicle that carries its own fuel and oxidizer and can operate outside Earth's atmosphere.

Semisynchronous orbit. An orbit set at an altitude of 12,834 miles. Satellites in this orbit revolve around Earth in exactly twelve hours.

Single-stage-to-orbit (SSTO) system. A radically new, reusable single-stage rocket that can take off and land repeatedly and is able to boost payloads into orbit.

Stratosphere. That section of atmosphere about ten to thirty miles above Earth's surface.

Sun-synchronous orbit. A low-Earth orbit inclined at about 98° to the equator. At this inclination and altitude, a satellite's orbital plane will always maintain the same relative orientation to the position of the sun.

Thermosphere. The thin atmosphere about fifty to 300 miles above Earth's surface. It experiences dramatically increased levels of heat compared to the lower layers.

Transfer. Any maneuver that changes a spacecraft orbit.

Transponder. A radar or radio set that, upon receiving a designated signal, emits a radio signal of its own.

Troposphere. The region of the atmosphere from Earth's surface to about ten miles above the equator and five miles above the poles. This is where most clouds, wind, rain, and other weather occurs.

Van Allen belts. Zones of intense radiation trapped in Earth's magnetosphere that could damage unshielded spacecraft.

Space Firsts

February 24, 1949 Project Bumper, the first fully successful two-stage rocket-launch into space, reaches a record altitude of 244 miles.

July 24, 1950 Bumper-WAC becomes first missile launched from Cape Canaveral, Fla.

September 20, 1956 US Jupiter C rocket achieves record first flight, reaching an altitude of 682 miles and landing 3,400 miles from Cape Canaveral.

August 21, 1957 First successful launch of Soviet R7 rocket, which six weeks later will loft Sputnik into orbit.

October 4 USSR launches Sputnik 1, the first man-made satellite, into Earth orbit.

November 3 First animal in space, a dog, is carried aloft by Soviet Sputnik 2.

December 6 First US attempt to orbit satellite fails when Vanguard rocket loses thrust and explodes.

December 17 First successful Atlas booster launch.

January 31, 1958 Explorer 1, first US satellite, launched.

May 15 USSR launches first automatic scientific lab aboard Sputnik 3, proving satellites can have important military uses.

December 18 Project Score spacecraft conducts first US active communication from space.

February 28, 1959 Discoverer 1 becomes first satellite launched from Vandenberg AFB, Calif.

June 9 First engineer group arrives at Cape Canaveral to prepare Atlas booster carrying first Mercury capsule.

August 7 Explorer 6 spacecraft transmits first television pictures from space.

September 12 Soviet Union launches Luna 2, which two days later becomes first man-made object to strike the moon.

April 1, 1960 TIROS 1 becomes first US weather satellite to go aloft.

April 13 Transit 1B becomes first US navigation satellite in space.

May 24 Atlas D/Agena A booster places MIDAS II, first early warning satellite, in orbit.

June 22 US performs first successful launch of multiple independently instrumented satellites by a single rocket.

August 12 First passive communications carried via Echo 1 satellite.

January 31, 1961 Preparing for manned spaceflight, US launches a Mercury capsule carrying the chimpanzee Ham on a suborbital trajectory.

February 16 Explorer 9 becomes first satellite launched from Wallops Island, Va.

April 12 Soviet cosmonaut Yuri Gagarin pilots Vostok 1 through nearly one orbit to become first human in space.

May 5 Lt. Cmdr. Alan B. Shepard, Jr., aboard Freedom 7 Mercury capsule, becomes first American in space, climbing to 116.5 miles during suborbital flight lasting fifteen minutes, twenty-eight seconds.

October 27 First flight of Saturn rocket marks beginning of more than eleven years of Apollo launches.

February 20, 1962 Project Mercury astronaut Lt. Col. John H. Glenn, Jr., aboard the Friendship 7 capsule, completes the first US manned orbital flight.

December 14 Mariner 2 passes Venus at a distance of 21,600 miles, becoming the first space probe to encounter another planet.

June 16, 1963 Valentina Tereshkova of USSR pilots Vostok 6 to become first woman in space.

July 26 Hughes Corp.'s Syncom 2 (prototype of Early Bird communications satellite) orbits and "parks" over the Atlantic to become world's first geosynchronous satellite.

October 17 Vela Hotel satellite performs first spacebased detection of a nuclear explosion.

July 28, 1964 First close-up lunar pictures provided by Ranger 7 spacecraft.

August 14 First Atlas/Agena D standard launch vehicle successfully fired from Vandenberg AFB.

March 18, 1965 First spacewalk conducted by Alexei Leonov of Soviet Voskhod 2.

March 23 Gemini 3 astronauts Maj. Virgil I. "Gus" Grissom and Lt. Cmdr. John W. Young complete world's first piloted orbital maneuver.

June 4 Gemini 4 astronaut Maj. Edward H. White performs first American spacewalk.

July 14 Mariner provides the first close-up pictures of Mars.

August 21 Gemini 5 launched as first manned spacecraft with electrical power other than batteries; it is equipped with fuel cells.

March 16, 1966 Gemini 8 astronauts Neil A. Armstrong and Maj. David R. Scott perform first manual docking in space with Agena rocket stage.

June 2 Surveyor 1 is first US spacecraft to land softly on the moon. It analyzes soil content and transmits surface images to Earth.

January 25, 1967 Soviet Cosmos 139 antisatellite weapon carries out first fractional orbit bombardment.

January 27 First deaths of US space program occur in flash fire in Apollo 1 command module, killing astronauts Grissom, White, and Lt. Cmdr. Roger B. Chaffee.

September 8 Surveyor 5 conducts first chemical analysis of lunar soil.

October 20, 1968 Soviet Cosmos 248 and Cosmos 249 spacecraft carry out first co-orbital antisatellite test.

December 21–27 Apollo 8 becomes first manned spacecraft to escape Earth's gravity and enter lunar orbit. First live lunar television broadcast.

March 3–13, 1969 Apollo 9 crew members Col. James A. McDivitt, Col. David R. Scott, and Russell L. Schweickart conduct first test of lunar module in Earth orbit.

July 20 Apollo 11 puts first human, Neil A. Armstrong, on the moon.

November 14–24 US Apollo 12 mission deploys first major scientific experiments on the moon and completes first acquisition of samples from an earlier spacecraft—Surveyor 3.

February 11, 1970 Japan launches first satellite, Osumi, from Kagoshima Space Center using Lambda 4S solid-fuel rocket.

January 31, 1971 Apollo 14 launched; its astronauts will complete first manned landing on lunar highlands.

April 19 First space station, Salyut 1, goes aloft.

June 6 USSR's Soyuz 11 performs first successful docking with Salyut space station.

October 28 First British satellite, Prospero, launched into orbit on Black Arrow rocket.

November 2 Titan IIIC launches first Defense Satellite Communications System Phase II (DSCS II) satellites into geosynchronous orbits.

April 16–27, 1972 Apollo 16 astronauts Capt. John Young, Lt. Cmdr. Thomas K. Mattingly II, and Lt. Col. Charles M. Duke, Jr., are first to use the moon as an astronomical laboratory.

July 23 US launches first Earth Resources Technology Satellite (ERTS A), later renamed Landsat 1.

December 3, 1973 Pioneer 10 becomes first space probe to come within reach of Jupiter.

July 15, 1975 US Apollo and Soviet Soyuz 19 spacecraft perform first international docking of spacecraft in space.

August 12, 1977 Space shuttle *Enterprise* performs first free flight after release from a Boeing 747 at 22,800 feet.

February 22, 1978 Atlas booster carries first Global Positioning System (GPS) Block I satellite into orbit.

December 13 Successful launch of two DSCS II satellites puts a full four-satellite constellation at users' disposal for first time.

July 18, 1980 India places its first satellite, Rohini 1, into orbit using its own SLV-3 launcher.

April 12–14, 1981 First orbital flight of shuttle *Columbia* (STS-1) and first landing from orbit of reusable spacecraft.

December 20, 1982 First Defense Meteorological Satellite Program Block 5D-2 satellite launched.

June 18, 1983 Space shuttle *Challenger* crew member Sally K. Ride becomes first American woman in space.

September 11, 1985 International Cometary Explorer becomes first man-made object to encounter a comet (Giacobini-Zinner).

September 13 First US antisatellite intercept test destroys Solwind scientific satellite by air-launched weapon.

January 28, 1986 In the first shuttle mishap, *Challenger* explodes after liftoff, killing seven astronauts.

February 22 France launches first *Satellite Pour l'Observation de la Terre* (SPOT) for remote sensing.

August 12 First launch of Japanese H-I rocket puts Experimental Geodetic Satellite into circular orbit.

May 15, 1987 USSR stages first flight of its Energia heavy launcher, designed to lift 100 tons into low-Earth orbit.

November 15, 1988 USSR makes first launch of thirty-ton shuttle *Buran* using Energia rocket.

February 14, 1989 Launch of first Block II GPS satellite begins an operational constellation.

January 17, 1991 What the Air Force calls "the first space war," Operation Desert Storm, opens with air attacks.

October 29 Galileo swings within 10,000 miles of Gaspra, snapping first close-up images of an asteroid.

May 13, 1992 The first trio of spacewalking astronauts, working from the shuttle *Endeavour,* rescues Intelsat 6 from useless low orbit.

January 13, 1993 USAF Maj. Susan Helms, flying aboard *Endeavour,* becomes first US military woman in space.

July 19 Launch of a DSCS Phase III satellite into geosynchronous orbit provides the first full five-satellite DSCS III constellation.

December 2–13 USAF Col. Richard O. Covey pilots shuttle *Endeavour* on successful $674 million mission to repair $2 billion Hubble Space Telescope, a mission for which the crew wins the 1993 Collier Trophy.

January 25, 1994 Launch of the 500-pound unpiloted Clementine spacecraft marks the first post-Apollo US lunar mission.

February 7 First Titan IV–Centaur booster launches first Milstar Block I satellite into orbit.

March 13 First launch of Taurus booster (from Vandenberg AFB), which places two military satellites into orbit.

June 29 First visit of a US space shuttle to a space station, the Russian Mir.

November 5 Ulysses, first probe to explore the sun's environment at high latitudes, completes a pass over the sun's southern pole and reveals that solar wind's velocity at high latitudes (*i.e.,* about two million mph) is nearly twice its velocity at lower latitudes.

February 6, 1995 Shuttle *Discovery* (STS-63) and space station Mir perform first US-Russian space rendezvous in twenty years, with Air Force Lt. Col. Eileen M. Collins coincidentally becoming first woman to pilot a US spaceship.

March 14 US astronaut Norman E. Thagard becomes first American to accompany Russian cosmonauts aboard Soyuz TM-21 spacecraft and, two days later, becomes first American to inhabit space station Mir.

June 29 *Atlantis* (STS-71) docks with Mir, the first docking of a US spacecraft and a Russian space station.

July 13–22, 1995 Shuttle *Discovery* (STS-70) uses an inertial upper stage developed by USAF Space and Missile Systems Center (SMC) to boost the seventh NASA tracking and data relay satellite system into a geosynchronous orbit.

July 31 Atlas IIA booster with a Centaur upper stage launches Defense Satellite Communications System III B-7, which relies on an Integrated Apogee Boost System to finally reach its geosynchronous orbit.

August 4 SMC awards two team contracts for the pre–engineering and manufacturing development phase of the Spacebased Infrared (SBIR) system.

August 5 Delta II launches Koreasat-1 from Cape Canaveral AS, Fla., to provide direct-broadcast television, business, and general communications services for South Korea.

August 24 SMC awards four prime contracts for the low-cost concept

At White Sands Missile Range, N. M., in June, the Delta Clipper–Experimental Advanced program's Clipper Graham (right) demonstrated quick-turnaround operations for a reusable rocket, completing two test flights in twenty-six hours.

validation phase of the Evolved Expendable Launch Vehicle.

August 28
Atlas IIAS propels a Japanese communication satellite into orbit.

September 7–18
Astronauts aboard the shuttle *Endeavour* (STS-69) study astronomy, complete six-hour spacewalk tests, and launch and retrieve two satellites—the Spartan free-flying platform,

which collects data on the sun's corona and solar wind, and the Wake Shield Facility, which experiments with manufacturing wafer-thin gallium arsenide samples.

September 21
SMC authorizes full production rate of the Small Tactical Terminal for receiving, processing, and displaying weather data from Defense Meteorological Satellite Program (DMSP) satellites.

September 28
SBIR program office awards five-year contracts for the Attack and Launch Early Reporting to Theater (ALERT) and Talon Shield programs to improve capabilities for theater missile detection and warning.

October 20–November 5
Shuttle *Columbia* (STS-73) astronauts perform microgravity experiments with potential applications for chemical and pharmaceutical manufacturing.

October 22
Atlas II lofts the fifth successful UHF Follow-On satellite into orbit from Cape Canaveral AS as part of the effort to replace Fleet Satellite Communications and Leased Satellite capability in support of the Navy global communications network.

October 23
First Conestoga spacelifter, with the NASA Meteor-1 experiments platform, is automatically destroyed forty-five seconds into flight because of instability four miles downrange from Wallops Flight Facility, Va.

November 4
Delta II lofts the Canadian Radar Satellite into low-Earth orbit from Vandenberg AFB, Calif., to provide coverage of Arctic sea routes and complete the first comprehensive map of Antarctica.

November 6
Titan IV booster with a Centaur upper stage launches the second Military Strategic and Tactical Relay (Milstar) communications satellite into geosynchronous orbit.

November 12–20
Shuttle *Atlantis* (STS-74), piloted by Air Force Lt. Col. James D. Halsell, Jr., completes the second shuttle-Mir docking and transfers more than one ton of food and water to the Russian space station, which also received a permanent docking module with a pair of folding solar arrays to boost the station's overloaded power supply.

December 2
Atlas IIAS rocket launches European Space Agency's $1 billion Solar and Heliospheric Observatory from Cape Canaveral into a Lagrangian orbit to survey the sun's internal composition and observe solar winds.

December 7
Galileo, launched from the shuttle *Atlantis* in October 1989, reaches Jupiter, sends a probe parachuting through the planet's atmosphere, and rockets into orbit.

December 15
Two orbiting Milstar satellites successfully crosslink by transmitting messages directly between satellites without the use of ground stations, paving the way for enhanced US military capability to provide secure, survivable, jam-resistant communications.

December 28
China launches the US EchoStar-1 direct-broadcast satellite atop a Long March (CZ-2E) booster from Xichang, China, while Russia employs a Molniya-M rocket to launch India's IRS-1C remote sensing satellite from Tyuratam, Kazakhstan.

December 30
First launch of the Delta II Avionics Upgrade Vehicle carries NASA's X-Ray Timing Explorer into low-Earth orbit for a multiyear survey of such X-ray sources as white dwarfs, neutron stars, and black holes.

January 11, 1996
National Oceanic and Atmospheric Administration's (NOAA) seventh Geostationary Operational Environmental Satellite (GOES-7) retires after nearly nine years of orbital operation, with GOES-9 picking up the mission.

January 11–20
Air Force Col. Brian Duffy commands the shuttle *Endeavour* (STS-72) mission to retrieve the Japanese Space Flyer Unit satellite, deploy and retrieve the Office of Aeronautics and Space Technology–Flyer satellite, conduct scientific investigations, and evaluate space station assembly methods.

January 14
Delta II launches Koreasat-2 from Cape Canaveral.

January 31
Atlas IIAS lofts the Palapa C-1 satellite from Cape Canaveral to provide commercial telecommunications service for Indonesia.

February 17
Near-Earth Asteroid Rendezvous spacecraft, the first asteroid orbiter and the initial satellite in NASA's Discovery program for "faster, better, cheaper" planetary exploration, is launched atop Delta II from Cape Canaveral to encounter asteroid 433 Eros in February 1999.

February 22–March 9
Shuttle *Columbia* (STS-75) deploys the third US Microgravity Payload (USMP-3) but loses Italy's $443 million Tethered Satellite System-1R because of a broken tether.

March 5–6
Approximately 400 representatives from DoD, NASA, industry, and academia attend the first Space Strategy and Architecture Symposium, in Arlington, Va., to discuss key policy issues related to the future of the US in space.

March 8
At Vandenberg AFB, the first successful launch of the Pegasus XL rocket from beneath Orbital Sciences Corp.'s modified L-1011 aircraft sends the Air Force Radiation Experiment-II satellite into polar orbit.

March 22–30
Atlantis (STS-76) completes the third shuttle rendezvous and docking with the Russian space station Mir, where US Air Force Academy graduate Ronald M. Sega supervises the first shuttle-Mir spacewalk. Biochemist Shannon W. Lucid remains aboard Mir until August.

March 27
Delta II booster launches Navstar IIA-25 from Cape Canaveral. It is the first replenishment satellite for the operational Global Positioning System (GPS) constellation.

March 29
Vice President Al Gore announces that the Clinton Administration will open the Pentagon's sophisticated GPS to full commercial access within four to ten years, which could lead to 100,000 new jobs and help emerging businesses grow eightfold into an $8 billion industry by the end of this century.

April 24
Delta II booster launches the Ballistic Missile Defense Organization Midcourse Space Experiment from Vandenberg AFB to demonstrate Brilliant Eyes sensors for discrimination and tracking of midcourse targets as well as collect data on contamination of optical instruments in orbit.

June 27
Galileo encounters and captures the first close-up images of Ganymede, a moon of Jupiter about the size of Mercury.

Global Positioning System (GPS)
Constellation of twenty-four satellites used by military and civilians to determine a precise location anywhere on Earth. A small receiver takes signals from four GPS satellites and calculates a position. The satellites transmit a highly precise signal to authorized users, permitting accurate navigation to within sixteen meters. DoD has deployed more than 100,000 GPS receivers to US government and allied users, with terminals becoming much more widely available since the 1991 Persian Gulf War. Civilians use a commercial version of the terminals, with a degraded signal with an accuracy to 100 meters. Receivers are priced as low as $200. The less accurate signal prevents adversaries from using GPS for precision weapons targeting. Civilian users are working to obtain a much better signal through auxiliary equipment, known as differential GPS, that corrects the degradation. DoD has become increasingly concerned about enemy use of GPS during a conflict and has begun an effort called NAVWARS to protect its advantage while preventing adversary use of GPS. The current constellation consists of twenty-five production satellites known as Block II/IIAs. The GPS Joint Program Office has procured twenty-one replenishment satellites known as Block IIRs. The first Block IIR will launch in early 1997. In April 1996, a contract was awarded for thirty-three Block IIF GPS spacecraft to sustain the system through 2012. The Block IIF series will begin launching in 2001.

Defense Satellite Communications System (DSCS)
Constellation of five DSCS spacecraft in geostationary orbit provides voice, data, digital, and television transmissions between major military terminals and national command authorities. Secure voice and high-data-rate communications, operating in superhigh frequency, primarily for high-capacity fixed users. Five DSCS satellites remain to be launched. The Air Force has funded a program that will allow more tactical users access on DSCS. The Pentagon is developing the architecture to replace the capacity in the next decade.

Military Strategic and Tactical Relay (Milstar)
The first two Milstars of an intended constellation of four that would provide coverage between 65° north and 65° south latitude are in orbit. The first $1 billion Milstar was launched February 7, 1994, and the second November 5, 1995. Originally conceived as a communications system that could survive a nuclear conflict and connect national command authorities to commanders of ships, aircraft, and missiles during a war, the system's design and application have been altered in the aftermath of the Cold War. Milstar currently serves tactical forces as well as strategic, and the last four Milstars (Milstar IIs) will include medium-data-rate payloads able to transmit larger volumes of data. The upgraded satellites are to be launched between 1999 and 2002. All satellites have low-data-rate payloads providing communications at five bps to 2.4 kbps. The system can handle a data stream equal to 50,000 fax pages an hour and 1,000 simultaneous users. The satellites are designed to be jam-proof and use sophisticated techniques to provide secure communications.

Defense Support Program (DSP)
Infrared detectors aboard these satellites have provided early warning of ballistic missile attack to NORAD since the 1970s. During Operation Desert Storm, operators at Space Command used DSP data to provide warnings of Scud attacks to theater commanders, though DSP was not designed to spot and track smaller missiles. Information on procurement situation, number of satellites launched, and number to be launched is classified. DoD intends to replace the system with a new spacecraft designed to spot and track the smaller, faster-burning theater missiles that have proliferated in recent years.

Spacebased Infrared (SBIR) System
Advanced early warning satellites to replace the DSP. SBIR is the latest early warning system proposed by USAF. USAF plans to select a contractor this fall to design and build the satellites, which would be better able to detect small theater missiles than DSP satellites are. SBIR's four missions are missile warning, targeting defensive missiles, providing technical intelligence, and analyzing battle situations. Satellites in two types of orbits, geosynchronous (four) and high elliptical (two), would be used. The lower-orbit satellites are called the space and missile tracking system, and a decision on whether to deploy them is to be made in 2000. A two-satellite flight demonstration of SMTS, known earlier as Brilliant Eyes, is being funded. The first geosynchronous satellite would be launched in 2002. The system may use satellites in low-Earth orbit as well, with those being launched in about 2006.

Defense Meteorological Satellite Program (DMSP)
Military weather satellites operating in low-Earth orbit that collect and disseminate global weather information via groundbased systems for armed forces and government agencies. Operating in a two-satellite constellation, each spacecraft collects high-resolution cloud imagery (visible and infrared) from a 1,800-mile-wide area beneath it. Satellites collect other specialized data, such as atmospheric temperature and moisture, snow cover, precipitation intensity and area, and oceanographic and solar-geophysical information for DoD air, sea, land, and space operations.

Fleet Satellite Communications (FLTSATCOM)
Constellation of five satellites operated by USN, USAF, and the Presidential command network. A secure link among the three, providing ultrahigh-frequency (UHF) communications. Satellites carry twenty-three channels for communications with naval forces, nuclear forces, and national command authorities. The last two FLTSATCOM satellites (Flights 7 and 8) carry extremely high-frequency (EHF) payloads. In operation since 1978 in geostationary orbit, with a minimum of four satellites needed for worldwide coverage.

UHF Follow-On (UFO) Satellites
New generation of satellites providing UHF communications to replace FLTSATCOM satellites. UFO satellites have thirty-nine channels—compared to the twenty-three on the FLTSATCOM—are bigger, and have higher power. Compatible with the same terminals used by the earlier systems. UFO-4 was first in the series to include an extremely high-frequency communications payload with enhanced antijam telemetry, command, broadcast, and fleet interconnectivity. EHF channels provide an additional eleven channels. Ten UFO satellites were ordered; six have been launched; five are operational.

Leasecraft
Spacecraft that have been providing Navy UHF satellite communications since first launch in 1984 to augment FLTSATCOM. Three satellites, each with thirteen channels, are deployed in the same orbital locations as FLTSATCOM spacecraft. Leasecraft will be decommissioned at the end of 1996.

Dark and Spooky
An undisclosed number and type of intelligence satellites are operated by the intelligence agencies in cooperation with the military. The satellites, which monitor Earth with radar, optical sensors, and electronic intercept capability, have been treated as closely guarded secrets since the start of the space age. Even the names of satellites like LaCrosse (radar imaging), Keyhole (optical imaging), White Cloud (ocean reconnaissance), and Aquacade (electronic ferret) are secret and cannot be confirmed by the intelligence agencies. However, the move to declassify the space systems has begun, leading to the release of extensive information about one now-obsolete spy satellite called Corona. The intelligence community also will release selected archival images obtained by older spy satellites for scientific use. Some observers believe more military space secrets will be disclosed as the Cold War fades.

Major US Civilian Satellites in Military Use

Advanced Communications Technology Satellite (ACTS)
NASA's ACTS was launched in 1992 on the space shuttle to demonstrate Ka-band communications and on-board switching equipment. Military use of the technology demonstration satellite included communications service to US Army troops deployed in Haiti in 1994.

Geostationary Operational Environmental Satellite (GOES)
NOAA operates GOES-8 and GOES-9. GOES-7 provides backup. A European Meteosat 3 weather satellite augments the system. Satellites hover at 22,300 miles altitude over the equator, monitoring storms and tracking their movements for short-term forecasting. Satellites are a new design that has improved spatial resolution and full-time operational soundings of the atmosphere.

International Telecommunications Satellite Organization (INTELSAT)
Established in 1964 to own and operate a global constellation of communications satellites. Has 139 members and twenty-four operational satellites. The organization is considering how to restructure itself. One possibility would be to split the organization in the next two to three years into two entities, with commercial operations spun off into a separate entity from the treaty organization that provides connectivity on a global basis. US signatory to INTELSAT is Comsat Corp. The US military uses the system for routine communications and to distribute the Armed Forces Radio and TV Services network and to set up a Very Small Aperture Terminal data network for field commanders in Bosnia-Hercegovina in 1996.

International Maritime Satellite (INMARSAT)
Established in 1979 to own and operate satellites for mobile communications. Has seventy-nine member-countries and has spun off a private affiliate—ICO Global Communications—to develop a satellite system for global mobile telephone services. INMARSAT operates five satellites, including the first of the third-generation INMARSAT 3 series, which was launched in April. Another three satellites serve as orbital spares. The spacecraft are sometimes used by military forces for peacetime mobile communications services. INMARSAT is prohibited by convention from being used for military purposes. Briefcase- and laptop-sized satellite telephone terminals are used to communicate through the satellites. INMARSAT use in Somalia and Bosnia included the transmission of medical data and supply orders.

Landsat
US government's civilian remote sensing satellite system. Used in polar orbit since 1972. Carries a multispectral scanner able to operate at a resolution of thirty meters and provide imagery that can be computer enhanced to show deforestation, expanding deserts, crop blight, and other phenomena. Eosat Co. operates the aging Landsat 5. The government plans to launch a Landsat 7 satellite in 1998. Military use of Landsat imagery has included mapping and planning for tactical operations.

NOAA-12 and NOAA-14
Two polar orbit satellites for long-term forecasting of weather, operated by NOAA. The satellites fly in a 450-nautical-mile orbit, carrying visible and infrared radiometry imaging sensors and ultraviolet sensors to map ozone levels in the atmosphere. Provide weather updates for all areas of the world every six hours to civil and military users.

Orbcomm
Private firm Orbital Communication Corp. operates two satellites, launched in April 1995, in low-Earth orbit for global data messaging and position locating services. The satellites are precursors to a twenty-four-satellite constellation that will be orbited in 1997, allowing full, global, real-time operations to begin. DoD used the two Orbcomms in fall 1995 for a demonstration of military use of the commercial system, and another demonstration is planned for fall 1996. DoD also is buying a small quantity of test terminals, so the services can experiment with military applications of the Orbcomm service.

Orion Satellite (GBS)
Leased capacity on the Orion-1 commercial communications satellite, owned by Orion Network Systems, was used this spring to provide an early version of the Global Broadcast System for troops deployed to Bosnia. The Pentagon plans to build a more elaborate Global Broadcast System to disseminate a wide variety of information to military forces around the world, using a payload aboard military satellites and then possibly a dedicated system. The military GBS would be modeled after and use technology developed by the commercial direct-to-home satellite television industry.

***Satellite Pour l'Observation de la Terre* (SPOT)**
Remote sensing satellite system developed by the French space agency, CNES. Owned and operated by a commercial firm, SPOT Image S. A. of Toulouse. Two satellites produce images with resolution as fine as ten meters and can be used for stereoscopic viewing for three-dimensional terrain modeling. A third satellite in space serves as a backup, and SPOT 4 is scheduled for launch in late 1997. DoD is a large customer, purchasing the images for mission-planning systems, terrain analysis, mapping, and humanitarian missions.

Tracking and Data Relay Satellite System (TDRSS)
NASA operates seven TDRSS satellites to form a global network that allows low-Earth orbiting spacecraft, such as the space shuttle, to communicate with a control center without an elaborate network of ground stations. The geostationary TDRSS, with its ground station at White Sands, N. M., allows mission control in Houston, Tex., to maintain nearly constant contact with the shuttle. Other satellites using TDRSS include the Hubble Space Telescope, Compton Gamma Ray Observatory, Earth Radiation Budget Satellite, and military satellites. TDRSS satellites have been used since 1983. A next-generation system is being built for use with the shuttle, the space station, and satellites. NASA has contracted for a next-generation design. It will be smaller and cheaper.

Military Functions in Space

Communications
Provide communications from national command authorities to Joint Force Commander. Provide communications from JFC to squadron-level commanders. Permit transfer of imagery and situational awareness to tactical operations. Permit rapid transmission of JFC intent, ground force observations, and adaptive planning.

Environmental/Remote Sensing
Use space systems to create topographical, hydrographic, and geological maps and charts and develop systems of topographic measurement.

Meteorological Support
Operate weather satellites to provide data on worldwide and local weather systems affecting combat operations.

Missile Defense
Employ space assets to identify, acquire, track, and destroy ballistic and cruise missiles launched against forward-deployed US forces, allied forces, or US territory.

Navigation
Operate Global Positioning System network and certain smaller Navy systems. Enable commanders to determine precise locations of friendly and enemy forces and targets. Permit accurate, timely rendezvous of combat forces. Map minefields and other obstacles.

On-Orbit Support
Track and control satellites, operate their payloads, and disseminate data from them.

Reconnaissance and Surveillance
Identify possible global threats and surveillance of specific activity that might be threatening to US or allied military forces or US territory. Reduce effectiveness of camouflage and decoys. Identify "centers of gravity" in enemy forces. Accurately characterize electronic emissions.

Space Control
Control and exploit space using offensive and defensive measures to ensure that friendly forces can use space capabilities, while denying their use to the enemy. This mission is assigned to USCINCSPACE in the Unified Command Plan.

Spacelift
Prepare satellite and booster, joining the two. Conduct checkout prior to launch, carry out launch, and conduct on-orbit checkout.

Strategic Early Warning
Operate satellites to give national leaders early warning of all possible strategic events, including launch of intercontinental ballistic missiles. Identify launch locations and impact points. Cue area and point defense systems.

Tactical Warning/Attack Assessment
Discharge the North American Aerospace Defense Command mission calling for use of all sensors to detect and characterize an attack on US territory. US Space Command carries out similar tactical warning in other theaters.

Major US Agencies in Space

Central Imagery Office (CIO)
Headquarters: Vienna, Va. (Relocates to Chantilly, Va., as of September 1996, along with the National Reconnaissance Office.)
Established: May 6, 1992
Director: Dr. Annette J. Krygiel

Mission, Purpose, Operations
Ensure responsive imagery support to the national intelligence community, DoD, National Security Council, and other US government departments and agencies; also, as a DoD combat support agency, ensure timely imagery support to military operations. Does not own imagery products but has management and oversight responsibility for imagery. Intelligence imagery continues to be archived at the CIA's National Photographic Interpretation Center. CIO is due to be incorporated into a new National Imagery and Mapping Agency, along with the Defense Mapping Agency and parts of the intelligence-collection sections of the CIA and the NRO, on a yet-to-be-determined timetable.

Structure
Policy Directorate
Operations and Tasking Directorate
Systems Technology and Standards Directorate
Support Directorate
Programs and Resource Directorate
Requirements and Analysis Directorate
Accelerated Architecture Acquisition Initiative Program Office
Personnel: Classified

Central Intelligence Agency (CIA) Office of Development and Engineering
Headquarters: Washington, D. C.
Established: 1973
Director: Dennis Fitzgerald

Mission, Purpose, Operations
Develop systems from requirements definition through design, testing, and evaluation to operations. Works with systems not available commercially. Disciplines include laser communications, digital imagery processing, real-time data collection and processing, electro-optics, advanced signal collection, artificial intelligence, advanced antenna design, mass data storage and retrieval, and large systems modeling and simulations. Work includes new concepts and systems upgrades.

Structure: Classified
Personnel: Classified

National Aeronautics and Space Administration (NASA)
Headquarters: Washington, D. C.
Established: 1958
Administrator: Daniel S. Goldin

Mission, Purpose, Operations
Explore and develop space for human enterprise, increase knowledge about Earth and space, and conduct research in space and aeronautics. Operate the space shuttle and lead an international program to build a permanently occupied space station, which will be launched starting in 1997. Launch satellites for space science, Earth observations, and a broad range of technology research and development. Conduct aeronautical research and development.

Structure
Ten centers around the US, including Johnson Space Center, Houston, Tex.; Marshall Space Flight Center, Huntsville, Ala.; Kennedy Space Center, Fla.; Lewis Research Center, Cleveland, Ohio; Langley Research Center, Hampton, Va.; Ames Research Center, Mountain View, Calif.; Dryden Flight Research Center, Edwards AFB, Calif.; Stennis Space Center, Bay Saint Louis, Miss.; Jet Propulsion Laboratory, Pasadena, Calif.; and Goddard Space Flight Center, Greenbelt, Md.

Personnel
Civilians 21,555
Contractors 177,000

National Oceanic and Atmospheric Administration (NOAA)
Headquarters: Washington, D. C.
Established: October 3, 1970
Director: Dr. D. James Baker

Mission, Purpose, Operations
Provide satellite observations of the global environment by operating a national system of satellites. Explore, map, and chart the global ocean and its resources and describe, monitor, and predict conditions in the atmosphere, ocean, and space environment. Its National Environmental Satellite, Data, and Information Service processes vast quantities of satellite images and data. Its prime customer is NOAA's National Weather Service, which uses satellite information to create forecasts.

Structure
Headquarters
National Environmental Satellite, Data, and Information Service
National Weather Service
National Ocean Service
National Marine Fisheries Service
Office of Oceanic and Atmospheric Research
NOAA Corps
Office of Sustainable Development and Intergovernmental Affairs
Coastal Ocean Program

Personnel
National Environmental Satellite, Data, and Information Service 803
Other NOAA employees 12,181
Total 12,984

National Reconnaissance Office (NRO)
Headquarters: Chantilly, Va.
Established: September 1961
Director: Keith Hall (acting)

Mission, Purpose, Operations
Provide satellite reconnaissance to the US government to ensure that the US has the technology and assets to acquire worldwide intelligence. NRO satellites collect intelligence to support monitoring of arms-control agreements, military operations and exercises, events of national interest, natural disasters, and environmental issues. Purchases and operates intelligence satellites.

Structure
NRO is a DoD agency, funded through part of the National Foreign Intelligence Program, known as the National Reconnaissance Program. Both the Secretary of Defense and director of Central Intelligence have approval of the program. Six offices and three directorates reporting up to the level of the director. Offices are management services and operations, technology, plans and analysis, systems applications, space launch, and operational support. Directorates are space systems acquisition and operations, communications systems acquisition and operations, and imagery systems acquisition and operations.

Personnel
Staffed by CIA and military and civilian DoD employees.

National Security Agency (NSA)
Headquarters: Fort Meade, Md.
Established: 1952
Director: Lt. Gen. Kenneth A. Minihan, USAF
Deputy Director: William P. Crowell

Mission, Purpose, Operations
Protect US communications and produce foreign intelligence information. Supply leadership, products, and services to protect classified and unclassified information from interception, unauthorized access, and technical intelligence threats. In the foreign signals intelligence area, the central point for collecting and processing activities conducted by the US government, with authority to produce signals intelligence in accord with objectives, requirements, and priorities established by the CIA director with the advice of the National Foreign Intelligence Board.

Structure
Established by a Presidential directive in 1952 as a separate agency within DoD under the direction, authority, and control of the Secretary of Defense, who serves as the executive agent of the US government for the production of communications intelligence information. The Central Security Service was established in 1972 by a Presidential memorandum to provide a more unified cryptological organization within the Defense Department. The NSA director also serves as chief of the CSS and controls the signals intelligence activities of the military services.

Personnel: Classified

Other Agencies
The White House Office of Science and Technology Policy; Defense Advanced Research Projects Agency; Ballistic Missile Defense Organization; US Space Command and the component commands of the Air Force, Navy, and Army; North American Aerospace Defense Command; and the US Transportation Department's Office of Commercial Space Transportation.

Air Force Space Command Headquarters, Peterson AFB, Colo.

(As of July 1, 1996)

Commander
Gen. Joseph W. Ashy

- **Space Warfare Center** • Falcon AFB, Colo.
  Commander **Brig. Gen. Glen W. Moorhead III**

14th Air Force • Hq., Vandenberg AFB, Calif.
Commander **Maj. Gen. David L. Vesely**

- **21st Space Wing,** Peterson AFB, Colo.
- **30th Space Wing,** Vandenberg AFB, Calif.
- **45th Space Wing,** Patrick AFB, Fla.
- **50th Space Wing,** Falcon AFB, Colo.

20th Air Force • Hq., F. E. Warren AFB, Wyo.
Commander **Maj. Gen. Donald G. Cook**

- **90th Missile Wing,** F. E. Warren AFB, Wyo.
- **91st Missile Wing,** Minot AFB, N. D.
- **321st Missile Group,** Grand Forks AFB, N. D.
- **341st Missile Wing,** Malmstrom AFB, Mont.

Air Force Space Acquisition Organizations

Air Force Materiel Command • Wright-Patterson AFB, Ohio
Commander **Gen. Henry Viccellio, Jr.**

Space and Missile Systems Center • Los Angeles AFB, Calif.
Commander **Lt. Gen. Lester L. Lyles**

- **Defense Meteorological Satellite SPO**[1]
- **Launch Programs SPO**
- **Space Test and Experimentation Programs**
- **Satellite and Launch Control SPO**
- **Navstar Global Positioning System JPO**[2]
- **Phillips Laboratory,** Kirtland AFB, N. M.
- **Defense Dissemination Program**

Air Force Acquisition Executive • Washington, D. C.
Director **Arthur L. Money**

Program Executive Officer for Space Programs
Brent R. Collins

- **MILSATCOM System JPO**
- **Titan SPO**
- **Spacebased Early Warning SPO**
- **Evolved Expendable Launch Vehicle SPO**

[1]System(s) Program Office
[2]Joint Program Office

Russian Space Activity, 1995

	Launches	Payloads
Communications	4	4
Military reconnaissance	3	3
Unmanned space station resupply	5	5
Space station module	1	1
Navigation	7	13
Military ocean surveillance	2	2
Remote sensing	2	2
Early warning	1	1
Electronic intelligence	2	2
Manned flight	2	2
Geodetic	0	0
Meteorology	0	0
Science	2	2
Commercial	1	4
Total	**32**	**41**

Russian Operational Spacecraft, 1995

Mission	Type	Number
Communications	Kosmos (Strela-3)	30
	Raduga/Raduga-1	12
	Gorizont	13
	Molniya-1	8
	Molniya-3	8
	Kosmos (Geizer)	3
	Kosmos (Strela-2)	2
	Kosmos (Luch)	2
	Luch-1	1
	Ekran-M	2
	Ekspress	1
	Gals	2
	Radio Rosto	1
Navigation	Kosmos GLONASS	24
	Kosmos (military)	6
	Kosmos (civil)	4
Meteorology	Meteor-2	2
	Meteor-3	2
	Elektro (GOMS)	1
Early warning	Kosmos (Oko)	9
	Kosmos (Prognoz)	3
Electronic intelligence	Kosmos (Tselina-2)	4
	Kosmos (EORSAT)	3
	Kosmos (Tselina-D)	1
Photoreconnaissance	Kosmos (5th generation)	1
Remote sensing	Okean-O	2
	Resurs-O1	1
	Sich	1
Geodesy	Kosmos (Etalon)	2
	Kosmos (GEO-IK)	1
Radar calibration	Kosmos	1
Space station activity	Mir	1
	Kvant-1	1
	Kvant-2	1
	Kristall	1
	Spektr	1
	Shuttle Docking Module	1
	Soyuz TM	1
	Progress M	1
Scientific activity	Kosmos	1
	Coronas-I	1
	Granat	1
	Interball 1	1
	MAGION 4 (Czech satellite)	1

Older spacecraft sometimes are placed in orbital standby mode.

Russian Launch Site Activity, 1995

Spacecraft	Number of launches
Baikonur Cosmodrome, Tyuratam, Kazakhstan	
Proton	7
Soyuz	8
Zenit-2	1
Tsyklon-2	2
Molniya	1
Total	**19**
Plesetsk Cosmodrome, Plesetsk, Russia	
Tsyklon-3	1
Kosmos	5
Soyuz	4
Molniya	3
Total	**13**

US Space Funding

(Millions of current dollars)

FY	NASA	DoD	Other	Total
1959	$ 261	$ 490	$ 34	$ 785
1960	462	561	43	1,066
1961	926	814	69	1,809
1962	1,797	1,298	200	3,295
1963	3,626	1,550	259	5,435
1964	5,016	1,599	216	6,831
1965	5,138	1,574	244	6,956
1966	5,065	1,689	217	6,971
1967	4,830	1,664	216	6,710
1968	4,430	1,922	177	6,529
1969	3,822	2,013	141	5,976
1970	3,547	1,678	115	5,340
1971	3,101	1,512	127	4,740
1972	3,071	1,407	97	4,575
1973	3,093	1,623	109	4,825
1974	2,759	1,766	116	4,641
1975	2,915	1,892	107	4,914
1976	4,074	2,443	142	6,659
1977	3,440	2,412	131	5,983
1978	3,623	2,738	157	6,518
1979	4,030	3,036	178	7,244
1980	4,680	3,848	160	8,688
1981	4,992	4,828	158	9,978
1982	5,528	6,679	234	12,441
1983	6,328	9,019	242	15,589
1984	6,648	10,195	293	17,136
1985	6,925	12,768	474	20,167
1986	7,165	14,126	368	21,659
1987	9,809	16,287	352	26,448
1988	8,302	17,679	626	26,607
1989	10,098	17,906	444	28,448
1990	12,142	15,616	387	28,145
1991	13,036	14,181	566	27,783
1992	13,199	15,023	624	28,846
1993	13,077	14,106	559	27,742
1994	13,022	13,166	465	26,653
1995	12,543	10,644	489	23,676
Total	**216,520**	**231,752**	**9,536**	**457,808**

Figures are expressed in current dollars and are rounded. NASA totals represent space activities only. "Other" category includes the Departments of Energy, Commerce, Agriculture, Interior, and Transportation; the National Science Foundation; the Environmental Protection Agency; and other agencies.

Worldwide Launches by Site, 1957–95

Launch Site	Nation	Launches
Plesetsk	Russia	1,426
White Sands Missile Range, N. M.	US	1,070
Tyuratam/Baikonur	Russia	987
Vandenberg AFB, Calif.	US	508
Cape Canaveral AS, Fla.	US	492
Poker Flat Research Range, Alaska	US	270
JFK Space Center, Fla.	US	92
Kapustin Yar	Russia	83
Kourou	French Guiana	80
Tanegashima	Japan	27
Shuang Cheng-tzu/Jiuquan	China	22
Uchinoura	Japan	21
Wallops Flight Facility, Va.	US	21
Xichang	China	17
Indian Ocean Platform	Kenya	9
Sriharikota	India	6
Edwards AFB, Calif.	US	5
Hammaguir	Algeria	4
Woomera	Australia	2
Taiyun	China	2
Yavne	Israel	3
Total		**5,147**

Military vs. Civilian Launches

	Military		Civilian	
Year	US	Russia	US	Russia
1957	0	0	0	2
1958	0	0	7	1
1959	6	0	5	3
1960	10	0	6	3
1961	19	0	10	6
1962	31	5	21	15
1963	26	7	12	10
1964	32	15	25	15
1965	28	25	35	23
1966	32	27	41	17
1967	24	46	34	20
1968	20	49	25	25
1969	16	51	24	19
1970	15	55	14	26
1971	10	60	22	23
1972	11	53	20	21
1973	8	58	15	28
1974	6	52	18	29
1975	7	60	21	29
1976	7	74	19	25
1977	9	69	15	29
1978	8	60	24	28
1979	4	60	12	27
1980	5	64	8	25
1981	5	59	13	39
1982	6	68	12	33
1983	7	58	15	40
1984	12	63	10	34
1985	6	64	11	34
1986	3	63	3	28
1987	6	62	2	33
1988	6	53	6	37
1989	13	42	5	32
1990	13	45	14	30
1991	9	30	9	29
1992	12	32	16	22
1993	13	26	10	21
1994	12	26	14	22
1995	9	15	18	17
Total	**466**	**1,596**	**591**	**900**

Manned Spaceflights

	US		Russia	
Year	Flights	Persons	Flights	Persons
1961	2	2	2	2
1962	3	3	2	2
1963	1	1	2	2
1964	0	0	1	3
1965	5	10	1	2
1966	5	10	0	0
1967	0	0	1	1
1968	2	6	1	1
1969	4	12	5	11
1970	1	3	1	2
1971	2	6	2	6
1972	2	6	0	0
1973	3	9	2	4
1974	0	0	3	6
1975	1	3	4	8
1976	0	0	3	6
1977	0	0	3	6
1978	0	0	5	10
1979	0	0	2	4
1980	0	0	6	13
1981	2	4	3	6
1982	3	8	3	8
1983	4	20	2	5
1984	5	28	3	9
1985	9	58	2	5
1986	1	7	1	2
1987	0	0	3	8
1988	2	10	3	9
1989	5	25	1	2
1990	6	32	3	7
1991	6	35	2	6
1992	8	53	2	6
1993	7	42	2	5
1994	7	42	3	8
1995	7	42	2	6
Total	**103**	**477**	**81**	**181**

Payloads by Mission, 1957–95

Category	US	Russia
Platforms	**0**	**471**
Earth orbital science	**218**	**207**
Automated lunar, planetary	**55**	**85**
Moon	25	34
Mercury	1	0
Venus	8	33
Mars	9	18
Outer planets	4	0
Interplanetary space	8	0
Applications	**412**	**487**
Communications	285	273
Weather	99	74
Geodesy	20	34
Earth resources	7	96
Materials processing	1	10
Piloted activities	**142**	**230**
Earth orbital	92	86
Earth orbital (related)	13	136
Lunar	20	0
Lunar (related)	17	8
Launch vehicle tests	**11**	**22**
General engineering tests	**51**	**4**
Reconnaissance	**424**	**1,078**
Photographic	247	795
Electronic intelligence	92	129
Ocean electronic intelligence	38	81
Early warning	47	73
Minor military operations	**44**	**161**
Navigation	**79**	**208**
Theater communication	**0**	**535**
Weapons-related activities	**2**	**56**
Fractional orbital bombardment	0	18
Antisatellite targets	2	18
Antisatellite interceptors	0	20
Other military	**16**	**1**
Other civilian	**2**	**1**
Total	**1,456**	**3,546**

Spacefarers

(As of end of 1995)

Nation	Persons
Afghanistan	1
Austria	1
Belgium	1
Bulgaria	2
Canada	4
Cuba	1
Czechoslovakia	1
France	5
Germany	8
Hungary	1
India	1
Italy	1
Japan	3
Mexico	1
Mongolia	1
Netherlands	1
Poland	1
Romania	1
Russia	83
Saudi Arabia	1
Switzerland	1
Syria	1
United Kingdom	1
United States	216
Vietnam	1
Total	**339**

Payloads in Orbit

(As of end of 1995)

Launcher/operator	Objects
Argentina	1
Australia	6
Brazil	6
Canada	17
China	15
Czechoslovakia	2
ESA	29
France	29
France/Germany	2
Germany	14
India	13
Indonesia	6
Israel	1
Italy	5
ITSO[1]	48
Japan	55
Luxembourg	5
Mexico	4
NATO	8
North Korea	2
Norway	1
Portugal	1
Russia	1,335
Saudi Arabia	3
South Korea	1
Spain	4
Sweden	4
Thailand	2
Turkey	1
United Kingdom	22
United States	680
Total	**2,322**

[1]International Telecommunications Satellite Organization

Other Spacefaring Nations

For eight years after Sputnik went into orbit in October 1957, the two superpowers alone were able to launch spacecraft. France broke the monopoly in 1965, establishing an independent capability. China, India, Japan, and Israel also have hurled satellites into space using indigenously built rockets. European capabilities are embodied in the European Space Agency (ESA), a group of thirteen nations.

China launched its first satellite in 1970 and has at least thirty-nine satellites on orbit. China also launches science and military reconnaissance satellites and has made commercial launches for other nations. Its primary launch site is near Jiuquan, in northern China; a newer site is near Xichang, in southeastern China, and a third is at Taiyun. The launch program relies on the Long March series of rockets, one version of which has a cryogenic upper stage. Chinese astronauts were in training in the 1970s, but the country has indefinitely deferred manned spaceflight.

ESA was formed in 1975 for civilian activities only. It has thirteen members: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the UK. A major activity is development of the Ariane rocket. France led development of the booster, which is launched from Kourou, French Guiana. Arianespace, a private company, markets Ariane and manages launches. France, Italy, and Germany all have strong programs.

India launched its first satellite, Rohini 1, into orbit in July 1980. The Indian Space Research Organization operates an offshore Sriharikota Island launch site in the Bay of Bengal. India's booster program includes the Satellite Launch Vehicle, Augmented Satellite Launch Vehicle, and Polar Satellite Launch Vehicle. The latter is capable of placing spacecraft into polar orbit. India is particularly interested in remote sensing for resource, weather, and reconnaissance purposes. An Indian cosmonaut flew on a Soviet Soyuz mission in 1984.

Israel launched its first test satellite, Ofeq 1, into orbit September 1988. Believed to have been launched from Yavne in the Negev Desert, satellites in the Ofeq series are thought to be dedicated to military purposes. Ofeq is seen as a step toward creation of a military satellite reconnaissance system. The prime booster is Shavit, possibly based on the Jericho 2 missile.

Japan put its first satellite into orbit in 1970 and has made at least forty-eight successful satellite launches. Communications, remote sensing, weather, and scientific satellites are on orbit. Japan's satellite program is run by the National Space Development Agency and the Institute of Space and Astronautical Science. Main launch sites are Kagoshima, on Kyushu, southwest of Tokyo, and Tanegashima, an island south of Kyushu. The Mu series of launch vehicles is used to orbit scientific satellites and toss spacecraft into deep space. N-1 and N-2 rockets were based on the US Delta. The H-1 has begun to replace the N-1 and N-2 boosters. The H-2 booster was first launched in 1994.

Launches

Year	France	China	Japan	Europe	India	Israel
1965	1					
1966	1					
1967	2					
1968						
1969						
1970	2	1	1			
1971	1	1	2			
1972			1			
1973						
1974			1			
1975	3	3	2			
1976		2	1			
1977			2			
1978		1	3			
1979			2	1		
1980			2		1	
1981		1	3	2	1	
1982		1	1			
1983		1	3	2	1	
1984		3	3	4		
1985		1	2	3		
1986		2	2	2		
1987		2	3	2		
1988		4	2	7		1
1989			2	7		
1990		5	3	5		1
1991		1	2	8		
1992		4	1	7	1	
1993		1	1	7		
1994		5	2	6	2	
1995		2	1	11		1
Total	**10**	**41**	**48**	**74**	**6**	**3**

Space and Missile Badges

Space/Missile Badge

Senior Space/Missile Badge

Master Space/Missile Badge

Astronaut Pilot*

Senior Astronaut Pilot

Command Astronaut Pilot

Missile Badge

Senior Missile Badge

Master Missile Badge

Missile Badge with Operations Designator

Senior Missile Badge with Operations Designator

Master Missile Badge with Operations Designator

*The astronaut designator indicates a USAF rated officer qualified to perform duties in space (fifty miles and up) and who has completed at least one operational mission. Pilot wings are used here only to illustrate the pos tion of the designator on the wings.

Space master plan
A strategic plan to guide military spending on space systems for the next ten to twenty years is being assembled by a group working for Robert V. Davis, under secretary of defense for Space. The master plan is to be presented to Paul G. Kaminski, under secretary of defense for Acquisition and Technology, in the fall for approval. The plan is meant to address such complaints as the high cost of military space systems, the lack of coordination, and outdated technology. The position of DUSD for Space was created in December 1994 to provide a single DoD point of contact to oversee space matters within the services and intelligence communities.

Space architecture
Maj. Gen. Robert S. Dickman, USAF, was named September 14, 1995, as the first DoD Space Architect. The new function was created to integrate DoD space architectures, with the aim of eliminating overlap among systems and ensuring that space and terrestrial weapon systems work together. General Dickman has embarked on a series of architecture studies this year, with plans to issue recommendations every three months. The first plan to be delivered to the Joint Space Management Board this summer was to have been a military satellite communications architecture study that recommends methods of replacing three aging satellite systems in the next decade.

Commercial remote sensing
Three private ventures were developing commercial high-resolution satellite programs, and additional companies had received or filed for Commerce Department licenses to pursue similar ventures. EarthWatch, Inc., was expected to be the first into the business, with its three-meter-resolution satellite due for launch on a Russian rocket this September. Within two years, EarthWatch and two other firms, Orbimage and Space Imaging Inc., were to launch even better satellites with resolution finer than one meter. Civilians and foreign military forces, along with a wide variety of new users—such as farmers, land-use planning firms, and transportation companies—will be able to purchase images. The defense and intelligence communities were working with commercial firms to establish policy and procedures that would allow US ventures to lead the international market for the images at the same time national security concerns are being addressed.

Advanced Technology Launchers: X-33, X-34, EELV
US efforts to improve launch technology were focused on two programs: the Air Force Evolved Expendable Launch Vehicle (EELV) program and NASA's reusable launch vehicle (RLV) program, which include the X-33 and X-34 flight-test projects. USAF is funding four contractor teams studying EELV designs, with a plan to narrow the competition to two teams by late this year. In 1998, a single winning design will be selected. USAF had budgeted $2 billion through 2004 for the effort, including funds for three test flights. EELV is aimed at evolving current launcher systems into a common core family of medium- and heavy-lift boosters with launch costs twenty-five to fifty percent lower than the cost of today's rockets. The first medium launch is scheduled for 2001, and the first heavy launch is scheduled for 2003.

Delta Clipper DC-XA
NASA and contractor McDonnell Douglas resumed atmospheric test flights of the DC-X Delta Clipper–Experimental rocket in May 1996 after a one-year hiatus. The rocket demonstrated technology that could be used to build an orbital single-stage-to-orbit launcher with greatly reduced costs. The program has been supported by the Ballistic Missile Defense Organization and Phillips Laboratory, Kirtland AFB, N. M. NASA took over DC-X responsibility in 1995 from the Air Force, although Phillips Lab continues to play a role in the flight tests.

Declassification of satellite imagery
By May, the National Reconnaissance Office had released about 300,000 of the 800,000 satellite photos declassified by executive order of the President in February 1995. The photos, taken in the 1960s and 1970s, are from the Keyhole series of reconnaissance satellites, numbered one through six. Nearly seven million of the pictures may eventually be declassified. The images were due to become publicly available this month and can be obtained through the US Geological Survey, the National Archives, and on several sites on the Internet and the World Wide Web.

White House Global Positioning System (GPS) policy
In March, the White House issued the first policy guidelines for GPS that established free access to signals for all users, including foreign governments. The White House intended to create a more stable framework for public- and private-sector decisions on GPS. The policy also commits the Pentagon to lifting restrictions on the quality of the signal to nonmilitary users in the next four to ten years. The policy was spurred by an explosion in jobs, commercial products, and revenues from civilian uses of the military technology.

In July, NASA selected Lockheed Martin to build the reusable launch vehicle X-33. The company's winning design, VentureStar (shown in this computerized visual), is expected to have a four- to seven-day turnaround time, with payloads of up to 40,000 pounds, and an on-time reliability rate of more than ninety percent.

Launcher Concepts

Sea Launch
Boeing Commercial Space Co. and three foreign partners teamed in 1995 to develop Sea Launch, a system that will use a rocket built in Ukraine and launched from a ship at sea to put payloads weighing 5,900 kilograms (13,000 pounds) into geosynchronous transfer orbit (GTO). The venture has contracted for ten commercial missions, and the first Sea Launch is scheduled to go into orbit during the summer of 1998. Boeing's partners in the venture are RSC Energia, a Russian firm that will supply the vehicle's third stage, a Block DM-SL, and integration and support equipment; NPO Yuzhnoye, a Ukrainian aerospace firm that will provide the Zenit rocket for use as the first two Sea Launch stages; and Kvaerner a. s., a Norwegian company with experience in North Sea offshore oil platform operations that will build the launch platform and command ship.

X-33
NASA is leading the effort to flight-test an experimental vehicle that could be the precursor to a single-stage-to-orbit launcher for the next century. A subsequent phase of the program would feature a reusable launch vehicle capable of reducing launch costs by a factor of ten. In July, NASA selected Lockheed Martin from three competing contractor teams studying X-33 designs. Lockheed Martin's VentureStar design is to proceed to a series of flight tests starting in 1998. The project's five-year budget for 1996–99 was tentatively set at $941 million, with some $5 billion to $18 billion in commercial financing needed to develop the operational version. USAF's role in the X-33 is limited to managing flight-test operations through an office at Phillips Laboratory, Kirtland AFB, N. M.

X-34
In June, Orbital Sciences Corp. won a second X-34 contract from NASA for $60 million to perform two flight tests of a more limited demonstration of a reusable small launcher. Two X-34 tests scheduled for summer 1998 will test such technology as propulsion and thermal reentry systems that would be required to build the X-33 reusable launch vehicle. The contract has no commercial objectives tied to it.

Delta III
A new intermediate-class launcher, the Delta III is being developed—without government financial support—by McDonnell Douglas Corp. for a first launch in the first half of 1998. Delta III will be able to boost 8,400 pounds to GTO—more than twice Delta II's maximum payload. The rocket will have a new cryogenic upper stage and a larger fairing. The initial customer for Delta III launches is Hughes Space and Communications International Inc. Hughes and McDonnell Douglas have signed a contract for ten launches, plus options for additional launches through 2005.

Med Lite
McDonnell Douglas has signed a contract with NASA for the Medium Light Expendable Launch Vehicle Services program to fill the gap between the small launch-vehicle market and the medium-class market. Med Lite's objective is to support NASA's scientific missions, including the Mars Surveyor and Discovery programs. Launch vehicles include two- and three-stage versions of the Delta II with three strap-on solid rocket motors and Orbital Sciences Corp.'s Taurus XL.

Satellite Concepts

Combined weather satellites
Civil and military weather low-Earth orbit (LEO) polar satellites are being merged into a single system. The number of satellites will be reduced from four to three, saving $300 million through 1999. DoD and NOAA were to coordinate the purchase of remaining satellites. NOAA, DoD, and NASA will maintain a tri-agency office for the National Polar-Orbiting Operational Environmental Satellite System (NPOESS), which is to take responsibility for the Defense Meteorological Satellite Program (DMSP) after the satellites in the pipeline are launched. Operational control at the primary site in Suitland, Md., was to begin in the second quarter of 1998, with the backup site at Falcon AFB, Colo., to be operational in the third quarter. The first NPOESS satellite is scheduled for launch in 2004.

Milstar Follow-On
The last four Milstar satellites will have a higher data-rate capability added to respond to a shift in emphasis since the end of the Cold War from mostly strategic use to a more tactical use. The medium-data-rate payload uses better technology and includes two Nulling Spot Beam Antennas that give the satellite an antijam capability. The launch dates for the satellites are December 1998, December 1999, November 2000, and October 2001.

Global Broadcast System (GBS)
GBS is projected to be a high-speed, one-way, broadcast communications system that provides high-volume information directly to worldwide, in-theater warfighters. GBS will provide data to large populations of dispersed users with small mobile receive terminals. These terminals will allow data to be disseminated directly to lower-echelon forces, providing current weather, intelligence, news, imagery, and other mission-essential information. GBS will be implemented in three phases. Phase 1 will consist of leased, commercial transponders. Phase 2 will consist of GBS packages aboard three UHF Follow-On satellites. Phase 3 will be an objective system consisting of military assets, a commercial leased system, or a combination of the two.

Spacebased Infrared (SBIR) system
This advanced early warning satellite design will encompass and eventually replace the Defense Satellite Program (DSP). The SBIR system is the latest in a string of early warning satellite proposals by USAF. This fall, the Air Force plans to select a contractor to design and build the satellites, which would be better able to detect small theater missiles than the DSP can. The SBIR system's four missions are missile warning, defensive-missile targeting, providing technical intelligence, and analyzing battle situations. Satellites in two types of orbits, geosynchronous (four) and elliptical (two), would be used. The lower-orbit satellite constellation is called the space and missile tracking system (see next entry), and a decision on whether to deploy it is to be made in 2000.

Space and missile tracking system
Formerly known as Brilliant Eyes, these satellites would track small missiles and provide targeting and intelligence data for the SBIR system that will replace the DSP early warning satellites in the next decade. The demonstration satellites are to be launched in late 1998. The schedule calls for first launch of the operational satellites in 2002, with operational deployment in 2006. Between eighteen and thirty-two satellites could be deployed in the constellation. The system may use satellites in LEO as well, with those first being launched in about 2006.

Small satellites
USAF's Phillips Lab is a leader in the development of advanced technology for small satellites. Programs in this area include the Space Test Experiments Platform series of satellites; Clementine 2; a new, inexpensive series of spacecraft known as Mightysat; and a program dubbed Integrated Space Technology Demonstration, which will fly a hyperspectral imager known as Warfighter 1 on its first mission. The lab also was involved in NASA's Lewis and Clark and New Millennium small-satellite projects. The National Reconnaissance Office has come under pressure this year by Congress and other policymakers to add a small-satellite component to its existing large classified satellites.

US Space Command

	Personnel	Budget, Fiscal 1997	Activities
US Space Command Peterson AFB, Colo.	864	$17,600,000	Conducts joint space operations in accordance with the Unified Command Plan assigned missions of Space Forces Support, Space Force Enhancement, Space Force Application, and Space Force Control; plans and executes ballistic missile defense of North America operations; advocates the space and missile warning requirements of the commanders in chief.
Component			
Air Force Space Command Peterson AFB, Colo.	38,318	$1,708,000,000	Operates military space systems, groundbased missile-warning radars and sensors, missile-warning satellites, national launch centers, and ranges; tracks space debris; operates and maintains the USAF ICBM force (as a component of US Strategic Command). Budget includes funding for 11,100 contractor personnel and operations and maintenance for six bases and fifty worldwide sites.
Naval Space Command Dahlgren, Va.	442	$54,000,000	Operates assigned space systems for surveillance and warning; provides spacecraft telemetry and on-orbit engineering support.
Army Space Command Colorado Springs, Colo.	651	$52,000,000	Provides input for DoD space plans; manages joint tactical uses of DSCS; conducts planning for national and theater missile defense; operates the Army Theater Missile Defense Element force projection Tactical Operations Center; exploits leading-edge space technologies in support of warfighter needs; manages the Army Astronaut Program and Joint Tactical Ground Station.

Selected NASA Projects Fiscal Year 1997 Proposal, Current Dollars

■ **AXAF, $178.6 million.** Space science. The Advanced X-Ray Astrophysics Facility spacecraft to study the composition and nature of galaxies, stellar objects, and interstellar phenomena. Scheduled for launch aboard the space shuttle in September 1998.

■ **Cassini, $106.7 million.** Space science. Spacecraft mission to Saturn. Seeks data on formation of solar system, possible presence of chemical basis for evolution of life. Scheduled for launch in October 1997.

■ **Discovery, $74.8 million.** Space science. Spacecraft missions Mars Pathfinder and Near-Earth Asteroid Rendezvous (NEAR). Mars Pathfinder launch scheduled for December 1996. NEAR successfully launched in February 1996, now en route for a year-long rendezvous with asteroid 433 Eros in February 1999. Lunar Prospector is scheduled for launch in October 1997 and will search for resources on the moon, especially for water in the shaded polar regions. The Stardust mission, scheduled for launch in February 1999, is designed to gather dust samples from the comet Wild-2 and return the samples to Earth for analysis. Discovery is intended as NASA's low-cost planetary exploration program.

■ **Earth Observing System, $585.7 million.** Mission to Planet Earth environmental project. Series of satellites to document global climatic change and observe environmental processes. Scheduled launches start in June 1998.

■ **Explorer, $135 million.** Space science. Four missions and spacecraft development. Study of X-ray sources, solar corona, and organic compounds in interstellar clouds. Scheduled launches in 1997 and 1999.

■ **Galileo, $66.4 million.** Space science, planetary exploration. Funds to support operations of mission to explore Jupiter and its moons.

■ **Mars Surveyor, $90 million.** Space science. First launch of the Mars Global Surveyor orbiter is scheduled for November 1996, followed by a December 1996 launch of the Mars Pathfinder mission. Development of spacecraft for new Mars exploration strategy. Orbiter, small payload, communications orbiters, landers. Another orbiter launch is planned for December 1998, and a lander launch is scheduled for January 1999.

■ **New Millennium Spacecraft, $21.5 million.** Space science. Flight-technology demonstration to produce new microspacecraft with reduced weight and life-cycle costs. Technology demonstration flight test expected in 1998.

■ **Relativity (Gravity Probe-B), $59.6 million.** Space science. Major test of Einstein's general theory of relativity. Development of a gravity probe. Launch is scheduled for October 2000.

■ **Space shuttle, $3.2 billion.** Spaceflight. Program emphasizes continuing improvement of safety margins, fulfillment of the flight manifest, reduction of costs, and launch of eight flights for Fiscal 1997.

■ **Space station, $1.8 billion.** Spaceflight. International manned space facility. Capacity for six persons. Current plans call for first US crew to arrive on the station in May 1998, following a November 1997 launch. Systems design review was completed in 1994. Efficiencies gained through design changes and participation of the Russians in an international partnership.

■ **US/Russian Cooperative Program, $138.2 million.** Spaceflight. Program provides for contract with Russian Space Agency for services and hardware and joint activities with Russia on the Mir space station. The fifth, sixth, and seventh joint shuttle-Mir missions are scheduled for Fiscal 1997.

■ **Other space operations, $592.4 million.** Space science. Operation of Hubble Space Telescope, the AXAF program, the Global Geospace Science program, the Compton Gamma Ray Observatory, and the Collaborative Solar-Terrestrial Physics program.

Space Leaders

(As of July 1, 1996)

Directors, National Reconnaissance Office

Joseph V. Charyk	Sept. 6, 1961–Mar. 1, 1963
Brockway McMillan	Mar. 1, 1963–Oct. 1, 1965
Alexander H. Flax	Oct. 1, 1965–Mar. 11, 1969
John L. McLucas	Mar. 17, 1969–Dec. 20, 1973
James W. Plummer	Dec. 21, 1973–June 28, 1976
Thomas C. Reed	Aug. 9, 1976–Apr. 7, 1977
Hans Mark	Aug. 3, 1977–Oct. 8, 1979
Robert J. Hermann	Oct. 8, 1979–Aug. 2, 1981
Edward C. Aldridge, Jr.	Aug. 3, 1981–Dec. 16, 1988
Martin C. Faga	Sept. 26, 1989–Mar. 5, 1993
Jeffrey K. Harris	May 19, 1994–Feb. 26, 1996
Keith R. Hall (acting)	Feb. 27, 1996

Commanders, Air Force Space Command

Gen. James V. Hartinger	Sept. 1, 1982–July 30, 1984
Gen. Robert T. Herres	July 30, 1984–Oct. 1, 1986
Maj. Gen. Maurice C. Padden	Oct. 1, 1986–Oct. 29, 1987
Lt. Gen. Donald J. Kutyna	Oct. 29, 1987–Mar. 29, 1990
Lt. Gen. Thomas S. Moorman, Jr.	Mar. 29, 1990–Mar. 23, 1992
Gen. Donald J. Kutyna	Mar. 23, 1992–July 1, 1992
Gen. Charles A. Horner	July 1, 1992–Sept. 13, 1994
Gen. Joseph W. Ashy	Sept. 13, 1994

NASA Spending on Major Space Missions

Fiscal Year 1997 Proposal, Current Dollars

Project Office	Request
Spaceflight	$5,362,900,000
Space sciences	1,857,300,000
Mission to Planet Earth	1,402,100,000
Aeronautics	857,800,000
Space communications	712,000,000
Advanced concepts and technology	725,000,000
Life and microgravity sciences	498,500,000
Safety and mission assurance	36,700,000
Total	**$11,452,300,000**

Upcoming Shuttle Flights

Fiscal Year 1997 Proposal

Month/Year, Mission	Name
October 1996, STS-80	*Columbia*
December 1996, STS-81	*Atlantis*
February 1997, STS-82	*Discovery*
March 1997, STS-83	*Columbia*
May 1997, STS-84	*Atlantis*
July 1997, STS-85	*Discovery*
September 1997, STS-86	*Atlantis*

The Golden Age of NASA

Name	**Project Mercury**
Duration	**November 3, 1958–May 16, 1963**
Cost	$392.1 million (cost figures are in current dollars)
Distinction	First US manned spaceflight program
Highlight	Astronauts are launched into space and returned safely to Earth
Number of flights	Six
Key events	**May 5, 1961** Lt. Cmdr. Alan B. Shepard, Jr., makes first US manned flight, a suborbital trip of fifteen minutes. **February 20, 1962** Lt. Col. John H. Glenn, Jr., becomes first American to orbit Earth. **May 15, 1963** Maj. L. Gordon Cooper, Jr., begins flight of twenty-two orbits in thirty-four hours.

Name	**Project Gemini**
Duration	**January 15, 1962–November 15, 1966**
Cost	$1.3 billion
Distinction	First program to explore docking, long-duration flight, rendezvous, spacewalks, and guided reentry
Highlight	Dockings and rendezvous techniques practiced in preparation for Project Apollo
Number of flights	Ten
Key events	**June 3–7, 1965** Flight in which Maj. Edward H. White II makes first spacewalk. **August 21–29, 1965** Cooper and Lt. Cmdr. Charles "Pete" Conrad, Jr., withstand weightlessness. **March 16, 1966** Neil A. Armstrong and Maj. David R. Scott execute the first space docking. **September 15, 1966** Conrad and Richard F. Gordon, Jr., make first successful automatic, computer-steered reentry.

Name	**Project Apollo**
Duration	**July 25, 1960–December 19, 1972**
Cost	$24 billion
Distinction	Space program that put humans on the moon
Highlights	Neil Armstrong steps onto lunar surface. Twelve astronauts spend 160 hours on the moon.
Number of flights	Eleven
Key events	**May 28, 1964** First Apollo command module is launched into orbit aboard a Saturn 1 rocket. **January 27, 1967** Lt. Col. Virgil I. "Gus" Grissom, Lt. Cmdr. Roger B. Chaffee, and White die in a command module fire in ground test. **October 11–22, 1968** First manned Apollo flight proves "moonworthiness" of spacecraft. **December 21–27, 1968** First manned flight to moon and first lunar orbit. **July 16–24, 1969** Apollo 11 takes Armstrong, Col. Edwin E. "Buzz" Aldrin, Jr., and Lt. Col. Michael Collins to the moon and back. Armstrong and Aldrin make first and second moon walks. **December 7–19, 1972** Final Apollo lunar flight produces sixth manned moon landing.

Current US Launchers

Titan II

Titan IV

Atlas II

Titan II (Lockheed Martin Astronautics)

Modified ICBM. Fourteen missiles have been modified; five have been launched successfully. Puts 4,200 pounds into polar low-Earth orbit (LEO). The Air Force uses it for DMSP launches. Titan II is launched from Vandenberg AFB, Calif. It launched the Clementine mission to the moon and places NOAA satellites into orbit. In the 1960s, NASA used Titan II for the manned Gemini flights.

Titan IV (Lockheed Martin Astronautics)

Heavy-lift launcher, adapted from an ICBM as an expendable launch system. First launch in 1989. Carries DSP, Milstar, and classified satellites and will launch NASA's Cassini to Saturn. With Centaur G-prime upper stages, lifts 10,200 pounds to geosynchronous Earth orbit (GEO), 39,000 pounds to LEO, and 32,000 pounds into polar LEO. Titan IVB, with upgraded solid rocket motors, will have twenty-five percent better performance when it begins launches in 1997. The Air Force has contracted for forty-one Titan IVs; seventeen have flown.

Atlas II (Lockheed Martin Astronautics)

Current version of nation's first ICBM carries DSCS satellites and NASA and commercial payloads. The range of payloads Atlas II through IIAS can lift into geosynchronous transfer orbit (GTO) from Cape Canaveral AS, Fla., is 4,900 to 8,150 pounds and 13,650 to 15,900 pounds to LEO from Vancenberg AFB. The 100th Atlas-Centaur launch occurred in April 1996. A new configuration, the Atlas IIAR (with a Russian-designed RD-180 engine), will be used starting in 1998. It will increase the payload capability to 8,400 pounds to GTO.

Lockheed Martin Launce Vehicle (Lockheed Martin Astronautics)

Family of commercially developed boosters with varying configurations of solid motors that allow payloads weighing one to four tons to be placed into LEO, with plans to develop future versions for geosynchronous orbits. The LMLV-1 rocket, a two-stage version, failed on its first mission in August 1995. After changes to correct design problems, the rocket is due to resume operations this fall. The design is for "stack and shoot," which means the rocket can be launched within fifteen days of arrival at the SLC-6 launch site at Vandenberg AFB, although to date, no military use has been contracted for.

Multiservice Launch System (Lockheed Martin Astronautics)

Launcher is based on refurbished Minuteman II ICBMs. First suborbital use was planned for late July 1996 from Vandenberg AFB toward the Kwajalein Atoll Missile Test Range, with possible orbital versions of the rocket to fly later. Lockheed Martin's contract calls for three suborbital flights, with multiple options for other missions possible. MSLS can launch up to 830 pounds on suborbital missions with a range of 4,100 nautical miles, approximately 400 pounds into 100-nautical-mile polar orbit.

Delta II (McDonnell Douglas)

Medium launcher, in operation since 1989. Payloads include Navstar GPS, scientific, and commercial communications satellites. Launcher for a variety of NASA scientific payloads under the Medium Expendable Launch Vehicle Services program. Launch capability from both Cape Canaveral AS and Vandenberg AFB. Available in two- and three-stage configurations. Latest model lifts 11,100 pounds to LEO, 4,010 pounds to GTO. Has successfully launched twenty-five GPS satellites for USAF.

fact, unlikely. Whatever its merits as a technology demonstrator, the Whale encountered several factors that weakened its promise as a weapon system and eventually proved fatal to Northrop's full-rate production hopes.

First, Tacit Blue's intended mission meant that it probably would have to be invisible to more than radar. To avoid visual detection, stealth bombers and fighters operate at night, but a reconnaissance airplane would have to do much of its work in the daytime, when real-time information can be of more use to ground forces. The large Tacit Blue airframe was visible from the ground and would likely have required fighter protection if it stayed airborne behind enemy lines during daylight hours.

Second, it became clear that Joint STARS, with its large twenty-nine-foot-long antenna and superior depth of view, could perform much of Tacit Blue's mission by itself. Compounding the problem for the Whale was that Joint STARS cost less, had longer endurance, was air refuelable, and could scan a wider area.

"The [Tacit Blue] program turned into a test-bed because its low-observable technologies proved to be more valuable than its [mission] contribution," said General Muellner.

Learning From the Whale

These LO characteristics involved the airplane's radar as well as its shape, said General Muellner. Technicians from Hughes and DARPA used Tacit Blue test flights to increase their knowledge of such radar-cloaking techniques as the use of low-power signals and the spreading of signals around the spectrum. These methods, and others, are intended to fool an enemy into believing that the transmissions he detects are simply blips in electronic background noise.

The Joint STARS multimode radar does not need such LPI techniques. It achieves survivability by standing off behind the front lines, with the combat power of US fighters between it and danger.

Photo by Tony Sacketos

The Whale is now on display at the US Air Force Museum, Wright-Patterson AFB, Ohio. Though it never went operational, the technologies developed and perfected by the program continue to define today's aircraft.

Other modern US aircraft do make use of Tacit Blue–pioneered LPI. "Obviously, the B-2 has exploited that technology," said General Muellner.

Northrop engineers never really designed a Whale production version, which likely would have had a larger tail than the test version and would have featured more of a mid-wing design. Nor did they get around to integrating planned electronic eavesdropping equipment into Tacit Blue, which would have allowed it to perform some of the electronic intelligence functions now carried out by USAF's RC-135 Rivet Joint aircraft.

The Air Force will not say exactly where it kept the Tacit Blue prototype during the past eleven years or from which airfield or airfields the airplane flew. All that is publicly known is that it was shut up in a storage building, along with all its program files, until its existence was declassified this spring, following an eight-month review process.

For years, some hinted privately that the Air Force had produced a more stealthy Joint STARS aircraft. Officials admit that ordinary citizens may have spotted Tacit Blue during its open-air testing, as it flew exclusively during the day—normal for developmental testing. Overall, however, the program seems to have been a secret the Defense Department kept well for almost two decades.

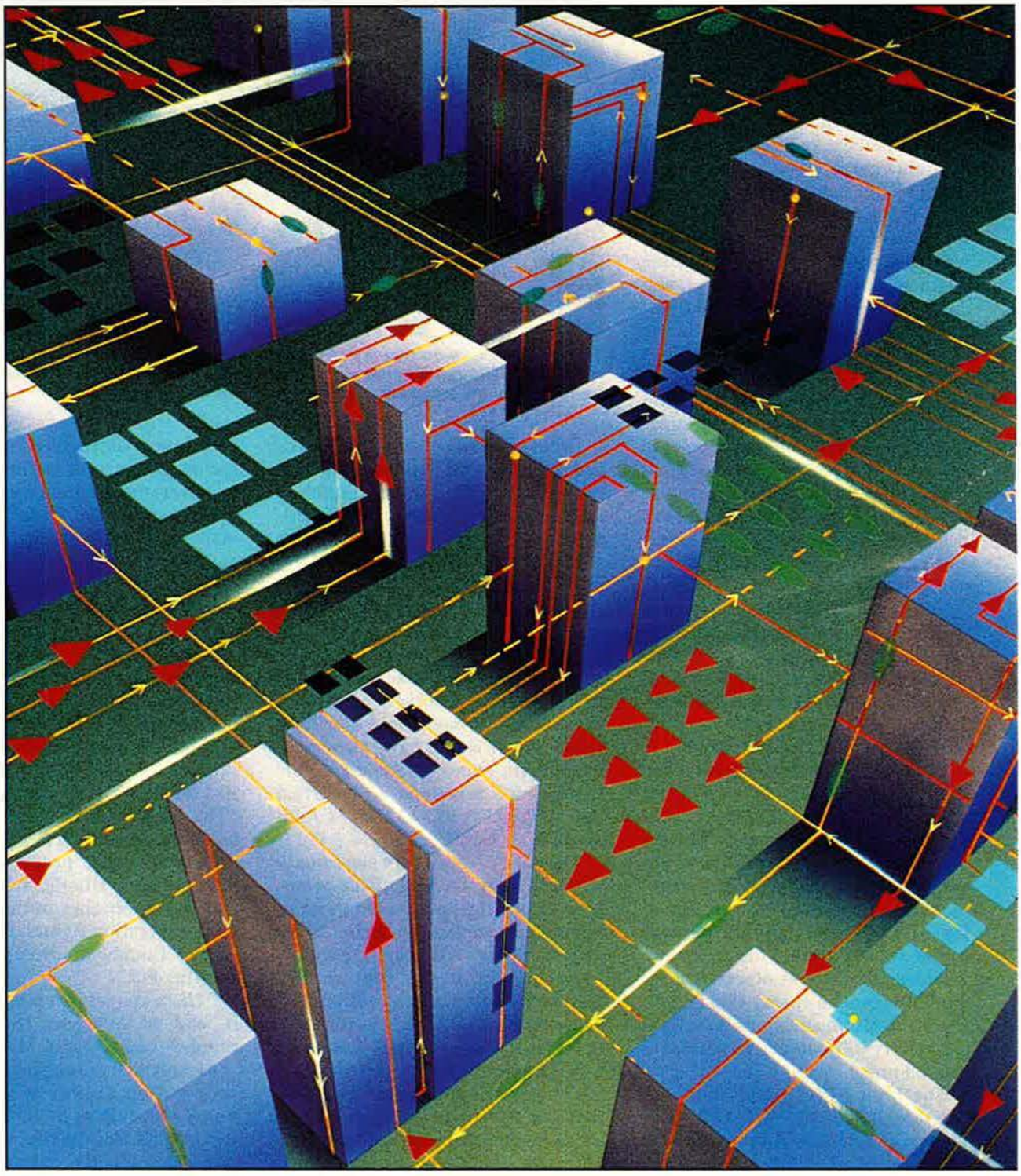
Officials say the airplane program was declassified because there was no longer any need to keep its technology secret. Of the weapon systems that drew most heavily on its advances, the B-2 bomber is now operational and in public view. The TSSAM, designed by the same Northrop team and looking so much like Tacit Blue that some called it "The Killer Whale," has been canceled. Northrop's YF-23 Advanced Tactical Fighter prototype, which shared Tacit Blue's butterfly tail and buried engine outlet, lost the next-generation fighter competition to the Lockheed (now Lockheed Martin) F-22.

"The taxpayers invested money in it, and we're trying to declassify things," said General Muellner.

Meanwhile, the original Whale has been put on display at the US Air Force Museum at Wright-Patterson AFB, Ohio. Despite the fact that only one was built, the program's semi-retired co-leader maintains that Tacit Blue still is the project he remembers most fondly.

"It was the first," says Mr. Cashen, who went on to a leading role in the B-2 stealth project. "It was pioneering work. Every day was a discovery." ■

Peter Grier, the Washington bureau chief of the Christian Science Monitor, *is a longtime defense correspondent and regular contributor to* Air Force Magazine. *His most recent article, "DarkStar and Its Friends," appeared in the July 1996 issue.*



The MIL-STD 1553 databus architecture makes sure every operating system knows what the other is doing. Just another way the "J" saves you money over its life span.

We've put a pretty amazing computer on board the new C-130J. (No, we're not just shipping it someplace.)

If the words "C-130" and "high technology" seem out of place in the same sentence, they won't for long. Because the new C-130J Hercules comes complete with an advanced mission computer using MIL-STD 1553 databus architecture.

Call it a computer, with wings.

This new technology -- which replaces 600 pounds of hard wiring -- allows the aircraft's operating systems to stay in constant communication with one another. Split-second decisions are now automated. And the computer even displays complete mission plans from a pre-programmed 2-by-3 inch card that's inserted into it.

Of course, this is just one of the many technological triumphs we've installed on the C-130J -- additions that will no doubt lead to significant cost savings over the life span of the aircraft.

We've also added twin Head Up Displays that allow the flight crew to maintain their focus outside while key instrument readings are displayed in front of them.

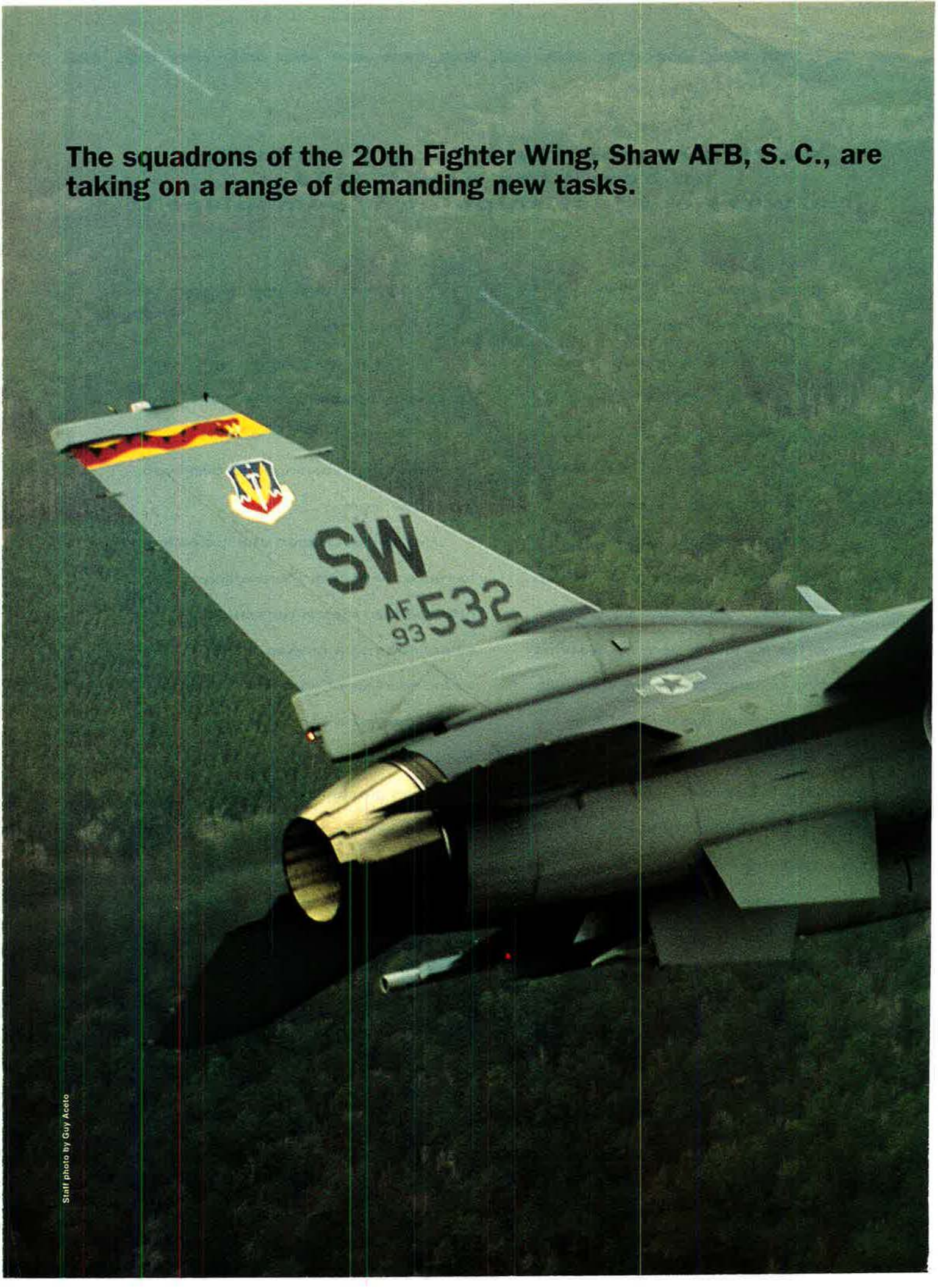
We've redesigned the propellers to make them 18% more efficient. We offer the load master remote control for safety and more precise drops. We've added twin-spool engines, allowing for higher operating temperatures, higher altitudes and a MTBF of 5,000 hours -- five times greater than before.

We've done all this for one reason only. To help you accomplish your mission. It's been our *modus operandi* since the Hercules debuted in 1955. And with this all-new, cost-efficient aircraft, it will continue to be for years to come.

LOCKHEED MARTIN

Mission Success

The squadrons of the 20th Fighter Wing, Shaw AFB, S. C., are taking on a range of demanding new tasks.



Staff photo by Guy Aceto

Multirole

Photographs by Paul Kennedy and Guy Aceto, Art Director

A Block 50 F-16C from the 78th Fighter Squadron, Shaw AFB, S. C., shows off one of its new weapons. The AGM-88 High-Speed Antiradiation Missile and the companion HARM Targeting System (HTS)—visible just under the aircraft's intake—add more lethality to this versatile aircraft's bag of tricks.

The 20th Fighter Wing's three F-16 squadrons consider the Suppression of Enemy Air Defenses (SEAD) mission their specialty. In addition, the wing's 77th, 78th, and 79th Fighter Squadrons also handle traditional air-to-air and air-to-ground missions. Lt. Col. Dave Herlong, assistant deputy operations group commander, said, "The F-16, phenomenal machine that it is, can fight its way . . . into the arena and fight its way back out and can do a lot of its own protection."

At right, three Block 50 F-16s from the 78th FS climb out of the weather, returning from a training mission.

Staff photos by Guy Aceto

The preferred weapon in hunting down antiaircraft artillery and surface-to-air missile (SAM) radars, the AGM-88 HARM was developed as a follow-on system to the AGM-45 Shrike and the AGM-78 Standard antiradiation missiles. During the Vietnam War, Soviet-built radars were capable of detecting the approach of those first-generation antiradiation weapons and often shut down before they could be hit.

Above and at right, a load crew mounts a pair of HARMs onto an F-16. A standard combat load would consist of pairs of HARMs and AIM-9 Sidewinders, along with two AIM-120 Advanced Medium-Range Air-to-Air Missiles (AMRAAMs) for self-protection. Experienced crews can load a "Viper" in short order, despite the size of the HARM—more than thirteen feet long. The 20th FW deploys often—especially to southwest Asia in support of Operation Southern Watch—so a walk down the flight line will usually find crew members honing their skills. Like these 78th FS "Bushmasters," the crews are determined to be ready when it's time to go.

Photo by Paul Kennedy

Staff photo by Guy Aceto

The Bushmasters named themselves after a poisonous snake of Central America, where the 78th FS was based in the 1930s. The unit was organized in February 1918 as the 78th Aero Squadron at Waco, Tex., training aircrews in JN-4, JN-6, and S-4 aircraft. Today, as part of the 20th FW, it performs demanding SEAD operations. The mission is divided into two distinct approaches, albeit with the same goal—to protect US flyers from the enemy's air defense network, including radar integrated AAA, SAMs, or any other ground-based threat. SEAD Alpha uses the HARM to suppress or destroy an enemy radar site. SEAD Charlie features an attack with conventional ordnance, such as general-purpose bombs, cluster munitions, or the AGM-65 Maverick.

In the mid-1980s, F-16 Fighting Falcons were paired with F-4G "Wild Weasels" in hunter-killer teams, so it has already earned a reputation for accurately putting iron on target. However, the Block 50 modifications and the HTS make the aircraft even more capable.

Photos by Paul Kennedy

Photos by Paul Kennedy

Located seven miles south of Shaw AFB, the Poinsett Range Complex provides crews with a veritable electronic jungle—the Electronic Combat Range—to test skills and new technologies needed for the SEAD mission. It also has an Air-to-Ground Gunnery Range that allows crews to practice strafing and bomb delivery. In a typical month, more than 400 aircraft use the complex. A diverse group of users includes F-16s and A/OA-10s from Pope AFB, N. C., the 169th Fighter Wing (ANG) from McEntire ANGB, S. C., and even Marine Corps F/A-18s.

The Poinsett Electronic Combat Range uses several radar systems to simulate real-world threats. Visiting aircrews can evaluate their own sensors and electronic countermeasures as operators provide realistic threat scenarios. Above (front to back), SrA. Steven Smith and A1C Jeremy Kittle, both from the 20th Operations Support Squadron, work at an AN/MST-T1(V) mini–multiple threat emitter system. At right, SrA. Eric Rippetoe and SSgt. Kenneth Glasgow work in the MUTES control cab.

With AGM-88 HARMs, AIM-9M Sidewinders, and AIM-120 AMRAAMs on its wings, this F-16 is ready for just about anything. AMRAAM adds a new dimension to the agile fighter, giving it a beyond-visual-range capability. "Instead of fighting from ten miles in—where the Viper is very good—now we have to start thinking about fighting [farther out]," said Capt. Tom Gould, an F-16 pilot with the 78th FS.

Staff photo by Guy Aceto

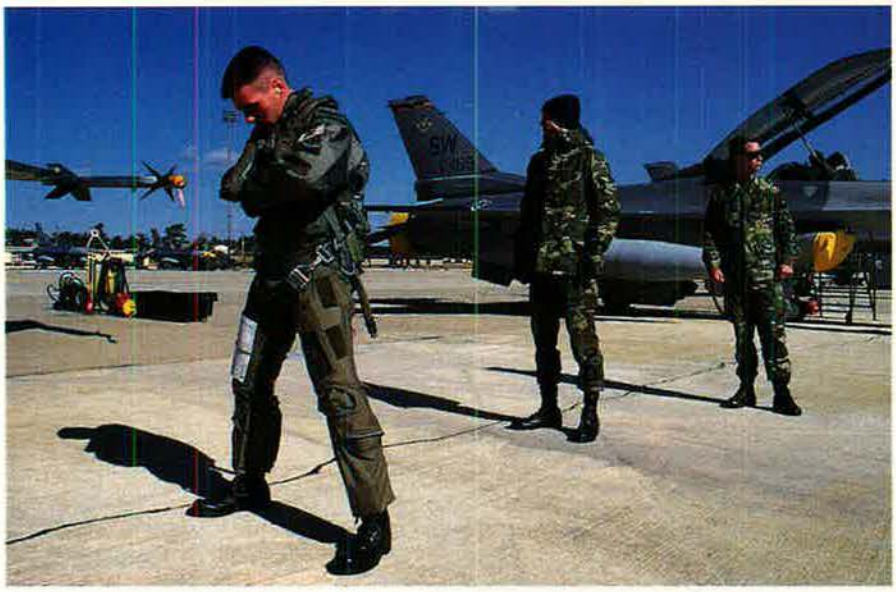
The 55th Fighter Squadron is the 20th FW's only A-10 unit. The "Warthog" is no stranger to upgrades, either: Special lighting to accommodate night vision goggles (NVGs) was added to the A-10, transforming it from a relatively low-technology fighter into a high-tech one. A few years ago, the Warthogs received the Low-Altitude Safety and Targeting Enhancement system, which improved the aircraft's accuracy in gunnery and bombing.

Above, an A-10 pilot checks his aircraft, preparing it for the unit's deployment to Kuwait in March 1996. Note the travel pods, ready to be loaded with what little luggage he'll take. At right, Maj. Randy Petyak models NVGs. Below is the A-10's main weapon, the deadly 30-mm GAU-8 Gatling gun.

This summer, the 55th FS's A-10 personnel and aircraft are moving to Pope AFB, N. C. There, they will paint the teeth of the Flying Tigers on their A-10s and form the 74th FS. Remaining at Shaw, the 55th FS was scheduled to receive Block 50 F-16Cs, giving the 20th FW its fourth F-16 squadron.

Photos by Paul Kennedy

Photos by Paul Kennedy



At left, 1st Lt. Lance Yarborough, from the 78th FS, buckles up before sliding into the cockpit (below). He already completed his walkaround, so as soon as the lieutenant is up the ladder, the ground crew will begin its well-rehearsed moves to send his F-16 on its sortie.

The 20th FW fielded the HTS pod in order to develop tactics, even as the Air Force was conducting tests on it. "To a large extent," Captain Gould said, "tactics were matured operationally and in the test field at the same time." SEAD conferences back then brought together F-16 pilots and some F-4 pilots to learn about the new system. The information passed on by the Weasel pilots was "invaluable," the Captain added. "We had plenty of people in the F-4 community help us out."

Below, Lieutenant Yarborough moves his aircraft forward a bit, preparing to taxi. A wisp of damp air is being sucked into the intake as the F-16's engine powers up.

Staff photos by Guy Aceto

F-16 pilots have certain core skills in common—air-to-air combat and dropping bombs or cluster munitions are basics for all. But the F-16s they end up flying may be very different aircraft, though the airframes look alike. The Block 40 fighter, with Low-Altitude Navigation and Targeting Infrared for Night pods, specializes in night attack with precision guided weapons, a substantially different mission from the Block 50 SEAD role or even the hunter-killer role of the Block 30 F-16 teamed with the F-4G. In explaining the difference between Blocks 30 and 50, Captain Gould said, "A Block 30 is a gunman with his eyes closed, and the guy next to him says, 'Turn left and shoot.' [Whereas] in a Block 50, I've got my eyes open, and I know exactly where to shoot."

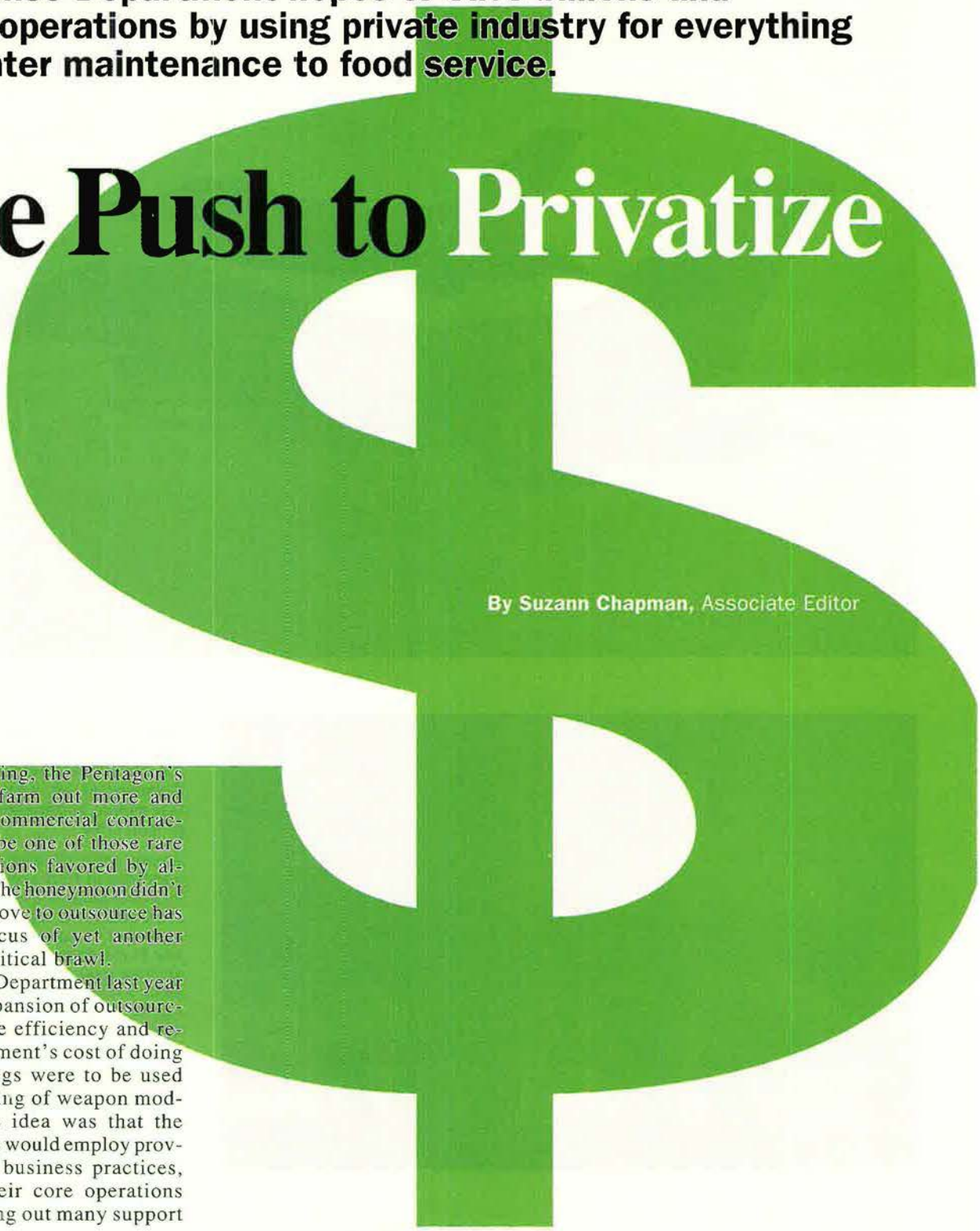
Staff photos by Guy Aceto

Above, a pair of Vipers from the 78th FS stay in tight formation on the way to the Poinsett Range Complex. At left, a pilot receives last-minute information from the ground crew.

Among other developments, upgrades in HTS and technical improvements in the RC-135 Rivet Joint electronic warfare aircraft are expected to make it possible for F-16s to increase their SAM-killing abilities even more. And while the basic F-16C airframe has given rise to variations in the fighter, leading, in turn, to units carving out different specialities, the 20th FW and its electronic combat range and new F-16 squadron could very well evolve into SEAD Central. As pilot 1st Lt. Ross Anderson said, "This will be the super-SEAD wing of the Air Force." ■

The Defense Department hopes to save billions and improve operations by using private industry for everything from fighter maintenance to food service.

The Push to Privatize



By Suzann Chapman, Associate Editor

IN THE beginning, the Pentagon's proposal to farm out more and more work to commercial contractors seemed to be one of those rare government actions favored by almost everyone. The honeymoon didn't last long. The move to outsource has become the focus of yet another Washington political brawl.

The Defense Department last year proposed an expansion of outsourcing to maximize efficiency and reduce the department's cost of doing business. Savings were to be used to beef up funding of weapon modernization. The idea was that the military services would employ proven commercial business practices, focusing on their core operations while contracting out many support functions.

Some Congressmen believe that the Pentagon has not clearly identified its core work load and in its move to privatize it runs a risk of undercutting the materiel readiness of the force. Critics are expressing deep opposition to a major element of the DoD initiative—"privatization-in-place" of Air Force mainte-

nance depots in California and Texas.

Under this plan, USAF would look for one or more contractors to take over operations at USAF's San Antonio Air Logistics Center at Kelly AFB, Tex., and Sacramento ALC at McClellan AFB, Calif., while hiring much of the current skilled work force at each location.

The critics claim that this ignores the intent of 1995 Base Realignment and Closure (BRAC) provisions, which is to raise the efficiency of USAF depot operations by shutting down two of the service's five ALCs and transferring their work to other DoD facilities. They charge that the act of preserving jobs at the two logistics centers is a ploy by the Clinton Administration to strengthen its political support in vote-rich Texas and California.

Outsourcing—the act of employing outside providers to conduct a variety of support functions—has been used increasingly over the last twenty years by both the commercial and public sectors. In the public sector, the concept of outsourcing includes "privatization"—that is, the transfer or outright sale of government assets to a private company, which then performs the support work once conducted by military or civil service employees.

The Allure

The appeal of outsourcing is that it enables a company or government agency to concentrate on "core" operations—those that are unique and truly vital to the organization. Having another organization handle important but routine tasks, such as payroll, inventory management, software maintenance, transportation, and the like, frees management to focus on improving quality, responsiveness, and efficiency while lowering costs.

In an April 4 Pentagon briefing on the subject, Deputy Defense Secretary John P. White pointed out that the US is in the midst of an outsourcing boom and that new industries have grown up to meet the increasing demand for the specialized services the boom has created. Secretary White estimated that those services would generate a total of $100 billion in sales in 1996.

The Defense Department for nearly two decades has used outsourcing and privatization to provide some support functions, in line with Congressional direction to use commercial services when that is more economical and efficient. For example, the Pentagon reports that, as a result of one Defense Logistics Agency privatization initiative, pharmaceuticals reach customers seventy-five to ninety percent faster than was the case before privatization. Moreover, the drugs are twenty-five to thirty-five percent cheaper.

Mr. White stated that, from 1978 through 1994, defense agencies overall had reduced annual operating costs by about thirty-one percent through competition, outsourcing, and privatization. This translates to savings of roughly $1.5 billion per year. (See chart, below.)

The Pentagon's recently published privatization roadmap, "Improving the Combat Edge Through Outsourcing," estimates that the Defense Department today outsources twenty-five percent of base commercial activities, twenty-eight percent of depot maintenance, ten percent of finance and accounting, seventy percent of Army aviation training, forty-five percent of surplus property disposal, and thirty-three percent of parts distribution.

USAF has been an active participant in outsourcing for a long time. The Air Force has contracted out for maintenance for the KC-10 tanker and F-117 fighter aircraft and for software on the latest B-1 and B-2 bombers. Private contractors have run the technical functions at Air Force Materiel Command's Arnold Engineering Development Center, Arnold AFB, Tenn., since its dedication in 1951.

In addition, private contractors for thirty-five years have conducted all support functions at Vance AFB, Okla., part of Air Education and Training Command. Before other AETC bases began contracting out functions, Vance produced the same number of new pilots but at an annual cost several million dollars less than the other bases spent. Many

Savings From A-76 Competitions, 1978–94

Service	Competitions Completed	Total Annual Savings (FY 1996 $ millions)	Percent Savings
Army	510	$470	27
Air Force	733	560	36
Marine Corps	39	23	34
Navy	806	411	30
DoD Agencies	50	13	28
Total	**2,138**	**$1,478**	**31**

Source: DoD

Private-sector entities won about half of these competitions, run under Office of Management and Budget Circular A-76—the federal guidance on obtaining commercial services from the private sector through head-to-head competition with the government sector. DoD said that it takes up to twenty-four months to complete simple cost comparisons and forty-eight months for complex ones and costs hundreds of thousands of dollars—providing a "strong disincentive" to outsourcing. OMB recently streamlined its cost-comparison procedures.

Newark Tests Privatization-in-Place

At Newark AFB, Ohio, a seventy-acre facility about thirty miles northeast of Columbus, private industry soon will take over the depot-level maintenance and repair activities once performed by Air Force civilian employees. This will mark the first practical application—and will be a key test—of the Pentagon's new privatization-in-place efforts.

Beginning October 1, 1996, Rockwell International will run the Aerospace Guidance and Metrology Center (AGMC) and Wyle Laboratories will operate the metrology laboratory.

As part of their packages, contractors must offer "the right of first refusal to federal employees affected by these awards," according to USAF officials. About 1,400 civilians work at the base. The Air Force has already found other government jobs for about 200 civilians and estimates that the two contractors will employ about 1,100 people.

The Newark center has performed repair and cleaning of guidance systems for ballistic missiles and navigation systems for ninety-five percent of all USAF combat aircraft and some Navy aircraft since its activation in 1962. The lab conducts precise measurement and calibration functions.

Robert D. Paster, president of Rockwell's Autonetics and Missile Systems Division, said, "We clearly understand that the defense readiness of virtually every weapon system in the Air Force inventory is dependent on the success of this program." He added that Rockwell plans "to utilize the highly skilled AGMC work force already in place."

Rockwell has more than forty years of experience in production and repair of guidance systems, according to a company news release, and has "developed more than ninety percent of the hardware, test equipment, and procedures currently in use at AGMC."

AETC bases now contract out aircraft maintenance and other functions. Contractors also operate most Air Force bases overseas.

Col. Michael A. Collings, chief of the Air Force's new outsourcing office, stated that USAF is the outsourcing leader within DoD. He told an Air Force Association symposium audience in May that the Air Force savings from outsourcing and privatization over the past twenty years range from ten percent to forty percent. Those savings netted nearly $600 million per year.

According to Colonel Collings, the Air Force is reviewing all USAF manpower slots to determine if they are inherently governmental or militarily essential. He thinks that some of those manpower slots will change and specifically mentioned current legislative policies that do not permit outsourcing such functions as firefighting and some security.

Bills Coming Due

Defense Department officials emphasize the need to do more outsourcing to help pay the hefty modernization bill that will be coming due during the next decade.

Secretary White, testifying before the House National Security Committee's Military Readiness Subcommittee in April, said that the Defense Department must gain additional savings from support activities to complement projected savings from BRAC actions and the Pentagon's ongoing acquisition reform measures. Those savings will enable the services to maintain readiness and increase funding for modernization, he said.

To emphasize that any savings would directly benefit modernization, Mr. White told the subcommittee, "I signed a memorandum on February 26, 1996, stating that the DoD components will not have their outyear budgets reduced as a result of the savings they create through their initiatives and that these savings should be dedicated to modernization."

Pentagon officials estimate that they need to commit about $60 billion per year over a decade to fund planned modernization, up from about $40 billion proposed for Fiscal 1997. One source of additional revenue: base closings. DoD projects that, when the totals are in, the four rounds of BRAC actions will save about $6 billion per year, all of which would be plowed back into modernization accounts. The department expects current acquisition reform measures to produce another $13 billion in savings.

Pentagon officials have repeatedly stated that force-structure cuts have far exceeded cuts in infrastructure and that the four BRAC rounds have targeted only about twenty-one percent of infrastructure for closure. Based on those numbers, one might expect that additional infrastructure reductions via outsourcing and privatization initiatives would generate solid support, but that has not been the case.

At issue are the privatization-in-place efforts under way at Kelly and McClellan, at a time when documented excess capacity exists in the remaining defense depots.

In July 1995, when he accepted the BRAC commission's decision to close two of the Air Force's five maintenance depots, President Clinton announced that the service would privatize-in-place most of the two depots' operations. The Administration estimated it could save about fifty percent of the jobs at Sacramento ALC and approximately two-thirds of the jobs at San Antonio ALC.

Not surprisingly, lawmakers from California and Texas urged support for the plan.

The Depot Caucus

Critics of the Administration plan include members of the Congressional Depot Caucus, featuring lawmakers whose districts include USAF Air Logistics Centers in Utah, Oklahoma, and Georgia, and a labor union representing government workers at those three depots. They recommend transferring work done at McClellan and Kelly to Warner Robins ALC at Robins AFB, Ga., Oklahoma City ALC at Tinker AFB, Okla., and Ogden ALC at Hill AFB, Utah. The union has filed suit against the President to prevent privatization-in-place at Kelly and McClellan.

One caucus member, Rep. James V. Hansen (R-Utah), took Air Force Secretary Sheila E. Widnall to task at a March hearing of the House National Security Committee. Mr. Hansen questioned the legality of the Administration's move to keep the work going at Kelly and McClellan, citing the views of two BRAC commissioners who agreed with him. He claimed that privatizing-in-place amounts to refusing to

close the facilities as the commission ordered.

In response, Secretary Widnall contended that the Air Force would carry out the BRAC requirement and that "those bases will be closed." She added, "I mean, 'closed' has a meaning. They will be closed." She explained that the act of closing a base involves deciding how to transfer assets to the community for reuse and stimulation of commercial development.

"We have unique assets at those depots," said the Secretary, "so we are anxious to turn those over in a form where they can be useful for the commercial sector."

At a Senate hearing in April, Sen. James M. Inhofe (R-Okla.) questioned Secretary White on the same issue. Mr. White submitted a letter signed by the BRAC commission chairman, former Sen. Alan J. Dixon (D-Ill.), for the record. The July 8, 1995, letter stated that the commission authorized for Kelly and McClellan "the transfer of any work load, other than the common used ground communication electronics work load, to any other DoD depot or to any private-sector commercial activity, local or otherwise, including privatization-in-place."

Senator Inhofe responded that the commission vote was six to two, not unanimous.

At the same hearing, but expressing the opposite viewpoint, was Sen. Kay Bailey Hutchison (R-Tex.). She prodded Gen. Henry Viccellio, Jr., AFMC commander, to explain why he thinks it would be risky to move the Air Force's depot work—and Texas jobs—from Kelly to another government depot. He said that, based on his experience with other closures, a readiness risk would arise with the inevitable break in production, which could be anywhere from four to fourteen months.

Mr. White and General Viccellio also responded to a claim that the remaining three ALCs all have excess capacity and could efficiently absorb more work. They pointed out that, under the Defense Department plan, the Air Force's remaining three depots would actually gain work from the closure of Kelly and McClellan. The General testified that some work—such as materiel management, core work, and some specified by law—will remain organic and transfer to Air Force depots.

"If you ask me to prognosticate where we're headed," said General Viccellio, "I would guess . . . we'll see somewhere between 5,000 and 7,000 workers' worth of work moved to the remaining depots, which is part of the reason I feel [the depots will] grow."

Down 25,000

Air Force officials point out that excess capacity at the depots is a function of facility and equipment capacity, rather than the size of the work force. The service has reduced its depot work force by 25,000 over the past few years.

According to General Viccellio, private companies have already announced their interest in not only performing some depot work but in using some of that excess capacity at the depots in Georgia, Oklahoma, and Utah.

Members of the Congressional Depot Caucus also took exception to DoD's intention to increase the amount of private competition for depot work, emphasizing what they saw as the potential risk to readiness of handing off even more maintenance work to private contractors. They opposed proposed changes in legislation, particularly the so-called sixty-forty rule and the $3 million rule.

With enactment of Section 2466, Title 10 of the US Code, Congress established a requirement that at least sixty percent of the Defense Department's depot work will be performed by federal employees, meaning that a maximum of forty percent remains for private industry. Section 2469 of the same title requires that the government hold competition between the private and public sectors before the Pentagon can transfer any depot work load of more than $3 million to the private sector.

In its outsourcing plan, the Defense Department stated that the sixty-forty rule limits its "ability to manage depot maintenance in an efficient and cost-effective manner." DoD also stated that it favored permitting its depots to compete only when private-sector competition was inadequate.

Many in Congress object to these Defense Department views, and they worry that the military is farming out too much of its key work. In introducing the outsourcing plan, Mr. White emphasized that the Pentagon and the individual services were still in the midst of identifying core work loads and reviewing potential candidates for outsourcing. He further stated in Congressional testimony that the "bottom line, obviously, is national security—the readiness and capability of our forces."

"We are not talking about wholesale outsourcing," he added. "We are talking about measured changes where we've been able to evaluate what the opportunities are, what the cost-savings are, [and] what the benefits to us are in terms of our core competencies, in terms of the technological change that we need, and in terms of the flexibility that we need."

General Viccellio also addressed the issue in testimony. He said, "There are those who feel additional involvement by the commercial sector in defense depot activity puts America's security at risk. I don't agree.

"[The rule of] sixty-forty and its assurance of predominant organic capacity may have served us well in a bygone era of large forces, the threat of global conflict, and push sustainment requirements, but in an era focused on responsive support and day-to-day readiness, it stands as an impediment to sound business management and inhibits initiatives that could keep today's smaller forces modern and ready."

General Viccellio emphasized that the armed forces support "outsourcing appropriate additional depot activities," adding, "When I say 'appropriate,' I mean to do so after a risk-and-readiness analysis and in those instances when doing so represents the best value to the Air Force."

Congress is not ready to forgo the sixty-forty rule entirely. The latest indication is that it may change to fifty-fifty.

The San Antonio *Express-News* quoted Air Force Chief of Staff Gen. Ronald R. Fogleman as saying that the compromise was important, but it was not the final answer.

"I see fifty-fifty as a necessary first step," he said. "We have to look beyond fifty-fifty and demonstrate the value we can get from outsourcing work loads." ■

The VA Secretary says that any move to cut benefits would be a "cruel trick" on those who served the nation.

On Watch With Jesse Brown

By David Masci

"VETERANS are the most deserving members of our society," said Jesse Brown, the Secretary of Veterans Affairs. He smiled as he said it, but he was not trying to be funny. He was signaling that, for him, the point wasn't open to debate.

"Look, veterans are the only Americans who have actually paid for the benefits they received," he went on. "They did not get these benefits because they were lucky enough to be born here."

Secretary Brown, in the midst of his fourth year as leader of the Department of Veterans Affairs, is a true believer when it comes to paying off the nation's debt to men and women who have served in the United States armed forces. His passion stems from a simple conviction: You deserve to be first in line for the benefits when you pay for them with your blood.

He has firsthand experience. In 1965, as a young Marine in Vietnam, Secretary Brown suffered serious wounds in combat. His injury left his right arm partially paralyzed. Since that time, he has devoted his professional life to work as an advocate for veterans. He spent more than twenty-five years as one of the top leaders of the Disabled American Veterans. He served as executive director from 1989 to 1993.

Now Secretary Brown runs the federal government's second-largest agency (only the Department of Defense is bigger), with a responsibility for serving the needs of the nation's roughly twenty-six million veterans. The VA provides veterans six major services—compensation and pensions, education and training, home-loan assistance, insurance, medical care, and medical research.

It is an immense job, one that Secretary Brown said will only grow in the coming years.

Double Hit

In a recent interview, the Secretary said two factors are converging to put the squeeze on the department. On the one hand, he said, the decreasing size of the veteran population and escalating budget pressures will surely lead many in Washington to try to cut the Department of Veterans Affairs or even dismantle it. On the other hand, the aging of the overall veterans community will bring new and expanded tasks.

The need for the VA is greater than ever, he asserted. He explained that, in the decade 1993 to 2002, the size of the veteran community will decrease by twelve percent, while overall demand for VA services will increase by approximately fifteen percent. For the latter estimate, he referred to projections showing that the agency will be called on to provide services for more chronically ill veterans from the huge World War II cohort.

Secretary Brown argued that, in the current circumstances, any attempt to shrink the VA or to reduce veterans benefits would be nothing less than "a cruel trick" on those who left the military with the expectation that the government would, to

Casualties

Wartime Dead and Wounded, 1775–1991

War	Battle Deaths	Other Deaths	Wounds Not Mortal	Known Casualties
Revolutionary War 1775–83	4,435	unknown	6,188	10,623
War of 1812 1812–15	2,260	unknown	4,505	6,765
Mexican War 1846–48	1,733	11,550	4,152	17,435
Civil War 1861–66	214,938	283,394	281,881	780,213
Spanish-American War 1898	385	2,061	1,662	4,108
World War I 1917–18	53,513	63,195	204,002	320,710
World War II 1941–45	292,131	115,185	670,846	1,078,162
Korean War 1950–53	33,651	unknown	103,284	136,935
Vietnam War 1964–73	47,369	10,799	153,303	211,471
Persian Gulf War 1991	148	145	467	760
Total Known Casualties 1775–1991	**650,563**	**486,329**	**1,430,290**	**2,567,182**

quote the agency's creed, "care for him who shall have borne the battle and for his widow and his orphan."

Even so, Secretary Brown said he knows that the VA, in order to survive and prosper, must make profound changes in the way it does business, especially in its health-care system.

The VA health-care operation is vast. Secretary Brown oversees the nation's largest medical system, a network of 171 hospitals, 126 nursing homes, and more than 350 outpatient clinics that provide care to an estimated 2.7 million veterans per year. This is the largest single function the VA performs, and health-care operations comprise about ninety percent of the agency's staff and roughly half of its budget, or about $18 billion a year.

Critics charge, with ample justification, that the VA system is frequently unresponsive and rigid, governed by rules that seem outmoded and overly bureaucratic. Secretary Brown said he wants to change this. His major goal is to make the VA's health-care system more flexible so that it can respond to veterans more efficiently.

Needed: New Rules

In order to do this, he said, today's eligibility rules must be altered to permit a more comprehensive approach to treatment.

Currently, the VA can treat an eligible veteran for a service-connected condition and for life-threatening ailments not related to military service. The irony of this situation can be illustrated with a simple example. If, during the fitting of a new prosthetic limb, the VA physician discovers that the veteran has diabetes or hypertension, the agency cannot by law give the patient ongoing care in most cases. "But," Secretary Brown said, "if [the veteran] walks out of the hospital and has a stroke or ends up with a massive infection as a result of the diabetes, we can bring him back into the hospital and give him everything he needs."

This, claimed Secretary Brown, is ridiculous.

"It's wasteful and antiquated, and it's not good medicine," he said. "We need a system that looks at [patients] . . . from the 'entire-person' perspective," meaning that, if veterans are sick, the VA should be allowed "to do everything to make them well, whether it's inpatient care, outpatient care, or whatever."

In other words, Secretary Brown wants the agency's doctors to be able to treat the veteran with hypertension or diabetes on an outpatient basis and thus avoid having to hospitalize that person when the condition becomes life-threatening.

To accomplish this, however, the VA must shift emphasis from inpatient treatment to caring for veterans on an outpatient basis. "With the advancements made in modern medicine, eighty percent of the problems people have today can be resolved on an outpatient basis," said Secretary Brown.

In addition, the agency must convince Congress to loosen eligibility rules that prevent it from treating less serious conditions.

The Secretary also wants to open up the VA health-care system to more people. "When I got out of the service thirty years or so ago, a veteran with an honorable discharge who was sick could get treatment from a VA hospital," said Secretary Brown. He then noted that the situation is very different today. Only about ten million veterans—about thirty-eight per-

The Long Echoes of American Wars

War	Last Veteran	Died	Age
Revolutionary War (1775–83)	Daniel F. Bakeman	Apr. 5, 1869	109
War of 1812 (1812–15)	Hiram Cronk	May 13, 1905	105
Mexican War (1846–48)	Owen Thomas Edgar	Sept. 3, 1929	98
Civil War, North (1861–65)	Albert Woolson	Aug. 2, 1956	109
Civil War, South (1861–65)	John Salling	Mar. 16, 1958	1·2
Indian Wars (1817–98)	Fredrak Fraske	June 18, 1973	101
Spanish-American War (1898–1902)	Nathan E. Cook	Sept. 10, 1992	106

cent of the total—are eligible for some sort of free VA care under existing law.

Secretary Brown knows that his agency will not go back to the days when it covered the health care of every veteran, but he does think it is practical to have a larger pool of potential patients in the future. The VA is experimenting with treating military retirees and their dependents who are eligible for the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS).

Down at the Heels

These steps all begin with the assumption that more people will want to use the VA health-care system, which, at present, is not a safe assumption.

When it comes to evaluations of its basic medical programs, the VA has numerous critics. Many say that the entire system and physical facilities are so run down and mismanaged that the VA offers woefully inadequate care compared to most private-sector hospitals. Some critics even maintain that it should be broken up and replaced with a voucher system, which would permit eligible veterans to receive care at private hospitals.

Secretary Brown scoffed at this last suggestion. He asserted that the private sector will only be interested in those VA patients who can pay from private funds when their voucher financing has been exhausted.

For instance, he said, private-sector hospitals will not want the many psychiatric and chronically disabled patients currently being cared for by the VA. "These are long-term patients who are very expensive and . . . are a lifetime commitment because there is no cure."

In addition, Secretary Brown argued, it makes no sense to judge the operations of Veterans Affairs by comparing it to the private sector, because his department "has more oversight than any other entity in this country," be it from Congress, the press, or the veterans service organizations. The Secretary contends that he welcomes the scrutiny, but he pointed out that such action leaves many of the VA's warts exposed.

He suggested that the VA acquired a negative reputation unfairly and that "we have to bring our record to the American people."

Secretary Brown said he is concerned about the image of the veteran in American society.

The Secretary said that, because far fewer young people serve in the armed forces today than during the draft era of the 1940s to the 1960s, he is concerned that most people won't feel any connection to the nation's veterans.

"The farther and farther we get away from national emergencies and wars," he said, "the more people tend to forget the contributions made by our citizen-soldiers."

As a result, he warned, the nation's politicians and the public may not care if Washington acts to curtail or eliminate programs that have helped millions of veterans through the years. This year, the Clinton Administration proposed a $39.3 billion VA budget for Fiscal 1997. The top line represents an increase of about $1 billion over the Fiscal 1996 spending plan.

Veterans by Service Branch

Service	Number	Percent of Total
Army	13,518,168	51.6
Navy	6,130,332	23.4
Air Force	4,060,690	15.5
Marine Corps	2,122,038	8.1
Coast Guard	366,772	1.4
Total	**26,198,000**	

Photo by Paul Kennedy

The outspoken Secretary of Veterans Affairs gave a well-received address at AFA's 1995 National Convention. Here, he is being welcomed by AFA Chairman of the Board James McCoy (left) and National President Gene Smith (right).

Photo by Paul Kennedy

Secretary Brown sees the need for profound changes in his department and is pushing for "entire-person" treatment, even if it means an increased emphasis on outpatient care. He terms the present system "wasteful and antiquated."

Status of Vets

Today, the status of veterans in the US is, in the words of the Secretary, "good." For instance, according to the VA, the median veteran income in 1994 was $24,708, compared with $21,941 for nonveterans over the age of nineteen. Veterans are also less likely to be unemployed and more likely to have some college education than their nonveteran counterparts.

Secretary Brown attributed these positive aspects to such government programs as the GI Bill, which has helped to educate and train more than 20.7 million veterans since Congress founded it in 1944. He credits the bill with helping to create the great US domestic economic expansion that followed World War II.

"If you look at the history of this nation," said the Secretary, "you'll see that when you invest in the people, you get the greatest return."

According to the Bureau of Labor Statistics, an agency of the Department of Labor, about ten percent of Vietnam-era veterans had a service-connected disability and about half of these veterans had participated in a special education or training program. Disabled veterans were more likely than nondisabled veterans to have participated. By far, the most popular benefit was the GI Bill, which was used by nearly everyone who had used any of the programs.

However, Secretary Brown warned that programs like the GI Bill and its successors are constantly under attack in Congress, where they are targets of budget-cutters.

"We sit back and we put billions into the defense budget to prepare our men and women to go to war," he said, but "when they come back home, we want to nickel and dime them to death looking for ways to cut here and cut there."

Secretary Brown explained that he is particularly troubled by past efforts to impose a "means test" to determine whether "so-called affluent veterans" qualify for participation in the VA's disability, pension, and other benefits.

One idea recently put forth by some members of Congress would have scaled back payments to veterans who annually earned $40,000 or more. According to Secretary Brown, if such a proposal were enacted, a veteran who lost his arms and legs but had managed to overcome adversity and become prosperous would be penalized for his success.

"It's absurd," he said, adding that it was the veteran's carrying out of his duty to his country that led to such injuries and that the nation must honor its responsibility to that veteran under all circumstances.

Secretary Brown has had a hand in adding a few responsibilities to the federal government's list. In the most recent major example, the VA extended new benefits to Vietnam veterans afflicted with prostate cancer and a type of neurological disorder that may be the result of exposure to the chemical defoliant Agent Orange.

Under the new guidelines, Vietnam veterans suffering from such ailments will now be entitled to disability payments, though they will not be compelled to prove a link between their service in Vietnam and their maladies. He also stated that the VA will propose new legislation to aid children of Vietnam veterans who suffer from the congenital defect spina bifida, said to be related to exposure of a parent to Agent Orange.

Agent Orange was a herbicide—containing dioxin—used in Vietnam to defoliate trees and remove cover. The VA said 2.6 million veterans potentially were exposed.

Benefit of the Doubt

The link between Agent Orange and some medical disorders has never been clear. Secretary Brown indicated that the VA decisions gave the veterans the benefit of the doubt. "The evidence, pro and con, is quite evenly balanced regarding these conditions," he said, "but the President and I firmly believe that the VA needs to be on the side of veterans and their children."

As of April, the VA had received 75,084 claims from Vietnam veterans or their survivors seeking disability compensation and death benefits related to Agent Orange.

Secretary Brown said that, in such cases, the government has an obligation to do the right thing without regard to cost.

"First of all, I think that it is important for everyone to understand that, from our perspective, from a philosophical perspective, we looked at the dollar amount last," said Secretary Brown. "We believe very strongly [that] when people are placed at risk as a result of serving in the armed forces and something happens to them, there is an inherent obligation assumed by our society as a whole." ■

David Masci, a reporter in Washington, D. C., covers veterans affairs for Congressional Quarterly. *His most recent article for* Air Force *Magazine, "Fixing the Mess in Veterans Benefits," appeared in the April 1996 issue.*

Everything from housing and services to personnel assignment policies reflects the fact that most military people today are married.

The Family and the Force

By Bruce D. Callander

AMERICAN lifestyles have changed over the decades, and, as a result, both the demographics and the personnel policies of the armed forces have shifted dramatically.

The makeup of today's Air Force illustrates this transformation. Almost two-thirds of all enlisted members are married. In the officer corps, the ratio continues to be somewhat higher, but it is dropping gradually, having fallen from eighty-three percent in 1976 to seventy-six percent in 1996. Across all officer and enlisted ranks, the divorce rate has doubled over those two decades, rising from less than three percent to almost six percent.

The gender mix also has changed. In the 1980s, the number of women in the Air Force totaled about 61,000. Today, the number has risen slightly—to 63,000—but, as the size of the force has dropped, the percentage of women in the force has leaped from about eleven percent to about sixteen percent.

Many women now serving are married, and substantial numbers of them are married to other USAF members. The Air Force still allows such couples to serve together where it has vacancies, but, in a smaller force, finding assignments for both spouses is proving to be more difficult. For USAF women married to civilians, no "join spouse" provisions exist and reassignment of either husband or wife can force difficult career choices.

The two-income family, once the exception in the armed services, now is the rule. At last report, almost sixty percent of officers' spouses and more than three-quarters of enlisted members' spouses worked outside the home or were actively looking for jobs. There also has been an increase in the number of single parents, both male and female.

The Air Force long ago gave up trying to bar married applicants from enlisting and requiring lower-

ranking members to get permission to marry. However, some restrictions continue. Since the 1980s, for example, USAF has refused to permit reenlistment of persons in grades of E-3 or below if they are married to civilians and have two or more family members incapable of self-care. Pregnancy alone no longer is grounds for separation.

The aim of these policies is to keep Air Force individuals from getting into financial difficulties. With pay still fairly modest and quarters allowances no longer based on family size, the addition of dependents can be a burden, particularly in the lower grades. Large families are less common than they were in earlier generations, with the average Air Force household now reporting only two children. Even so, most families find that they need two incomes to make ends meet.

One result has been a dramatic increase in the need for child-care facilities. The Air Force now maintains 161 child-care centers and another 3,200 day-care homes, private residences where the owners are trained and licensed to care for youngsters.

Air Force officials say the service has an aggressive program to build additional facilities, but they add that funding is tight. They estimate that the Air Force needs some 36,000 more child-care spaces to meet future needs. They hope that, by Fiscal 2001, they will have met at least sixty percent of the requirement but, as in the private sector, the demand continues to outpace the supply.

World's Largest System

The Defense Department's child-care program is by far the largest in the world. More than sixty-five percent of military spouses are in the labor force, resulting in a huge need for child care. In a recent study, DoD learned that in military families, nearly 299,000 children under age thirteen need some kind of child care.

Today, DoD provides 155,391 child-care spaces at 346 locations. The Pentagon also is conducting two evaluations regarding outsourcing child care, recognizing that the department is nearing its maximum ability to meet child-care needs on base.

Another new aspect of Air Force life is the vast array of counseling and guidance available. Family Services offers a variety of financial planning, parenting, and domestic counseling services. Such on-base resources have long been available, but their scope and the range of family problems they address have widened dramatically.

The Air Force maintains 161 child-care centers and another 3,200 day-care homes, but experts predict that USAF will need some 36,000 more child-care spaces to meet future needs.

Financial worries are nothing new to military families, of course. Although service pay has risen sharply in the past twenty-five years, so has inflation. Even based on a forty-hour work week, a rarity in the military, basic pay for recruits barely matches the minimum wage, and starting pay for lieutenants with college degrees is less than $25,000 per year.

Housing costs also remain a concern for USAF members, even for those families with two incomes. At some bases, the drawdown has eased matters a little, because fewer members are competing for the same amount of on-base housing, but this is not the case throughout the force. A number of bases have shut down completely and had their units moved to other locations, which has increased rather than decreased the housing demand at the remaining bases.

At present, only about 96,000 Air Force families live on base. Some 223,000 live in civilian communities. Of those who live off base, almost forty percent own their own homes. The combination of USAF efforts to reduce permanent change of station moves and the emergence of an improved housing market apparently has convinced many that buying is a practical option and often a good investment.

Buying or renting still claims a significant part of a family's budget. In recent years, the services have won some improvements in Basic Allowance for Quarters (BAQ) and in special payments for high-cost areas and special circumstances.

With-dependents BAQ rates range from $346 for recruits and $469 for new lieutenants to $631 for top NCOs

and $874 for colonels. These can be supplemented by a variable housing allowance (VHA) and a cost-of-living allowance for those in high-cost US areas.

Still, officials say, quarters money remains barely adequate. Congress's stated intention has been that sixty-five percent of housing costs would be covered by BAQ, twenty percent by VHA, and only fifteen percent by basic pay. Despite the recent increases, officials say, the members' out-of-pocket contribution has remained higher than that—about nineteen percent—and further adjustments are needed.

Families can receive additional allowances to help cover costs when members are away from home because of assignments.

Stress of Deployment

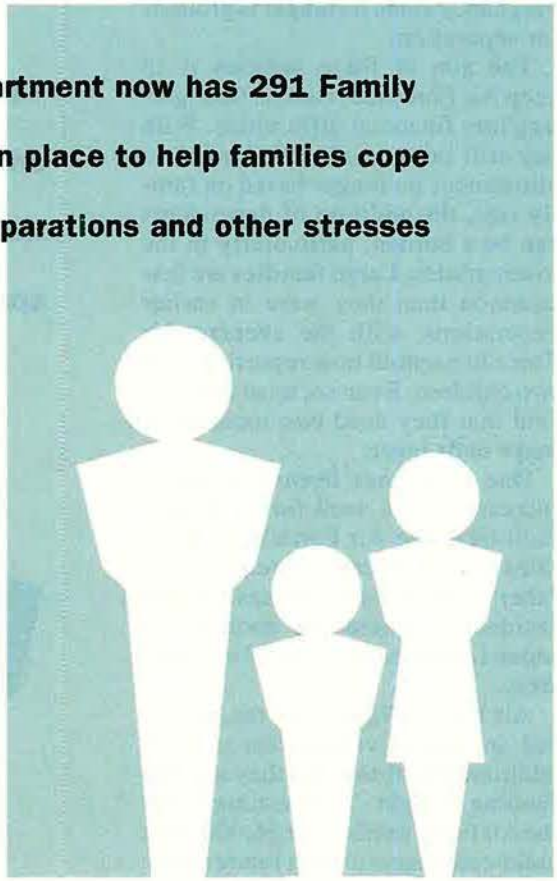
However, money alone does not ease all the problems of such separations. With the end of the Cold War and the cut in overseas forces, unaccompanied tours are rarer. Only about 3,500 permanent overseas billets now are in areas where dependents are not allowed. In recent years, however, the Air Force has been called on increasingly to respond to humanitarian and contingency missions that take members away from their families.

Relatively small forces are involved in most cases, but, since 1989, the number of members deployed on these operations has more than quadrupled. At last count, some 14,500 members (about five percent of the force) were away from home for such reasons on any given day. Most are on TDY for no more than thirty days per year, but members in a few key specialties may be deployed for up to 120 days per year and sometimes longer.

Separations long have been a difficult fact of service life. Today, day care and added parenting problems make separations even more exacting.

Time was when wives' clubs and close friends provided informal assistance during these periods of deployment. Today, the help offered by Family Support Centers is more organized and extensive. The Defense Department's 291 family centers are the focal point of basic social services and support networks for the military community. Bases now provide predeployment briefings, organize spouse networks, and help with everything from financial management to car repairs. They can coordinate the resources of chapels, medical facilities, youth groups, and counselors, if the situation warrants. They can provide something as simple as a video camera, so family members can tape messages to each other.

The Defense Department now has 291 Family Support Centers in place to help families cope with prolonged separations and other stresses of military life.



The centers operate a major relocation program, providing information and assistance to the more than one-third of the force that relocates each year. Many of these members and families are facing their first move and do not know how to plan and carry it out without significant stress and unnecessary costs.

Centers also provide programs not offered elsewhere on the installations. These range from counseling and transition assistance to programs for family members with special emotional, physical, or educational needs.

Bases also provide families with the more traditional fringe benefits and relatively low-cost recreation opportunities.

Clubs and Stores

During the drawdown, base stores, clubs, and other facilities received less government support, increasingly paying their own way. Despite the belt-tightening, officials say, on-base facilities still contribute substantially to the overall benefits package. A full-course family meal at a club may no longer cost less than a round of hamburgers in town, but surveys show that more than half of all club members think the same or better value is offered at clubs than at similar off-base facilities.

Air Force market comparisons also indicate that base stores still offer bargains. The latest surveys showed that customers save 23.4 percent at commissaries and twenty percent at exchanges when the two are compared with civilian stores. *[See "Tar-*

geting the Commissaries," December 1995, p. 46.]

Sales figures indicate that most families continue to shop on base for at least some items. For example, 2.6 million active-duty members and dependents shopped in Army and Air Force Exchange Service (AAFES) facilities in 1994. The number of Guard and Reserve customers (2.9 million) and retirees (3.6 million) increased in that year. Overall, nine million customers from both services spent more than $7.1 billion in the stores in 1994.

AAFES continues to plow the bulk of its profits into morale, welfare, and recreation activities and keeps only enough profit to improve existing facilities and build new ones. In 1994, its dividend to USAF MWR activities was $67 million, an increase of seventy-five percent over the contribution ten years earlier.

Military family health care has been transformed over the past several decades. Dependents have wider choices of care providers and depend less on base facilities alone. At the same time, however, they must expect to pay more for such care. With the rapid rise in medical costs, service families now pay premiums and copayments for much of their care.

Still, the military medical system remains one of the major perks of life in the service. It also has an advantage most civilian workers wish they had: The coverage goes with the member no matter where he or she is based and even, at least in theory, into retirement.

Service families are likely to look to local communities for some needs, however. Gone is the "stockade mentality," when the base provided not only most of a family's social life but everything else from quartermaster packing services to on-base elementary schools.

With most members now living off base and most of their spouses working, today's service family more often blends into the local community. Children attend in-town schools, parents join local clubs, and families generally become involved with the civilian community. The Air Force does not keep records of member involvement with volunteer organizations, but bases do encourage it, and many base families are active in everything from youth baseball to school and charitable organizations.

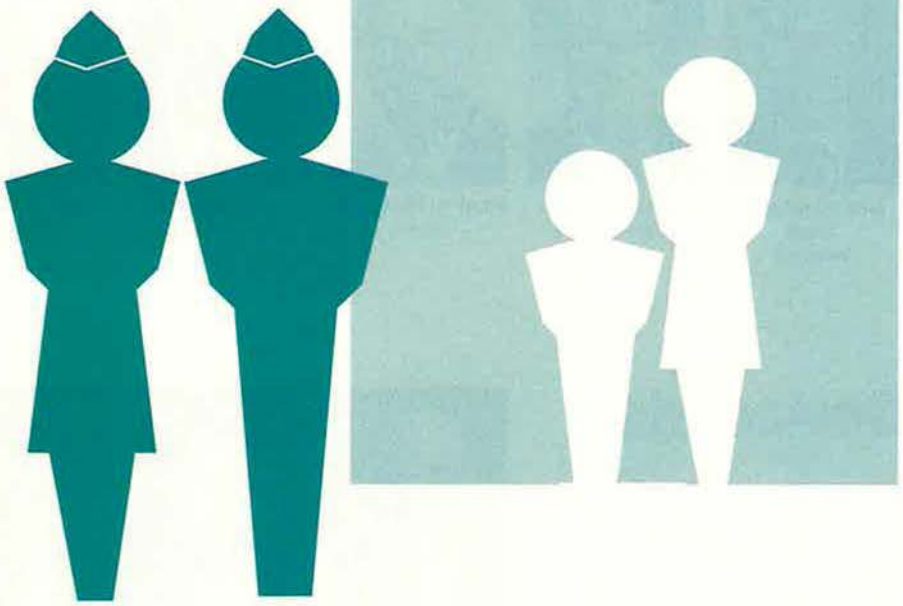
Still Distinctive

Even with this breakdown of base-town barriers, however, service life remains distinctive—especially for children. USAF is only too aware of this. Today, bases provide a variety of recreational and educational activities and special services to help youngsters make a successful transition from one location to another. Every organization, from the base chapel to Family Services, has on-base and outreach programs to help youngsters cope.

Several recent books have examined the upbringing of service "brats" and have had unflattering things to say about the military's impact on children later in life. Recently, the Department of Defense began a study to see if significant differences between military and civilian adolescents do exist. The results are due this fall. So far, officials say, they have found no evidence that youngsters who live on base or whose parents are affiliated with the military have more or fewer behavioral problems than their peers from nonmilitary households.

The DoD study may conclude otherwise, but USAF parents appear to agree with this early assessment. In a recent survey, well over half of the members responding said that the Air Force is a good place to bring up kids. Only about sixteen percent expressed dissatisfaction. ■

Today, Air Force bases provide a variety of recreational and educational activities to help youngsters make a successful transition from one location to another.



Bruce D. Callander, a regular contributor to Air Force *Magazine, served tours of active duty during World War II and the Korean War. In 1952, he joined* Air Force Times, *serving as editor from 1972 to 1986. His most recent article for* Air Force *Magazine, "Eight Decades Over Hollywood," appeared in the July 1996 issue.*

Congressional Veterans' Affairs Establishment

An *Air Force* Magazine Directory (Members arranged by seniority in committee)

Senate Committee on Veterans' Affairs

Republicans

Alan K. Simpson
Chair
Wyoming

Strom Thurmond
South Carolina

Frank H. Murkowski
Alaska

Arlen Specter
Pennsylvania

James M. Jeffords
Vermont

Ben Nighthorse Campbell
Colorado

Larry E. Craig
Idaho

Democrats

John D. Rockefeller IV
Ranking Minority Member
West Virginia

Bob Graham
Florida

Daniel K. Akaka
Hawaii

Paul D. Wellstone
Minnesota

Patty Murray
Washington

House Committee on Veterans' Affairs

Republicans

Bob Stump
Chair
Arizona

Christopher H. Smith
New Jersey

Michael Bilirakis
Florida

Floyd D. Spence
South Carolina

Tim Hutchinson
Arkansas

Terry Everett
Alabama

Steve Buyer
Indiana

House Committee on Veterans' Affairs, Republicans

Jack Quinn
New York

Spencer Bachus
Alabama

Cliff B. Stearns
Florida

Bob Ney
Ohio

Jon D. Fox
Pennsylvania

Michael P. Flanagan
Illinois

Bob Barr
Georgia

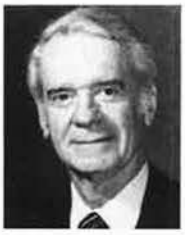
Jerry C. Weller
Illinois

J. D. Hayworth
Arizona

Wes Cooley
Oregon

Dan Schaefer
Colorado

Democrats



G. V. "Sonny" Montgomery
Ranking Minority Member
Mississippi

Lane Evans
Illinois

Joseph P. Kennedy II
Massachusetts

Chet Edwards
Texas

Bob Clement
Tennessee

Bob Filner
California

Frank Tejeda
Texas

Luis V. Gutierrez
Illinois

Scotty Baesler
Kentucky

Sanford D. Bishop, Jr.
Georgia

James E. Clyburn
South Carolina

Corrine Brown
Florida

Mike Doyle
Pennsylvania

Frank R. Mascara
Pennsylvania

The undamaged target surrounded by craters is already becoming a thing of the past.

One Target, One Weapon

Paul G. Kaminski is the Clinton Administration's under secretary of defense for Acquisition and Technology. On May 2, he delivered the Ira C. Eaker Distinguished Lecture on National Defense Policy at the US Air Force Academy, Colorado Springs, Colo. Here are excerpts from Dr. Kaminski's address.

Dramatic Transformation

"America's armed forces are going through a dramatic transformation—everything from objectives and strategy to weapons and force structure to doctrine and tactics. The world is changing, and just like the larger civilian society that we protect and serve, so, too, must we adapt to the changes driven by the information revolution.

"At the time I was born, the country had one overriding national security objective: to win the Big War. We did that. In 1964 [the year Dr. Kaminski entered the Air Force Academy], our objective was to deter a bigger war. We have done that, too. Now our objective is to deter smaller wars and the use of weapons of mass destruction, the so-called NBC weapons—nuclear, biological, and chemical."

Mean Value and Variance

"In the post–Cold War world, the United States no longer faces a single galvanizing threat, such as the former Soviet Union. Instead, there is increased likelihood of our forces being committed to limited regional military actions—coalition operations—in which allies are important partners. . . .

"I would sum up our current national security environment in statistical terms by saying that the mean value of our single greatest threat is considerably reduced. But the irony of the situation is that the variance of the collective threat that we must deal with and plan for, and must counter, is up.

"This gives us some pause in trying to plan intelligently. In response to reduced mean value of the threat, the United States has cut end strength by about a third from 1985 levels. But at the same time, the increase in variance has caused deployments of US forces to go up by a third. In the defense acquisition and technology program, this means we are focusing on fielding superior operational capability and reducing weapon system life-cycle costs."

Better Than the Storm

"We are succeeding in this effort by exploiting the opportunities made possible by the information revolution. As impressive as our military accomplishments were against Saddam Hussein, our forces are qualitatively superior today. The NATO combat operation in Bosnia [-Hercegovina]—Operation Deliberate Force—showed that and gave us a hint of what combat will look like in the twenty-first century.

"In [Operation] Desert Storm, only two percent of all weapons expended during the air war were precision guided munitions, or PGMs. In Bosnia, they accounted for over ninety percent of all ordnance expended by US forces during Operation Deliberate Force."

"One Target, One Weapon"

"The bomb-damage assessment photographs in Bosnia bear no resemblance to photos of the past, where the target, often undamaged, is surrounded by craters. The photos from Bosnia usually showed one crater where the target used to be, with virtually no collateral damage.

"We are moving closer to a situation known as 'one target, one weapon.' It was actually more than one—but less than two—weapons per target in Operation Deliberate Force. This has been the promise for the past twenty years. Now it is becoming a reality.

"Our weapons focus now is to preserve accuracy while reducing cost, increasing standoff range, and providing all-weather capability. These are the major imperatives behind our development of systems like the all-weather Joint Direct Attack Munition, the Joint Standoff Weapon, and the Joint Air-to-Surface Standoff Missile."

World Chessboard

"A chess analogy is useful for explaining what this means for the changing nature of warfare. Today, precision weapons have made it possible to take any piece on any square of the chessboard with no collateral damage to adjacent squares. Given this one target, one weapon capability, commanders now need to know where all one's forces are and where all the targets are on a 100 by 200

kilometer battlefield. This is analogous to seeing all the pieces on the chessboard—something we take for granted when playing chess.

"Imagine how fast you would win the game if you could see all the pieces on the board, but your opponent could see only his major pieces plus a few of your pawns. This is what it means to have 'dominant battlefield awareness.' "

Joint STARS

"A number of new systems are helping us see all the pieces—[E-8 Joint Surveillance and Target Attack Radar System] and unmanned aerial vehicles like the Predator, for example. . . .

"We've used these capabilities to great advantage in Bosnia. For example, Joint STARS has flown fifty-one missions in Bosnia, covering a total area of 747 million square kilometers, or about seventy-five times the land area of the United States. On a typical mission, Joint STARS spends an average of eight and a half hours on station, fills up the sixty [gigabytes, or billions of bytes] of mass storage on board, and acquires 100 radar images at three-meter resolution. There have been thirty-eight million total detections and 26,000 total revisits. Over the fifty-one missions, 6,950 radar service requests were met."

Dominant Cycle Time

"To secure an overwhelming advantage, commanders will need [command, control, and communications] and planning tools to achieve something I call 'dominant battle cycle time'—or the ability to act before an adversary can react. Back to the chess analogy, dominant battle cycle time would be, well, gaining an unfair advantage by breaking the rules. It means to keep moving your pieces without giving your opponent a chance to move his. To do this on the battlefield, one must have superb command-and-control systems, like Joint STARS, fast transportation, and highly mobile maneuver forces.

"To support [NATO's implementation force] in Bosnia, I recently approved spending about $80 million on an information-communications initiative to be sure we have superb command, control, and communications systems for Operation Joint Endeavor. The impetus for this initiative came from a 1994 Defense Science Board summer study co-chaired by [Gen. James P. McCarthy, USAF (Ret.)]. This initiative is improving our communications capabilities in two ways: first, by using commercial TV satellite technology to provide a direct-broadcast communications capability; second, by fielding a wide bandwidth, secure tactical Internet connection through fiber and commercial satellite transponders."

Where's the Remote?

"These communications allow war planners and logisticians on the ground in Bosnia, in the European Command headquarters in Germany, and back in the Pentagon to have access to the same data at the same time. This access is available to virtually anyone with a twenty-inch receive antenna, cryptologic equipment, and authentication codes. We've designed the system in such a way that we are giving local commanders a 5,000-mile remote control to select the programming that they receive over their . . . downlinks from direct-broadcast satellites.

"There are many striking aspects to this Bosnia [information-communications] initiative. First, we're pushing hard to get the most advanced information capabilities to our forces, and we are succeeding. We've accomplished in four months what it normally takes ten years to do for a new system. Second, we are demonstrating our willingness to use—even to lease—commercial systems. And third, we are proving the need to possess system engineering and system integration skills."

Going Off-Board

"If I compare . . . today's major Air Force acquisition programs with those that existed thirty years ago, I am led to the conclusion that we are now paying much more attention than we have in the past to enhancing the performance of our combat platforms with off-board information. In 1966, our focus was on the combat platforms—ships, tanks, and planes. The weapons, more often than not, were inertially guided. Today, we have clearly shifted our emphasis toward working with system-of-systems architectures involving sensor, communication, and command-and-control systems."

Commercial Brilliance

"In 1966, I had been working on the seeker for the Maverick missile, when TV videotape recorders were invented. The Maverick, being a TV-guided bomb, benefitted greatly from this commercial development because we were able to preserve television images from flight tests for subsequent analysis and evaluation.

"In this way, commercial TV videotape recorders helped improve the Maverick missile—one of our first precision guided munitions. It came about because of commercial sector investment in R&D [research and development]. It is also an early example of . . . a dual-use technology . . . that is, a technology that has both commercial and military applications.

"In aggregate terms, commercial industry surpassed DoD in R&D spending back in 1965. The disparity between defense and commercial sector investment in R&D has been growing wider ever since. This difference means that this nation's technological momentum is driven to a greater extent by commercial market forces."

No Defense Industrial Base

"Today's global economy allows everyone, including our potential adversaries, to gain increasing access to the same commercial technology base. To the extent that commercial technology can enhance military capability, the military advantage will go to the nation that has the best cycle time to capture technologies that are commercially available, incorporate them in weapon systems, and field new operational capabilities first.

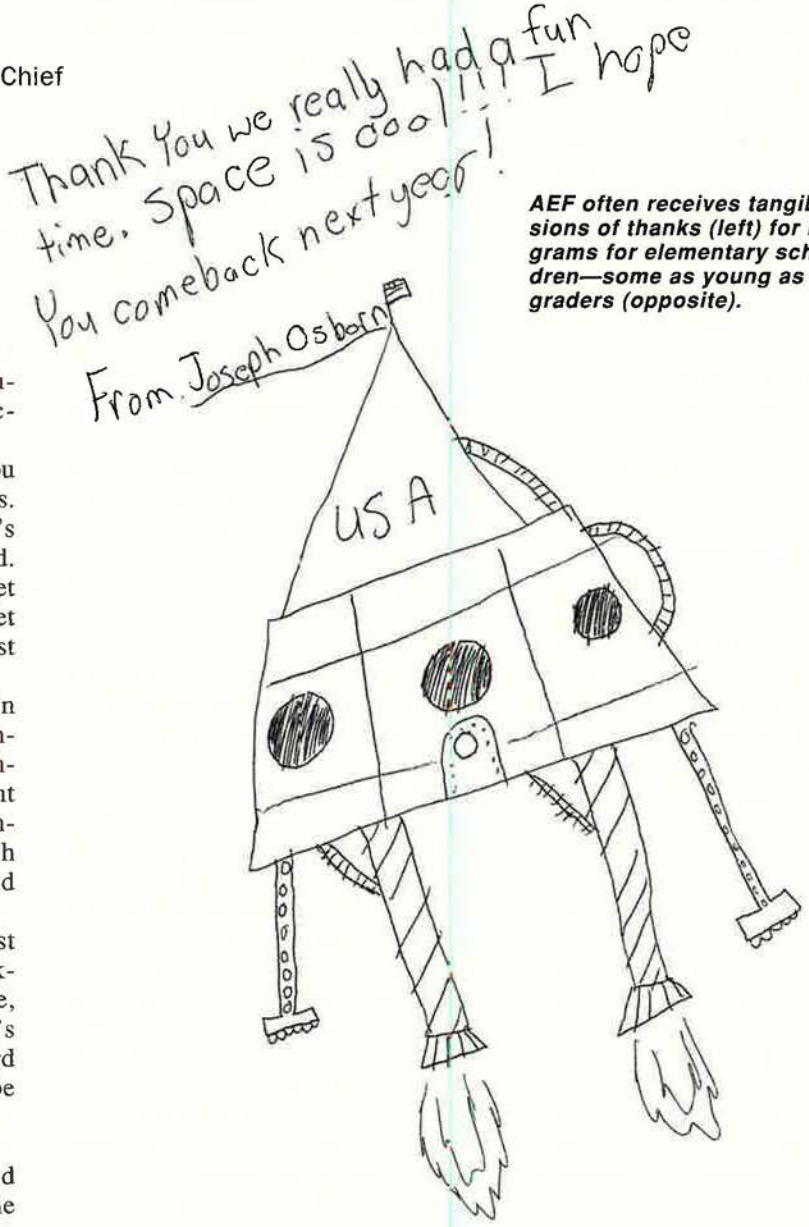
"In this environment, we have no choice but to move from separate industrial sectors for defense and commercial products to an integrated national industrial base. Leveraging commercial technological advances to create military advantage is critical to ensuring that our equipment remains affordable and the most advanced in the world. . . .

"We are surrounded by change. The world is moving fast, information is moving fast, information technologies are moving fast. Just as mass production–based manufacturing replaced agriculture in the nineteenth century, the information age promises to reward the best integrator of knowledge, men, and machines in the twenty-first century." ■

The Aerospace Education Foundation has shifted gears. Its main attention is now directed at local teachers and schools.

The Foundation and the Schools

By John T. Correll, Editor in Chief



AEF often receives tangible expressions of thanks (left) for its programs for elementary school children—some as young as these third graders (opposite).

THE report to the Aerospace Education Foundation was succinct:

"Thank you for the grant that you gave all eighteen of us for our rockets. We went to Don Bowers's grandfather's farm. We set off our rockets in a field. They all went off OK. We did not get hurt with the rockets. I have never set off rockets before, so this is the best rocket I have ever seen."

That was from Jenny, a student in the fifth grade at Glenwood Elementary School in Enid, Okla. Her teacher, Wayne Wagner, used a $250 grant from the Aerospace Education Foundation to buy model rockets, which his students then assembled and launched.

It was a good day all round. Most of the students recovered their rockets. Casey said that "If I get a chance, I will launch mine again." Josh's rocket, however, drifted off toward the Trogens' farm and could not be found.

Erica caught a fish in the pond.

The entire class sent illustrated thank-you notes. Summing up the appreciation to AEF, Megan wrote, "Without you, we would not have done this."

Photo by Paul Kennedy

Each week's mail brings more testimonials from teachers, principals, parents, and students on the difference that AEF programs are making in local schools.

"Let me give you an idea of what teachers are doing with these funds," says AEF President Thomas J. McKee. "Several used the funds to take field trips. There were three or four to NASA facilities; several to Air Force bases; a half-dozen went to local airports; and a number visited technology, space, and aviation museums. Frequently, the funds were actually used to pay for buses that the local school systems couldn't pay for. Hundreds of students had the chance to build and fly model rockets.

"One teacher designed a program for her fourth-grade students that [begins] by examining the owl, how it flies, and how it is adapted as a bird of prey. She then moves her students into studying airplanes and how they fly. Our grant purchased the videos and textbooks she needed to support the program."

Local Focus

The Air Force Association Foundation, later AEF, was formally established as an affiliate of the Air Force Association in 1956. Until recently, its best-known achievement was "Project Utah," undertaken in the 1960s in cooperation with the US Office of Education. It demonstrated the feasibility of using Air Force technical training courses in the Utah public schools and was, later on, a significant element in securing accreditation for the Community College of the Air Force.

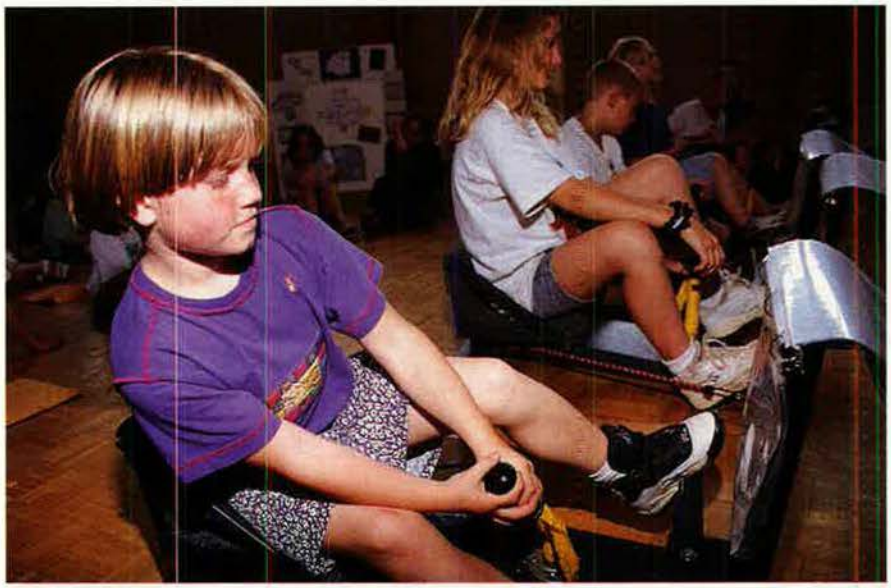
In 1989, AEF began awarding scholarships in appreciable numbers. Since then, AEF has given almost 1,500 scholarships and study grants to Community College of the Air Force graduates, outstanding graduates of AFROTC, and others. Over the years, AEF has worked with the AFA staff and *Air Force* Magazine to publish a number of important works, including several reports on the defense industrial base and a 1992 book, *Airpower in the Gulf.*

In years past, AEF was almost completely dependent on the Air Force Association for financial support. A large AFA endowment and continuing contributions from AFA and its field organizations are still important, but the foundation now raises about half of its own funding donations, generated by such premiums as an AEF calendar and personalized address labels sent to individuals on a mailing list.

The excitement that the Aerospace Education Foundation is generating is the result of redefinition and revitalization that began two years ago. After a critical self-examination, AEF set new priorities and adopted "National Vision, Local Focus" as a major operating principle. "Basically, what this means is that AEF's first focus is on meeting the needs of its number one customer—the Air Force Association—and doing so by directing its resources toward meeting AFA educational needs at the chapter level," says Walter E. Scott, the foundation's Chairman of the Board. Today, seventy-five percent of AEF's expenditures are at the local level.

Nothing showcases the new look of AEF better than four activities targeted at public school classrooms: chapter matching grants, direct grants to educators, "Visions of Exploration"—a joint venture of AEF and *USA Today* newspaper—and teacher-recognition programs.

Photo by Paul Kennedy



AEF sponsors several programs, some more hands-on than others. One teacher gives AEF credit for the fact that, after her class's participation in the "Visions" program, she now has "future pilots, engineers, and scientists" in her class.

Chapter Matching Grants

The foundation will match, up to $1,000, expenditures by Air Force Association chapters on innovative aerospace education efforts. It made fourteen such grants in 1995 and figures to increase that number substantially this year.

One such grant went to the Hawaii Chapter, which sponsors a two-week aerospace education summer workshop to prepare at least fifty elementary school teachers a year to incorporate aerospace concepts into the curricula for grades four through six. It familiarizes teachers with the many and varied aerospace resources in Hawaii and lets them meet people in the community who can help them with aerospace education.

The program includes classroom instruction, guest speakers, field trips, orientation flights, and other activities. The workshops are supervised by a volunteer, Dr. Phillip R. Brieske, vice president for Aerospace Education of the Hawaii Chapter and a retired professor of physics. In 1995, Dr. Brieske received AEF's Sam E. Keith, Jr., Award, given for the outstanding contribution of the year to aerospace education.

Another AEF matching grant went to the Colorado Springs/Lance Sijan Chapter in Colorado Springs, Colo., which sponsored teachers to attend the US Space Foundation's Space Discovery course at the US Air Force Academy. This is a professional development program in which teachers "get comfortable teaching with space." According to chapter officials, it "shows teachers how to incorporate space and aviation concepts into all areas of the curriculum and to stimulate student interest and achievement."

The General B. A. Schriever Los Angeles Chapter in El Segundo, Calif., used its matching grant to sponsor an essay-writing competition for memorials along the "Space Walk" in San Pedro, Calif. Each year, the Space Walk honors four people or events in the history of space evolution. Students compete by writing essays on topics selected for memorializing on plaques lining the wall by the walk.

Direct Grants to Educators

In a program that caught fire immediately upon its inception in 1995, AEF awards grants of up to $250 directly to teachers for an aerospace-related activity or to assist in math and science instruction in the classroom. Last year, there were 119 of these direct grants altogether. In the first five months of 1996, however, 148 had already been awarded.

"While $250 might not sound like a lot of money, it makes more of a difference than you might think," says AEF Managing Director Phillip E. Lacombe. Teachers use these grants to pay for trips, books, videotapes, and other materials not in the school budget.

Spanish Fort School in Spanish Fort, Ala., used its $250 grant to help put on "Space Week" in March 1996. It began on Monday, with teachers appearing in astronaut training uniforms. Each morning, students in grades from kindergarten on up got a "space question of the day." Correct answers went into a box, from which winners were drawn to receive NASA patches and space pencils. The school cafeteria served Saturn Sausage, Galactic Green Beans, and Jupiter Jell-O with Flying Fruit. Throughout the week, students learned about space and space exploration in the classrooms.

"With our grant money, we purchased the materials to build a wonderful space shuttle," wrote Harriett Brunson, the teacher who had sent the application to AEF. "Parents worked together to build this model of a shuttle. A class of about thirty students could fit inside the shuttle. It was assembled in our gym using PVC pipes and a heavy black plastic. A commercial artist used fluorescent paint to paint a control panel across the front. A beautiful picture of a space shuttle was painted on one side, while planets and an orbiter were painted on the other. . . . A large-screen television was used inside the shuttle to show a video purchased from NASA, entitled 'The Dream Is Alive.' "

AEF received a huge notebook with 140 thank-you cards and notes from Spanish Fort, some of them signed by a dozen students or more. Ryan, a second grader: "Thank you for giving us money for Space Week. That is my favorite subject." A neatly lettered note from Ethan in the first grade said, "Thank you for the space grant. I liked it a lot. I hope it comes again."

Lori Nazareno, a science teacher from Miami, Fla., used her AEF grant to take students on a tour of the Kennedy Space Center. Many of the children attending her school live at or below the poverty level. "As a result, they only rarely are afforded the opportunity to get out of town and see the many things the world has to offer. Being a school of technology, we thought it quite appropriate to visit Kennedy Space Center and, perhaps, attempt to inspire our students to achieve greater things and gain exposure to the aerospace field. The students absorbed a tremendous amount of information and had a wonderful time while they did it."

Francis X. Cantwell, a retired Air Force lieutenant colonel and a teacher at Cardozo Senior High School in Washington, D. C., used an AEF grant for activities that included a tour of Andrews AFB in the Maryland suburbs.

"He found that the school had a transportation center where students could learn about careers in the transportation industry—buses, trains, taxis—but not a shred of information about aviation, the Air Force, or aerospace," says AEF President McKee. "With our grant, he is working to change that."

Mr. Cantwell adds that, "I have promised students who attain an A in one of my classes, or who have perfect attendance in my homeroom, a flight in a light aircraft. Many of my students have difficult home lives and need real-life, hard-core purposes to come to school and study. I am hoping that taking some of them flying and teaching them about flying will be reason enough for them to come to school."

Photos by Paul Kennedy

AEF does not neglect secondary school education. These students from Randolph-Macon Academy, Va., will each receive a copy of* Air Force *Magazine's "Space Almanac," courtesy of an AEF program.

Field trips to such educational landmarks as the Kennedy Space Center in Florida are natural targets for AEF grants. As one teacher put it, students can absorb "a tremendous amount of information and [have] a wonderful time."

Air Force Junior ROTC and Civil Air Patrol instructor grants are new developments in the foundation's program for schools. They work the same way the direct educator grants do except that they are reserved for AFJROTC and CAP instructors. The grants are for aerospace educational programs in the classroom or the cadet program and cannot be used for uniforms, drill teams, color guards, or honor guard activity.

Among the first schools to receive one of the new grants was Randolph-Macon Academy in Front Royal, Va. Randolph-Macon is the only coeducational boarding school in the nation with an AFJROTC program. As such, it receives special support from AFA's Northern Shenandoah Valley (Va.) Chapter, which has undertaken a project to establish a permanent endowment to provide scholarships to outstanding JROTC cadets from the area. The AEF grant will provide Randolph-Macon cadets individual copies of *Air Force* Magazine's "Space Almanac."

Visions of Exploration

In 1991, the Aerospace Education Foundation entered into a partnership with *USA Today* newspaper to provide public school students with materials to develop their interests in issues of the twenty-first century, using space as a motivating theme. The program is called "Visions of Exploration." Last year, it covered 2,031 classrooms and reached more than 60,000 fourth, fifth, and sixth graders.

Materials include subscriptions to *USA Today* and a teacher's lesson guide keyed to articles in the newspaper that stimulate interest in math and science. Students keep an "Explorer's Journal," a colorful twenty-four-page activity book in which they record their own ideas, thoughts, and discoveries. Surveys of teachers find that eighty-eight percent of them believe the "Visions" program does enhance interest and performance in math and science and that it also helps students develop their thinking skills.

AEF matches local AFA chapter sponsorship of "Visions" classrooms, dollar for dollar. Among the chapters participating most vigorously are the General E. W. Rawlings Chapter in Minneapolis, Minn., which sponsors 121 classrooms; the Langley (Va.) Chapter with sixty-seven class-

Elementary schools can use AEF matching grants to help sponsor a Space Week, which could include the building of a model space shuttle or contests and competitions designed to stimulate interest in space.

rooms; the Fort Worth (Tex.) Chapter with fifty-six; and the Dallas (Tex.) Chapter with forty.

Teacher Brenda Standley of Alexander Attendance Center in Mississippi says that her "Visions" students were pleased to see math and science employed in the real world. They formerly saw these subjects as boring, "but not anymore." Nancy Beutler-Abbey from Santa Barbara Elementary in Oregon writes that the very fact that AEF and *USA Today* provide the materials is impressive to her students. "Look who is interested in you," she tells them. As a result, she says, "I now have several future pilots, engineers, and scientists."

The program sometimes leads to interest not only in science, math, and space but also in aviation and the Air Force. "Because of the foundation laid by Visions, we've had pilots invited to speak at schools," says Managing Director Lacombe.

Teacher Recognition Programs

AEF's premier recognition program for educators is the Christa McAuliffe Award. (Ms. McAuliffe was to be the first teacher in space. She died on the ill-fated *Challenger* mission in 1986. Six months previously, she had been a featured speaker at an AEF roundtable program on space.)

The award has been presented every September since 1986. Competition is high. The winner is announced with fanfare during the AFA National Convention in Washington, D. C., and receives $1,000 from AEF.

The McAuliffe Award in 1995 went to Barbara Walters-Phillips, who teaches math, science, and social studies at Glenridge Middle School in Winter Park, Fla. Among her programs are "Aviation Invasion," which teaches girls about flying; "The Young Eagles," which organizes airplane rides for students; and "Expanding Your Horizons," which stimulates interest by girls in math and science careers.

To allow recognition of more educators, the foundation introduced the Regional Teacher of the Year awards in 1995. Recipients chosen by AFA regions receive $500 checks from the Foundation and AFA "Teacher of the Year" jackets.

The most recent recognition program is for local teachers of the year. So far in 1996, nine AFA chapters have made such awards.

The Clearinghouse

As news of the AEF program spreads among teachers and school administrators, the foundation often finds itself fielding questions and acting as a clearinghouse on aerospace education matters. Each week, the foundation mails out dozens of packets of informational material, including products from NASA, the FAA, and others.

Furthermore, AEF has begun to seek out other organizations with an interest in aerospace education to establish working relationships and is organizing a get-acquainted meeting of such groups later this year at AFA headquarters in Arlington, Va.

Among the large organizations attending will be the 4-H Club, which has a program of some size to encourage and help prepare young people for careers in aerospace. 4-H plans to devote one issue of its newsletter—which reaches thousands of 4-H volunteers and every extension agent in every county in the United States—to AFA and AEF aerospace education efforts. ■

Photo by Paul Kennedy

Students at Cardozo Senior High School in Washington, D. C., used an AEF grant for a field trip to Andrews AFB, Md., opening their eyes to Air Force, aviation, and aerospace career opportunities.

Valor

By John L. Frisbee, Contributing Editor

Double Feature

Crossbow, the bombing campaign against German V-1 and V-2 weapon sites, included some unique events.

BY EARLY June 1944, the Battle of Britain had long been won. Luftwaffe bombing attacks on the island, no longer a major threat, were replaced by a rain of V-1 buzz bombs—pilotless aircraft that carried one-ton bombs, their inaccuracy limiting them to area targets. The first buzz-bomb attack came on June 13, 1944. It was no surprise to Allied intelligence, which had been keeping a close watch on launch-site construction in northern France. The Army Air Forces had lost seventy-nine aircraft in sorties against the sites before the first V-1 was launched. They were not easy targets.

Some 2,000 V-1s were launched against the UK, primarily the London area, by the end of June. Loss of life and property damage were extensive. Estimates vary widely, some as high as 6,000 killed, 17,000 injured, and more than a million left homeless. This use of unmanned weapons marked a new phase of warfare, against which there was no good active defense. British Prime Minister Winston Churchill persuaded Gen. Dwight D. Eisenhower to give the launching sites top priority, with fifty percent of Allied heavy bomber and many tactical air missions targeted against them in Operation Crossbow.

On July 8, 1944, the 398th Bomb Group, based at Nuthampstead, Hertfordshire, UK, and other 1st Air Division groups were dispatched against V-1 targets. It looked like an easy mission—good weather, no fighter opposition anticipated, and flak expected to be light. The group was led by Capt. Tracy Petersen, flying with Capt. Hal Lamb and his crew. Deputy lead was Capt. Kearier Berry. Some surprises lay ahead.

All went well as the formation crossed the English channel and made landfall. Then, as they left the initial point and approached their target, things began to turn sour. The formation was hit by a heavy barrage of accurate flak, concentrated on the three B-17 Flying Fortresses in the lead element. Oil poured from the two damaged engines of Captain Petersen's aircraft; the deputy lead completely lost two engines, suffered other major damage, and had to drop out of the formation. The number three B-17 disappeared.

Captain Petersen elected to continue the bomb run, getting what little power he could from the damaged engines that momentarily would run out of oil to feather the props. With great difficulty, the formation held together, if only raggedly.

After bombs away, the lead aircraft took more hits, losing a third engine. With two windmilling props that could not be feathered and one that could be, Petersen's B-17 headed back across the cold waters of the channel, steadily losing altitude. The crew members threw out everything not bolted down, hoping to make the Royal Canadian Air Force strip at Manston, the closest friendly base. Air-Sea Rescue was informed they might have to ditch. As they approached the English coast, it was clear they were several hundred feet too low to clear the bluffs that stood between them and Manston. Ditching was out because of heavy surf. They would have to belly-in on the beach.

Here, another unforeseen problem arose: The beach was full of concrete posts—tank traps that had been erected when a German invasion seemed likely. The crew had already weathered a left turn into the two dead engines—not a prescription for long life. Now what? Lifting first one wing then the other to avoid the posts, they finally saw a clear stretch of beach ahead of them. Hal Lamb and Tracy Petersen made a gentle wheels-up landing after a masterful job of flying.

As the jubilant crew poured out of the B-17, observers near the beach shouted to them that they were between two mine fields and should not move until a guide could lead them to safety. Thanks to crew teamwork and a bit of luck, they had survived another brush with disaster. A 398th Bomb Group aircraft soon picked them up at Manston, uninjured, except for the radio operator, who had been slightly wounded by flak. Not your average July day.

Later, they learned that Captain Berry's crew had been forced to bail out over the channel. The last to leave the aircraft, Berry hit the water in sight of a rock formation along the British coast, a destination he reached after an exhausting three-hour swim. Moments after he emerged from the water, he heard an aircraft approaching. It was a fighter, blinking lights along the leading edge of its wing, headed directly for him. Its machine guns fired at him. Berry headed back into the water. Belatedly, the Spitfire pilot recognized that he had been firing at a human target. He called Air-Sea Rescue, which retrieved Berry from his hot spot, which turned out to be a gunnery range.

The rest of his crew also survived the bailout. All other 398th Bomb Group B-17s made it back to the UK that day, some with battle damage.

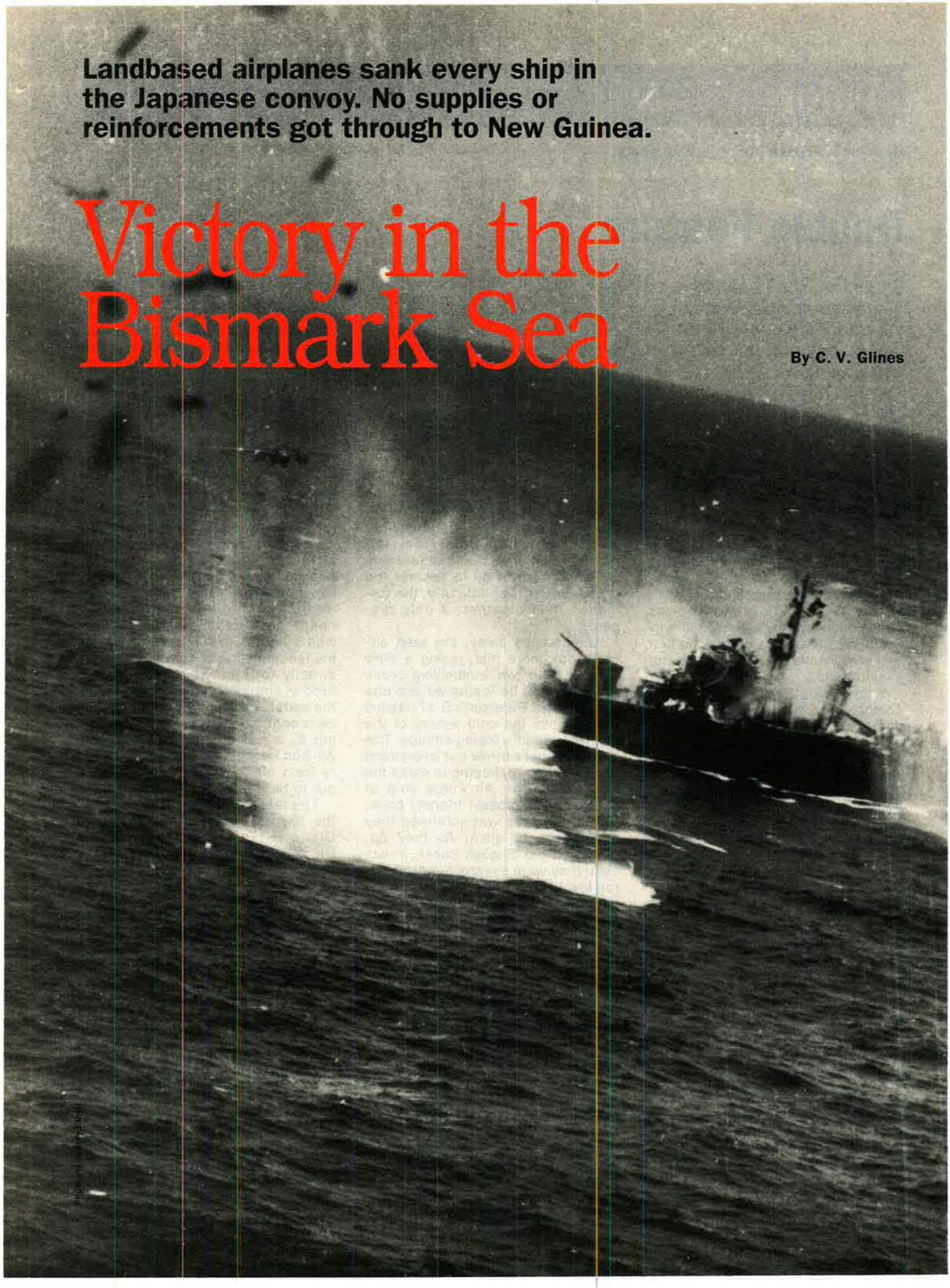
Although Crossbow has had relatively little attention in the postwar years, it was a major Allied bombing campaign. Nazi Germany hoped the V-1 and V-2 attacks would stem the tide of war that was running against them. They did not, thanks to hundreds of Allied heavy and medium strikes on launching, storage, and production facilities. The hazards of the mission flown by the Petersen-Lamb and Berry crews on July 8, 1944, were typical of that campaign, but not all missions had such welcome endings. ■

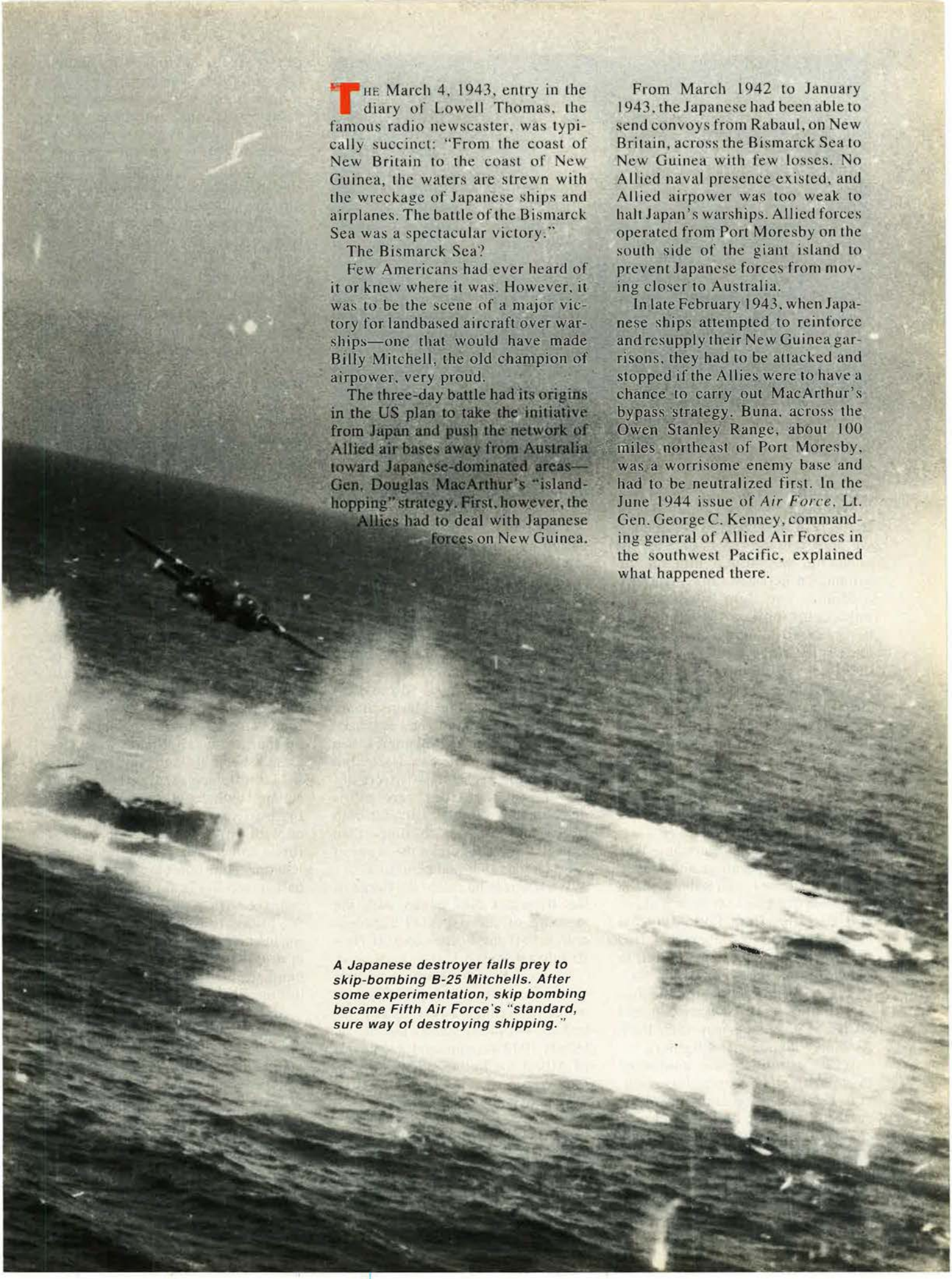
Thanks to Herbert F. Mellor, president, and Virginia Leitch, assistant administrator, of the McChord Air Museum Foundation, McChord AFB, Wash.

Landbased airplanes sank every ship in the Japanese convoy. No supplies or reinforcements got through to New Guinea.

Victory in the Bismarck Sea

By C. V. Glines





THE March 4, 1943, entry in the diary of Lowell Thomas, the famous radio newscaster, was typically succinct: "From the coast of New Britain to the coast of New Guinea, the waters are strewn with the wreckage of Japanese ships and airplanes. The battle of the Bismarck Sea was a spectacular victory."

The Bismarck Sea?

Few Americans had ever heard of it or knew where it was. However, it was to be the scene of a major victory for landbased aircraft over warships—one that would have made Billy Mitchell, the old champion of airpower, very proud.

The three-day battle had its origins in the US plan to take the initiative from Japan and push the network of Allied air bases away from Australia toward Japanese-dominated areas—Gen. Douglas MacArthur's "island-hopping" strategy. First, however, the Allies had to deal with Japanese forces on New Guinea.

From March 1942 to January 1943, the Japanese had been able to send convoys from Rabaul, on New Britain, across the Bismarck Sea to New Guinea with few losses. No Allied naval presence existed, and Allied airpower was too weak to halt Japan's warships. Allied forces operated from Port Moresby on the south side of the giant island to prevent Japanese forces from moving closer to Australia.

In late February 1943, when Japanese ships attempted to reinforce and resupply their New Guinea garrisons, they had to be attacked and stopped if the Allies were to have a chance to carry out MacArthur's bypass strategy. Buna, across the Owen Stanley Range, about 100 miles northeast of Port Moresby, was a worrisome enemy base and had to be neutralized first. In the June 1944 issue of *Air Force*, Lt. Gen. George C. Kenney, commanding general of Allied Air Forces in the southwest Pacific, explained what happened there.

A Japanese destroyer falls prey to skip-bombing B-25 Mitchells. After some experimentation, skip bombing became Fifth Air Force's "standard, sure way of destroying shipping."

Photo via Jeffrey Ethell

It was dangerous work, but modified B-25s were ideal for the task of cutting the enemy's supply lines. After skip bombing and strafing the deck, the bombers would hurdle the beset vessel, clearing the area before the bombs detonated.

"Too Expensive"

"Our fighters began to patrol over Buna. If [a Japanese pilot] came up, we shot him down. If he did not come up, we strafed him on the ground. In between times, heavies, mediums, and light bombers dug holes in his runways, battered down his revetments, burned up his stores, and strafed his personnel. The [Japanese] kept filling up the bomb craters, and we kept making new ones. He replaced his airplanes, and we promptly shot them out of the air or burned them on the ground. Before long, he tired of the game and didn't bother to fill in the holes on the runway. It had cost him around seventy-five planes, and he decided that it was too expensive."

However, the Japanese wanted the base back in operation and staged their main forces from Rabaul on the Bismarck Sea coast off New Britain, 500 air miles from Port Moresby. Enemy convoys from there had tried to relieve Buna, but it finally fell to Allied ground forces in January 1943. It cost the enemy about 300,000 tons of shipping sunk or damaged and scores of planes destroyed by Fifth Air Force bombers and fighters.

While ground forces continued to clean up enemy stragglers, General Kenney's air units began to carry out almost daily attacks on enemy concentrations farther up the New Guinea coast. There were three chief targets:

- Lae, a major Japanese base and the most active airfield on the northern side of New Guinea.
- Salamaua, with an important harbor and airfield.
- Finschhafen, a shipping center and anchorage for seaplanes and tenders.

Japan's bases and shipping throughout the nearby Bismarck Archipelago were also attacked in order to isolate that area.

On February 25, Allied radio intercepts revealed that a large enemy convoy, traveling to Lae, was scheduled to arrive in the Bismarck Sea early in March. The exact size and composition of the convoy were unknown, but the Allies were confident that they would be carrying both troops and supplies to support an expected push to retake the areas of New Guinea that had been lost.

What was to be called the Battle of the Bismarck Sea began with the sighting of the expected Japanese convoy off the north coast of New Britain on March 1.

General Kenney knew the battle would show what landbased airpower could do against naval forces. He had arrived in the southwest Pacific in July 1942 as commanding general of Allied Air Forces under General MacArthur.

While he was en route to the Pacific to his assignment as MacArthur's chief air officer, he and his aide, Maj. William Benn, commander of the 63d Bomb Squadron, discussed low-altitude bombing of ships. Kenney recalled: "It looked as though there might be something in dropping a bomb with a five-second-delay fuze from level flight at an altitude of about fifty feet and a few hundred feet away from a vessel, with the idea of having the bomb skip along the water until it bumped into the side of the ship. In the few seconds remaining, the bomb should sink just about far enough so that when it went off it would blow the bottom out of the ship. In the meantime, the airplane would have hurdled the enemy vessel and would get far enough away so that it would not be vulnerable to the explosion."

Innovators, Improvisers

When Kenney arrived in Australia, he found that his flying assets were about 200 fighters—mostly P-39s and P-40s—along with an assortment of A-20s, B-25s, B-26s, B-17s, and C-47s; a high percentage were out of commission for maintenance and parts. His air force units grew during the next few months as he reorganized them and put men in charge who knew how to innovate, improvise, and make do with the supplies available.

In the air, they began to show what could be achieved with a mix of bombardment and fighter aircraft. With the number of Japanese ships of all types plying their resupply routes, there would be plenty of opportunities to experiment with low-altitude bombing tactics against them.

Major Benn is credited by General Kenney with developing skip bombing into a fine art. He experimented with different bomb sizes, timed fuses, and approaches to targets. He led one skip-bombing raid with a half-dozen B-17s at low altitude and sent six enemy ships to the bottom. According to Kenney, "Skip bombing became the standard, sure way of destroying shipping, not only in Bill's bombardment squadron but throughout the Fifth Air Force."

Meanwhile, General Kenney called on Maj. Paul I. "Pappy" Gunn, a pilot whose unorthodox solutions to maintenance problems became legendary. Gunn developed a package of four .50-caliber machine guns for the nose of A-20 light bombers. This impressed Kenney. He directed Gunn to "pull the bombardier and everything else out of the nose of a B-25 medium bomber and fill it full of

.50-caliber guns, with 500 rounds of ammunition per gun."

Kenney said, "I told him I wanted him then to strap some more on the sides of the fuselage to give all the forward firepower possible. I suggested four guns in the nose, two on each side of the fuselage, and three underneath. If, when he had made the installation, the airplane still flew and the guns would shoot, I figured I'd have a skip bomber that could overwhelm the deck defenses of a [Japanese] vessel as the plane came in for the kill with its bombs. With a commerce destroyer as effective as I believed this would be, I'd be able to maintain an air blockade . . . anywhere within the radius of action of the airplane."

Lt. Gen. George Kenney (left), Fifth Air Force commander, and Maj. Gen. Ennis Whitehead, his deputy, were the architects of the victory in the Bismarck Sea, which General MacArthur said, "cannot fail to go down in history."

"Pretty Shooting"

The combination of forward-firing .50s and skipping bombs was effective. As fast as planes could be modified, pilots were trained. One of the B-25 squadron commanders who became especially adept at attacking shipping at low altitudes was Maj. Ed Larner. He and his "commerce destroying" squadron had become expert at skipping bombs into ground targets at low altitudes and strafing with the nose- and side-gun-firing .50 calibers. Kenney recalled, "I saw a couple of them practicing on the old wreck on the reef outside Port Moresby. They didn't miss. It was pretty shooting and pretty skip bombing."

General Kenney added that he had "a hunch" that the enemy's forces "were going to get the surprise of their lives."

The battle began on the afternoon of March 1, 1943, when a convoy of seven merchant vessels, six destroyers, and two cruisers was first sighted north of New Britain. Seven additional merchant vessels reportedly joined the convoy en route as the weather closed in.

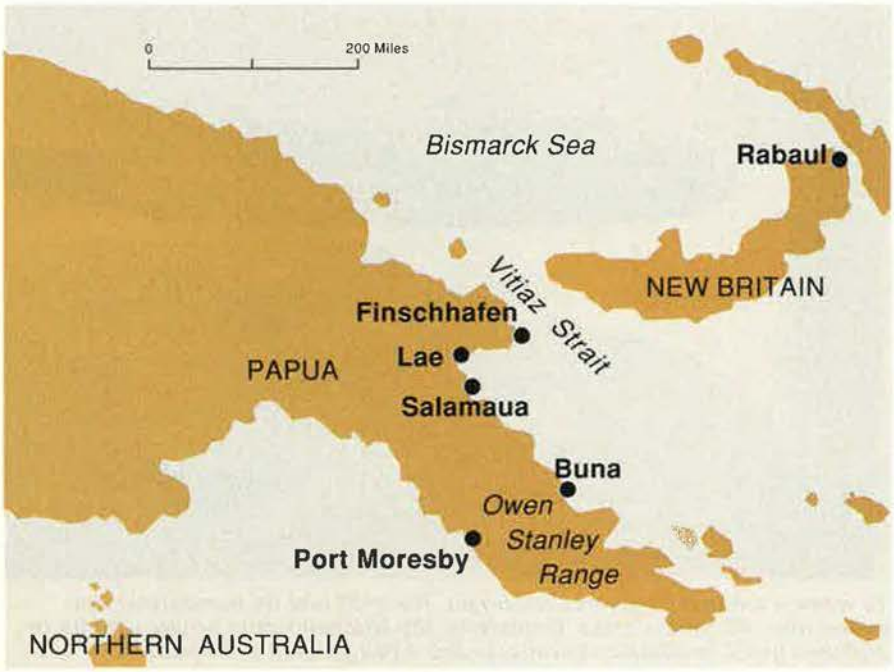
On March 2, the vessels were again sighted heading from the Bismarck Sea toward the Vitiaz Strait. When a force of twenty-nine B-17s hit the convoy, a large merchant vessel was sunk, two others damaged, and a destroyer was set on fire. The Flying Fortresses were attacked by thirty Japanese fighters, three of which were shot down. Ten Allied bombers were riddled with holes, but all returned to their base at Port Moresby.

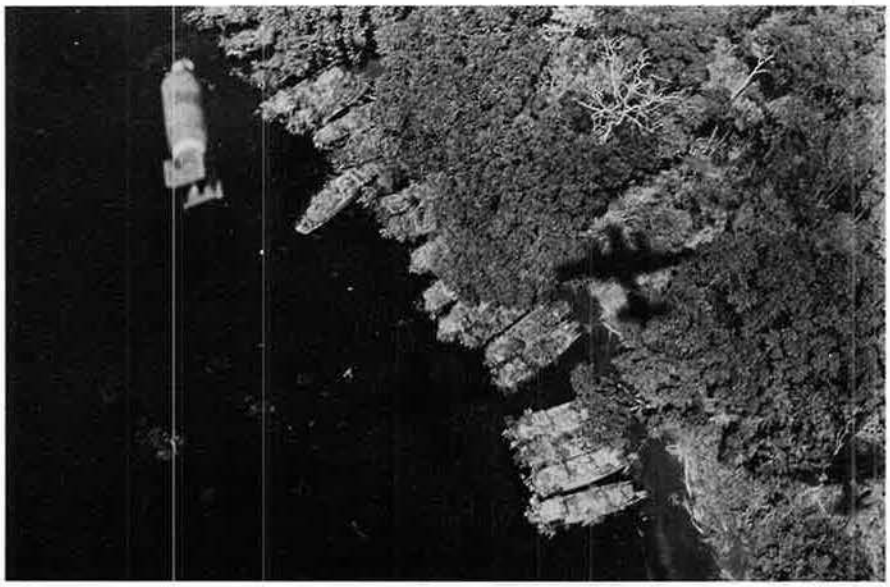
Later that day, the convoy consisted of six warships and ten merchant vessels. They were attacked by nine B-17s that eliminated two merchantmen and damaged another. One intercepting fighter was shot down; again, all bombers returned safely.

Just before daybreak on March 3, reconnaissance airplanes spotted eight enemy warships escorting seven merchant vessels headed south through the Vitiaz Strait. General Kenney explained what happened next:

"At ten o'clock, the big brawl began about fifty miles southeast of Finschhafen, right where we had planned it. Eighteen heavy bombers and twenty medium bombers attacked from 7,000-foot altitude. As the last bombs were dropped, thirteen Australian Beaufighters swept in at deck height, strafing the whole length of the convoy, as Ed Larner with twelve of my new B-25 commerce destroyers skip-bombed, followed by twelve A-20 light bombers, also down 'on the deck.' Sixteen P-38s provided top cover.

"Ed Larner's squadron dropped thirty-seven 500-pound bombs, scor-





The Japanese did a masterful job of camouflage—to no avail—on these troop transports in Bargen Bay, New Britain. Fifth Air Force B-26s found them anyway and sent them to the bottom.

ing seventeen direct hits, and the A-20s, which also skip-bombed, scored eleven direct hits out of the twenty 500-pounders they let go.

"Twenty minutes from the time the attack started, the battle was just about over. Every . . . merchant vessel was sunk, sinking, or so badly damaged that it was certain they would never reach land. One of the destroyers had been sunk and three others were in bad shape from direct skip-bombing hits."

During the battle, one B-17 was set on fire, but it continued on its bomb run. Just as the bombs were released, the airplane lost its wing and spiraled seaward out of control. Seven men bailed out successfully, and all were strafed by Japanese fighters as they swung in their parachutes. Three P-38 pilots, seeing what happened, dove on the enemy planes and blasted five of them out of the sky; however, all three P-38s were shot down. Of the thirty Japanese fighters in the engagement, twenty-two were definitely destroyed, two were probables, and four were damaged.

Larner and Henebry

That afternoon, what was left of the Japanese convoy came under attack by a force of sixteen B-17 bombers, five Australian Beaufighters, and ten B-25 "strafers" led by Major Larner, with Maj. John P. "Jock" Henebry on his wing. Eleven P-38s flew top cover. When the attack was over, three enemy vessels were on fire and sinking fast. One destroyer was set on fire and another was left sinking.

When reconnaissance airplanes came over the next morning, only one burned-out Japanese destroyer was visible and it was barely afloat. One of Major Larner's B-25s skipped a bomb into it and sent it to the bottom.

The Battle of the Bismarck Sea was over. The entire force of Japanese troops, supplies, and equipment had been destroyed; the encounter had cost the enemy an estimated 15,000 lives. US losses came to thirteen men killed and twelve wounded. Four aircraft were shot down and two crash-landed close to base.

The number of ships sunk varied in official reports; poor weather prevented reliable reconnaissance. However, when all the reports were in, the final count, according to the official Summary of Results, was "thirteen to fourteen M/V [merchant vessels] and seven DD [destroyers] sunk and one DD as a possible only. In addition to shipping losses, our fighters shot down twenty-seven fighters, and our bombers destroyed thirty-two planes."

"Jock" Henebry, who in time became a major general and then, after retirement, the National President of the Air Force Association from 1956 to 1957, summarized the three-day battle this way: "All ships of the convoy were sunk. All landbased Army Air Forces and a few Australian planes did the job. There were no Allied navy surface vessels involved—a 'first' in history involving such a large enemy force. No troops or equipment reached their destination."

In his after-action report, Maj. Gen. Ennis C. Whitehead, then deputy commander of Fifth Air Force, reviewed the battle strategy and results:

"Our plan of attack was to begin hitting the convoy as far out as weather and radius of our bombers permitted. In each attack, we used all air force units [that] had suffi-

Photo via Jeffrey Ethell

To make it a lethal commerce destroyer, the B-25 lost its bombardier but added four .50-caliber guns. Eventually, the Mitchell would bristle with up to eighteen guns, in addition to rockets and 3,000 pounds of bombs.

cient radius in one coordinated attack. Once the convoy was within the operating radius of our attack bombers, we used medium-level bombing to divert AA [antiaircraft artillery] and fighters and the attack bombers to make the 'kills.'

"The medium-level bombing was surprisingly effective. Strafing by our attack bombers and the RAAF Beaufighter squadron proved adequate in the neutralization of destroyer and light cruiser AA. The fighter cover over each coordinated attack effectively neutralized the enemy fighter force, permitting our bombers to make their runs without enemy fighter interference."

General Whitehead noted that the .50-caliber "gun is adequate for strafing such targets. The eight-gun B-25C-1 has, however, only half enough firepower. From fifteen to twenty [.50-caliber] guns firing forward would give a suitable covering fire for attack bomber operations against warships."

"Jock" Henebry's 3d Bomb Group became proficient skip bombers and were instrumental in the lopsided victory in the Bismarck Sea. He went on to become a major general and later AFA President and Chairman of the Board.

They Mean Business

As many as fourteen forward-firing .50-caliber guns were added to some later model B-25s, as well as eight five-inch rockets and a 75-mm cannon, which "Pappy" Gunn had perfected. In addition, the B-25H, the most lethal of all B-25s, also was able to carry a hefty 3,000 pounds of bombs. As General Kenney commented in the *Air Force* article, "The greatest commerce destroyer of the war had been born. We hurriedly remodeled every B-25 we could get our hands on and made the phrase 'air blockade' mean something."

General MacArthur sent his "gratitude and felicitations on the magnificent victory," which "cannot fail to go down in history as one of the most complete and annihilating combats of all time." General Kenney sent a congratulatory message to General Whitehead and added, "Airpower has written some important history in the past three days. Tell the whole gang that I am so proud of them I am about to blow a fuze."

Since the Bismarck Sea action had proved the concept was sound, all light- and medium-bomber pilots were trained in low-altitude bombing techniques. "Jock" Henebry's 3d Bomb Group became especially adept. Further proof came in an attack at Rabaul on November 2, 1943, a date that ranks with the Bismarck Sea battle in the history of the war in the South Pacific.

While six P-38 squadrons flew top cover, Maj. Ben Fridge, with four squadrons of B-25s, machine-gunned and dropped phosphorous bombs on antiaircraft positions. Henebry led his five squadrons into Rabaul Harbor through the smoke of the phosphorous bombs at masthead height. "Of the thirty-eight vessels . . . and twenty merchant ships . . . in the harbor that day," Kenney reported, "thirty received direct hits in the toughest, hardest-fought engagement of the war. The list included one heavy cruiser, one destroyer tender, one submarine tender, three destroyers, two naval auxiliary craft, three minesweepers, sixteen merchant vessels, two tankers, and a tug."

Although from fifty to sixty enemy fighters were expected, 125 to 150 showed up and dove through the P-38s to get at the B-25s. Sixty-eight Japanese fighters were destroyed by the P-38s and B-25s, with twenty-three probables. In addition, Fridge's B-25s destroyed ten floatplanes sitting at anchor, as well as other aircraft on the Lakunai Airdrome. US losses were six B-25s, with three missing, and nine P-38s, with eight of them missing.

Kenney reported:

"In the space of twelve minutes, we had destroyed or damaged 114,000 tons of Japanese shipping, shot down or destroyed on the ground eighty-five . . . airplanes, and burned out half the town of Rabaul, with a loss of supplies to the enemy estimated at 300,000 tons."

"Jock" Henebry did not escape the enemy's wrath unscathed. He had to ditch his B-25 after it was riddled with bullet and shell holes and one engine was shot out. He and his crew were rescued later that day.

In writing about the Bismarck and Rabaul battles in his personal history of the war, General Kenney, declared, "Never in the long history of warfare had so much destruction been wrought upon the forces of a belligerent nation so swiftly and at such little cost to the victor."

General Kenney, a contemporary of Billy Mitchell's who agreed with the great crusader's airpower postulates, must have taken special pride in writing that statement. After the 1921 bombing tests off the Atlantic coast, Mitchell had declared, "No surface vessels can exist wherever air forces acting from land bases are able to attack them." General Kenney's low-flying B-25 mediums, appropriately named for Mitchell, proved beyond all doubt that he was right. ■

C. V. Glines is a writer living in Dallas, Tex. His most recent article for Air Force *Magazine, "The Son Tay Raid," appeared in the November 1995 issue.*

AFA Nominees for 1996–97

AT A meeting May 25, 1996, in Colorado Springs, Colo., the Air Force Association Nominating Committee selected a slate of candidates for the four national officer positions and the six elective positions on the Board of Directors. This slate will be presented to the delegates at the National Convention in Washington, D. C., on September 16.

The Nominating Committee consists of the five previous past National Presidents (not serving as Chairman of the Board) and one representative from each of the twelve US regions.

Nominated for his first term as National President was **Doyle E. Larson** of Burnsville, Minn. He retired from the Air Force in 1983 as a major general. He serves as chairman of the board of Centurion Enterprises and president, D. E. Larssen Co. In addition to his AFA work, he serves as a trustee of Macalester College, Saint Paul, Minn., and as a visiting lecturer at the National Security Agency.

Doyle Larson attended Madelia High School, Madelia, Minn., and Macalester College before the Korean War interrupted his studies. He enlisted in the Air Force in 1951 and served as a Russian linguist until entering flying training, receiving his wings and commission in 1953. He completed his B.A. degree at Hardin-Simmons University, Tex., on Project Bootstrap, earned his M.A. degree at Auburn University, Ala., and received an honorary doctor of laws degree from Pikeville College, Ky.

Early assignments included radar observer in F-94C Starfire and F-89D Scorpion aircraft, chief of Language Training with USAF Security Service, and commander of RC-121, RC-130, and RC-135 reconnaissance squadrons. He is credited with seventy-one combat-support missions in the Vietnam War. He served as the director of Intelligence of US Pacific Command and deputy chief of staff for Intelligence, Strategic Air Command. In 1979, he became the commanding general of USAF Security Service, then the first commander of Electronic Security Command and the first director of the Joint Electronic Warfare Center. He was awarded two Distinguished Service Medals, three Legion of Merit medals, the Meritorious Service Medal, and four Air Medals. In 1982, he was inducted into the Order of the Sword by noncommissioned officers of the Air Force.

He joined AFA in 1976. He has served on the Executive, Resolutions, Long-Range Planning, and Constitution Committees and as a National Director, National Vice President (North Central Region), Minnesota state president, and president of the General E. W. Rawlings Chapter. He also serves as a trustee of the Aerospace Education Foundation. His national AFA awards include the Medal of Merit, an Exceptional Service Award, and a Presidential Citation. Doyle Larson is a Life Member of both AFA and AEF.

Gene Smith of West Point, Miss., was nominated for his first term as Chairman of the Board. Mr. Smith retired from the Air Force as a lieutenant colonel in 1978. Active in

many business and civic organizations, he has served as president of the Starkville, Miss., Chamber of Commerce, Mississippi Airport Managers Association, Southeastern Airport, and the Greater Golden Triangle Economic Development Council Managers Association. He is a Rotarian.

Mr. Smith was born in Marks, Miss. He graduated from Tunica County High School in 1952. He earned a degree in chemical engineering in 1956 at Mississippi State University. He joined the Air Force in September 1956, serving in Air Defense Command and Tactical Air Command, flying a variety of fighter aircraft. On October 25, 1967, while flying his thirty-third combat mission over North Vietnam, he was shot down in Hanoi and captured. He was repatriated on March 14, 1973.

He completed his Air Force career as director of Operations for Air Training Command's 14th Flying Training Wing. Mr. Smith received two Silver Stars, a Legion of Merit, two Distinguished Flying Crosses, two Purple Hearts, a Meritorious Service Medal, two Air Medals, an RVN Gallantry Cross, and other military decorations.

Mr. Smith joined AFA in 1974 and is currently serving as its National President. He is past chairman of the Long-Range Planning Committee and the Veterans/Retiree Council. He is also past president of Mississippi AFA and the Golden Triangle Chapter. His national AFA awards include two Medals of Merit, an Exceptional Service Award, a Special Citation, two State Storz Awards, and a Chapter Storz Award. Mr. Smith is a Life Member of AFA.

Mary Anne Thompson of Oakton, Va., was nominated for her third elected term as National Secretary.

Born in Montclair, N. J., Ms. Thompson graduated from Montclair High School. She holds a bachelor of science degree in commercial consumer services from Pennsylvania State University, an M.Ed. in elementary education from the University of Nebraska, and an education specialist post-master's degree in educational administration and supervision from Troy State University, Ala.

For the last thirteen years, she has been a master facilitator for total quality management programs at TRW. She is the manager for the National Airspace Systems configuration management, FAA SETA, and previously was manager for Maintenance, Logistics, and Training Implementation for the FAA Voice Switching and Control System program. In other corporate duties, she represents TRW on the Industry Steering Group of the Computer-Aided Acquisition and Logistics System (CALS) program. She chaired the International CALS Expo in 1992 and currently chairs the Software Products Technical Committee and is a member of the CALS Expo Planning Committee. She was named the 1993 TRW Woman of Achievement.

Ms. Thompson joined AFA in 1981. However, her association with AFA began in 1957 when she was the first national administrative services officer of Angel Flight and wrote the original national standard operating procedure for Angel Flight and designed the Angel Flight pin still used today. Following graduation from Penn State, she served on the Angel Flight National Advisory Board and was founder of and advisor to the University of Nebraska Angel Flight in 1963.

Active in aerospace education since 1960, Ms. Thompson developed and managed the nation's first university-level Aerospace Education Instructional Materials Center at the University of Nebraska. She has written aerospace education publications for Civil Air Patrol and the National Air and Space Museum and serves on the Staff Committee for the National Congress on Aviation and Space Education. She has served as the AFA National Vice President (Central East Region); Virginia state president; Virginia state vice president for Programs and North Area; Virginia state secretary; and Donald W. Steele, Sr., Memorial Chapter president, vice president, and secretary. Her national committee assignments have included AFA National Board of Directors and Executive, Resolutions, and Membership Committees. She has received numerous AFA chapter, state, region, and national awards, including the AFA Presidential Award.

Charles H. Church, Jr., of Lenexa, Kan., was nominated for his second term as National Treasurer. Mr. Church was born in Kansas City, Mo., and he graduated from Southwest High School and from the University of Kansas with a bachelor's degree in political science. He has also completed several specialized courses sponsored by the American Institute of Banking.

A World War II Navy veteran, Mr.

Church was in training to be an aerial gunner when the war ended. He went on to a successful career in banking and retired as chairman of the United Missouri Bank of Hickman Mills. He still serves as an advisory director of the United Missouri Bank of Kansas City.

Mr. Church is past president of the Richards-Gebaur AFB, Mo., Community Council and was president of the South Jackson County Kiwanis, South Kansas City Chamber of Commerce, and the Bankers Consumer Credit Association of Kansas City.

He has been an American Cancer Society volunteer.

An AFA member for more than thirty years, Mr. Church has been a Life Member since 1983 and also is a Life Member of AEF. He has held all chapter and state offices and currently serves on the Harry S. Truman Chapter's Executive Committee.

Nationally, he has been active for seventeen years as a member of the Finance Committee and had been the National Treasurer's personal choice to be vice chairman of that committee for eight years. He was National Vice President (Midwest Region) for three years and has chaired AFA's Long-Range Planning Committee. He has received AFA's Medal of Merit, Exceptional Service Award, Presidential Citation, and Special Citation and has been designated an AEF Doolittle Fellow, in recognition of his superior service to both his region and national AFA.

The following individuals are permanent members of the AFA Board of Directors under the provisions of Article IX of AFA's National Constitution: John R. Alison, Joseph E. Assaf, Richard H. Becker, David L. Blankenship, John G. Brosky, Dan F. Callahan, Robert L. Carr, Earl D. Clark, Jr., O. R. Crawford, R. L. Devoucoux, Jon R. Donnelly, Russell E. Dougherty, George M. Douglas, Joseph R. Falcone, E. F. Faust, Joe Foss, Barry Goldwater, John O. Gray, Jack B. Gross, Alexander E. Harris, Martin H. Harris, Gerald V. Hasler, Monroe W. Hatch, Jr., H. B. Henderson, John P. Henebry, Robert S. Johnson, David C. Jones, Arthur F. Kelly, Victor R. Kregel, Jan M. Laitos, Frank M. Lugo, Nathan H. Mazer, William V. McBride, Thomas J. McKee, Edward J. Monaghan, J. B. Montgomery, Bryan L. Murphy, Jr., J. Gilbert Nettleton, Jr., Ellis Nottingham, Jack C. Price, William C. Rapp, Julian B. Rosenthal, Peter J. Schenk, Walter E. Scott, Mary Ann Seibel, Joe L. Shosid, William W. Spruance, Thos. F. Stack, James M. Stewart, Harold C. Stuart, James M. Trail, A. A. West, William N. Webb, and Sherman W. Wilkins.

The six people whose photographs appear on this page are nominees for the six elected Directorships for the coming year.

Henry W. Boardman, Mississippi. Former state and chapter president. Current National Vice President (South Central Region) and serves on the Audit Committee. Life Member of AFA.

James E. Callahan, New York. Manager, Aerospace & Defense, Military Requirements & International Programs, Sierra Research Division, Sierra Technologies, Inc. Former state president and vice president; L. D. Bell–Niagara Frontier (N. Y.) Chapter president, vice president, and secretary; and vice president for aerospace education for chapter and state AFA. Currently National Vice President (Northeast Region) and member of the Long-Range Planning Committee. Life Member of AFA.

Dr. Dan Callahan, Georgia. Former National Director; National Vice President (Southeast Region); and state president. Current Georgia state vice president for Government Relations. Life Member of AFA.

William A. Lafferty, Arizona. Former member of the Executive and Resolutions Committees; Arizona state president, vice president, and secretary; chapter president and vice president. Current National Vice President (Far West Region) and member of the Constitution Committee. Life Member of AFA and AEF.

Stephen M. Mallon, Virginia. Marketing director, Department of Development, Hampton, Va. Former Langley Chapter secretary; vice president for community affairs; Under-40 National Director; Virginia state vice president for community partner program and vice president for membership. Currently Langley Chapter vice president for community affairs, state vice president for community partner programs, and serves on the AFA Membership Committee. Life Member of AFA.

Joseph A. Zaranka, Connecticut. Former National Vice President (New England), chairman of the AFA Constitution Committee, and National Director. Also former president, General George C. Kenney Chapter and Flying Yankees Chapter; state president. ■

Verbatim

Price of Safety

"I think we have an excellent safety program. We are being penalized . . . by the fact that, by definition, if an aircraft receives $1 million in damages or more, it's categorized as a major aircraft accident. With the cost of engines today and costs of some of our components, you can lose an engine due to foreign-object damage or some other means, and it will be listed as a major aircraft accident. . . . But as it is, I stand behind the US Air Force's safety record any day, before anybody, anywhere."

Gen. Ronald R. Fogleman, USAF Chief of Staff, in a June 7, 1996, press conference following release of an accident investigation board's report on the April 3, 1996, CT-43A crash that killed Commerce Secretary Ronald H. Brown and thirty-four others.

Proaction in Action

"IFOR [the US-led NATO implementation force] is now in a position to expand its presence throughout all of Bosnia[-Hercegovina] to establish a safe and secure environment for civilian implementation. Our troops will conduct more visible and more proactive patrols throughout the country. This will improve conditions for freedom of movement and put war criminals at greater risk of apprehension."

Secretary of State Warren M. Christopher, in a June 2, 1996, statement in Geneva, Switzerland, indicating that the Alliance force would be more aggressive in arresting Serbian war criminals.

Here's a Second Opinion

"I would remind you that when IFOR . . . went in, [it] went in with a certain, very strict mission, and it did not include running down people who were suspected of war crimes. . . .

"IFOR troops can arrest anybody who's been charged with a war crime with whom they come in contact, but they are not charged with, in effect, being the domestic or the international police force and targeting people and going after them."

President Clinton, in a June 12, 1996, press conference at the White House.

Russian Politics Explained

"This was not an attempted coup. It was an attempt to put pressure on the President."

Gen. Alexander Lebed, Russian defense minister, in a June 18, 1996, news conference, referring to an attempt by Russian generals to put the Army on high alert to thwart the firing of Defense Minister Pavel Grachev.

Lesson Learned

"Many people have raised the question, 'What will happen in Bosnia in 1997?' Is there a danger of the war restarting? . . . The deterrent to that war restarting, implicit in NATO air, is very powerful. All of the former warring factions have had very vivid examples of the capability and effectiveness of NATO air strikes."

Secretary of Defense William J. Perry, in a June 13, 1996, press conference at NATO headquarters, Brussels, Belgium. His reference is to Operation Deliberate Force, the US-led NATO air campaign in late 1995 against the Bosnian Serbs.

Gray Threats

"I doubt very much we will buy another C-5 or anything like a C-5 class. We can't afford it. I recommended to [Lockheed Martin] folks that they come in with ideas on how to modernize the C-5s, so we can keep them around for forty or fifty years. U-2s will probably be seventy-five years old before they are retired. B-52s are already thirty-eight; they will probably be fifty-plus when retired. With the F-22 coming in, with the procurement rates we are talking about, F-15s will be forty-five years old before they are retired. It is aging aircraft and how to modernize them [that is] the name of the game."

Arthur L. Money, assistant secretary of the Air Force for Acquisition, in a May 24, 1996, address to the Air Force Association's Acquisition Update conference held in Colorado Springs, Colo.

Prevent Defense

"The security of the US continues to require us to maintain strong military forces to deter and, if necessary, to defeat those who threaten our vital national interests—and we do. But today, the US also has a unique . . . opportunity . . . to prevent the conditions for conflict and to help create the conditions for peace. . . .

"America's security policy in the post–Cold War era requires us to take advantage of that opportunity: to make 'preventive defense' the first line of defense of America, with deterrence the second line of defense, and with military conflict the third and last resort. . . . Preventive defense creates the conditions that support peace, making war less likely and deterrence unnecessary."

Secretary Perry, in a May 13, 1996, address to the John F. Kennedy School of Government, Harvard University.

Air Dominance

"I would describe the difference between 'air dominance' and 'air superiority' as one of magnitude of ability to influence events in a given piece of airspace. For instance, when you begin to conduct any kind of a combat or theater-wide operation, normally that theater commander's first priority is to make sure that you have *air superiority* over your own troops, [which should] generally guarantee that you will not have your troops attacked. . . . The next stage has been called *air supremacy*, where you, for all intents and purposes, not only are able to defend your own people, but you pretty much dominate the space. You can operate at will in there. *Air dominance* . . . is a term that's sort of grown up in the last couple of years in joint doctrine. . . . Dominance to me is kind of an extension of the supremacy idea that says, 'Nothing moves or operates in that guy's airspace.' I mean, you totally control it. It's a step above."

General Fogleman, in March 14, 1996, testimony before the Senate Armed Services Committee. ■

Books

Compiled by Wendy Alexis Peddrick, Editorial Associate

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Brannon, D. Edgar. *Fokker Eindecker in Action.* Squadron/Signal Publications, Inc., 1115 Crowley Dr., Carrollton, TX 75011-5010. 1996. Including photos, 50 pages. $7.95.

Bugos, Glenn E. *Engineering the F-4 Phantom II: Parts into Systems.* Naval Institute Press, 118 Maryland Ave., Annapolis, MD 21402-5035. 1996. Including notes, bibliography, and index, 258 pages. $29.95.

Calder, Kent E. *Pacific Defense: Arms, Energy, and America's Future in Asia.* William Morrow and Co., Inc., 1350 Avenue of the Americas, New York, NY 10019. 1996. Including notes and index, 253 pages. $25.00.

Clancy, Tom. *Fighter Wing: A Guided Tour of an Air Force Combat Wing.* The Berkley Publishing Group, 200 Madison Ave., New York, NY 10016. 1995. Including photos, illustrations, glossary, and bibliography, 331 pages. $15.00.

Cordesman, Anthony H., and Abraham R. Wagner. *The Lessons of Modern War, Vol. IV: The Gulf War.* Westview Press, Inc., 5500 Central Avenue, Boulder, CO 80301-2877. 1996. Including tables, bibliography, and index, 1,022 pages. $98.00.

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Glantz, David M., and Jonathan House. *When Titans Clashed: How the Red Army Stopped Hitler.* University Press of Kansas, 2501 W. 15th St., Lawrence, KS 66049-3904. 1995. Including maps, photos, appendices, sources, notes, and index, 414 pages. $29.95.

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Hansen, James R. *Spaceflight Revolution: NASA Langley Research Center From Sputnik to Apollo.* Government Printing Office, Superintendent of Documents, P. O. Box 371954, Pittsburgh, PA 15250-7954. 1995. Including photos, notes, and index, 542 pages. $30.00.

Havelaar, Marion H., with William N. Ness. *The Ragged Irregulars of Bassingbourn: The 91st Bombardment Group in World War II.* Schiffer Publishing Ltd., 77 Lower Valley Rd., Atglen, PA 19310. 1995. Including photos and appendices, 264 pages. $45.00.

Isserman, Maurice. *Witness to War: Vietnam.* The Berkley Publishing Group, 200 Madison Ave., New York, NY 10016. 1995. 211 pages. $12.00.

Jordan, Kenneth N., Sr. *Forgotten Heroes: 131 Men of the Korean War Awarded the Medal of Honor, 1950–1953.* Schiffer Publishing Ltd., 77 Lower Valley Rd., Atglen, PA 19310. 1995. Including photos and index, 336 pages. $24.95.

Keegan, John. *The Battle for History: Re-fighting World War II.* Random House, Inc. 201 E. 50th St., New York, NY 10022. 1996. Including notes, 128 pages. $10.00.

Kelleher, Catherine McArdle. *The Future of European Security: An Interim Assessment.* Brookings Publications, The Brookings Institution, 1775 Massachusetts Ave., N. W., Washington, DC 20036-2188. 1995. Including bibliography, notes, and index, 216 pages. $14.95.

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Lanning, Col. Michael Lee, USA (Ret.). *Senseless Secrets: The Failures of US Military Intelligence from George Washington to the Present.* Carol Publishing Group, 120 Enterprise Ave., Secaucus, NJ 07094. 1995. Including photos and source notes, 336 pages. $24.95.

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Laur, Lt. Col. Timothy M., USAF (Ret.), and Steven L. Llanso. *Encyclopedia of Modern US Military Weapons.* The Berkley Publishing Group, 200 Madison Ave., New York, NY 10016. 1995. Including photos and appendices, 496 pages. $39.95.

Lemish, Michael G. *War Dogs: Canines in Combat.* Brassey's, Inc., 1313 Dolley Madison Blvd., Suite 401, McLean, VA 22101. 1996. Including photos, bibliography, and index, 284 pages. $22.95.

Malcolm, Col. Ben S., USA (Ret.), and Ron Martz. *White Tigers: My Secret War in North Korea.* Brassey's, Inc., 1313 Dolley Madison Blvd., Suite 401, McLean, VA 22101. 1996. Including appendices, maps, photos, bibliography, and index, 241 pages. $24.95.

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Miller, Roger G., ed. *Seeing off the Bear: Anglo-American Air Power Cooperation During the Cold War: Proceedings, Joint Meeting of the Royal Air Force Historical Society and the Air Force Historical Foundation.* Air Force History Support Office, 110 Luke Ave., Suite 405, Bolling AFB, DC 20032-8050. 1995. Including photos and index, 262 pages. $6.00.

O'Grady, Capt. Scott F., USAF, with Jeff Coplon. *Return with Honor.* Doubleday, 1540 Broadway, New York, NY 10036. 1995. Including photos, 206 pages. $21.95.

Potter, Capt. Michael C., USNR, *Electronic Greyhounds: The Spruance-Class Destroyers.* Naval Institute Press, 2062 Generals Hwy., Annapolis, MD 21401. 1995. Including photos, drawings, appendices, notes, glossary, and index, 285 pages. $49.95.

Rosch, Barry C. *Luftwaffe Codes, Marking, and Units, 1939–1945.* Schiffer Publishing Ltd., 77 Lower Valley Rd., Atglen, PA 19310. 1995. Including photos, illustrations, glossary, and bibliography, 444 pages. $59.95.

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AFA/AEF National Report

By Frances McKenney, Assistant Managing Editor

Councils Take E-Mail Input in Working Up Position Proposals

When delegates to the AFA National Convention in September establish the Association's policy on personnel issues, they will have the benefit of team research that began last January. That's when six groups—the Junior Officer Advisory, Enlisted, Air National Guard, Reserve, Veterans/Retiree, and Civilian Advisory Councils—began surveying their constituencies and studying the issues on their way toward position proposals for the convention delegates to consider in setting AFA policy.

The councils have always worked to ensure that their reports reflected a "sense of the membership," but the capability to determine that has advanced dramatically in the age of the Internet and e-mail. This year, the councils have had the benefit of an enormous amount of electronic correspondence as they worked up their advice to AFA.

"The use of the World Wide Web and the Internet allows Reserve mem-

"As a member of the National Security Appropriations Subcommittee, it is important that I am well informed of the latest issues facing our military. The Air Force Association and Air Force Magazine provide me and my staff with accurate, timely, reliable information of a full range on national security issues—from the B-2 to health care for military families, retirees, and veterans."

—Rep. George R. Nethercutt, Jr.

Photos by John K. McDowell

Members of the Air Force Association's six councils (such as the Junior Officer Advisory Council at top left) have been working to develop proposals that will become the basis of AFA's policy papers. This year, the availability of e-mail has allowed the councils to gather ideas from all over the world. At a June meeting of the Reserve Council, SMSgt. Gail L. Paich, who serves as the council's liaison; Brig. Gen. Michael J. Peters, council chairman; and CMSgt. Michael H. Wysong from McGuire AFB, N. J. (above, l–r), were among those who met at San Antonio, Tex., to discuss Reserve affairs.

Keynote speaker Edwin Dorn, the under secretary of defense for Personnel and Readiness (second from right), was welcomed to the Madison (Wis.) Chapter by (l–r) Ronald J. Bauer, vice president for Communications; USAF MSgt. Joseph M. Lustgraaf, treasurer; and Raymond J. Thurber, president.

bers all over the world to have a voice in policy development," said SMSgt. Gail L. Paich, the Reserve Council liaison. "This basic change in information gathering will produce policies truly reflective of actual needs."

Once adopted by the convention delegates, AFA policy papers are distributed to Congress, the news media, government leaders, and AFA organizations worldwide. These papers are the basis for much of the work that the Association does for the remainder of the year.

Anyone who wants to participate in the process can send a message to any of the councils through the AFA National Defense Issues Department at its e-mail address: ndi@afa.org.

VIP in Wisconsin

Edwin Dorn, the under secretary of defense for Personnel and Readiness, spoke in April to a breakfast gathering of Wisconsin's top military leaders, hosted by the **Madison (Wis.) Chapter.**

As the Defense Secretary's senior policy advisor on recruitment, career development, and pay and benefits, Mr. Dorn was invited to the University of Wisconsin–Madison to speak to the students and faculty, and AFA's National Defense Issues Department helped arrange for him to appear before the chapter.

Among the guests at the breakfast, held at a local hotel, were Maj. Gen. Jerome Berard, ANG, the Wisconsin Adjutant General; Brig. Gen. Albert H. Wilkening, ANG, the state's deputy AG for Air; Brig. Gen. James Blaney, ArNG, Wisconsin deputy AG Army; and Brig. Gen. Fred R. Sloan, commander of the 115th Fighter Wing (ANG).

Chapter President Raymond J. "Jack" Thurber said the chapter members are concerned about the military drawdown and appreciated Mr. Dorn's information on the topic. Many of the chapter members are former pilots, Mr. Thurber said, and are "vitally interested in how many dollars we're going to have to support planes and people."

Dedicated to Donnelly

The **Gen. Charles L. Donnelly, Jr. (Tex.), Chapter** hosted the Donnelly family at a Sheppard AFB, Tex., dedication of a building named for the General, who died in 1994.

A former commander in chief of US Air Forces in Europe, General Donnelly had joined the Air Force as an aviation cadet in 1951. Following a thirty-six-year military career, he served as Executive Director of AFA and AEF in 1988–89. He later became an aerospace consultant.

The Wichita Falls (Tex.) Chapter was renamed in 1995 to honor General Donnelly, who helped establish more than thirty AFA chapters in Europe and the Far East during his assignments abroad. David W. Frutchey, chapter vice president for Community Partners, said the chapter had worked to get a building at Sheppard named for General Donnelly for about a year. The General was the installation commander there from 1978 to 1979.

Mrs. Carolyn Donnelly, the General's wife, and Linda Wieland, his daughter, attended the dedication ceremony in April. Mr. Frutchey said the new Donnelly building is the site of armament and aircraft mechanic training. It is used by the 361st Training Squadron.

Space-Age Commuter

Until this year, he had rocketed into space more times than any other US astronaut—aboard *Challenger* in 1983 and 1985, *Atlantis* in 1989, and *Discovery* in 1992, and aboard a Russian Soyuz spacecraft in 1995. On that last journey, Norman E. Thagard also became the first American to fly into space in a Russian rocket. He spent three months with a Mir space station crew.

At the May meeting of the **Colonel H. M. "Bud" West (Fla.) Chapter,** Dr. Thagard showed slides of his Mir mission and described his experiences in space. Chapter President John E. Schmidt, Jr., said the audience, which included members of the local Military Order of the World Wars and The Retired Officers Association, was amazed to learn about the Russians' casual approach to launch-site security. He said Dr. Thagard's

USAF photo by Ron Hall

For their contributions to reducing the threat from nuclear weapons and materials in states of the former Soviet Union, Sen. Richard G. Lugar (R-Ind.), left, and Sen. Sam Nunn (D-Ga.), right, each received from the Nation's Capital (D. C.) Chapter a Distinguished Award for International Achievement. Chapter President Albert Barbero (center) made the presentation in June.

photos showed people standing within feet of the launcher and well-wishers shaking hands with the cosmonauts just minutes before launch. No one seemed worried about human contamination, Mr. Schmidt noted.

Dr. Thagard entered the Marine Corps Reserve in 1966. He flew F-4s at MCAS Beaufort, S. C., then went to Vietnam, where he flew 163 combat missions. After military service, he earned a medical degree. Today, Dr. Thagard is an engineering professor at Florida A&M University/Florida State University in Tallahassee.

At this meeting, the chapter also presented its Col. Bud West Outstanding Cadet of the Year award to AFJROTC Cadet Brandon M. Nesmith of Godby High School, Tallahassee, Fla. Mr. Schmidt has a special tie to Cadet Nesmith's school: He retired in June after fifteen years as a JROTC aerospace science instructor there. In recognition of the retired chief master sergeant's service, the school named its JROTC facility in his honor.

Vietnam War Memories

At the Minnesota Vietnam Veterans Memorial, three **General E. W. Rawlings (Minn.) Chapter** members shared with cadets from AFROTC Det. 410, University of Saint Thomas, Saint Paul, Minn., firsthand accounts of their Vietnam War experiences. Their testimony moved the cadets to tears, reported CMSgt. Clayton C. Pyle, USAF (Ret.).

A former B-52 maintenance chief in Strategic Air Command at U Tapao, Thailand, Chief Pyle described for the students what it was like to live in Southeast Asia, where he endured monsoons, coped with numerous Asian languages and dialects, and slept in a tent for almost eight months.

Vic Seavers, who is National Vice President (North Central Region), flew more than 100 missions during the war. He talked about being an F-4C pilot, including jungle training in Guam.

Doyle E. Larson flew seventy-one combat-support missions in Vietnam. He told the cadets that they, too, will face situations where they will have to act decisively to accomplish the mission.

Minnesota Director of Veterans Affairs Bernie Melter, who served two tours in Vietnam as a Marine Corps gunnery sergeant, and Army CWO Brian Lambie, a UH-1 Huey pilot, also spoke to the cadets. Mr. Lambie was shot down during the war, and he focused his talk on what it was like to recover from the injuries.

The memorial is in front of the state capitol in Saint Paul, Minn., and, similar to the national Vietnam Veterans Memorial in Washington, D. C., is made of a dark granite wall on which the names of Minnesotans who died in the war are engraved chronologically.

Explaining why he organized this tour to the memorial and lecture for the cadets, Chief Pyle said, "It was a war of youth. The average age on that wall is nineteen."

In This Corner . . .

With an assist from the **Colorado Springs/Lance Sijan (Colo.) Chapter,** the US Air Force Academy's annual Wing Open Boxing Championship raised close to $20,000 for charity. This year, the wing earmarked the funds for two youngsters with brain tumors and a third fighting Hodgkin's disease.

Astronaut Norman Thagard (center), the first American to fly in a Russian spacecraft, presented AFJROTC cadet Brandon Nesmith with the Outstanding Cadet of the Year award from the Colonel H. M. "Bud" West (Fla.) Chapter. John Schmidt, Jr., the chapter's president, is at right.

The chapter contributed $1,400 toward this effort by selling tickets to a reception held at the Academy's field house before the boxing competition. Chapter Community Partners, such as Domino's Pizza and Pikes Peak Distributors, donated food and beverages for the social, while Western Pacific Airlines offered a round-trip airplane ticket as a door prize.

The Academy's head boxing coach, Ed Weichers, and his staff attended the reception and spoke to the chapter about the school's boxing program and the upcoming match.

Chapter President Howard Vasina formally presented the members' donation at the boxing contest, in front of fans who jammed the field house to its rafters. The chapter has supported the annual charity event for more than ten years.

AFA National President Gene Smith (third from left) and five of AFA's past National Presidents met in Colorado in May, when the Nominating Committee selected a slate of candidates for four national offices and six elective positions on the Board of Directors. Pictured here are (l–r) Jack C. Price, Judge John G. Brosky, Smith, O. R. Crawford, David L. Blankenship, and Martin H. Harris.

And the Winner Is . . .

The Colorado Springs/Lance Sijan Chapter also recently honored three local Air Force spouses who were among the twenty winners of Air Force Spouse Scholarships awarded by AEF for the spring 1996 semester.

At a recent luncheon, Carol E. Sexton-Samelo, Johanna L. Soli, and Kristin A. Kouri were presented with their scholarship checks and AEF certificates. Ms. Sexton-Samelo is a sign language–interpretation major at Front Range Community College in Westminster, Colo. Her husband, SSgt. Erman E. Samelo, is assigned to the US Air Force Academy. Ms. Soli, the wife of Capt. Robert Soli of Peterson AFB, is studying for a master's degree in computer science at the University of Colorado at Colorado Springs. Ms. Kouri attends the University of Southern Colorado, where she is studying for a degree in social work. Her spouse, Lt. Col. Jeffrey Kouri is assigned to the Academy.

The **Montgomery (Ala.) Chapter** also honored an Air Force Spouse Scholarship winner from its area: Jennifer A. Geiger-Upton, a premedical biology major at Auburn University at Montgomery and the wife of 2d Lt. Mark A. Upton of the Standard Systems Group, Maxwell AFB, Gunter Annex, Ala. Maj. Gen. D. Bruce Smith, commandant of the Air War College, Maxwell AFB, joined Chapter President Roy A. Boudreaux in making the presentation at a chapter luncheon.

AEF received nearly 500 applications from Air Force spouses around the world, who competed for the twenty scholarships, judged on their grade-point average, community service, an essay, and recommendations.

On a visit to encourage AFA activities in Europe, National President Gene Smith met with Brig. Gen. David F. MacGhee (right), commander of the 48th Fighter Wing, RAF Lakenheath, UK. Mr. Smith also visited RAF Mildenhall, UK, Ramstein AB, Germany, and Aviano AB, Italy.

Exceptional Performers

Maj. Gen. Eugene L. Tattini, commander of Sacramento Air Logistics Center, McClellan AFB, Calif., noted that it was the first AFA event he had attended that honored USAF people from so many sectors.

The General was describing the **Sacramento (Calif.) Chapter's** Exceptional Performers Awards Banquet. The twenty-seven people recognized at this annual event were selected from the active-duty enlisted and officer ranks and the Air Force Reserve, Air National Guard, JROTC and AFROTC, Civil Air Patrol, federal government, and local business and education communities.

The evening opened with the showing of the video "The Force Behind the Force: The First Fifty Years of the Air Force Association." To be formally introduced to the crowd, the guests of honor then passed under a crossed-sabers arch formed by a base honor guard. With music, a spotlight, and an announcer, it was quite dramatic—an idea the chapter borrowed from the 1995 Outstanding Airmen Dinner, said George J. Martin, chapter vice president for Programs.

Also at the banquet, five high school and college students were awarded chapter scholarships for $500. Pres -

dent Kenneth R. Pribyla made the presentations.

"Something More"

The **Chuck Yeager (W. Va.) Chapter** has in the past arranged with ANG's 130th Airlift Wing to give JROTC cadets orientation flights on C-130s. Chapter President Samuel Rich said he "wanted to do something more for the kids" this year, so in May, the chapter sponsored the cadets' first drill competition.

Seven of the state's nine high schools sent drill teams to the meet. The 167th Airlift Wing (ANG), from Eastern West Virginia Regional Airport/Shepherd Field, even flew in cadets from Martinsburg to save them a ten-hour drive.

Competition day began with orientation flights for the students by the 130th AW, based at Yeager Airport. Next, R. C. Sheffield, director of Advanced Systems for Lockheed Martin, presented a video and lecture on the company's famous Skunk Works, where such aircraft as the U-2, SR-71, and F-117 were developed. After lunch at the 130th's dining facility, the cadets went to the Army National Guard armory for the drill contest.

South Parkersburg High School, of Parkersburg, took home the advanced-level award. South Charleston High School, of Charleston, won the beginner-level award. It is among four high schools that started their first Air Force JROTC program in the fall of 1995.

Cadets in Florida

AFJROTC Flight 953, from River Ridge High School in New Port Richey, Fla., held its first awards ceremony in May, with support from the **John C. Meyer (Fla.) Chapter.** Chapter Vice President Norman S. Collard presented an AFA Cadet of the Year medal, a Certificate of Accomplishment, and an AFA cadet membership to Cadet Maj. Shane W. Pixton, who also toted home five other awards from the ceremony. Flight 953 was created last fall, commanded by Col. George N. Whipple, USAF (Ret.)

The **Central Florida Chapter** took part in the spring 1996 commissioning ceremony held by AFROTC Det. 159, University of Central Florida, in Orlando. Richard A. Ortega, the chapter's vice president for Membership, reported that the chapter presented fifteen newly minted second lieutenants with a two-year extension to the one-year complimentary AFA memberships that they receive under the Association's Salute Program.

The **John W. DeMilly, Jr. (Fla.), Chapter** invited AFJROTC cadets from three high schools to "An Evening in History," featuring Chapter Treasurer William Susser's account of his World War II experiences with the Flying Tigers of Fourteenth Air Force in the China-Burma-India theater. He spoke about flying supplies from India, over the Hump, into China; the Chinese early warning system; and about B-24 pilot Maj. Horace S. Carswell, Jr.—the Medal of Honor recipient for whom Carswell AFB, Tex., was named. For the young cadets in the audience, Mr. Susser's talk was a lesson in history according to those who made it. The chapter also presented the cadets' high schools with checks for $1,000 each.

Coming Events

August 2–3, **Michigan State Convention,** Mount Clemens, Mich.; August 2–3, **Missouri State Convention,** Kansas City, Mo.; August 9–10, **North Carolina State Convention,** Goldsboro, N. C.; August 9–11, **Iowa State Convention,** Cedar Rapids, Iowa; August 15–18, **Washington/Oregon State Convention,** Portland, Ore.; August 16–17, **Colorado State Convention,** Colorado Springs, Colo.; August 17, **Indiana State Convention,** Indianapolis, Ind.; August 23–24, **Utah State Convention,** Park City, Utah; September 16–18, **AFA National Convention and Aerospace Technology Exhibition,** Washington, D. C.

Secretary of the Air Force Sheila E. Widnall received a Women of Distinction award from the Thomas W. Anthony (Md.) Chapter in April at the Andrews AFB, Md., Officers' Club. Civil Air Patrol Lt. Col. William H. Thomas, state and chapter vice president of Communications, was on hand to congratulate her.

First Up

The **Mobile (Ala.) Chapter** sponsored the first stop on the 1996 national tour of the Collings Foundation's restored World War II bombers. Chapter President Richard Brannon said a front-page newspaper story on the event attracted several thousand people to the Mobile Downtown Airport, where they toured the B-24J *All American* and the B-17G *Nine-O-Nine.* More than 300 were on hand just to watch the warbirds land, Mr. Brannon added.

AFA National Director Frank M. Lugo, Alabama State President William B. Divin, John R. Dyas, and Hugh L. Baynes were among the chapter members who attended the warbirds display. Mr. Brannon arranged everything from courtesy cars to lodging for the crews of the classic bombers and said chapter volunteers helped at the display on all three days that it was in town.

More Chapter News

The guest speaker drove a 500-mile round trip to address the **Blue Ridge (N. C.) Chapter's** May meeting. Lt. Col. Jeffrey P. Smith, then chief of Campaign Plans for 9th Air Force and Headquarters, US Central Command Air Forces, traveled from Shaw AFB, S. C., to the Pisgah View Ranch, Asheville, N. C., at the re-

Industrial Associates

Listed below are the Industrial Associates of the Air Force Association. Through this affiliation, these companies support the objectives of AFA as they relate to the responsible use of aerospace technology for the betterment of society and the maintenance of adequate aerospace power as a requisite of national security and international amity.

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the celebration of USAF's fiftieth anniversary in Las Vegas April 22–26, 1997.
Huge crowds are expected to attend. This is a once-in-a-lifetime
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For registration information, write to:
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Air Force Association
1501 Lee Highway
Arlington VA 22209
or call AFA's Fax on Demand System
(800) 232-3563 and order document number 1997
Air Force Fifty staff can be reached at (800) 552-5427
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50
YEARS
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Las Vegas, Nevada
April 22-26, 1997

quest of Shaw's public affairs office. Chapter President William T. Stanley had asked the PAO to send a fighter pilot to the chapter's podium, and Colonel Smith had been an F-16 and A-10 pilot. He spoke about USCENTAF's mission and initiatives in southwest Asia.

The commander of the 123d Airlift Wing (ANG), Col. Michael L. Harden, spoke to the **Lexington (Ky.) Chapter** on the Kentucky ANG's organization, history, and mission. The unit was created in the mid-1940s as the 123d Fighter Group and assigned P-51 Mustangs. Today it is based at Louisville IAP and supports operations in Bosnia-Hercegovina with its dozen C-130Hs. It has also deployed to Somalia and Rwanda. The meeting was held at the Aviation Museum of Kentucky in Lexington, a location Chapter President Daniel Wells called "a natural tie-in."

Arizona State AFA Recognition and Appreciation Days took place in May at three military hospitals. State President Sally R. Reid; Angelo Di Giovanni, president of the **Richard S. Reid Chapter;** and State Vice President Raymond D. Chuvala, from the **Tucson Chapter,** presented Col. Stanley F. Uchman, commander of the 355th Medical Group at Davis-Monthan AFB, Ariz., with a plaque that expressed appreciation for the base's military medical personnel.

On the same day, but at Luke AFB, Ariz., Glenn O. Plaumann, state vice president for Government Relations; **Phoenix Sky Harbor Chapter** President Tom Molloy; and Harry H. Bailey, from the **Frank Luke Chapter,** presented a plaque to Col. (Brig. Gen. selectee) Carrol H. Chandler, 56th Fighter Wing commander, and Col. Robert P. Edwards, 56th Medical Group commander, in appreciation for the 56th MG.

The following week, **Cochise Chapter** President Robert W. Hazlett was joined by Ms. Reid and Mr. Di Giovanni for the presentation of a plaque to Army Col. Warren Silberman, commander of the Raymond W. Bliss Army Community Hospital at Fort Huachuca, Ariz.

Explaining why he chased after the alleged robber of a delicatessen in Bakersfield, Calif., and pointed out the thief's hiding place for the police, JROTC Cadet Robert J. Taylor said, "In ROTC, I've been taught to help out citizens, so I just went after him." After the police arrived, the first people the fifteen-year-old student called were his mother and his aerospace science instructor, **Bakersfield Chapter** member Lt. Col. Jeryl R. Huffman, USAF (Ret.). Cadet Taylor's quick response resulted in the apprehension of the suspect. "We must be doing something right to teach him such citizenship," said Colonel Huffman.

The district director for Rep. Mark E. Souder (R-Ind.) spoke to the **Fort Wayne (Ind.) Chapter's** May luncheon meeting. Mark A. Wickersham described the activities of the Congressman's local office, projects affecting the Fort Wayne area, and Mr. Souder's position on defense issues.

Have AFA/AEF News?

Contributions to "AFA/AEF Report" should be sent to *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Phone: (703) 247-5828. Fax: (703) 247-5855. ■

Unit Reunions

AFROTC Det. 172, Valdosta State University. October 25–26, 1996, in Valdosta, Ga. **Contacts:** Cadet James D. Schebel, AFROTC Det. 172, 1500 N. Patterson St., Valdosta State University, Valdosta, GA 31698. Mrs. Tippett, (912) 333-5954.

Air Force Women Officers Associated (AFWOA). October 17–20, 1996, at the Radisson Hotel in Sacramento, Calif. **Contact:** AFWOA, P. O. Box 780155, San Antonio, TX 78278-0155. Phone: (800) 854-1842 access code 18 or (800) 805-8297 access code 96.

Bergstrom Field, Tex., military personnel, 1942–45 (World War II). October 9–12, 1996, in San Antonio, Tex. **Contact:** Wayne Taylor, 5015 S. W. 20th Terr., Topeka, KS 66604-3576. Phone: (912) 272-2584.

Blackjacks Ass'n, 53d Troop Carrier/Airlift Squadron. August 23–25, 1996, in Little Rock, Ark. **Contact:** Lt. Col. Hobart E. Carter, USAF (Ret.), 161 Southcreek Cir., Folsom, CA 95630-1510. Phone: (916) 989-3804. Fax: (916) 988-9806.

National World War II Glider Pilots Ass'n. October 3–6, 1996, in Portland, Ore. **Contact:** Charles J. Giallanza, 3881 Stone Mountain Fwy., Suite 2, Snellville, GA 30278. Phone: (770) 972-7100.

Parks Air College, Army Air Corps cadets (World War II). August 22–24, 1996, at Parks College of St. Louis University in Cahokia, Ill. **Contact:** Burres W. Garrison, Jr., 1550 W. Rosedale St., Suite 302, Fort Worth, TX 76104-7494.

Strategic Air Command, Fiftieth-Anniversary Celebration. September 27–29, 1996, at the Museum of Flight in Seattle, Wash. **Contact:** I. Fred Rosenfelder, P. O. Box 59445, Renton, WA 98058. Phone: (206) 718-2399.

Thunderbirds Alumni Ass'n. November 21–24, 1996, at Bally's Las Vegas in Las Vegas, Nev. **Contact:** Lt. Col. Denny Weddle, USAF (Ret.), 3900 Paradise Rd., Suite T, Las Vegas, NV 89109-0930. Phone: (702) 369–8488. Fax: (702) 732-3900.

Mail unit reunion notices well in advance of the event to "Unit Reunions," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information.

2d Emergency Rescue Squadron, 5th and 13th Air Forces. October 10–13, 1996, at The Inn at San Luis in Galveston, Tex. **Contact:** Leroy R. Nelson, 13515 Butterfly Lane, Houston, TX 77079-7151. Phone: (713) 464-0655.

36th Service Hq. Squadron, 5th Air Force (World War II), including the 49th and 374th Service Squadrons, 46th Service Group, 15th Weather Squadron, 1927th Quartermaster Truck Aviation, and 1615th and 1616th Ordnance. September 18–22, 1996, at the Holiday Inn Lexington-North in Lexington, Ky. **Contact:** Richard L. Wilisch, 129 Jefferson Park Dr., Huntington, WV 25705. Phone: (304) 736-8786.

Flying Class 38-C (Randolph and Kelly Fields, Tex.). October 15–17, 1996, in San Diego, Calif. **Contact:** Raymond F. Toliver, 4116 Rhodes Way, Oceanside, CA 92056. Phone: (619) 940-8555.

39th Fighter Squadron Ass'n, 40th and 41st Fighter Squadrons, 35th Fighter Group, 5th Air Force. October 17–20, 1996, at the Hilton East in Tucson, Ariz. **Contact:** Bob Latimer, 6139 Berwyn Lane, Dallas, TX 75214-2108. Phone: (214) 691-7806.

Flying Cadet Class 40-F. October 4–6, 1996, in Orlando, Fla. **Contact:** Ray McDaniell, 1220 Roxboro Rd., Longwood, FL 32750. Phone: (407) 831-6126.

51st Troop Carrier Wing, Hq. and Hq. Squadrons (World War II). September 12–14, 1996, at the Holiday Inn Garden of the Gods in Colorado Springs, Colo. **Contact:** Robert G. Oliver, 597 Vista Dr., Castle Rock, CO 80104. Phone: (303) 688-3346.

61st Troop Carrier Squadron, 314th Troop Carrier Group. September 19–22, 1996, at the Hilton Valley Forge in King of Prussia, Pa. **Contact:** Gordon Trendell, 3418 Drighton Ct., Bethlehem, PA 18017. Phone: (610) 867-3610.

85th Bomb Squadron Ass'n and 47th Bomb Wing. October 30–November 3, 1996, in San

Antonio, Tex. **Contacts:** G. E. Watson, Jr., 5 Ryder Ct., Stony Point, NY 10980. Phone: (914) 786-5366. Lt. Col. Edwin L. Phillips, USAF (Ret.), 3519 McCormick St., San Antonio, TX 78247. Phone: (210) 494-0228.

99th Bomb Group Historical Society (World War II). September 11–14, 1996, at the Holiday Inn–Lorain in Elyria, Ohio. **Contact:** Robert J. Bacher, 692 N. Abbe Rd., Elyria, OH 44035-3044. Phone: (216) 365-3023.

158th Fighter Squadron/165th Air Transport Group/165th Airlift Wing, Ga. ANG (1946–96). Fiftieth-anniversary reunion, October 4–6, 1996. **Contact:** Lt. Col. Edward I. Wexler, 165th Airlift Wing, 1401 Robert B. Miller, Jr., Dr., Garden City, GA 31408-9001. Phone: (912) 966-8252. Fax: (912) 966-8132.

306th Bomb Group Ass'n. October 28–November 1, 1996, at the Riviera Hotel Casino in Las Vegas, Nev. **Contact:** Russell A. Strong, 5323 Cheval Pl., Charlotte, NC 28205. Phone: (704) 568-3603.

340th and 341st Fighter Squadrons, 348th Fighter Group, 5th Air Force (World War II). September 26–29, 1996, in Dayton, Ohio. **Contact:** Duane A. Kuhlmann, 4 Sweetgum Crossing, Savannah, GA 31411. Phone: (912) 598-1854.

363d Mustang Fighter Group. September 26–28, 1996, at the Sheraton Uptown Hotel in Albuquerque, N. M. **Contact:** Lt. Col. Arthur Mimler, USAF (Ret.), 3086 US Hwy. 140, Catheys Valley, CA 95306-9735. Phone: (800) 363-3864 access code 363.

365th Fighter Group (World War II). September 23–29, 1996, at the Marina Inn in South Sioux City, Neb. **Contact:** Dennis Swanstrom, P. O. Box 2780, Sergeant Bluff, IA 51054-1002. Phone: (800) 582-7518.

386th Bomb Group Ass'n. September 17–21, 1996, at the Kings Island Inn and Conference Center in Mason, Ohio. **Contact:** John M. Bryant, 10555 Davy Crockett Dr., Austin, TX 78737-9246. Phone: (512) 288-3124. Fax: (512) 288-5970.

409th Bomb Group. October 6–9, 1996, at the Radisson Hotel in Hampton, Va. **Contact:** Hasell W. Barton, 14 Queen St., Charleston, S. C. 29401. Phone: (803) 577-3596.

413th, 437th, and 456th Fighter Squadrons, 414th Fighter Group, pilots (World War II). September 16–20, 1996, at the Sheraton Gunter Hotel in San Antonio, Tex. **Contact:** James H. Baird, 1645 Plummer Dr., Rockwall, TX 75087. Phone: (214) 771-8529.

414th Bomb Squadron Ass'n, 97th Bomb Group. October 17–19, 1996, in Meridian, Miss. **Contact:** Irving S. Schumer, 441 Falconrock Lane, Agoura, CA 91301.

436th Fighter Squadron, 479th Fighter Group. October 21–25, 1996, in San Diego, Calif. **Contact:** John Monohan, 12204 Sintonte Ct., San Diego, CA 92128. Phone: (619) 487-0596.

454th Bomb Squadron, 323d Bomb Group, 9th Air Force. September 18–22, 1996, at the Red Lion Hotel in Omaha, Neb. **Contact:** Joseph R. Havrilla, 1208 Margaret St., Munhall, PA 15120-2048. Phone: (412) 461-6373.

455th Bomb Squadron, 323d Bomb Group "Whitetail Marauders," 9th Air Force (World War II). September 18–21, 1996, in Concord, Calif. **Contact:** Richard "Bud" Botsford, 3209 Hudson Ave., Walnut Creek CA 94596.

463d Bomb Group "Swoose Group," Italy (World War II). October 10–13, 1996, at the Marriott Hotel in Chattanooga, Tenn. **Contact:** Eugene Parker, R. R. 3, Box 188, New Matamoras, OH 45767-9732. Phone: (614) 473-1515.

487th Bomb Group Ass'n, 8th Air Force (World War II). September 10–14, 1996, in Springfield, Mo. **Contact:** Don Denbeck, 119 N. 4th St., O'Neill, NE 68763. Phone: (402) 336-3124.

493d Fighter Squadron, 48th Fighter Group (World War II). November 7–10, 1996, in Fort Lauderdale, Fla. **Contact:** Col. Jacob L. Cooper, USAF (Ret.), 41 Petan Dr., Buffalo, NY 14225. Phone: (716) 633-6056.

507th Fighter Group, Hq., 463d, 464th, and 465th Fighter Squadrons (World War II). September 19–21, 1996, in Cleveland, Ohio. **Contact:** James H. "Mose" Mosbey, Jr., P. O. Box 163, Watkinsville, GA 30677. Phone: (706) 769-6236 or (706) 548-1410.

Pilot Class 48-C. Seeking members for a reunion. **Contact:** Maj. Michael Loyd, USAF (Ret.), 62 Lakeview Dr., Daly City, CA 94015.

Observer Class 52-19 (James Connally AFB, Tex.) and **Pilot Class 55-C** (Malden and Webb AFBs, Tex.). Seeking members for a reunion and to update class roster. **Contact:** Col. Frank B. Preston, USAF (Ret.), 7531 Eaton Ct., University Park, FL 34201-2305. Phone: (941) 355-0524.

611th Aircraft Control and Warning Squadron, Japan (1946–50). Seeking members for a reunion. **Contacts:** Edward A. Brill, 1745 Foster Park Rd., Vermilion, OH 44089. Phone: (216) 988-4550. Dalton Martin, 7375 Via Montecitos, San Jose, CA 95135. Phone: (408) 274-3374.

1208th Flight/3726st Basic Military Training Squadron, Lackland AFB, Tex. (1954–55). Seeking members for a reunion. **Contacts:** Ronald G. S. Navickas, 12818 Docksin Dr., Sterling Heights, MI 48313. Phone: (810) 739-7895. CMSgt. Wally Pyles, USAF (Ret.), 27141 Spaulding Rd., New Hudson, MI 48165-9760. Phone: (810) 486-3397.

3389th Pilot Training Squadron (1960–80). Seeking T-28 Trojan and C-47 "Gooney Bird" pilots for a reunion in the fall of 1996. **Contact:** Lt. Col. Charles P. Davies, USAF (Ret.), 4435 Monaco Dr., San Antonio, TX 78218-4340. Phone: (210) 653-1475. ■

Bulletin Board

Seeking information on **Maj. Murray Benson,** chief of X-ray and internal medicine with the 181st General Hospital, 95th Station Hospital, in the China-Burma-India theater. **Contact:** Sara J. Benson Victor, 1209 Bonaventure Dr., Melbourne, FL 32940-1902.

Seeking contact with Sandy Townsley, wife of **Gary Townsley,** stationed in Tucson, Ariz., in 1974. **Contact:** Robin Davies Morrisette, c/o MSgt. James A. Mulligan, USAF (Ret.), Box 711, Flin Flon, Manitoba R8A 1N5, Canada.

Seeking information on **Maj. Len Sexton,** a B-17 pilot taken prisoner April 29, 1944. **Contact:** Ama S. Lowery, 2423 Tazewell Rd., Pekin, IL 61554.

Seeking contact with **Stanley Molander and Francis Nance,** who bailed out of a plane with Robert Nattkemper during World War II. **Contact:** Maj. Robert Nattkemper, USAF (Ret.), P. O. Box 1852, Kamuela, HI 96743.

Seeking contact with **72d Troop Carrier Squadron** members, 1943–45. **Contact:** Lt. Col. Henry J. Free, AFRES (Ret.), 136 S. Main St., Summerville, SC 29483.

Seeking contact with B-24 crew members **Lt. Andrew J. Moran and Sgts. Phillip J. Carroll, Joseph F. DeMario, and Norman C. Howell,** stationed with the 449th Bomb Group, 47th Bomb Wing, 15th Air Force, Grottaglie, Italy, in 1944. **Contact:** Col. Norman T. Lawrence, USAF (Ret.), 7037 Overlook Dr., Santa Rosa, CA 95409.

Seeking a **patch** from or a sketch of the 6622d Air Transport Squadron, Torbay Airport, Newfoundland, Canada, during the 1950s. **Contact:** Bernard R. Stevens, 1025 Arizona St. S. E., Albuquerque, NM 87108-4827.

Seeking information on and photos of the **545th Bomb Squadron,** 384th Bomb Group, Grafton Underwood, UK, 1943–45. In particular, seeking information on the B-17G *Buckeye Belle.* **Contact:** Michael W. Buczynski, 7 Gaffney St., Nashua, NH 03060.

Seeking the whereabouts of **Betty Byrd,** whose father was a master sergeant at Homestead AFB, Fla., in the early 1970s. **Contact:** Shannon L. Lagatutta, 4751 Justin Ct., Moorpark, CA 90321.

Seeking **identification models** of aircraft—any scale, material, or country of issue—from World War II to the present. Also seeking 1/500 and 1/250 Teacher-scale ships, 1/200-scale Hansa models, and 1/432-scale Kix cereal, Cruver Manufacturing Co., and Cox Showcase miniature models. **Contact:** James A. Dorst, 113 Beach Rd., Hampton, VA 23664-2054.

Seeking information on and contact with **Women's Airforce Service Pilots** who were at Long Beach, Calif., 1943–44. **Contact:** Michael Tulane, 3137 Bel Air Dr., Las Vegas, NV 89109.

Seeking the whereabouts of **MSgt. William E. Gardner,** first sergeant of the 40th Munitions Maintenance Squadron, Plattsburgh AFB, N. Y., in the late 1950s and early 1960s. **Contact:** Allen W. Kirsch, 50 Clifford Blvd., Hauppauge, NY 11788.

Seeking contact with 83d Fighter-Interceptor Squadron crew involved in **Project Jonah-Able** to Formosa in 1958. **Contact:** T. E. McClure, 150 Johnston Rd., Marion, VA 24354.

Seeking contact with airmen **Joseph H. Buckwater, Jack Howard, Eric McCormick,**

- **Opening ceremonies:** keynote address
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and Howard McKinnon, possibly from the 21st Troop Carrier Squadron, 374th Troop Carrier Group, Brisbane, Australia, 1944–45. **Contact:** Mary McGuiness, 26 Greens Ave., Oatlands, NSW 2117, Australia.

Seeking recollections of **F-4 missions** out of Ubon RTAB, Thailand, 1969–70. **Contact:** Wayne J. Theriot, 10746 Cletus Dr.. Baton Rouge, LA 70815-1507.

Seeking contact with USAF personnel who have been **penalized for reporting fraud,** waste, or abuse. **Contact:** J. Durbin, 6219 Seal Place, Waldorf, MD 20603.

Seeking contact with anyone involved with **Projects Kedlock and Kempster** in the 1960s. **Contact:** Ron Kloetzli, P. O. Box 114, Laguna Beach, CA 92652.

Seeking information on the 719th Bomb Squadron, 449th Bomb Group **B-24 #4129307 *Buzzer*** that crashed on December 9, 1944, en route to Naples, Italy. **Contact:** Benedict Yedlin, 1000 Herrontown Rd., Princeton, NJ 08540-7799.

Seeking photographs of or information on the markings of **World War II jeeps,** especially flightline vehicles, assigned to Wright Field, Ohio, in the late 1940s and early 1950s. **Contact:** Andrew S. Kididis, 6493 Rangeview Dr., Dayton, OH 45415.

Seeking contact with anyone who flew with **Maj. Anthony Namiotka,** who was a POW after his bomber went down in Hungary or Romania during World War II. **Contact:** M. A. Gajkowski, 205 Stonebridge Dr., Myrtle Beach, SC 29577-6138.

Seeking photographs of a **B-36** in flight or on the Carswell Field, Tex., runway. **Contact:** Edwin D. Benbow, 1805 Toplea Dr., Euless, TX 76040-4012.

Seeking **patches** worn by USAF personnel during Operation Desert Storm. **Contact:** Emil L. Balusek, 13405 Wisterwood St., Austin, TX 78729-1941.

Seeking memorabilia from **Moffett Field** during World War II, the Vietnam War, and the Korean War for museum display. **Contact:** Carole Henderson, P. O. Box 16, Moffett Field, CA 94025-0016.

Seeking the whereabouts of **Sgt. Geri Dreibelbis,** last stationed in Alaska. **Contact:** MSgt. Dennis K. Fetzer, USAF (Ret.), 16 Holly Cir., State College, PA 16801.

Seeking the whereabouts of **Dottie Goot,** a World War II ferry pilot, and **Lt. Al Goot,** a flight-line officer at Mather AFB, Calif., in 1949. **Contact:** Lt. Col. Mannie H. Banner, USAF (Ret.), 6412 Silverbrooke W., West Bloomfield, MI 48322-1034.

Seeking **Rudolf Hengst's** military records and flying license, which were confiscated in 1945 at Wehrkreisamt Stollberg, Saxony. **Contact:** Rudolf Hengst, Weilerweg 7, 54662 Speicher, Germany.

Seeking contact with crew from the **423d Bomb Squadron,** 306th Bomb Group, who flew B-17s out of Gibraltar in early 1946. **Contact:** Charles R. McCreight, 725 Lewis Rd., Sumter, SC 29154.

Seeking information on or the whereabouts of **Trueman S. "Turpy" Fulcuno,** a Japanese-American interrogator at Kataoka Naval Base, Kuril Islands, in June 1945. **Contact:** William V. Cavanaugh, 2169 S. W. 153d Place, Ocala, FL 34473-4210.

Seeking the whereabouts of **James F. Backus,** from Atlanta, Ga., who was stationed with the 13th Bomb Group, Westover Field, Mass., in 1942 and then joined a B-17 group in the UK. **Contact:** Lt. Col. Robert R. Boyd, USAF (Ret.), 5100 John D. Ryan Blvd., Apt. #711, San Antonio, TX 78245-3535.

Seeking contact with **2d Lt. George I. Aneloski,** who was stationed with the 394th Bomb Squadron, 5th Bomb Group, Samar, the Philippines, and was the only survivor of a B-24 crash June 17, 1945. Also seeking a **patch** or color print of the "Bomber Barons" insignia. **Contact:** Cmdr. Randy L. Etter, USN, 24 Chases Lane, Middletown, RI 02842.

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

Seeking contact with personnel from the **1st Arctic Search and Rescue Squadron,** Greenland. **Contact:** Lew Grossman, 9601 N. W. 67th Ct., Tamarac, FL 33321.

Seeking contact with **squadron leader Friend and officer Wheeler**—who photographed the IG Farben Works near Auschwitz, Poland, in January 1945—and **Major Allam, Lieutenants Roth and Tasker, and Flight Sergeant Murphy,** 680th Squadron, 15th Air Force, Foggia, Italy. Also seeking contact with any crew that bombed administration buildings and armament plants at Buchenwald, Germany. **Contact:** D. A. V. Hicks, 3A Haven Rd., Canford Cliffs, Dorset BH13 7LE, UK.

Seeking information on and contact with aviation cadets, especially from **Observer Class 55-07,** Ellington AFB, Tex., and from **Preflight School** at Lackland AFB, Tex., March to June 1954. **Contact:** Lt. Col. H. J. "Pete" Birkhofer, USAF (Ret.), 1463 Front Nine Dr., Fort Collins, CO 80525.

Seeking a picture of **Gen. Henry H. "Hap" Arnold and Brig. Gen. Chuck Yeager** together on any occasion. Also seeking a formal picture and a short biography of each General. **Contact:** Anna M. Fee, 411 W. Woodland Ave., Penndel, PA 19047.

Seeking the whereabouts of **"Red" Bienke or Billy Ohara,** stationed at Baer Field, Ind., in 1944. **Contact:** Roger K. Myers, Greater Fort Wayne Aviation Museum, P. O. Box 9573, Fort Wayne, IN 46899.

Seeking to correspond with personnel stationed at the **Cold Weather Experimental Station,** Ladd Field, Alaska, before December 7, 1941. **Contact:** Col. L. A. Tenold, 6325 River Overlook Dr., Atlanta, GA 30328.

Seeking contact with 8th Air Force personnel based at Grangemouth, Scotland, in February 1945, especially anyone who knew **Katherine "Katy" Rose. Contact:** Fiona Elliot, 29 Inchmead Dr., Kelso, TD5 7LW Roxburghshire, Scotland, UK.

Seeking contact with personnel stationed with the **6970th Air Base Group,** Fort Meade, Md., in support of the National Security Agency, 1973–76. **Contact:** Michael Hummel, P. O. Box 83, Springfield, NH 03284-0083.

Seeking information on **2d Lt. Jim Sullivan,** a fighter pilot who disappeared near Aruba, the Netherlands Antilles, March 23, 1943. **Contact:** John Martuscelli, 1635 Dubac Rd., Wall, NJ 07719.

Seeking the whereabouts of **Capt. James Meyer,** a fighter pilot stationed in England, 1944–45. He may be from Fort Lauderdale, Fla. **Contact:** Edward Wynne-Owen, c/o Dougherty Smith, 2910 S. Peninsula Dr., Daytona Beach, FL 32118.

Seeking contact with USAAF and RAF pilots employed by **Scandinavian Airlines System** after 1946. **Contact:** Goran C. Sundblad, 264 Shoreline Dr., New Bern, NC 28562.

Seeking contact with World War II **Link Trainer operators** and personnel from Pyote AAF, Tex. **Contact:** Bill Switzer, 2500 Oak Ave., Manhattan Beach, CA 90266.

Seeking contact with **William T. Winter,** stationed at Hickam Field, Hawaii, in 1946. **Contact:** Lehman A. Overman, 723 Riverview Dr., North Augusta, SC 29841.

Seeking contact with anyone who knew aviation cadet **Kenneth Wilbur Meeks,** stationed at Santa Ana AAB, Calif., who died in July 1943. **Contact:** Sharon Meeks Wert, 56640 McKenzie Hwy. M-3, McKenzie Bridge, OR 97413.

Seeking contact with the family of **Capt. Charles W. Stevenson,** stationed with the 81st Troop Carrier Squadron, 436th Troop Carrier Group, who was killed in action in the Netherlands on September 19, 1944. **Contact:** Peter J. M. Joosten, Stationsdwarsstraat 10A, 6131 BA Sittard, the Netherlands.

For the Pueblo Historical Aircraft Society/International B-24 Memorial Museum, seeking information on, photographs of, and manuals and parts from an Emerson model A-15 **B-24 nose turret** and an MPC model 5800-5 **B-24 tail turret. Contact:** Richard Wood, 1331 S. Shoshone St., Denver, CO 80223.

Seeking information on **Donna Lynn Moore (More),** whose father was stationed at RAF Lakenheath or RAF Mildenhall, UK, in the early 1970s. **Contact:** David Stephens, Gloucestershire Constabulary, Bearland, Gloucester GL1 2JP, UK.

Seeking contact with **SSgt. Rex Isabel,** stationed in Colorado Springs, Colo., possibly at the Air Force Academy, in the early 1950s. **Contact:** Theresa A. Kennedy, 1364 S. Cathay St., Aurora, CO 80017.

Seeking **patches** from the 3d Bomb Wing, 13th and 90th Bomb Squadrons, 1st Shoran Beacon Squadron, and B-57 missions in Vietnam. **Contact:** Robert L. Baird, 1400 Cathedral Pines Dr., Prescott, AZ 86303.

Seeking the whereabouts of **Frederick M. Patrick,** stationed at RAF Bentwaters, UK, 1959–61. **Contact:** Sue Dromey, Cottage No. 1, Tanners Lane, Barkingside, Ilford, Essex IG6 1QG, UK.

Seeking contact with **Capt. Jeffrey Baker,** who was stationed at McChord AFB, Wash., in 1969. **Contact:** Lt. Col. Joe Brand, USAF (Ret.), Rte. 5, Box 3037, Bonne Terre, MO 63628.

Seeking contact with **Capt. Bill Chapman,** a chaplain stationed with the 460th Fighter-Interceptor Group, 337th Combat Camera Reconnaissance Squadron, Portland IAP, Ore., 1960–63. **Contact:** Charles L. Nicodemus, 11854 S. E. Sunnycreek Lane, Clackamas, OR 97015.

Seeking contact with former members of the **415th Night Fighter Squadron,** especially Beaufighter pilots Rodger D. Littlejohn and William D. MacMonagle. **Contact:** Don Flaherty, 9408 Layton Ct. N. E., Albuquerque, NM 87111.

Seeking information on or contact with anyone who participated in the **Douglas XB-42/43** bomber programs. **Contact:** Frank J. Gasperich, Jr., 7304 Valley Forge Rd. N. E., Albuquerque, NM 87109-5044.

Seeking contact with or information on **Howard Hostler,** an E-6 B-52 mechanic at Seymour Johnson AFB, N. C., 1959–61. **Contact:** SMSgt. Louis E. Shadday, USAF (Ret.), 562 Waring Way, Columbus, OH 43213-3475.

Seeking photographs of, diaries and anecdotes about, and letters regarding **3d Air Force. Contact:** Robert B. Sligh, Hq. 3d AF/HO, Unit 4840, APO AE 09459.

Seeking contact with **Ernest A. Cole, William Cook, Jack E. Cox, Richard E. Davidson, Thomas V. Gibson, and Wayne R. Henderson. Contact:** Maj. Charles D. McCamey, USAF (Ret.), 818 Briddlewood St., Beavercreek, OH 45430-1404.

Seeking surplus a RCT-CFC **B-29 gunsight** and a **Norden bombsight. Contact:** James W. Johnson, 50 Puu Anoano St., Apt. #508, Lahaina, HI 96761-1955.

Seeking information on **B-25J-1NA #43-27712,** which served with 11th Air Force in Alaska from June 1944 to July 1946. **Contact:** James G. A. "Smitty" Smith, 6000 E. Valencia Rd., Tucson, AZ 85706.

Seeking the whereabouts of **Lt. E. J. Maveal,** a P-47 fighter trainee, possibly with the 121st AAF Base Unit, who was stationed at Bradley AAFB, Conn., in spring 1945. **Contact:** William Fasolo, 50 Hannah St., Bristol, CT 06010-3240.

Seeking a yearbook from the **4th Fighter-Interceptor Wing,** Kimpo AB, South Korea, published in 1952. **Contact:** Jack L. Casotti, 125 Santa Monica Ave., Channel Island Harbor, CA 93035-4684.

Seeking contact with **2d Bomb Group or 2d Bomb Wing** members who are not members of the 2d Bombardment Association. **Contact:** Kemp F. Martin, 806 Oak Valley Dr., Houston, TX 77024.

To help members of a support group for victims of stroke in the UK, seeking contact with USAF members who have **suffered a stroke. Contact:** Ian T. Mayne, Pentire, Stafford Rd., Penkridge, Stafford ST19 5AX, UK.

Seeking contact with **500th Bomb Squadron,** 345th Bomb Group, members who flew B-25s in the Pacific region, 1942–45. **Contact:** William J. Cavoli, 2320 Encino Cliff, San Antonio, TX 78529-2433.

Seeking contact with **Warrant Officer Neughar (Neugber),** stationed at Hq., 6606th Air Base Wing, Goose Bay, Labrador, Canada, in 1956. **Contact:** Franklin L. Haywood, 4209 Horseshoe Rd., Danville, VA 24541.

For a military aviation magazine, seeking contact with and photos from **Operation Desert Storm pilots. Contact:** Reinor F. S. Neto, Rua Batista de Oliveira, 1272, COB 402, Juiz de Fora, MG 36010-530, Brazil.

Seeking the whereabouts of airmen **George Fogg and Charles S. Greene, Jr.,** stationed with Army Airways Communications System Technical Control, Hickam AFB, Hawaii, 1956–59. **Contact:** Francis J. Graviano, 6153-G Edsall Rd., Alexandria, VA 22304-4185.

Seeking contact with **Undergraduate Pilot Training Class 69-04,** Craig AFB, Ala., for a class directory. **Contact:** Claude E. Branscome, 523 W. 14th St., Del Rio, TX 78840.

Seeking contact with **339th Fighter-Interceptor Squadron** members stationed in Chitose, Japan, 1955–57. **Contact:** Calvin Jones, 304 Beverly Ct., Melbourne Beach, FL 32951.

Seeking the whereabouts of **1402d (6555th) Guided Missile Squadron** members, stationed at Holloman AFB, N. M., and Patrick AFB, Fla., in 1951 or 1952, who were involved with the Martin Matador B-61 project. **Contact:** Richard E. Gross, 6468 Safford Terr., North Port, FL 34287.

Seeking contact with graduates of **Det. 840,** Southwest Texas State University, Tex. **Contact:** Holly S. Sutherland, Southwest Texas State University, AFROTC Det. 840 HAC, Room 108, San Marcos, TX 78666.

Seeking the whereabouts of **Sgt. Jeffrey French,** stationed with the 59th Fighter-Interceptor Squadron, Goose Bay, Labrador, Canada, 1963–64, and with the 366th Tactical Fighter Wing, 1966–67. **Contact:** Michael Lusby, P. O. Box 154, Arivaca, AZ 85601. ■

Pieces of History

Photography by Paul Kennedy

It Began in the Desert

Memorabilia from the collection of the National Atomic Museum, Kirtland AFB, N. M.

It first detonated in a test on July 16, 1945, at Alamogordo AAF, N. M. On August 6, 1945, the atomic bomb was dropped on Hiroshima, Japan, by a 509th Composite Group B-29, the Enola Gay. *Three days later,* Bockscar *dropped one on Nagasaki. Above are artifacts of the nuclear age—the first news of the blast, a badge worn by a technician on the once-secret Manhattan Project, a B-29 flight manual, and a container holding bits of nuclear weapons destroyed under recent treaties.*

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