July 2001/$4

AIR FORCE MAGAZINE

JOURNAL OF THE AIR FORCE ASSOCIATION

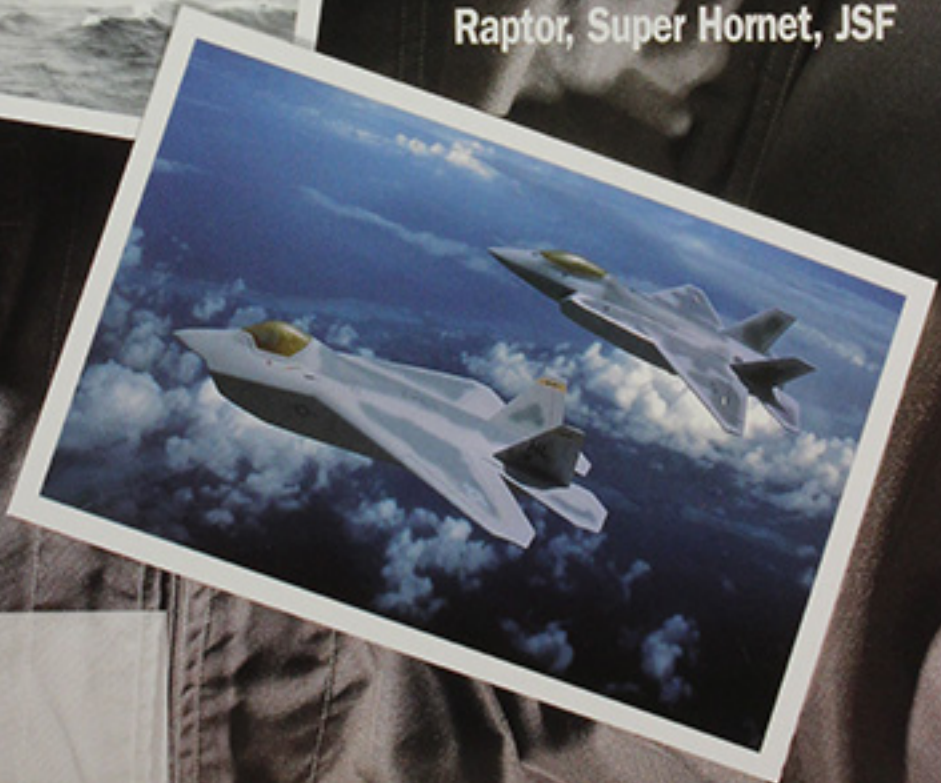
Smaller Bombs for Stealthy Aircraft

The Last Flight of Wang Wei

Space Watch, High and Low

The Three Fighters

Raptor, Super Hornet, JSF




LOCKHEED MARTIN
www.lockheedmartin.com
Proof Through Performance
This Joint Strike Fighter for the United States Air Force is totally uncompromised by STOVL requirements. The engine is in the right place – and the aircraft is about 3,000 pounds *lighter*. Which helps to explain a level of performance already proven in a fighter that brings flexibility today and growth for tomorrow. From the team best suited for the task: Lockheed Martin, Northrop Grumman and BAE SYSTEMS – the team with a JSF that is virtually identical to the one we will deliver. And it looks and flies like a fighter because it was designed as a fighter *first*.
a fighter first.

July 2001, Vol. 84, No. 7

AIR FORCE MAGAZINE

JOURNAL OF THE AIR FORCE ASSOCIATION

www.afa.org

About the cover: The F-22, F/A-18E/F, and Joint Strike Fighter (top to bottom) have unique yet complementary roles. See "The Three Fighters," p. 26. F-22 photo by Judson Brohmer. F/A-18 photo by Navy Airman Recruit Adam Plantz. JSF photo illustration by Erik Simonsen. Background photo by Paul Kennedy.

46

58

AIR FORCE Magazine (ISSN 0730-6784) July 2001 (Vol. 84, No. 7) 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:** $36 per year; $90 for three-year membership. **Life Membership (nonrefundable):** $500 single payment, $525 extended payments. **Subscription Rate:** $36 per year; $29 per year additional for postage to foreign addresses (except Canada and Mexico, which are $10 per year additional). Regular issues $4 each. USAF Almanac issue $6 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.

Editorial

By John T. Correll, Editor in Chief

Rumsfeld's Review

WHEN the Bush Administration took office six months ago, it was greeted with enormous goodwill by the defense community. The armed forces, used hard and poorly supported in the Clinton era, were in bad shape.

After years of underfunding and lack of force modernization, the services are in bad shape. Airplanes and other weapons are wearing out. Readiness is down. The services need at least $50 billion more a year just to avoid further deterioration.

The Bush campaign had promised a stronger defense and said that "help is on the way." The return of the tough-minded former Secretary of Defense Donald Rumsfeld was taken as another good sign.

Things did not happen as expected. The new White House team concentrated its energy on a tax cut. Decisions about a defense increase were set aside, pending a review of requirements by Rumsfeld.

The President told Congress, "Our military was shaped to confront the challenge of the past, so I have asked the Secretary of Defense to review America's armed forces and prepare to transform them to meet emerging threats."

Other descriptions of the coming review were similar.

Rumsfeld decided to conduct his study behind closed doors, relying on a limited number of trusted insiders. He was no doubt aware that previous reviews, including the Quadrennial Defense Review (QDR) in 1997, led to little change, largely because vested Pentagon interests ambushed any ideas that threatened them.

This time, however, the secrecy would lead to a different set of problems.

The strategy review was to be done by Andrew Marshall, 79, director of the Office of the Net Assessment, cult figure in the Pentagon, and leading prophet of the technological Revolution in Military Affairs. More than a dozen panels were also appointed to study other matters.

On May 8, Rumsfeld announced a major initiative to put more emphasis on space and make the Air Force the Department of Defense's executive agent for space, but that announcement was an exception. Those who knew what the panels were doing weren't talking.

The review eclipsed the QDR, which went into standby mode. Rumors abounded: Rumsfeld was going to kill a fighter program, dump the two-conflict standard for sizing the armed forces, cut big deck aircraft carriers, cut Army divisions.

The closed-door approach led to problems, and they are not over yet.

There was no visible effort to correct the rumors or the expectations. Discontent, alarm, and confusion grew. It spread from the armed forces and Congress to the news media.

Rumsfeld, surprised by the misunderstanding, launched a news media blitz. He said the services had not been excluded from the review. There had been many meetings, but it was not possible to meet with everybody.

As he explained it, the big study wasn't that secret, nor was it that big. The panel work was exploratory in nature. If some expected a Rumsfeld plan for reorganizing the military, 'it certainly never came out of my mouth that way," he told PBS.

No decisions had been made about weapons or programs. The issue of troop cuts had never come up. Defense strategy might not change. The panel findings would be rolled into a souped-up QDR.

After a meeting with Rumsfeld May 24, Sen. Carl Levin, the new chairman of the Senate Armed Services Committee, said: "I don't have a good grasp on where the Secretary is headed. I don't think the Secretary has a good grasp on where the Secretary is headed."

Revelation of the grand plan was said to be just around the corner. Informed sources said Bush would declare the new defense strategy in a speech at Annapolis May 25. His statement was good, but limited and short: "I'm committed to building a future force that is defined less by size and more by mobility and swiftness, one that is easier to deploy and sustain, one that relies more heavily on stealth, precision weaponry, and information technologies."

In June, the panel leaders began talking publicly, but they did not attribute their views or proposals to Rumsfeld.

The Administration proposes a defense budget supplement of $5.6 billion for this year, which barely dents the requirement. Further increases may be coming in the "placeholder" budget in 2002 and the "transformation" budget in 2003.

However, the once-huge federal surplus is vanishing fast, gone to pay for the tax cut and other federal programs that got in line ahead of defense. Bush and Rumsfeld will need large amounts to correct critical problems in defense and to pay for recapitalization and readiness. And that covers only the "help is on the way" problems. Transformation costs would be extra.

Despite all that has happened, many defense people still give Rumsfeld a "wait and see" professional courtesy. Some of his support is likely to diminish, however, when and if he begins identifying specific programs as bill payers for his plans.

Rumsfeld may not have perceived himself as moving mysteriously or secretively, but many others saw it that way. His approach may have alienated some who would have been his allies. Conducting business behind closed doors has never worked in Washington.

There is genuine support for transformation and for the strengthening of national defense. To gain and channel that support, Rumsfeld is going to have to build some consensus. And soon. ■

THERE IS NO SECTION TITLED,

"THE UNFAIR USE OF TECHNOLOGY"

IN THE GENEVA CONVENTION.

The Joint Strike Fighter represents the next generation of advanced strike aircraft to dominate the skies. Pratt & Whitney is proud to lead the propulsion team on a project that has met or exceeded its performance requirements. The JSF is quicker, more agile and has a greater combat radius than any other strike fighter. It is survivable, it is lethal and it may even be a little unfair. Pratt & Whitney. *SMART ENGINES FOR A TOUGH WORLD.*

Pratt & Whitney
A United Technologies Company

www.pratt-whitney.com

Letters

letters@afa.org

From Khobar to *Cole*

No doubt retired Brig. Gen. [Terryl J.] Schwalier paid a large price for being the commander of an installation suffering destruction and death by terrorism. *[See "Letters: There's More to the Story," May, p. 4, and "From Khobar to* Cole, *March, p. 48.]*

The American [military] is trained for warfare but is so far unable to cope with guerrilla tactics. USAF especially—as a technical force—is ill-suited for defense against highly motivated, suicidal, fanatical attackers. Nor can USAF be expected to avoid all harm in hostile territory.

Civilian leadership has always sacked star ranks when things go badly. To expect successive elected and appointed officials to learn from the past is absurd. Each Administration concocts its own set of blunders and how to deal with our military in servicing those decisions. Star ranks need not think they are somehow extraordinary and above being sacrificed in Washington's public relations maneuvers.

Wendell Lepic
Delevan, Wis.

Bravo, Terry Schwalier. When you know you're right, don't give up the fight. Your comments made sense, were well thought out, and from the heart.

Timing is everything. How would [Defense Secretary William S.] Cohen have reacted if the timing of the *Cole* and Khobar incidents had been reversed? Let's hope that our new SECDEF has the professional integrity and desire to put politics and personal career aside when dealing with issues of such significance.

Investigate incidents and then act according to the facts, not what will "sit well" in Washington. All of us who have worn the uniform know what it means to focus on the mission and live the phrase "duty, honor, country." Let's hope the new Administration knows what it means and acts accordingly.

Col. John Doolittle
AFRC (Ret.)
Bodega Bay, Calif.

More on Sea-Going U-2

Gerald P. Hanner's letter *["U-2 at Sea," May, p. 12]* prompts me to add some additional details to the colorful history of the U-2. I was a pilot and operations officer in the 4028th [Strategic Reconnaissance Wing] from 1963 to 1973 and participated in some bizarre uses of the U-2, as unusual, I think, as carrier operations.

Some U-2E models did have air refueling capabilities. While I know of only a few operational missions on which air refueling was employed, many of us were qualified in air refueling and maintained our currency with a select few C-135 crews that were capable of carrying our special fuel.

[Refueling] was somewhat dangerous since the jet wash of a C-135 was probably capable of separating a U-2's tail feathers from its fuselage. Our approach to the tankers was very cautious and unconventional. U-2 #680 on display in the Air and Space Museum in Washington, was at one time an air refuelable model.

From my viewpoint, an even more unusual use of the U-2 was to "chase" that era's high-altitude drone craft. Our wing was experimenting with Ryan Firebee drones during the Vietnam War, seeking to get photography without risking a pilot to fairly lethal [surface-to-air missiles].

Another pilot, Willy Lawson, and I were tasked to develop a method of flying formation on the drones to give their controllers a set of eyes to determine control responses. It seems that the drones tended toward independent action when given various maneuvering commands. We at first tried to intercept the drones at about 60,000 feet after they had been launched from their mother C-130s. I found this to be a harrowing operation since the drone was cruising at about Mach .62, was small and hard to see, and the U-2 was not designed for rapid roll rates at those altitudes.

After nearly getting rammed by a couple of drones, we asked for permission to fly formation with the mother bird and "join up" with the drone from launch at a much lower altitude.

Though the drone climbed at a higher speed than the U-2's planned 160 knots, by operating in "gust" position (ailerons tilted up about 10 degrees from faired) we could climb at the higher speed of about 220 knots for which the drone was programmed.

I eventually completed a number of formation flights with the drones and thought at one time of claiming the world's record for formation flight above flight level 600. Perhaps by now someone else has eclipsed that feat. If not, I offer about 20–25 hours on the wing of another airframe in formation above 60,000 feet as an aeronautical record of sorts.

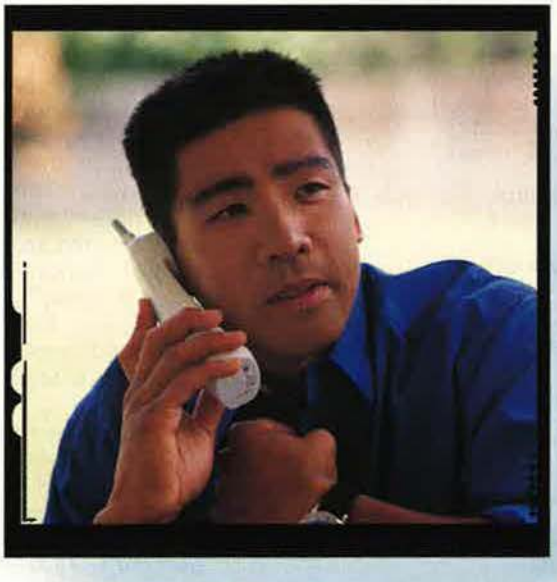
Lt. Col. Ward G. Graham,
USAF (Ret.)
Manns Choice, Pa.

We read the "When the U-2 Went to Sea" article *[February, p. 60]* with great interest, and it is, as usual, a great article by Norman Polmar. There is one area, however, in which we offer some corrections.

And to set the scene, both of us were attached to Fleet Operational Investigation 265, better known as FO265. We were based in the Lockheed Missiles and Space plant in Sunnyvale, Calif.

FO265 was formed in the early 1970s with the specific task of evaluating the U-2 as an ocean surveillance platform. The first phase of the testing was under the program name of Highboy. The sensors in the U-2 were not quite as listed in the Polmar

Do you have a comment about a current article in the magazine? Write to "Letters," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. (E-mail: letters@afa.org.) Letters should be concise and timely. We cannot acknowledge receipt of letters. We reserve the right to condense letters. Letters without name and city/base and state are not acceptable. Photographs cannot be used or returned.—THE EDITORS



"I keep it simple. So I called USAA to consolidate my accounts."

USAA Fund Marketplace.® Why have several investment accounts with different companies, when you can have one account with a company you trust—USAA Investments. USAA Fund Marketplace allows you to hold or consolidate non-USAA mutual funds in a single USAA brokerage account. We offer an extensive selection of over 6,000 funds from America's most prominent fund families such as Janus, Vanguard and Invesco. You'll receive streamlined investment records for tax reporting, and one monthly statement reflecting your entire portfolio. With USAA Fund Marketplace, you keep your fund choices, you do business with a company you trust, and you make it easier to manage your portfolio. So take a step toward simplifying your life.

Call us today at 1-800-645-6816
or visit us at usaa.com

USAA

We know what it means to serve.®

INSURANCE · BANKING · INVESTMENTS · MEMBER SERVICES

For more information and a prospectus on any of the funds in USAA Fund Marketplace, please call. • Transaction fees for nonproprietary funds can be avoided by purchasing directly from the fund family. • USAA Brokerage Services (USAA Investments) is a discount brokerage service of USAA Investment Management Company.

AIR FORCE
JOURNAL OF THE AIR FORCE ASSOCIATION MAGAZINE

Publisher
John A. Shaud

Editorial afmag@afa.org

Editor in Chief
John T. Correll

Executive Editor
Robert S. Dudney

Senior Editor
John A. Tirpak

Associate Editor
Tamar A. Mehuron

Managing Editor
Suzann Chapman

Assistant Managing Editor
Frances McKenney

Director of Production
Robert T. Shaughness

Art Director
Guy Aceto

Assistant Art Director
Cathy Cavanaugh

Research Librarian
Pearlie M. Draughn

Editorial Associate
Chequita Wood

Administrative Assistant & Staff Editor
Juliette Kelsey Chagnon

Advertising adv@afa.org

Advertising Director
Patricia Teevan
1501 Lee Highway
Arlington, Va. 22209-1198
Tel: 703/247-5800
Telefax: 703/247-5855

Industry Relations Manager
Nicola C. Whitlock • 703/247-5800

US and European Sales Manager
William Farrell • 847/295-2305
Lake Forest, Ill.
e-mail: BFarr80708@aol.com

BPA Circulation audited by Business Publication Audit

Letters

article. There was no [infrared] sensor during any of our tests but rather a visual imaging device which provides real-time images of surface targets via real-time-data link to our command center ashore. There was also an [Electronic Warfare] installation to detect and downlink electronic signatures as well as the information from the radar listed by Polmar.

During Project Highboy, a series of tests were conducted off the West Coast with data being downlinked to a command and control installation located in the Lockheed plant at Sunnyvale. The system proved to have potential, but the level of ocean activity in the area just offshore of the central California area did not provide sufficient traffic to properly test the system. Political considerations [canceled use of] the Mediterranean [as test site for] high density shipping area.

Upon cancellation, a suite of the Highboy command center equipment [was installed] in USS *Kitty Hawk* as a prototype Tactical Flag Command Center. FO265 was tasked to support *Kitty Hawk* with real-time multisource ocean surveillance information via a direct data link from the FO265 command center ashore. The multisource data was then merged with *Kitty Hawk* local sensor data and displayed on a large-screen display in Flag Plot as *Kitty Hawk* transited from San Diego to Hawaii en route to West Pac.

In fact, FO265 was deeply involved in Outlaw Hawk but the EPX did not participate. For us in FO265, it became apparent that there was a rather large vacuum in multisource correlation, on the operational level, both within the Navy and between services. Outlaw Hawk was an effort, and not welcomed with open arms by the Intelligence Community, to illustrate the value of the correlation of data from multiple sources, in real-time sense, for operational use by commanders at sea. In Outlaw Hawk, working from a command center, manned by experts in various sensor areas, once again in the Lockheed plant at Sunnyvale, information of use to USS *Kitty Hawk* during her transit was data linked directly to the ship. It should be noted that on a number of occasions during the transit this data was able to provide advance information on contacts that the task group did not contact until 12 to 24 hours later.

Capts. Fred Carment, John Dillon, USN (Ret.)
Ponte Verde Beach, Fla.

Air Force Association
1501 Lee Highway • Arlington, VA 22209-1198

Telephone: (703) 247-5800
Toll-free: (800) 727-3337

Press 1 *if you know your party's extension.*
Press 3 *for Member Services.*
(For questions about membership, insurance, change of address or other data changes, magazine delivery problems, or member benefit programs, select the "Member Services" option.)
Or *stay on the line for an operator to direct your call.*

Fax: (703) 247-5853

Internet: http://www.afa.org/

E-Mail Addresses

Field Services ..... **fldsvcs@afa.org**
Government Relations ..... **grl@afa.org**
Industry Relations ..... **irl@afa.org**
Information ..... **information@afa.org**
Member Services ..... **service@afa.org**
Policy & Communications (news media) .... **polcom@afa.org**

Magazine

Advertising ..... **adv@afa.org**
AFA/AEF Report ..... **afa-aef@afa.org**
Editorial Offices ..... **afmag@afa.org**
Letters to Editor Column..... **letters@afa.org**

Aerospace Education Foundation ..... **aefstaff@aef.org**
Eaker Institute ..... **eaker@aef.org**
Air Force Memorial Foundation ... **afmf@afa.org**

For individual staff members
first initial, last name, @afa.org
(example: jdoe@afa.org)

AFA's Mission

To promote aerospace power and a strong national defense.

To support the needs of the Air Force and Air Force people.

To explain these needs to the American people.

How Many Runways?

The [USAF] Almanac, as always, is excellent. One note: The instructor pilots and their students taking off and landing on the center and outside runways would be shocked to learn Vance AFB [Okla.] has only one 5,000-foot runway.

MSgt. Boyd A. "Bud" Hemphill Jr.,
USAF (Ret.)
Maxwell AFB, Ala.

■ *Vance now reports they have five runways: 5,038; two at 9,200; 5,100; and 4,956 feet.—THE EDITORS*

Those Other Aces

While reading the rosters of leading USAF (and predecessor organization) aces ["Air Force *Magazine's Guide to Aces and Heroes," May, p. 65.],* I wondered why those who fought for our allies prior to US involvement and then joined USAF were not listed.

I refer to such organizations as the Lafayette Escadrille, American Volunteer Group (Flying Tigers), and RAF Eagle Squadron. For example, Maj. Raoul Lufbery had 17 confirmed victories with the Lafayette Escadrille before joining the 94th Aero Squadron, where he met his death. Similarly, there were at least four double aces of the Flying Tigers, some of whom served in the AAF following their AVG tour.

My point is that all of these pilots were carrying out American policy, although unofficially, and every enemy aircraft they downed contributed to eventual victory for the US and our allies. They should be recognized as "official" USAF aces.

MSgt. Bill Brockman,
Georgia ANG
Robins AFB, Ga.

■ *Those aces were officially flying for France when they became aces; however, we have recognized their contributions, most recently for the Lafayette Escadrille in December 2000 and for the Flying Tigers in June 1999.—THE EDITORS*

About Those P-38s and WASPs

Political correctness often produces articles that are grossly incorrect and uniformed. Such was the article about WASPs and the P-38. As a 19-year-old second lieutenant with less than 300 hours flying time, I was assigned to the 27th Fighter Squadron in North Africa in August 1943. My experience and attitude parallels that of retired Lt. Col. [Philip] Taback. *[See "Letters: The WASPs," May p. 10.]*

Along with five other pilots, we were [all] overjoyed to be assigned to P-38s. After four or five flights in the local area, I went to war in that aircraft in complete confidence. Like Taback, I flew other fighters, and after 30 years and some 16,000 hours, I never flew any other aircraft that even came close to the P-38 in its ability to get the job done and bring the pilot home. It was a pure delight to fly, and all of the critical crap that has been written about it is just that.

I also towed targets for a while in the Martin B-26 (which flew without a co-pilot, only a crew chief and tow reel operator). The few targets that were shot off by P-47s were invariably cut just ahead of the target and simply indicated a slight overlead and certainly no problem for the tow airplane. Complaints about "tracers coming too close" sounds like more stretching for glory than fact. If that ever happened, our procedure was to immediately drop the target and woe be unto the pilot who caused the loss of the rest of the firing mission. I only know of one such case.

Lt. Col. Frank Lawson,
USAF (Ret.)
Montgomery, Ala.

[The] letter from Taback [talks] about the P-38 being a great fighter. While I was not a pilot in World War II, I was a mechanic/crew chief on P-39s and P-38s and also view the P-38 as an outstanding fighter. However, I have to correct Taback's remarks about being a witness to the tragic accident of Evelyn Sharp in Long Beach, Calif. Evelyn Sharp, also known as "Sharpie," met her death after takeoff on April 3, 1944, from Harrisburg, Pa. A photo of that P-38J, #43-28750, flown by her is shown on p. 245 of the book *Sharpie* (written by Diane Ruth Armour Bartels). The photo illustrating the P-38J crash on the ground shows no evidence of its having rolled over on its back, but [the aircraft] appeared to have struck the ground in a relatively flat, upright attitude with the major components all in one piece.

During early 1945 the 24th Fighter Squadron started replacing its P-39s with P-38Js and P-38Ls. By October 1945 [its pilots] had suffered a number of fatal accidents. At least two were the result of compressibility dives, one weather related, and one in-flight engine fire.

Yes, the P-38 was a beautiful airplane, but maintenancewise it was a lot of work compared to the P-39s we had prior to 1945. I still have scars on my hands from some of the engine changes we made. We only had a crew chief and assistant on P-39s. The P-38s had a crew chief, assis-

tant crew chief, and one or two other mechanics, plus all the prop, radio, and armament work being done by those specialists.

On the P-39 you could change an engine without touching the prop and do it in less than a day, but a P-38 engine change was about a three-day job. I am sure some crew chiefs could beat those times when the situation required it.

Robert L. Taylor,
President, Antique Airplane Assn.
Ottumwa, Iowa

Four-Engine Fighter

Regarding your "Flashback" in the May issue *[p. 110],* I take some exception to the accompanying data. Aircraft #41-24341 was originally the second G model off the Boeing production line before its conversion to the XB-40 test platform, not a modified F model.

After the gunship program was [deemed] impractical, the aircraft were depot overhauled to remove the excess armament and converted to the conventional G configuration and assigned to various Eighth Air Force units. One of the 14 aircraft, going overseas, crashed en route on the Isle of Lewis and one, #42-5735, was lost in action June 22, 1943.

Robert D. Elliot
Newbury Park, Calif.

Stretch That Hercules

Regarding the first C-130J-30 for the Air Force: "It's about time!" I wonder why it took [Air Mobility Command] and its predecessor [Military Airlift Command] so long to wake up to the capabilities offered by the "stretched" Hercules. During part of my career in the Air Force airlift business I worked as a load planner. We were all aware of the increased capacity offered by the L-100-30s. C-130s flying from Kadena or Yokota [ABs, Japan] to Korea were nearly always underutilized. An L-100-30 on the same route could deliver two more pallets and still be well under its [allowable cabin load]. Other air forces and airlines figured this out over 20 years ago. Given the increased capability of the C-130H over the C-130E I have often wondered why the Air Force [did not] go with the more capable stretched version then—especially when you consider what the stretched C-141B did for MAC 20 years ago.

SMSgt. Mitchel D. Parker,
USAF (Ret.)
Seoul, Korea

For the Record on Mule Train

I thoroughly enjoyed the article on Mule Train. *[See "Mule Train," February, p. 70, and "Letters: Mule Train Memories," April, p. 8.]* The C-123 was an extremely reliable, rugged, and slow aircraft. We had great aircrews and maintenance. I know—I have 5,200 hours as a flight mechanic on the aircraft.

Furthermore, you mentioned me in your [article] as the first [C-123] airman wounded [by Vietcong ground fire] in Vietnam. However, I was the first Air Force person to be wounded and awarded a Purple Heart in Vietnam after President Kennedy directed the Purple Heart would be awarded for wounds received in action in Vietnam. In addition, we were flying near Bien Hoa dropping flares and not on approach to Saigon as mentioned in your article.

CMSgt. Howard W. Wright,
USAF (Ret.)
Schmitterhof, Germany

Not a Tanker

I read with interest a reader's suggestion *["Letters: Why Not a KC-17?" April, p. 9]* that USAF procure 150 C-17s as a replacement tanker. The C-17 is a great plane in the role for which it is designed, but turning it into a tanker will almost undoubtedly result in fewer airframes than we really need as well as a tanker that can do things tankers don't need to do!

USAF needs an airframe with the lowest development cost and the lowest price per unit delivered in order to have the number we really need. Any of Boeing's 7XX series could probably do the job. The KC-10 might provide the lowest fly away cost per unit if it were possible to restart production.

Hopefully, the USAF Tanker Replacement Study will reach a sound, if not similar, conclusion.

Jack DeForrest III
Ramstein AB, Germany

Corrections

May issue corrections: On p. 56, the age of the F-117s should read:

Number	Years
5	9–12
18	12–15
23	15–18
9	18–21

Average Age: 15.5 years

On p. 89, the 6th Air Refueling Wing is now the 6th Air Mobility Wing.

On p. 92, we failed to list the most current NATO military command structure, which has been undergoing a reorganization that will result in two Strategic Commands, one for the Atlantic and one for Europe and involves reducing the number of command headquarters from 65 to 20. The process is expected to continue through 2003. Last year, under Allied Command Europe, the headquarters of Allied Forces Northwest Europe and Allied Forces Central Europe merged to form Allied Forces North Europe (AFNORTH) in Brunssum, Netherlands. Its air force component is Allied Air Forces North (AIRNORTH) at Ramstein AB, Germany.

On p. 112, the correct telephone number for Aviano AB, Italy, from CONUS is 011-39-0434-667111.

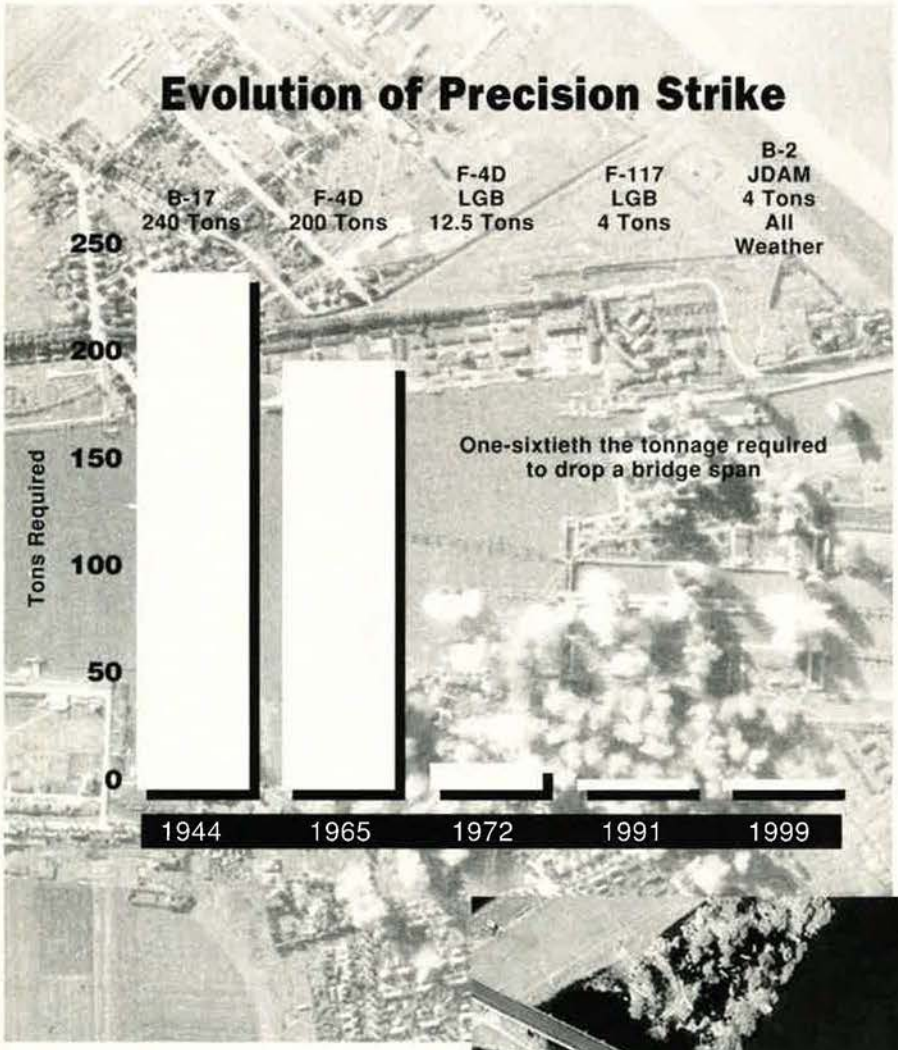
On p. 125 under Syracuse Hancock IAP, N.Y., the 152nd Tactical Control Group was redesignated the 152nd Air Operations Group; the 108th and 113th Tactical Control Squadrons no longer exist.

On p. 140, the RQ-1A Predator was first delivered to DOD in July 1994; USAF took over the system in July 1996; the Rotax 914 engine is turbocharged.

The Chart Page

By Tamar A. Mehuron, Associate Editor

To Bomb a Bridge



In 1944, attacking B-17s had to drop roughly 240 tons of bombs, on average, to be sure of destroying one German bridge. Even then, mission success required daylight and fair skies. By 1965, F-4D fighters could destroy a North Vietnamese bridge by dropping 200 tons of unguided bombs. Again, daylight and clear skies were required.

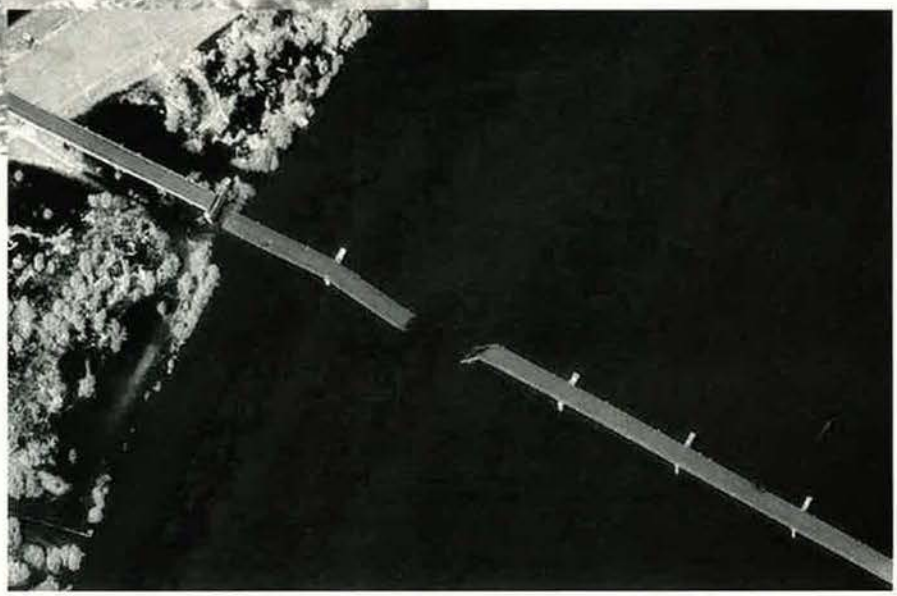
By 1972, however, new Laser-Guided Bombs made possible attacks of previously unthinkable accuracy. The same F-4Ds were suddenly able to drop a span with just 12.5 tons of bombs. This marked a stunning decrease of 95 percent from the World War II standard. Even so, bad weather could still thwart success.

The Persian Gulf War of 1991 marked another advance. Stealthy F-117s, operating at night, required just four tons—that is, four 2,000-pound LGBs—to take out an Iraqi bridge.

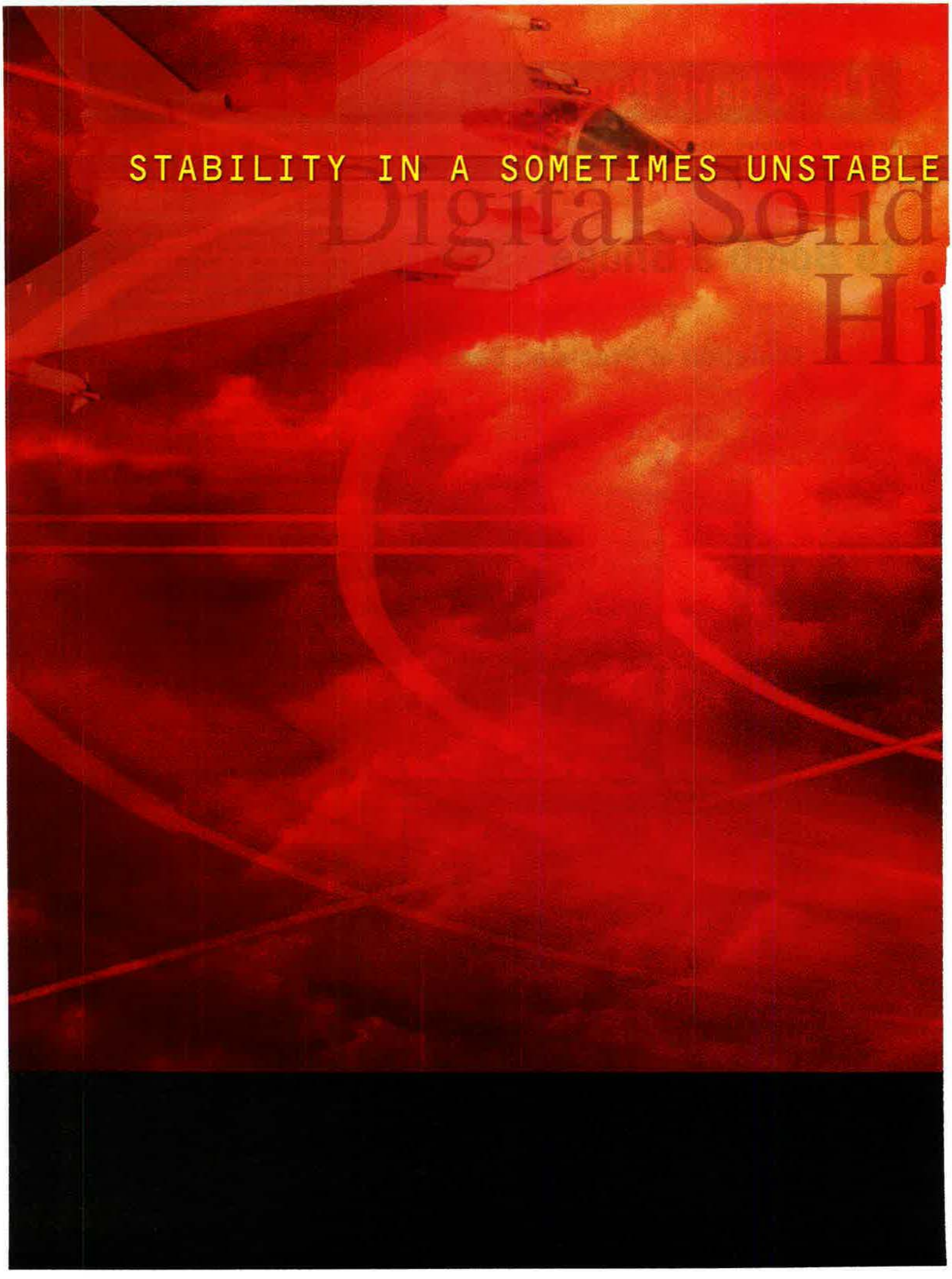
Eight years later, during Operation Allied Force, B-2 bombers over Serbia could destroy a bridge with four tons of GPS–guided Joint Direct Attack Munitions, in all kinds of weather.

Today, Air Force planners are working on a small diameter bomb weighing a mere 250 pounds. It will carry the explosive power of today's 2,000-pounders.

Source: USAF



Then and now. *The photo above shows a concentration of bombs laid over Brunsbuttel Locks in Germany in World War II. At right is a poststrike photo of a bridge bombed in Serbia during Allied Force.*


STABILITY IN A SOMETIMES UNSTABLE

ENVIRONMENT.

V-80

MDR-80

SSMDR

ME-1000

V-83

We've been the leading supplier of airborne video recorders since 1975. Over 20,000 airborne recorders for 35 different aircraft types in 24 countries worldwide. Today our role is to combine airborne MPEG-2 digital video recording with other key functions like video burst receive/transmit, mission data loading, 1553, and ACMI recording.

Consider it done.

Our new digital solid state MDR-80 offers all the plug-in configurations you'll need with over 50 combinations. And conveniently, our new solid state MDR-80 fits in your existing V-80 Hi-8mm airborne tape recorder slot. Speaking of Hi-8mm tape systems, digital options for our V-80/V-83 also include video burst transmission, multisync playback station and more. Whether it's digital solid state or Hi-8mm, if you want reliable solutions with worldwide support, call us. You'll like the TEAC environment.

www.teac-recorders.com
Tel. 323-727-4866 • Fax 323-727-4877
e-mail: airborne@teac.com

If it's worth a mission, it's worth a

TEAC®

Airborne Products Division

Aerospace World

By Peter Grier

Senators Target Dress Code in Saudi Arabia

Five Republican Senators sent Secretary of Defense Donald H. Rumsfeld a letter requesting a review of the military's strict dress code for USAF women based in Saudi Arabia.

Their request, reported in *USA Today,* comes in the wake of a public complaint by Lt. Col. Martha McSally, the senior female fighter pilot in the Air Force, that the current US military policy of requiring her to wrap herself in a fully covering robe and scarf while off base discriminates against women.

The Saudi government does not require foreign women to wear the garb, known as an abaya, but it does request that they dress conservatively. It is the US military, rather, that has imposed the requirement.

The current policy could violate service members' "rights and liberties as US citizens," said the letter, signed by Sen. Bob Smith of New Hampshire, Sen. Jesse Helms of North Carolina, Sen. Don Nickles of Oklahoma, Sen. Susan Collins of Maine, and Sen. Larry Craig of Idaho.

Smith Slams Army Over ASAT Program

The Air Force should perhaps assume control of the Army's Kinetic Energy Anti-Satellite research, as it appears the Army leadership is less enthusiastic than it should be about the program, said a member of the Senate Armed Services Committee during a May 10 hearing.

Sen. Bob Smith (R–N.H.) has long been a KE-ASAT advocate. Memos obtained by his office indicate that much of its funding has been used by the Army for support activities that do not bear on the program's central effort—construction of three kill vehicles that might be fired at adversary space assets.

Secretary of Defense Rumsfeld recently announced consolidation of space operations under Air Force control, Smith reminded Thomas E. White at the confirmation hearing for White to become Army Secretary.

"If the Army is not going to be supportive of getting this program back on line, then maybe we ought to look at the Air Force," Smith said.

USAF photo by SSgt. Adrian Cadiz

Honoring the Doolittle Raiders, Maj. Gen. Thomas Waskow, Pacific Air Forces director of air and space operations, and retired Maj. Gen. David Jones place a wreath on a memorial at the National Cemetery of the Pacific in Honolulu. Jones was a B-25 pilot in Jimmy Doolittle's group, which on April 18, 1942, carried out the first raid on the Japanese home islands in World War II.

Air Force Seeks Top Civilian Workers

An Air Force civilian employee looking for ways to enhance his or her leadership and management potential may find useful opportunity in two development programs.

The Air Force Civilian Competitive Development Program will select 104 employees from grades GS-12 through GS-15 who are nominated by senior leaders for a variety of management development activities.

The Defense Leadership and Management Program will select an additional 50 to 60 qualified Air Force candidates from the GS-13 through GS-15 range for a comprehensive program of professional development carried out over a six-year period. Participants must finish a 12-month rotational assignment, senior-level professional military education, and at least 10 graduate-level courses in a broad array of subjects.

For both programs, commanders must submit nominations to the Air Force Personnel Center, HQ AFPC/DPKD, by Aug. 3.

UK Forces Receive First C-17

The first of four C-17 Globemasters ordered by the United Kingdom was delivered to RAF Brize Norton on May 23.

The RAF is procuring the aircraft under an innovative arrangement whereby they lease the airplanes themselves from manufacturer Boeing while obtaining support arrangements through US Air Force foreign military sales.

"This is the first time the Air Force has partnered with a NATO country to provide for a commonly used airframe," said Maj. Brent Polglase, chief of the C-17 spares and readiness integrated product team.

GAO Says Navy Courts Danger in Littorals

The US Navy lacks crucial capabilities that would enable it to operate more safely in coastal waters, ac-

Army Supporters Lash Out at Technology, Missile Defense, Airpower, and Spending "Rat Hole" in Space

In May—convinced, apparently, that the Army was going to lose big in the defense review being conducted by Secretary of Defense Donald Rumsfeld—Army supporters came out swinging. Among the targets of their wrath were technology, the space program, national missile defense, and the Air Force.

Out front, leading the charge was retired Gen. Gordon Sullivan, former Army Chief of Staff and now president of the Association of the US Army.

He told a breakfast audience May 10 that those who want to "rack and stack the priorities" and "make the Army small" ought to "get a grip."

Sullivan warned that "countless billions" might be spent on space. "Look up at the sky and see how much money you want to pour into *that* rat hole," he thundered.

There was no direct mention, however, of Rumsfeld, who had increased the emphasis on space and who, two days previously, had designated the Air Force as the Department of Defense's executive agent for space

(About the same time Sullivan was declaring space to be a rat hole, "Defense Week" newsletter was reporting Army concern that the Air Force had been given too great a share of the space program, in which the Army was vitally interested.)

In a follow-up speech on May 19, Sullivan said "the ugly realities of conflict" cannot be avoided by "spending hundreds of billions of dollars on weaponizing space, developing NMD [National Missile Defense], and buying long-range precision weapons."

He said, "Diminishing the capabilities of our major ground force to support or finance untested technological solutions and theories for the distant future is, in my opinion, ill advised."

But Sullivan was not categorically opposed to increasing some parts of the defense budget to support or finance others. He said that "the Army's share of the defense topline must, must go up."

The *Army Times* then picked up the cry with an editorial, "Army Does the Heavy Lifting," in its May 28 issue, declaring that "emasculating the world's best Army to pay for costly Air Force fighter programs and a plethora of precision guided munitions is neither wise nor prudent."

The editorial was accompanied by a long article, "Army vs. Air Force: The War at Home." The key issue, it said, was this: "Should airpower—with its reliance on long-range fires—dominate America's military strategy, or are ground forces still the heavy hammer required for decisive victory?"

The article was built around assertions by an unnamed "senior military official" who said that dependence on airpower was risky and that "the effects of airpower are temporary."

In Operation Allied Force in the Balkans in 1999, the official said, the Air Force spent 78 days pounding "an impoverished nation" with "the 38th largest Army in the world" without accomplishing a single one of the assigned objectives.

(In a *Washington Times* op–ed column in March, Sullivan said the decisive element in the Balkans had been the threat of ground power—even though ground forces were not engaged—rather than airpower, with which the operation was conducted. Likewise, in the 1991 Gulf War, "ground forces achieved in 100 hours what airpower could not achieve in six weeks of around-the-clock bombings," Sullivan said.)

The *Army Times* article said the "vaunted" Kosovo air campaign killed about 1,500 civilians and struck the Chinese Embassy in Belgrade by mistake. "I'm not saying the Air Force did anything wrong," the senior military official told *Army Times*, but added that "the morality of bombing has to be called into question."

(That expanded on the accusation, made by Sullivan in his op–ed column in March, that some airpower theorists "advocate relaxing the targeting restrictions imposed by the law of war to enable direct attacks on civilian targets in order to inflict punishment on the population in hopes of generating opposition to their regime.")

The official who shared his thoughts with *Army Times* said also that the Air Force was avoiding investment in airlift, needed to transport the Army, in order to buy fighter aircraft that he said were not needed.

The article wound up with the anonymous senior official saying that Army leaders "are the loyal subordinates who play by the rules and avoid taking [their] case to Congress and to the press."

—John T. Correll

cording to a new General Accounting Office report.

Among other things, Navy warships in close-in waters remain vulnerable to mines and land-based cruise missiles. Nor does the service have enough means to project firepower in support of amphibious landings, according to GAO.

"Unless current efforts can be accelerated or alternatives developed, it will be another 10 to 20 years before the Navy and the Marine Corps will have the capabilities needed to successfully execute littoral warfare operations against competent enemy forces," said the report.

Send F-22s Here, Says Idaho Lawmaker

The initial operational F-22 unit should be based at Mountain Home AFB, Idaho, not at the Air Force's first choice of Langley AFB, Va.

That is the opinion of Idaho Republican Congressman Mike Simpson. He sent Secretary of Defense Rumsfeld a letter on April 26 saying that Mountain Home would be an "excellent choice" for the fighters, reported "Inside the Air Force."

Mountain Home "enjoys tremendous support from the surrounding community," wrote Simpson. "There is little to no threat of encroachment by the community, and there is ample space available for base expansion."

Air Force officials have said they prefer Langley because its operational F-15s could be swapped one-for-one for new F-22s, thus limiting the environmental impact of the change.

Mountain Home's 366th Wing, by contrast, has fewer F-15s in its force of mixed aircraft types.

US Strike Fighter Attracts New Customers

Six more US allies appear ready to invest money in Joint Strike Fighter development, according to a senior program official.

Britain has already agreed to pay upward of $2 billion to participate in JSF work. Now Italy and the Netherlands are close to signing on, with Turkey, Canada, Denmark, and Norway behind them.

"We've basically completed negotiations with the Italians . . . [and] with the Dutch," Jon A. Schreiber, director of international programs for the Pentagon's JSF office, told reporters May 9.

The Pentagon has projected that the winning JSF contractor could sell about 3,000 of the aircraft to allied air forces. But political uncertainty caused by the Administration's wide review of all defense programs has given competing aircraft, such as the Eurofighter and France's Rafale, a selling point.

Schreiber stated that competitors are beating down the doors in Rome

and Amsterdam and elsewhere, "saying, 'Hey, the Bush Administration doesn't even support Joint Strike Fighter. You'd better sign up with us.' "

Navy Aviator Faulted for Kuwait Accident

The naval aviator whose wrongly aimed laser-guided weapons caused a fatal accident at a Kuwait training range earlier this year was relieved of his squadron command in mid–May. He will retire from the military this summer.

No formal charges were filed against the pilot, Cmdr. David O. Zimmerman. However, following an admiral's mast, he received a written reprimand, which would have in effect ended his military career even if he had not chosen to retire.

An accident report found a variety of procedural faults underlying the March 12 accident, which killed six US and allied personnel gathered in an observation post at the Udairi range.

USAF photo by MSgt. Kenneth Fidler

SSgt. John Douglas cuts a metal frame. The structural craftsman and three other engineers from the 3rd Civil Engineer Squadron, Elmendorf AFB, Alaska, kept busy on an AEF deployment to Istres, France, in February. They did everything from fixing weed-eaters to erecting walls and painting parking ramp lines.

Air Force Seen as "Most Important" Military Service

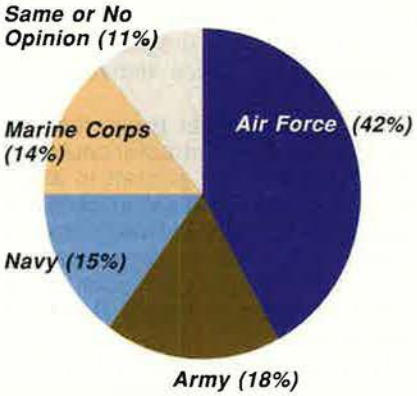
The Air Force, by a wide margin, "is considered to be the most important branch to the nation's defense," according to a new Gallup poll of American public opinion.

The Gallup News Service reported May 25 that the Air Force got the top rating from a whopping 42 percent of the public. No other service exceeded 18 percent in the public estimation. The results for the other branches were: Army, 18 percent; Navy, 15 percent; and Marine Corps, 14 percent. Eleven percent rated them the same or had no opinion.

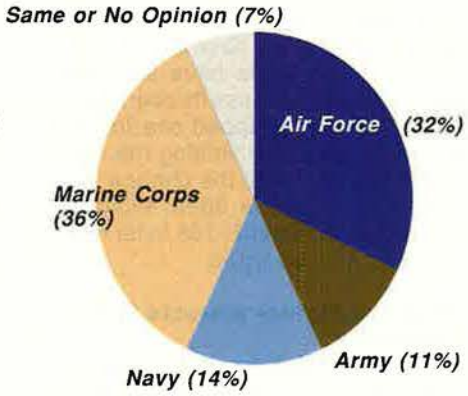
"Interestingly," the report went on, "the Air Force has long held this position of perceived importance in the eyes of the American public. Gallup polls conducted as long ago as the 1950s show that when given a choice, Americans have said the Air Force should receive more military appropriations than the other branches."

The Air Force and Marine Corps were viewed as the most prestigious of the four armed services, by far. Asked which armed service had the highest status, 36 percent of the public chose the Marine Corps, slightly edging out the Air Force's 32 percent. Both USAF and USMC far surpassed the Navy (14 percent) and the Army (11 percent). The other seven percent didn't express a preference.

Importance to National Defense



Prestige and Status in Society



Zimmerman, for his part, released three 500-pound bombs a few seconds too early. They were aimed at the source of a laser illuminating the actual target, not the target itself.

The report also faulted two others. One was the ground controller, Air Force SSgt. Timothy B. Crusing. For a moment Crusing looked at the individual illuminating the target at Zimmerman's request, losing track of the pilot's position, which prevented Crusing from calling for a mission abort in time. Crusing was seriously injured by the resulting explosion.

The other individual, Navy Lt. Patrick T. Mowles, was flying an F-14 above the area as airborne controller. According to the report, Mowles used improper terminology that may have misled Zimmerman about his position.

Anthrax Lawsuit Targets FDA's Role

A lawsuit filed in federal court the first week in May is seeking a court order forcing the US Food and Drug Administration to declare the military's anthrax vaccine an "experimental" drug.

This could seriously curtail DOD's ambitious anthrax vaccination program altogether, as it would mean the military could not administer the drug without the informed consent of recipients.

Previous attempts to challenge the program in court have generally cited constitutional grounds. To this point, all have failed.

"The ultimate purpose of this lawsuit

smiths

are your memory systems hard to tame?

airborne video solid-state recorder (AVSR™)

mass memory unit (MMU)

Are your videotape recorders and disk drives giving you a rough time? Are you wasting money and losing critical mission data because your memory systems won't work when you need them to? Get your problems under control with flight-proven solid-state video recorders from Smiths. Our systems provide gigabytes of solid-state mass storage, contain no moving parts, and record multiple-video, audio, and data channels. They're available with a wide variety of interfaces so you can remove and replace your current recorders with no wiring or software changes.

Are you ready to tame your tape recorder and disk drive problems? When you are, go with a company that has a proven track record. Go with a company that has flight-proven hardware. Go with Smiths.
email: fdbusdev@fsd.com Tel: +1 301 428 6477

engineering value in electronic systems

www.smiths-aerospace.com

is to open the eyes of the Pentagon and the new Administration and have them say, 'Enough is enough, this has to end,' " said lawyer Mark S. Zaid.

Zaid filed the suit in US District Court in Washington on behalf of Sonnie Bates, an Air Force major discharged last year after refusing the vaccine, and Capt. John E. Buck, an Air Force physician at Keesler AFB, Miss., who refused to take the vaccine. Court-martial proceedings against Buck began May 14.

The suit contends that the FDA licensed the anthrax vaccine in the 1970s for purposes other than that of biological warfare protection and that the agency needs to study the drug further before its safety in wide use can truly be determined.

Study Sees $80 Billion to $95 Billion Annual Weapons Cost

If President Bush pursues a military modernization plan similar to that of the previous Administration it might require annual average procurement budgets of nearly $80 billion for the next 15 years, according to Steven Kosiak, director of budget studies at the Center for Strategic and Budgetary Assessments.

The outgoing Clinton national security team intended to buy a range of next-generation systems such as the F-22, but not necessarily enough of them to replace current systems one-for-one. Doing that would cost even more—perhaps $95 billion annually, said Kosiak at a May 15 briefing in Washington. Current procurement budgets are around $60 billion annually.

A third option, which would skip next-generation weapons until even more advanced designs were available, would be somewhat cheaper, said Kosiak.

World War II Memorial Gains Final Approval

On Memorial Day, May 28, President George W. Bush signed into law a bill that orders construction of a monument to World War II veterans in the heart of Washington's National Mall. The move finally laid to rest an eight-year battle over the site and design of a memorial that will stand as a pivot point between the Washington, Jefferson, and Lincoln monuments.

The legislation nullified both a lawsuit filed in federal court to challenge the project and the recent decision of the National Capital Planning Commission to reconsider its approval of the memorial blueprint.

In the past Bush has noted that an average of 1,100 World War II veterans are now dying every day, and that of the 16 million US citizens who served in the war, only 5 million remain.

If any of these vets are to ever see what the nation has built in their honor, construction needs to begin now, the President said.

"In the 60th year after Pearl Harbor, it is my huge honor to set my name on this bill ordering construction of a monument that will stand for the ages," said Bush.

Ever since Congress first approved construction of a World War II memorial in 1993 critics have argued that it would intrude on the open vista between the Washington Monument and Lincoln Memorial. They have derided its columns and archways as kitschy and neo-authoritarian.

The $160 million project has already been scaled back in size by one-third. What remains are a 247-by-148-foot Rainbow Pool, two 49-foot granite arches, 56 stone pillars topped by bronze wreaths, four bronze eagles, 24 wall sculptures, 4,123 gold stars, and a waterfall.

In some ways, the successes of monument critics proved their undoing. After a federal judge issued a stop construction order pending resolution of a lawsuit filed last year, and the planning commission began to backpedal due to what some lawmakers felt were trivialities, Congress stepped in and used its powers to resolve the matter itself.

A few critics have managed to drag the memorial through "a mind-numbing bureaucracy, a bureaucracy at its worst," said House Armed Services Chairman Rep. Bob Stump (R–Ariz.) during floor debate on the legislation. "It's up to Congress to save the memorial."

USAF photo by SrA. Esperanza Barrios

In Paris on Memorial Day, members of the Air Force Honor Guard (at left) from Bolling AFB, D.C., and a flag detail from the US Air Forces in Europe Special Security Squadron Elite Guard at Ramstein AB, Germany, perform a ceremony at France's tomb of the unknown soldier.

AETC Stands Down Its T-1s

On April 30, Gen. Hal M. Hornburg, commander of Air Education and Training Command, ordered a 72-hour nonflying stand-down for all T-1A training aircraft.

A small number of elevator and rudder discrepancies was the cause of the flying halt. The pause allowed technicians to review operation and maintenance procedures and check all T-1 aircraft, officials said.

The twin-jet T-1 has been in the service inventory since 1992. It is flown by all student pilots and navigators training to fly airlifters, tankers, and other large multi-engine aircraft.

Bush Broadly Sketches a Shift in Defense Policy

President Bush hinted at major shifts in military policy and procurement in his May 25 address to graduating cadets at the US Naval Academy in Annapolis, Md., but indicated he had not yet decided on specific courses of action.

"Changing the direction of our military is like changing the course of a mighty ship—all the more reason for research and development, and all the more reason to get started right away," Bush told the USNA crowd.

Previously, White House aides had hinted that Bush would take the opportunity of his first commencement address as Commander in Chief to begin talking about how his general plans for the military might be translated into reality.

But with complicated budget and policy choices still hanging, and Secretary of Defense Donald Rumsfeld's strategic review not yet complete, Bush chose instead to focus on expressing thanks for those who have chosen to wear the nation's uniform.

The President did say that he intends to focus on mobility and precision, as opposed to brute strength, in future procurement decisions.

"I'm committed to building a future force that is defined less by size and more by mobility and swiftness, one that is easier to deploy and sustain, one that relies more heavily on stealth, precision weaponry, and information technologies," Bush said.

In California, DOD Will Cut Energy Usage

The Pentagon on May 3 rolled out a comprehensive plan to substantially reduce the amount of peak-hour electricity military facilities need from California.

A combination of conservation, energy efficiency investments, and on-site generation seeks a 10 percent reduction in peak-hour power use by DOD in the state by this summer, said Secretary of Defense Rumsfeld.

DOD plans to redirect $32 million in Fiscal 2001 to implement DOD plans and for purchase of lighting upgrades, improvements to ventilation and air-conditioning systems, and demand meters, among other equipment.

"Although the department represents only one percent of California's peak load, as one of its largest consumers of electricity, we intend to do our part to mitigate the electricity shortage," said Rumsfeld.

By next summer the reduction should reach 15 percent, he said. Ultimately the Pentagon's cuts should be the equivalent of adding another 200 megawatts to the power grid in America's western states for use by other customers.

Nationwide, ongoing efforts have cut the energy used in DOD buildings by 23 percent since 1985.

DOD Scored for WMD Unpreparedness

The Department of Defense has no coordinated militarywide guidelines outlining how the services should react to the use of Weapons of Mass Destruction against bases or other official installations, according to a new report.

As a result, each service is drawing up its own WMD response plan, concluded "Installation First Responder Preparedness," prepared by DOD's Office of Special Operations and Low-Intensity Conflict. The office's conclusions were reported by *Defense News* on May 7.

An installation pilot program, begun last October, is supposed to serve as a baseline for WMD plans at all Pentagon installations. But the services used unique criteria to pick the

Army, Surveying Self, Finds Big Problems

A groundbreaking study of more than 13,000 Army officers, enlisted personnel, and family members has found profound dissatisfaction in the ranks with many of the most important aspects of service life.

Micromanagement, poor training, arbitrary rotations, inadequate housing, and insensitivity to family needs were among the major complaints. Fully two-thirds of those who took part in the Army Training and Leader Development study said that the quality-of-life standards they experienced were unacceptable.

"The Army culture is out of balance," concluded the study, which was directed by Lt. Gen. William M. Steele, commander of the Combined Arms Center at Ft. Leavenworth, Kan.

Army Chief of Staff Gen. Eric K. Shinseki commissioned the wide-ranging look at attitudes last year in response to an alarming increase in the number of junior officers exiting service life.

Its purpose was to try and identify why promising personnel were leaving and to determine what skills Army leaders of the future might need.

Shinseki has already moved to try and alleviate some of the problems identified by the survey. Among other things, the Army now grants four-day weekends over federal holidays to provide hard-pressed troops an extended break. Personnel with children who are high school seniors can request a transfer delay. Officers will receive more combat training.

But survey results indicate that Army leaders have a long way to go to before the lower ranks sense a turnaround.

Among the most important problems identified was a disconnect between junior officers and their units. Many are rotated out of assignments before they have a chance to develop ties with those under their command.

"The Army assignments systems is driven by requirements to fill spaces rather than leader development," said the report.

In addition, senior officers barrage their underlings with e-mail and other missives of micromanagement, usurping much of their juniors' command authority.

Yet despite such control junior leaders feel distant from their superiors. Much of the direction from on high occurs via remote communication.

"There is diminishing direct contact between seniors and subordinates," said the report.

Overall, the Army has been slow to change its culture to adapt to the changes in its role that have occurred since the fall of the Berlin Wall. Key training still focuses on Cold War–era strategies and needs, said the study.

The Army "continues to fall behind in adapting its training and leader development programs. Consequently, these programs must change quickly to become relevant," said the study.

USAF photo by SrA. Lanie McNeal

South Korean air force pilot Capt. Choi Sung Keun and crew chief Kim Dae Hyun review maintenance forms. They were participating in a combined-operations training program with USAF's 35th Fighter Squadron at Kunsan.

five bases each has selected for inclusion in the pilot program. The Army, Navy, Air Force, and Marines are also all at different points along the road in carrying out pilot program implementation, said the study.

Marines See V-22 Operations in 2004

The Marine Corps now expects to field its first operational V-22 tilt-rotor aircraft in 2004, following a multiphase program designed to address any hydraulic or flight control deficiencies.

Maj. Gen. Robert Magnus, assistant deputy chief of staff for the Marine Corps Quadrennial Defense Review, said that among other things the Marines plan to further examine the issue of the V-22 and vortex ring state, a condition that can cause loss of lift during rapid descent.

The Bush Administration will likely preserve the V-22 program, since there is little alternative for replacement of the Corps' aging helicopter fleet, Magnus told reporters at a Defense Writers Group breakfast.

To Build a Bigger Osprey?

Bell Helicopter Textron and the Defense Advanced Research Projects Agency are collaborating on tests to demonstrate the feasibility of a larger version of the V-22 Osprey tilt-rotor aircraft.

Recent crashes and design problems have called the future of the V-22 itself into question.

However, both Bell and DARPA believe the same tilt-rotor technology can safely be upsized into a two-wing, four-engine Quad Tilt-rotor that would fill a cargo-carrying niche between the V-22 and the C-130 Hercules.

So far DARPA has committed $4 million to scale model construction and testing, reported "Defense Week" May 14. The goal: an aircraft that can carry two Humvees and troops for quick entry into such delicate situations as an embassy under siege.

USAF Starts Construction on C-130J Simulator

Construction has begun on a C-130J simulator training facility at Keesler AFB, Miss. The $36.5 million project is scheduled for completion in April 2002.

In addition to housing the state-of-the-art simulator, the new building will contain a cockpit procedures trainer, an avionics systems man-

Weapons in Space?

The Air Force would be ready to work on methods of placing weapons in space, says a top service official, but that is not a decision for the US military.

"If the policy decision is made to take our guns into space, that will be decided by our civilian leadership," said Lt. Gen. Robert Foglesong, deputy chief of staff for air and space operations, on May 10.

Foglesong was speaking in the wake of the release of the Department of Defense's sweeping reorganization of space operations on May 8.

The reorganization calls for consolidating military space within the Air Force under a four-star general who will serve as the Pentagon's top military voice on space affairs. But the reform was also notable for what it did not do—namely, call for the development of offensive or defensive space weaponry.

"These proposals have nothing to do with that," said Secretary of Defense Donald Rumsfeld.

Rumsfeld is on record as supporting such a move. A Congressionally mandated commission that he led until last December urged an increase in spending on space operations and study of methods to project power from space.

Nor did Rumsfeld rule out a future move to arm space during the lengthy press conference he held to outline his space reorganization. Instead, he read from a Clinton-era National Space Policy that said the Department of Defense should "develop, operate, and maintain space control capabilities to ensure freedom of action in space, and if directed, deny such freedom of action to adversaries."

Opponents of space weaponry reacted sharply to the Administration's ambiguous statements on the matter.

"I think Democrats will be universally opposed to doing something as foolish as that," Sen. Thomas A. Daschle (D–S.D.), who is now the Senate majority leader, told reporters May 8. "It only invites other countries to do the same thing."

Washington Starts Missile Defense Sales Pitch

Administration emissaries pitching the benefits of missile defense received a mixed reaction during a sweep around the world in early May.

US envoys traveled everywhere from Beijing to New Delhi in the wake of President Bush's May 1 speech vowing missile defense deployment. If they were counting on winning quick converts, they were disappointed. For the most part, allies were neither outspoken in opposition or enthusiastic in support. They are still awaiting answers as to proposed system effectiveness and cost, many said.

Germany's position was typical in this regard. "The German position is that we say neither yes nor no," said Michael Steiner, foreign policy advisor to Chancellor Gerhard Schroeder, after listening to the US missile defense traveling team.

Russia warned that defenses could unravel a decade of progress on arms control—yet added that it is important that consultations on the issue have begun. The US defense road show received perhaps its coolest reception in China, where officials said they are still adamantly opposed to any changes in nuclear status quo.

"We are opposed to the national missile defense system because it destroys the global strategic balance and upsets international stability," said Foreign Ministry spokesman Sun Yuxi.

The Bush Administration said it was not disappointed with the results of its geopolitical lobbying. The visits were the beginning of a process, said officials, and not the end of one.

"There was never an expectation that people would go abroad and come back and have the allies say, 'Sign us up.' ... There will be more consultations to come," said White House spokesman Ari Fleischer on May 16.

agement trainer, advanced electronic classrooms, and electronic briefing rooms for computer-based training and instructor presentations.

"The C-130J is 70 percent different than previous C-130 variants and requires its own, totally new training for aircrews," said Maj. Mike Lewis, Air Education and Training Command C-130J program manager.

Currently, Air Force Reserve Command's 403rd Wing at Keesler and the Maryland Air National Guard are flying C-130Js with only in-unit conversion training.

When finished, the new Keesler facility will be used to train all J model crew members until a formal training unit becomes operational at Little Rock AFB, Ark.

Once initial training switches to Little Rock the Keesler equipment will be used for continuation training.

Upgrade Due for U-2 Software

A new mission planning system that will greatly simplify preflight preparation for U-2 crews is currently in the final stages of testing at the U-2 Integration Branch, Combat Air Forces Command and Control Systems Program Office, Hanscom AFB, Mass.

The computer and automated software of the Mission Planning System V will provide dramatic performance improvements, said officials.

"The Mission Planning System V computer ... operates at approximately 19 times the speed of systems used in 1995," said Lt. Col. Christopher King, Air Force mission support system and mission planning system program manager at Electronics Systems Center. It weighs only 70 pounds and fits into one transit case. Older models required 13 large cases and two shipping pallets.

To use the system, the U-2 navigator enters route and intelligence collection plans into the MPS-V. The system then crunches the data and creates a data transfer disk that is used to load the resulting product into the aircraft's flight computer.

On any particular flight a U-2 may have to handle upward of 400 to 500 different requests for data collection, using its array of onboard sensors. Each has its own limitations—camera range, cloud cover, shadows, etc.

Troops-to-Teacher Funding Rises

First Lady Laura Bush announced a tenfold increase in the Administration's budget for Troops to Teachers funding at a May 8 speech at Ft. Jackson, S.C.

If approved by Congress, Troops to Teachers funding would jump from $3 million to $30 million next year. The program would begin paying retiring military personnel who want to become teachers up to $5,000 to cover the cost of obtaining a teaching certificate. A $10,000 bonus would be tacked on for those who agree to accept a job in an inner-city school or other high-needs area.

More than 4,000 retired military personnel have become civilian teachers through the program, noted the First Lady, herself a former elementary school teacher. Yet the need for new teachers in the years ahead will only grow.

"You're tremendous role models, with a sense of duty, honor, and country that our children would do well to emulate," said Mrs. Bush.

News Notes

■ Northrop Grumman executive James G. Roche was sworn in as Secretary of the Air Force on June 1. Also sworn in were Thomas E. White,

C-5 Parts Shortages Threaten US Airlift

Shortages of spare parts for the C-5 Galaxy are threatening US heavy airlift capacity to the point that they have become a national security problem, said Sen. Joseph R. Biden (D–Del.) in a Senate floor speech May 9.

Keeping the C-5 fleet based at Dover AFB, Del., airborne has required that two multimillion dollar airlifters be turned into nonflying "hangar queens" that provide parts for other airplanes.

Such cannibalization lowers morale because of its inefficiency and the extra work it requires, according to a short report prepared by Biden's staff.

The cannibalization cost Dover more than $2.7 million in Fiscal 1999, said Biden. "In addition, the overall health of the C-5 fleet [has] suffered," he added.

Air Mobility Command's goal for the C-5 is a cannibalization rate of 31—that is, for every 100 C-5 sorties, an average of 31 parts had to be lifted off of other airplanes.

But after two years of steady increase, the C-5's actual rate peaked in 2000 at between 42.7 and 72.2 cannibalizations per 100 sorties, said Biden's report.

In recent months the rate has stabilized. Reversing it will require, among other things, steady and predictable parts funding, complete modernization of the fleet with new avionics and the reliability enhancement and re-engining program, and management reforms throughout the defense logistics system, said Biden.

"I know that spare and repair parts is not glamorous, but it is vital to America's ability to protect and promote our national security," the Delaware Democrat told his colleagues.

EP-3 To Come Home in Pieces

The damaged Navy EP-3 surveillance airplane that has been stranded in China since the beginning of April will be cut up and airlifted home, the Pentagon announced May 30.

Final details still have to be worked out. But current plans call for the wings and tail of the aircraft to be removed from the fuselage and the parts flown back on a giant Soviet–era An-124.

The US had wanted to fix up the airplane on-site and fly it home. The Chinese opposed that solution as an insult to their national pride. The EP-3 made an emergency landing on China's Hainan Island following a collision with a Chinese fighter that veered into its path April 1.

"I think that at the end of the day we're glad to get the airplane back in a condition that it can be repaired and used again," said Pentagon spokesman Rear Adm. Craig R. Quigley.

Various private companies in Russia and the Ukraine lease out An-124s, the largest airlifter in the world, for big jobs. Use of any other commercial airlifter would have required that the EP-3 be dismantled into pieces too small to be of further use, said Quigley.

US officials did not propose use of a C-5 or other US cargo airplane to bring the EP-3 home.

Meanwhile, the US has resumed surveillance flights off the coast of China for the first time since the collision sparked an international incident.

The May 7 mission was flown by an Air Force RC-135 electronic eavesdropping aircraft, said officials. It took place off China's northeastern coast, rather than the South China Sea region where the April accident took place.

as Secretary of the Army, on May 31, and Gordon England, former General Dynamics executive, as Secretary of the Navy, on May 24.

■ Washington public relations executive Victoria Clarke was sworn in as the assistant secretary of defense for public affairs on April 5.

■ David S.C. Chu, who had served in several executive positions with RAND, was sworn in June 1 as undersecretary of defense for personnel and readiness.

■ President Bush presented the Air Force Academy football team with the Commander in Chief's Trophy in a White House South Lawn ceremony May 4. The trophy, awarded annually to the top service academy gridiron squad, has been won by the Air Force in 10 of the last 12 years.

■ Gen. William J. Begert took command of Pacific Air Forces on May 4. Previously, he served as assistant vice chief of the Air Force in Washington.

■ The White House announced May 24 that President Bush would nominate Albert E. Smith to be undersecretary of the Air Force. Smith is currently executive vice president of Lockheed Martin Space Systems.

■ White House officials also announced May 15 Bush's intention to nominate Marvin R. Sambur, former president and chief executive of ITT Industries, to be assistant secretary of the Air Force for acquisition, research, and development.

■ Dov S. Zakheim was sworn in as undersecretary of defense (comptroller) and chief financial officer for the Department of Defense on May 4. Zakheim has served previous Republican Administrations in a variety of national security positions.

■ Former Senate Armed Services Committee staff member Charles S. Abell was sworn in as assistant secretary of defense for force management policy in a May 8 Pentagon ceremony.

■ Powell A. Moore was sworn in as assistant secretary of defense for legislative affairs on May 4. Previously, he was chief of staff for Sen. Fred Thompson (R–Tenn.).

■ A groundbreaking pararescue squadron became operational May 7 at Moody AFB, Ga. The 38th Rescue Squadron is the first such unit to be led by combat-rescue officers and the first in many years to focus exclusively on pararescue.

■ Four Air Force personnel are among the 30 finalists selected for the 2001–02 White House Fellows program. If selected, Lt. Col. Martha McSally, Riyadh, Saudi Arabia; Maj. Bruce McClintock, Schriever AFB, Colo.; Maj. Ross McNutt, the Pentagon; or Maj. John Shaw, Ramstein AB, Germany, would serve as a full-time assistant to a Cabinet secretary or senior White House staff, beginning Sept. 1.

■ Engine failure caused the Dec. 13 crash of an F-16 over the Gulf of Mexico, according to a newly released accident report. The pilot, from the 27th Fighter Wing, Cannon AFB, N.M., ejected with minor injuries.

■ On April 24 Wilbur C. West of Pine Bluff, Ark., finally received a Silver Star he had earned as a B-24 copilot in World War II. More than 200 friends and family watched as West's cousin, retired Air Force Gen. Lewis E. Lyle, pinned on the medal.

■ A satellite door developed in the late 1990s by high school students in New Mexico with the aid of two Air

Bond Calls for "Team B" Readiness Commission

Sen. Christopher S. Bond (R–Mo.) wants an independent investigative body of experts to examine the state of readiness in US armed forces.

"Much like the CIA required an outside panel of 'Team B' experts during the 1970s, ... the Pentagon desperately needs an outside group of experts to look at the readiness books," said Bond.

With his mention of Team B, Bond was referring to one of the most famous analytical clashes of the Cold War.

In December 1976, CIA's Team B, led by Soviet analyst Richard Pipes, produced a top secret report titled "Soviet Strategic Objectives: An Alternative View." Its first words were: "Team B found that the [CIA's series of national intelligence estimates] through 1975 has substantially misperceived the motivations behind Soviet strategic programs, and thereby tended consistently to underestimate their intensity, scope, and implicit threat."

Bond was clearly implying that non–Department of Defense personnel might issue a similarly harsh critique. Reports of declining readiness abound, Bond pointed out in a May 25 floor speech, but it is anecdotal in nature and not supported in formal DOD readiness reporting.

He pointed out, for example, that Navy E-2C Hawkeye radar airplanes carry intelligence files that in some cases are five and nine years old; the Army's 3rd Infantry Division was recently dropped to the second lowest readiness rating; the Marine Corps is diverting funds from its modernization accounts to keep combat training sharp.

Building a national consensus to address this problem will require an objective assessment by an outside board, said Bond, who introduced legislation that would mandate such a review.

LINK 16 TACTICAL TECHNOLOGY. WHILE OTHERS WAIT FOR IT,
YOU COULD BE FLYING IT.

Link 16 is more than a promise. More than the data link of the future. It's here. It's flying. It's delivering right now. From Data Link Solutions: the joint force leaders in electronic command, control and surveillance. Supplying high-speed tactical intelligence and interoperability in a jam-resistant, securely encrypted format, DLS Link 16 gives fighters and naval combatants the fastest, surest "total-picture" view of active targets, threats and friendlies. Because, in the split-second world of situational awareness, "wait and see" is never an option. Call now.

DATA LINK SOLUTIONS

319.295.5100
www.collins.rockwell.com/gs

973.633.6000
www.cnl.no.boesystems.com

BAE SYSTEMS/Rockwell Collins
Data Link Solutions, L.L.C.

Force officers has been awarded a US patent. While stationed at nearby Kirtland AFB, N.M., Capt. Phi-Anh Lutz and Capt. Wes Turner helped students from Albuquerque's Eldorado High School on the project as part of the Air Force's Students Planning and Conducting Experiments program.

■ A flight from the 48th Medical Group, RAF Lakenheath, UK, was awarded a Public Employees Roundtable Public Service Excellence Award for Community Service at a May 7 Washington ceremony.

■ Two Air Force enlisted personnel were recently honored as the 2000 Government Employee Insurance Co. Military Service Award winners. TSgt. Jimmy Whittington, 96th Bomb Squadron, Barksdale AFB, La., was recognized for fire prevention and fire safety efforts, while MSgt. Carol Elam, Iowa National Guard, was tapped for her drug and alcohol abuse prevention efforts.

■ An Air Force bicyclist rode across America. MSgt. Wayne Bartlett, who began his trek from March ARB, Calif., on May 1 and arrived at his home base, Andrews AFB, Md., June 1, was riding to focus attention on recruiting and retention.

■ Space wings from Minot AFB, N.D., Vandenberg AFB, Calif., and Peterson AFB, Colo., all walked away winners from Air Force Space Command's May 7–10 Guardian Challenge competition. The 91st Space Wing, Minot, took the Blanchard Trophy as the service's best ICBM wing. The 30th Space Wing, Vandenberg, captured the Schriever Trophy as outstanding space launch wing. The 21st Space Wing, Peterson, won the Aldridge Trophy as the best space operations wing.

■ The defending champion US Air Force team captured the Air Force Atlantic Challenge marksmanship trophy by a narrow margin over a British Royal Air Force team during a May 11–14 competition at Bisley Camp, UK.

■ TSgt. Jeanne M. Vogt, formerly of the 728th Air Control Squadron, Eglin AFB, Fla., received the Air Force's 2000 Cheney Award for extreme acts of valor performed in connection with an aircraft. While on a commercial airline flight to St. Louis, Vogt's emergency medical technician skills allowed her to save the life of a young women whose airway was blocked and who had stopped breathing due to an epileptic seizure.

DOD photo by PH2 Leland Comer

USS Cole during repairs aboard a Norwegian drydock vessel at a shipyard in Pascagoula, Miss.

Failures, Errors Blamed for *Cole* Disaster

USS *Cole* was not left exposed to terrorist assault by any one US decision, policy, or practice. Rather, the bombing of the Navy ship in Aden harbor in Yemen last October was the result of systemic problems in anti-terror protection, concludes a new House Armed Services Committee report.

"Many mistakes, oversights, errors in judgment, and missteps—each of which may have been insignificant on an individual basis—combined to leave the USS *Cole* and its crew vulnerable to a terrorist attack," said the chairman, Rep. Bob Stump (R–Ariz.), in a May 30 statement.

The bipartisan HASC study drew on the findings of the official Pentagon commission investigation, among other sources. Its findings include:

■ The US desire to increase strategic engagement with Yemen "outpaced an understanding of the terrorist threat there."

■ Navy training does not adequately address waterborne terrorist threats.

■ Intelligence shortfalls led to a failure to provide tactical warning of the attack.

Efforts to remedy these mistakes "will have lasting effects on force protection activities not only for US Navy forces, but for all US forces and installations," said Rep. Ike Skelton (D–Mo.), the panel's ranking minority member.

Index to Advertisers

■ Offutt AFB, Neb., won a Secretary of Defense Environmental Security Award for an environment restoration program that included a "bio-wall" system to prevent chlorinated solvents from migrating into groundwater.

■ The rate of men signing up for the military draft rose last year for the first time in a decade. Officials said 87 percent of men who turned 20 in calendar 2000 registered with the Selective Service System, up from 83 percent the year before. ■

The Global Hawk Unmanned Aerial Vehicle returned to Edwards AFB, Calif., June 8 after a historic trans-Pacific flight to Australia in April. The UAV is to receive $25 million under the defense supplement for this fiscal year.

Bush Asks for Modest DOD Supplement

The Bush Administration in early June asked Congress to provide an additional $6.1 billion in supplemental defense funds for the current fiscal year.

However, some $505 million would be removed from the already passed Fiscal 2001 budget, under the request, making the addition closer to $5.6 billion.

The supplemental cash would be used to address some of the armed forces' most urgent needs, said White House officials.

"The supplemental ... is focused on addressing the shortfalls in the budget ... so they can finish Fiscal 2001 in good shape," said Bush spokesman Ari Fleischer. (Fiscal 2001 ends Sept. 30.)

The biggest single item is $1.9 billion earmarked for personnel benefits. About $1.4 billion of that would pay for expansion in defense health care benefits already mandated by Congress.

Readiness, training, and operations would receive $1.7 billion, including about $970 million to pay for previously authorized flying hours.

Development programs slated to get an infusion of extra funds under the supplemental include the Air Force's Evolved Expendable Launch Vehicle, which would get $48 million, and the Global Hawk UAV, which would receive $25 million.

The Bush supplemental falls far short of earlier service hopes and expectations and does not even meet what the military had considered the minimum requirement—$7 billion.

Senior Staff Changes

PROMOTIONS: To **ANG Major General:** Gregory B. **Gardner,** Robert I. **Gruber,** Craig R. **McKinley,** James M. **Skiff.**

To **AFRC Major General:** James **Sanders,** David E. **Tanzi.**

To **ANG Brigadier General:** Richard W. **Ash,** Thomas L. **Bene Jr.,** Philip R. **Bunch,** Charles W. **Collier Jr.,** Ralph L. **Dewsnup,** Carol Ann **Fausone,** Scott A. **Hammond,** David K. **Harris,** Donald A. **Haught,** Kencil J. **Heaton,** Terry P. **Heggemeier,** Randall E. **Horn,** Thomas J. **Lien,** Dennis G. **Lucas,** Joseph E. **Lucas,** Frank **Pontelandolfo Jr.,** Ronald E. **Shoopman,** Benton M. **Smith,** Homer A. **Smith,** Annette L. **Sobel,** Robert H. **St. Clair III,** Michael H. **Weaver,** Van P. **Williams Jr.,** Lawrence H. **Woodbury.**

To **AFRC Brigadier General:** Fred F. **Castle Jr.**

CHANGES: Lt. Gen. Brian A. **Arnold,** from Dir., Space & Nuclear Deterrence, Asst. SECAF, Acq., Pentagon, to Cmdr., SMC, AFMC, Los Angeles AFB, Calif. ... Maj. Gen. John D. **Becker,** from Dir., Ops. & Log., TRANSCOM, Scott AFB, Ill., to Cmdr., 15th AF, AMC, Travis AFB, Calif. ... Maj. Gen. Carrol H. **Chandler,** from Dir., Operational Plans, DCS, Air & Space Ops., USAF, Pentagon, to Dir., Aerospace Ops., ACC, Langley AFB, Va. ...

Brig. Gen. Scott S. **Custer,** from Dep. Dir., Ops., Natl. Mil. Cmd. Ctr., Jt. Staff, Pentagon, to Dir., P&P, AETC, Randolph AFB, Tex. ... Lt. Gen. (sel.) Timothy A. **Kinnan,** from Vice Dir., Strategic P&P, Jt. Staff, Pentagon, to US Mil. Rep. to NATO Mil. Committee, JCS, Brussels, Belgium ... Maj. Gen. (sel.) Jeffrey B. **Kohler,** from Spec. Asst., DCS, Air & Space Ops., USAF, Pentagon, to Dir., Operational Plans, DCS, Air & Space Ops., USAF, Pentagon ... Lt. Gen. Donald A. **Lamontagne,** from Dir., Aerospace Ops., ACC, Langley AFB, Va., to Cmdr., AU, AETC, Maxwell AFB, Ala. ...

Lt. Gen. Lance W. **Lord,** from Cmdr., AU, AETC, Maxwell AFB, Ala., to Asst. Vice C/S, USAF, Pentagon ... Maj. Gen. (sel.) Wilbert D. **Pearson Jr.,** from Dir., Ops., AFMC, Wright-Patterson AFB, Ohio, to Cmdr., AFFTC, AFMC, Edwards AFB, Calif. ... Lt. Gen. (sel.) Richard V. **Reynolds,** from Cmdr., AFFTC, AFMC, Edwards AFB, Calif., to Cmdr., ASC, AFMC, Wright-Patterson AFB, Ohio ...

Maj. Gen. James G. **Roudebush,** from Cmd. Surgeon, TRANSCOM, AMC, Scott AFB, Ill., to Dep. Surgeon General, USAF, Bolling AFB, D.C. ... Brig. Gen. Norman R. **Seip,** from Cmdr., 4th FW, ACC, Seymour Johnson AFB, N.C., to Dep. Dir., Ops., Natl. Mil. Cmd. Ctr., Jt. Staff, Pentagon ...

Maj. Gen. James N. **Soligan,** from Dir., Strategy, Policy, & Plans, SOUTHCOM, Miami, Fla., to DCS, UN Cmd. Korea, Yongsan, South Korea ... Maj. Gen. (sel.) Joseph B. **Sovey,** from Dir., Spec. Projects, SECAF, Pentagon, to Dir., Space & Nuclear Deterrence, Asst. SECAF, Acq., Pentagon.

SENIOR EXECUTIVE SERVICE CHANGE: James C. **Barone,** to Dir., Personnel, AFMC, Wright-Patterson AFB, Ohio. ■

Face-to-face with the future.
The F-22 Raptor.
It's ready.

F22 RAPTOR

The F-22 Raptor will enable America to continue to dominate the skies in the 21st century.

The F-22 Raptor is flying.

The F-22 is ready for production – to support the Air Force mission.

The F-22 ... air dominance for the 21st century. It's ready!

www.f22-raptor.com

Fighter modernization has been in the deep freeze for years. Now, three fighters are bidding for money at the same time.

The Three Fighters

By John A. Tirpak, Senior Editor

HAVING gone two decades without fielding a new fighter design, the Pentagon is poised to spend about $180 billion over the next 25 years on three new types to replace the bulk of its fighter fleet.

Those who want to find big savings in the Pentagon's budget have suggested killing one or more of the programs, but the services insist that all three fighters fulfill unique missions, are not interchangeable, and must be bought in planned numbers if the US military is to remain credible in the 21st century.

The three fighters, in order of their planned entry into service, are: the F/A-18E/F Super Hornet for the Navy, in 2001; the F-22 Raptor for the Air Force, in 2005; and the Joint Strike Fighter, for the Air Force, the Navy, and the Marine Corps, beginning in 2008.

The trio of programs is expected to take center stage in a major aircraft review to be completed sometime this year, following the completion of the Bush Administration's national strategy review but before the F-22 and JSF reach major contract go-ahead milestones this fall. President Bush himself has suggested that the defense budget might not accommodate all three fighters, since DOD now must also finance an expensive new missile defense program.

The services insist the new fighters are needed to solve two kinds of problems. First, current aircraft are becoming obsolete and would be overmatched against a new crop of air and ground threats. Second, these fighters also are physically wearing out, causing maintenance and operating expenses to soar. Buying a new generation of aircraft, the services assert, will restore this nation's traditional edge in fighter technology and, at the same time, save money by sharply reducing support costs.

The three fighters could scarcely be more different. Each is designed to solve a unique military problem and each in some way assumes the presence of the others, as they all fit together in the Pentagon's grand scheme of operations.

The F-22 and the Joint Strike fighter are both stealthy and both will use the most advanced avionics and weapons, but there the similarity ends. The F-22 has the highest unit cost of the three because it meets the most stringent requirements of all—stealth, extreme agility, flight at high altitude, and persistent high speed. It will have to take on and win against large numbers of the very toughest enemy fighters and air defenses. It must be able to range the battlefield at will, clearing the air for less-capable, less-stealthy airplanes needed later to fully prosecute a war. The F-22 will have a ground attack capability as well, to deliver bombs against critical point targets deep inside enemy territory.

No one doubts the F-22 will perform as advertised. Even the makers of its toughest overseas competitor,

the Eurofighter Typhoon, advertise their airplane as being 80 percent as capable as the F-22.

The JSF was designed as an affordable way to replace thousands of worn-out aircraft, while taking prudent, selective advantage of new technologies. It is the cheapest of the three fighters. It will perform the day and night, constant-pressure wartime missions against dispersed ground targets once the F-22 has already swept the skies of enemy fighters and knocked down the surface-to-air missile threat.

The JSF will be very maneuverable—the Air Force version will be as agile as the F-16—but it was never intended to do the F-22 mission and was not equipped for it. It will carry missiles and can shoot down enemy airplanes, but in small numbers. It is geared mainly toward precision attack of ground targets.

The JSF was made stealthy because the science of low observability has matured to the point where it is only a modest part of the cost of an airplane, if it is designed-in from the beginning. That stealth is necessary to protect the JSF against pop-up ground threats, such as mobile missiles.

The F/A-18E/F Super Hornet is quite simply a stopgap airplane, providing the Navy with an imminently needed, carrier-based jack-of-all-trades platform for defense and attack. It is an upgrade of a 1970s design and must carry around the extra weight necessary to endure repeated carrier takeoffs and landings; it lacks the stealth and agility of the F-22 and JSF.

While its unit cost is between that of the JSF and the F-22, the program cost is about the same as that of the F-22, because so many more Super Hornets than F-22s are planned.

The Navy sees the Super Hornet as mainly a "bomb truck," which, because it has been given only minimal stealth treatments, will depend on standoff weapons and heavy electronic jamming to survive. The Navy itself acknowledges the Super Hornet will have to avoid dogfights, because of its lumbering turning ability vs. contemporary adversaries.

The F/A-18E/F was not the Navy's first choice for the air war of the 21st century; it originally envisioned an all-stealth force consisting of a navalized F-22 and the A-12 attack airplane. When those projects were canceled, the F/A-18 seemed an economical way to refresh the flight deck with an adequate platform while follow-on aircraft like the JSF took shape.

Pentagon officials seriously contemplated dropping the Hornet upgrade in favor of waiting for the JSF, since the E/F is considered by many only a marginal improvement over the earlier version, the C/D. However, the Clinton Administration determined the Super Hornet would serve as competition to hold the JSF on track.

F-22 Team photo

The F-22, shown being chased by an F-16, is two generations beyond the F-15 and represents an impressive technological leap over competing fighters. Buying the F-22 would also be cheaper than rebuilding the aged F-15 fleet.

F/A-18E/F Super Hornet

Without the single-seat F/A-18E and the two-seat F/A-18F Super Hornet, the Navy would have little justification for the aircraft carrier in the next decade. Unless the sea service can equip its flattops with an aircraft more capable against modern defenses, the striking power of the aircraft carrier will be limited, and the risk of losses in action against any modern adversary will be high.

Today's carrier aircraft are mostly designs of 1960s and 1970s vintage, updated in the 1980s. The swing-wing F-14 Tomcats, featured in the movie "Top Gun," are wearing out and becoming prohibitively expensive to maintain. Around 2007, they will have been retired altogether. Though designed as interceptors, the F-14s have been pressed into service as attack airplanes—dubbed "Bombcats"—to fill in behind the A-6E Intruder medium bomber, the last operational version of which left the fleet in 1998. The A-6's intended replacement, the stealthy A-12, was terminated in 1991 when the Navy botched its development.

To save on logistics costs, the Navy about a decade ago decided to move toward fewer types of aircraft on the flight deck at sea. The Navy chose to focus its carrier striking power in the F/A-18C Hornet because it was the newest fighter in the inventory and promised to be a flexible design. Thus, the plain Hornet became the carrier workhorse of the 1990s.

The F/A-18C, however, has run out of room for improvement. The Hornet has no more unused fuselage space in which the Navy could install new avionics equipment. Moreover, the plain Hornet cannot land safely on a carrier deck while still carrying a bomb load. As a result, pilots have gotten in the habit of dumping good ordnance into the sea before bringing the fighter down. This, said Navy officials, has become too costly to bear.

"It's reached its maximum growth capability," Rear Adm. Evan M. Chanik Jr., chief of naval aviation plans and requirements, said of the F/A-18C. "We've run out of electrical power, we've run out of cooling power, so we really can't do any more modifications or improvements.

We've run out of weight, so we can't add any weight in terms of growing it."

The plain Hornet has also been infamous for its short range, limited maneuvering capability against contemporary fighters, and relatively small offensive payload.

Despite these shortcomings, the F/A-18 became the centerpiece of naval aviation in 1991 because, at that point, the Navy had been hit, in close succession, with cancellations of an F-14 upgrade, an A-6 upgrade, and the entire A-12 program. The Navy chose to "grow" the F/A-18 design to allow it to replace the F-14 in the interceptor role and to become a respectable bomb truck to carry the kind of heavy load in which the A-6 Intruder specialized.

US Navy photo by Airman Recruit Adam Plantz

The Super Hornet, dependent on standoff weapons and jamming to survive, is not the stealthy jet the Navy originally had in mind for its 21st century carriers, but the service sees it as vital to replacing worn-out aircraft in the near term.

Heavy Lifting

That enlarged design is what the Navy now calls the F/A-18E/F Super Hornet. "We see it as filling that 'heavy lifting' mission," Chanik explained.

The E/F version will also take on the role of carrier-based tanker, substituting for the S-3 Viking. In addition, the Navy is considering the F/A-18E/F as the basis for a replacement of the EA-6B Prowler electronic warfare platform; Boeing is developing an EF-18 "Growler" variant.

When compared to the original Hornet, the two versions of the Super Hornet present a somewhat reduced radar cross section in the front aspect, which will improve their survivability against air-to-air and surface-to-air threats. The improvements included coatings on the canopy, a redesigned engine inlet, radar blockers for the larger engines, and radar absorbent material on leading-edge surfaces.

"We didn't go [for] all-around reduced visibility, i.e., JSF style or F-22 style," Chanik noted. "That was a cost–benefit tradeoff. ... We looked at the aircraft in various configurations and designed accordingly to provide us with what we think are some LO [Low Observable] benefits."

Chanik acknowledged that hanging external stores on the E/F will increase its observability to radar, but he suggested that the weapons themselves could be treated to make them less detectable.

Other survivability improvements include onboard electronic countermeasures and fiber-optic towed decoys.

The Navy feels that the Super Hornet must have jamming support if it is to survive in future aerial combat. Chanik said that, in addition, the Super Hornet will succeed by relying on long-range weapons, such as the Joint Standoff Weapon glide bomb and the Standoff Land Attack Missile–Extended Range. Such munitions will reduce the need for the E/F to have to get close to its target, as they can be launched dozens of miles from the intended point of impact.

Compared with the C/D model, the Super Hornet has one additional weapon hardpoint, or carrying station, on each wing. It carries more internal and external fuel and has a larger combat radius—about 650 to 700 miles (compared to about 500 miles for the plain Hornet)—depending on the mission. The aircraft overall is about 20 percent larger than the F/A-18C/D model.

The Navy is already well into production of the Super Hornet. It has taken delivery of nearly 50 aircraft and plans to embark its first squadron aboard a carrier later this year. The F/A-18E and F will replace not the C/D model, but the F-14. The F-14 fleet needs to retire before the F/A-18Cs do.

"We're necking down to an F/A-18–only fleet, for all practical purposes," Chanik said.

Boeing is under contract to provide 222 Super Hornets under a multiyear contract approved by Congress. That contract winds up in 2004, but officials expect another to come immediately after the first. The Navy's requirement is for 548 Super Hornets, with deliveries completing around 2012.

The QDR Cut

The Navy initially envisioned buying more than 700 Super Hornets, but the 1997 Quadrennial Defense Review determined that the Joint Strike Fighter, which will be stealthier and is an all-new design, should be procured by the Navy as soon as it becomes available. Pentagon officials opted not to cancel the Super Hornet in 1997. Even though they considered it only a modest improvement on the C/D, it answered the Navy's urgent need for fresh airplanes and could serve as competition or a fallback if the JSF program failed to deliver.

In Fiscal 2001 dollars, the flyaway cost of a single Super Hornet is "just over $50 million ... $52, $53 million," Chanik said. That cost is for a fighter equipped with the APG-73 radar, but in order to make the aircraft "fully capable," the Navy will be adding a new Advanced Electronically Scanned Array radar starting in 2006. The AESA will add a couple of million dollars to the cost of each Super Hornet once it's available, but the technology will be

Photo illustration by Erik Simonsen

An electronic warfare version of the F/A-18F—nicknamed "Growler"—is being touted by Boeing to replace the aging EA-6B Prowler, which retires next decade. Commonality with the Super Hornet is the main selling point.

shared with the JSF program. An advanced forward-looking infrared system is also in the works for the Super Hornet fleet, and its cost is also considered separate from that of the E/F.

Not counting development and acquisition of the new radar, the F/A-18E/F program is expected to cost a total of $47 billion by the time production ends 11 years from now. Discounting the sunk development costs, the "cost to go" on the F/A-18 is about $30 billion.

Navy plans call for moving, by 2020, to a new 50-aircraft air wing comprising 12 F/A-18Es, 14 F/A-18Fs, and 24 Joint Strike Fighters. The Navy will buy more two-seater than single-seater Super Hornets; it sees a need for two crewmembers in missions with a high workload, such as forward air control, and it needs the two-seat aircraft to fill the Stateside training role.

F-22 Raptor

The Air Force's top priority program is the F-22. It needs the F-22 because the service does not believe its 30-year-old air superiority champ, the F-15, can soldier on much longer. Designed in the late 1960s to go against the Soviet–built MiG-21 and MiG-23, the F-15 is now matched or surpassed by later generations of foreign aircraft such as Russia's Su-35 and S-37, the Eurofighter Typhoon, and France's Rafale.

Gen. John P. Jumper, head of Air Combat Command, said, "We've had a chance to look at this latest generation of airplanes," and when US pilots flying real or simulated threat airplanes go against US pilots in current US fighters, "our guys flying their airplanes beat our guys flying our airplanes. ... And that airplane we're flying is the F-15."

USAF requires an airplane that is greatly superior to the opposition because of US military strategy of fighting at the enemy's doorstep. Upon arrival in a crisis, a few squadrons of American airplanes could be facing an enemy's entire air force, and some "traditional adversary" nations have fleets of hundreds of airplanes, many of them late-model types. Simply to survive, US fighters must be able to shoot down many enemy aircraft for each of their own lost in combat.

The F-15 was also designed before the advent of digital avionics, digital engine controls, stealth, and new engine technology, while competitor aircraft designed in the 1980s and 1990s have, to some degree, incorporated all these advances.

Curse of Old Age

Moreover, USAF's F-15 fleet is afflicted by all of the problems of old age as they pertain to aircraft: crumbling seals, stress cracks, airframe fatigue, frayed wiring, parts shortages, and obsolescent components. The problems are fixed to the degree possible, but it takes more and more manpower to do so. The airplanes stay out of service longer, cannibalization rates are going up, readiness rates are going down, and more age-related problems crop up all the time.

The expectation was that the F-15 would be replaced by the mid-1990s, so no one is quite sure just how long the hardware can be kept going. The cost of keeping the F-15 flying continues to rise, and the aircraft just don't stay fixed for long until something else breaks.

More lethal than enemy fighters, however, is the threat posed by ground defenses, which have been improving continuously over the decades. The F-15, having no stealthiness, will routinely have to operate near the "no escape zone" of enemy surface-to-air missiles. Its effectiveness in keeping the skies clear for allied airplanes is eroding rapidly.

The Bush Administration has talked about skipping a generation of weapons programs to remain at least a generation ahead in military technology. However, Jumper said, "We've already skipped a generation of technology, and probably ... two, if you think about the fact that the F-15 first flew in 1972." The F-22 Raptor, Jumper insists, fulfills the concept of a "leap ahead" system whose technology will surpass that of the competition for decades to come.

The F-22 features three technologies that give it a wide edge over any competitor. These are stealth, the ability to "supercruise," and fusion of its sensor input.

The Raptor is the first fighter to combine great agility with all-aspect stealth. Being stealthy will allow the F-22 pilot to see and fire on his enemy before being seen himself—in combat, an enormous advantage. Should rules of engagement or the situation make it necessary to fight at close range, the F-22's unparalleled agility should allow it to prevail there as well, the key enabler being another US fighter first: thrust-vectoring nozzles.

Supercruise

The F-22 is the also the first fighter to have the capability to cruise at supersonic speed for long periods of the mission. Previous fighters could only achieve supersonic speed in a

"dash"—that is, for very brief periods on afterburner, which quickly eats up fuel. The Raptor, though, will be able to leap across swaths of real estate at over 1,000 miles an hour, do it persistently, and without resort to afterburner. Top speed of the F-22 is classified, but it does have an afterburner for high dash speeds as well.

The pilot of the Raptor will have more awareness of the air combat situation than any pilot, ever. The computer processors and communications gear onboard will capture data from a host of sources—satellites, E-3 AWACS airplanes, ground radars, other fighters—and present it in a single display which will tell him exactly what's airborne in his area, who's friendly, who's an enemy, and where all of them are and where they're headed.

Making possible this unprecedented capability is a new technique called sensor fusion. Unlike the F-15 pilot, the F-22 pilot will not need to interpret the displays given by raster screens in the cockpit. Data will be presented in an integrated view, on a single multifunction display. Fuel consumption, weapon effectiveness, optimum release points—all these things will be calculated for him. The pilot will be free to fly and employ the airplane and not have to focus on making sense of many visual and audio cues about what's happening.

Jumper recently unveiled a concept of operations called Global Strike Task Force, a plan which highlights capabilities of the F-22 for defeating anti-access threats, such as theater ballistic missiles, weapons of mass destruction, anti-air and anti-ship missiles, and other systems which could hold the US and its forces at bay in a foreign theater.

"Only the F-22," with its combination of stealth, supercruise, and a significant ground-attack capability, can "kick down the door" into a hostile theater and clear the way for the rest of the force to enter and operate, Jumper said.

The United States fights "as part of alliances and coalitions," Jumper said. "Our coalition and alliance partners don't have the strategic assets to stand back a long way and prosecute wars." The F-22, he said, will help the allies "get in close enough that they can participate with us."

Morever, said Jumper, the F-22 Raptor can "bring stealth into the daytime; it can protect itself," which the stealthy B-2 bomber and stealthy F-117 attack airplane cannot do, except passively, by using their stealth. "You can now use stealth 24 hours a day, and it can also protect our other stealth assets."

The Air Force was dealt a setback in the 1997 QDR, when its plan to procure 438 F-22s was reduced to 339 aircraft. The service insists it needs at least one squadron of 24 airplanes for each of its 10 Aerospace Expeditionary Forces, plus about 100 more for training, testing, and maintenance pipeline purposes. To buy fewer than 339 would mean some contingencies might not get covered. It would also prematurely wear out both the machines and their pilots. Regional commanders in chief would demand the F-22 and its ability to guarantee control of the skies in any foreseeable conflict, and the system would never stop deploying. Its pilots would quit in frustration, as has been seen on other systems considered low-density, high-demand weapons.

F-22 Team photo

The F-22 plays the crucial role in USAF plans to gain entry to future theaters of war. Stealthy and superfast, the F-22 kicks down the door by knocking out missile sites, weapons of mass destruction, and enemy fighters.

Actual Requirement

The Air Force would like to have 572 F-22s, which would put two squadrons—48 total fighters—in each AEF, with enough left over for a schoolhouse, tactics development, test, and other functions.

To date, the Air Force's expenditure on the F-22 comes to about $21 billion. That money has paid for a fly-off competition between the YF-22 and YF-23, eight additional years of design and development work, the initial 400 hours of flight tests, and creation of factories, certification of vendors, and readiness for production.

From this point on, the F-22 program would cost an estimated $36.4 billion, money that would be used to complete all flight tests, establish a logistics train, and procure all 339 aircraft. The Air Force pegs the fly-away unit cost of the F-22 at $83.6 million, in Fiscal 2000 dollars.

Jumper warns that canceling the F-22 now is a loser for the Air Force—financially and operationally.

Without the F-22, the Air Force would have to restart the F-15 production line, he said, and add "as much of the F-22 capability as possible" onto the Eagle. This might include some minimal stealth treatments, new engines, thrust-vectoring nozzles, and electronic upgrades.

"To do that would cost us $10 billion more ... than it will to buy out the F-22," Jumper said.

What the F-22 represents, he added, is an effort to put Air Force pilots into the air with an airplane that represents "the true technological capability of this nation" and to give the US "as much of an advantage over the current generation of aircraft that are out there as we did when we fielded the F-15, and it enjoyed such a big advantage over

USAF photo by Judson Brohmer

Testing of the F-22 is progressing well, and Congress seems satisfied that it will live up to its billing. The planned buy of 339 airplanes, however, will not allow a one-for-one replacement of the F-15; F-22s will be in constant demand.

airplanes like the MiG-23 and MiG-21."

Joint Strike Fighter

The Joint Strike Fighter is the largest fighter airplane program for the foreseeable future, with nearly 3,000 planned for the US military and a market for 3,000 more anticipated overseas. If it goes forward, the program is likely to be in production well into the 2020s and maybe beyond.

The JSF program seeks to derive—from one basic fighter design—three highly similar, stealthy variants, one each for the Air Force, Navy, and Marine Corps.

Plans call for the Air Force model to replace the F-16 as the low end of the service's high/low mix, complementing the F-22. The service wants 1,763 JSFs to replace F-16s, which were bought in large blocks in the 1980s and will begin retiring by 2005. The Air Force expects to pay about $35 million apiece for the JSF, in 2001 dollars. The Air Force insists that the airplane be stealthy and meet its cost goal; otherwise, the service will not be able to buy it in sufficient quantities.

If the JSF doesn't appear in time to replace the F-16 within this decade, lengthy and expensive service life updates will be necessary. Because the F-16 is not stealthy, the Air Force's ability to operate in areas with many mobile surface-to-air missiles roaming the battlefield will be severely hampered.

For the First Day

The Navy wants 480 JSFs to complement the F/A-18E/F. It would serve as a first-day-of-the-war, direct-attack platform, Chanik explained. Stealthier and carrying a bigger payload than the USAF version, the Navy expects to keep the cost of its JSF down to about $45 million.

Low operating cost and carrier suitability are the Navy's top requirements for the JSF, Chanik said.

The Marine Corps wants 609 JSFs to replace its AV-8B Harrier Short Takeoff and Vertical Landing jets for close air support. The JSF would also supplant the F/A-18s in Marine service. Considered the most technically challenging of the three variants, the STOVL model will also be used by the UK, which has invested $2 billion in the program in exchange for technology sharing and the right to help set requirements for the airplane. The Marine model is supposed to cost about $38 million.

The Marines need the JSF to be a STOVL airplane for two reasons: There are no catapults on the Marine amphibious assault vessels, which have short flight decks. The Marines also want to position JSFs forward, near the battle lines, to be able to provide close air support within a few short minutes of a request. USMC doesn't want to depend on existing runways to meet this need.

Approximately $14 billion has been spent on JSF over the last seven years, in a 50–50 cost-sharing arrangement between government and industry. To fully develop the airplane and create a manufacturing capability will cost another $25 billion—vs. twice that if three separate programs were pursued—and production will cost about $90 billion. Foreign orders are expected, with six more nations interested in getting in on development and contributing funds toward it.

Two concepts are competing to be the JSF, which is expected to be called the F-24 in operational service. Boeing is offering an airplane based on its X-32 demonstrator, while Lockheed Martin's entry is based on its X-35.

Boeing's design is characterized by a large air intake under the nose, a feature which opens even wider on the Marine model when taking off or descending vertically. Though the X-32 is a tailless design, Boeing's proposed JSF has a more conventional layout. While the engine fan blades seem to be visible on the Boeing concept—a no-no in stealth design—Boeing program manager Frank Statkus said the blades are hidden by a blocker, which is a new approach to stealth. The X-32 meets all the Pentagon's requirements for stealth, Statkus said.

Lockheed Martin's X-35 bears a vague family resemblance to Lockheed's F-22. The conventional layout features inlets on the sides of the airplane; the fan blades are hidden from view, inside the fuselage.

Both aircraft are required to carry two 1,000-pound Joint Direct Attack Munitions internally and have the ability to carry external stores to increase payload when stealth is not required. Both types must have a combat radius in excess of 600 miles.

Marine Corps Maj. Gen. Michael Hough, the JSF program manager, says the program is right on track and performing beyond anyone's expectations.

The Dart Throw

"In 1994, they threw a dart in the wall and decided that there would be a [winner chosen] in April 2001. We

Boeing photo

Boeing's tailless X-32 design has been superceded by the company's final JSF proposal, which has a more conventional layout. The JSF X-planes demonstrate design, flight, and manufacturing concepts and aren't meant to be prototypes.

will do it in October. Over a seven-year program, we're five months off."

Hough said the JSF will in every way match or exceed the performance of the aircraft it is designed to replace. However, "cost of ownership is the legacy of this airplane. Not performance. Relative to cost of ownership, performance is easy."

He said when the services got serious about setting their true top priorities for the JSF, they found that they were willing to trade away some aspects of performance to get an aircraft that was cheap to own and operate.

"It's cost of ownership of legacy airplanes that's ... eating us alive," Hough noted. He also said that when the contractors "saw we were serious" about an almost religious zeal for savings, they too sharpened their pencils and went to work, discarding long-standing traditional ideas about how fighter airplanes are made. For its part, the government did not specify what it wanted. It set the performance and cost requirements and let the contractors offer their own solutions, using their own techniques, technology, and business practices.

In the end, Hough said, the services will get both high performance and an affordable aircraft.

The JSF will save large amounts of money because of high commonality between the three variants. The target parts commonality is 80 percent, and both competitors report they are comfortably above that level. Moreover, the three versions will use nearly identical software, and more savings will derive from common training systems, common depot equipment, and a single, streamlined parts catalog.

The JSF will be able to carry either the Pratt & Whitney F119 or General Electric F120 engine. Both engine companies have to fit the same hole in the airplane, and the software to run the two engines must be identical. To the pilot, it will not matter whether he is flying with one or the other type engine; performance will be the same.

Competition on the engine is expected to save billions and produce continually better value in performance and reliability, Hough said. Achieving the ability to use the engines interchangeably was the hardest challenge of the program, he added. Though there have been engine competitions in the past—particularly on the F-16—the engines were not interchangeable and required unique equipment on the airplane, as well as unique software.

The No-Break Fighter

The assault on cost has been fierce from the beginning, Hough explained. He wanted an airplane as reliable as a TV set, car radio, or refrigerator.

"They don't break," he said. "Why can't you have an airplane like that?"

He gave as an example of cost avoidance the reliability of the JSF engines.

On current fighters, "every 250 to 300 hours, we jerk a motor out of an airplane," he said. If an airplane is going to an overseas deployment with 100 hours on the engine and will be deployed for more than six months, "you have to take another motor with you [and] that increases footprint."

The JSF engines will require changeout for service only every 800 to 1,000 hours, or every three or four years, instead of at least once a year. They will need fewer maintainers and fewer spares on deployments.

He summed up the cost-saving

Lockheed Martin photo

The X-32 and X-35 have racked up the smoothest-ever flight test program of X-planes, thanks to exhaustive simulation beforehand. Lockheed Martin's X-35, shown here, closely matches the company's proposed JSF design.

Photo illustration by Erik Simonsen

The two JSFs—Boeing's on the left and Lockheed Martin's on the right—are competing to fill a need for 3,000 fighters for the US and as many overseas. Choosing one will be hard; the program manager rates them both a "10."

approach by pointing out that manpower accounts for 65 percent of the cost of ownership.

"We took the man out of the loop" wherever possible, he said. "I'm reducing manpower requirements, ... decrease the footprint."

Similarly, the radar in the JSF has a theoretical mean time between failure that is longer than the life expectancy of the aircraft itself, so that technicians will rarely, if ever, have to open it for maintenance.

The payoff is enormous, Hough said. A 10,000-man Marine Aviation Logistics Squadron can be reduced to 2,000 troops, simply by cutting down the time it takes to fix avionics.

"I can take 8,000 guys out of there and give them back to the Marine Corps and make them into trigger-pullers," he said.

Even the stealth treatments on the JSF will require less than 30 minutes between sorties for touch up, Hough noted. "That's two guys for 15 minutes each," Hough reported.

Overall, he said, the JSF will take advantage of everything learned on the F-22 and F/A-18E/F, in terms of design and manufacturing technology.

When President Bush talked about "skipping a generation" of technology, "I thought he was talking about us," Hough grinned.

However, the Joint Strike Fighter assumes the F-22, he said. The JSF does not have supercruise ability, he pointed out, nor is it designed to be an air superiority airplane.

"It's a bomb truck ... and a very efficient one," Hough said.

Statkus said the single biggest thing that made the JSF possible was the ability to accurately model aircraft performance on a computer.

Just Like the Simulator

"It is an extreme excitement for people like myself and other engineers when a pilot who has spent thousands of hours in the simulator flies the airplane ... and comes back and says, 'You know, I couldn't tell the difference between the airplane and the simulator,' " he said.

Boeing's tailless X-32 does not look much like its proposed JSF, but Hough said he's confident that Boeing will deliver what it proposes "because of the fidelity of the simulations" between the demonstrator and the models which predicted its performance.

The requirements for the JSF were adjusted frequently during the seven-year concept definition phase, and Statkus said the ability to fine-tune the design at each step in the process led to adjusting the company's JSF proposal from its initial tailless offering.

Lockheed Martin JSF manager Tom Burbage said his company began with a "good, all-around design ... easily tunable to the requirements as they were changing." Whereas Boeing seemed to be designing to a price point, he said, Lockheed's airplane was geared toward "offering best value." Statkus agreed about designing to a price point but also insisted his airplane, too, would be "best value."

Hough said he believed several years ago that the requirements for JSF would be set too high. He feared that, on a scale of one to 10, the contest would see a six beat a four.

"I wanted two nines. I don't have that. I have two 10s," he asserted. "Competition and money drove those guys" to offer airplanes that meet or exceed all requirements, he said.

When the program was sketched out in 1994, it was assumed the concept airplanes would fly like those in the past, plagued with the technical problems of flying virtually one-of-a-kind machines. But the computer-aided design and manufacturing of the demonstrators was so smooth that they have been almost as reliable as the objective aircraft.

Instead of flying two to five times a week, "we're flying them three to five times a day," Hough reported. So accurately have they been hitting test points that, instead of the planned 200-hour flight test program, "we're knocking these things out in 110 to 120 hours."

Hough said that the contractors have made the concept demonstration flying program "look ridiculously easy." He's not taking success for granted. "That was done with a hell of a lot of forethought, planning, superb engineering, and a heavy, heavy dose of leadership," said Hough.

Jumper said the Air Force is relying on the JSF to deliver an airplane that will fill out its fleet. The F-22 is vital to gaining access to a future theater of war. However, noted Jumper, gaining access by itself "does not win the war."

The JSF will be vital to keeping up the pressure on the enemy, as the "persistence stealth over the battlefield" that continues to suppress and destroy enemy air defenses, find mobile targets, and hit time-critical targets as they emerge, Jumper said.

The F-22 "gets the low end of the mix in" to the fight, he said. And it is that lower end of the mix that is "the war-winning force, that has to come in behind the kick-down-the-door force," he said. ■

The SBIRS constellations hold the key to warning and intercept of enemy ballistic missiles.

Space Watch, High and Low

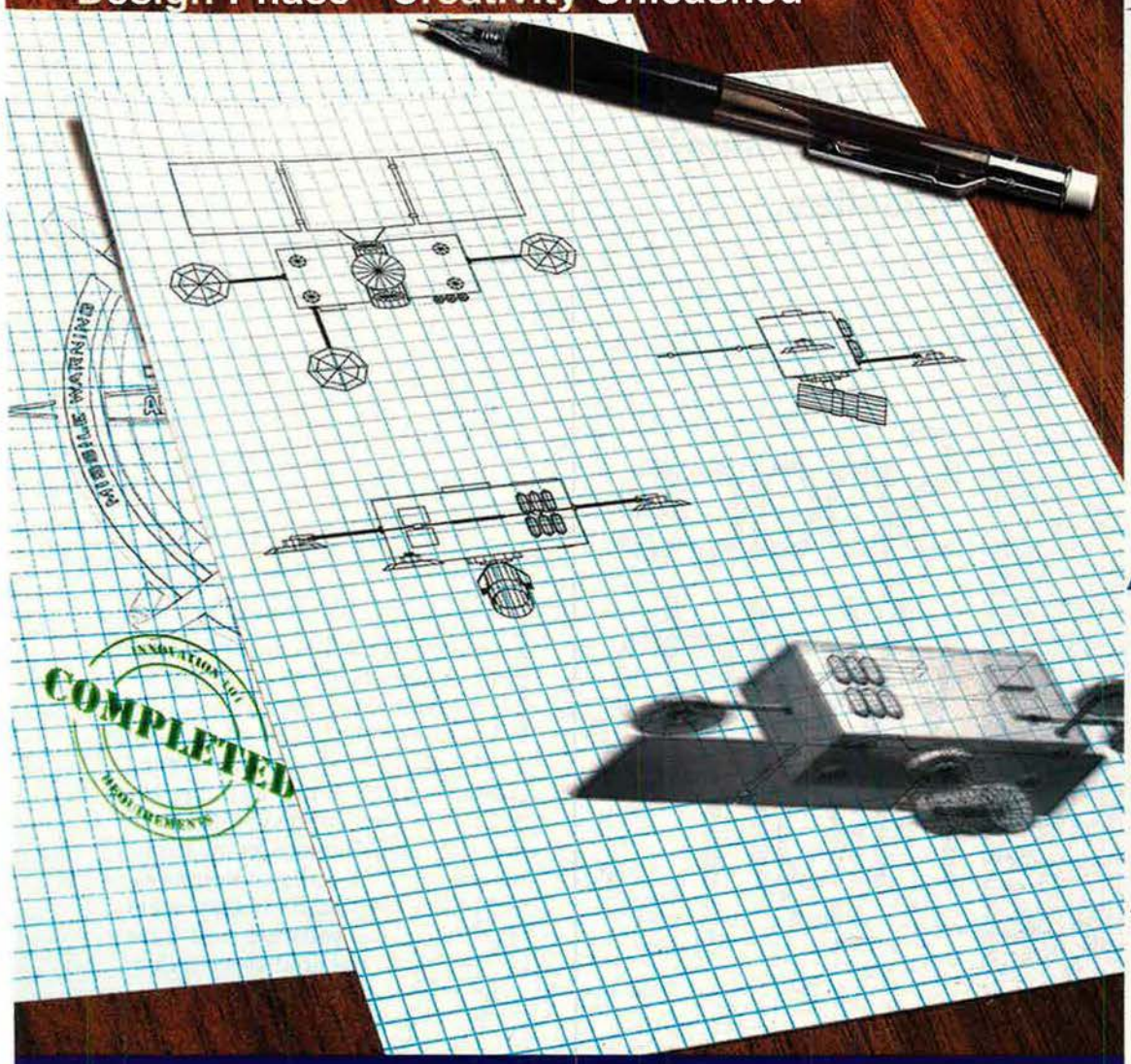
By Richard J. Newman

INTERCEPTORS, kill vehicles, boosters, warheads, decoys. These are the principal topics in the political debate over what kind of national missile defense system the United States should build, if any. Yet before any interceptor leaves its silo or any kill vehicle homes in on a missile, an extraordinarily complex system of sensors, battle management computers, and software will have to find, track, and predict the trajectories of incoming warheads. Those systems get little public attention, but without them, even the best interceptors or kill vehicles would be virtually useless.

The most ambitious sensor package in the Pentagon's future plans is the Air Force's Space Based Infrared System, known as SBIRS (pronounced "sibbers"). If fielded as planned, SBIRS would consist of two sets of satellites. The so-called SBIRS High constellation, consisting of four satellites in geosynchronous Earth orbits and two sensors in elliptical high Earth orbits, would primarily provide early warning of missile launches and track rockets until their heat-generating boosters burn out. SBIRS Low, consisting of about two dozen satellites in low Earth orbit, would then track the warheads from their point of separation from a

Continued on p. 37.

Innovation 101:
Requirements Definition Phase - Completed
Innovation 201:
Design Phase - Creativity Unleashed



With the completion of the Requirements Definition Phase for the Space Based Infrared System Low (SBIRS Low) program, the Spectrum Astro Team now moves forward into the Design Phase. Our Team, recognized for its proven ability to turn difficult science into progressive and affordable solutions that work, is designing a key and vital element of our nation's missile defense systems with multi-mission military capability.

When the science is new…
When the science is hard…
When the science is expensive…

Look to the Spectrum Astro/Northrop Grumman Team to pioneer the affordable, creative solution that works … and works well for the warfighter.

Spectrum Astro, Inc. • 1440 North Fiesta Boulevard • Gilbert, Arizona 85233
Phone (480) 892-8200 • FAX (480) 892-2949
www.spectrumastro.com • www.SBIRSLow.com
Contact Dan Toomey in the Program Development Office.

SBIRS LOW
AFFORDABILITY THROUGH INNOVATION

SPECTRUMASTRO

NORTHROP GRUMMAN

BOEING

LOCKHEED MARTIN

ITT Industries

Litton TASC

ANALEX

booster until they neared re-entry. Combined with powerful radars, SBIRS will provide "birth-to-death tracking" of ballistic missiles, says Col. Michael W. Booen, the Air Force's SBIRS program manager.

The $8 billion program could experience some difficulties. The Air Force already has delayed the deployment of both segments by two years. Plans now call for launching the first SBIRS High satellite in 2004 and the first SBIRS Low satellite in 2006. That delay sparked concerns in Congress that the Air Force might be neglecting the system. As a result, lawmakers last year ordered that by this October the Air Force hand over program management responsibility for SBIRS Low to the Pentagon's Ballistic Missile Defense Organization. Moreover, there are major questions about whether the technology for SBIRS Low is mature enough to be fielded in just five more years. In a February report, the General Accounting Office found that SBIRS Low "is at high risk of not delivering the system on time or at cost or with expected performance."

Different Lineages

SBIRS High and SBIRS Low, though they have been grouped together in the same program, have distinctly different lineages and missions.

The SBIRS High system will be the next-generation replacement for the Air Force's venerable Defense Support Program sensors. The first DSP satellite was placed in orbit in 1970, and at any given time, the on-orbit constellation comprises about five spacecraft. The DSP originally was intended to provide early warning of a Soviet ICBM launch. Over the decades, however, the satellite has been upgraded to provide several types of technical intelligence that would be hard to get any other way. Military experts regard an enhanced space early warning system as a high priority. "If I could only build one space system for the next 20 years, it's SBIRS High," says retired Gen. Thomas S. Moorman Jr., former vice chief of staff of the Air Force and former commander of Air Force Space Command. "It's a matter of survival."

During the 1991 Persian Gulf War, DSP satellites provided the primary means for detecting launches of Iraqi Scud missiles. The Gulf War also highlighted the limitations of the aging DSP system. It took a full 10 minutes to transmit missile-launch data from DSP through the ground stations to troops operating Patriot anti-missile batteries in the theater. That severely limited the time available to launch the Patriot weapons. The DSP satellites were unable to pinpoint launch areas, a fact making it difficult for coalition troops to find and destroy mobile Scuds—nor could they accurately predict a Scud's impact point.

SBIRS High is expected to eliminate or at least greatly diminish these problems. Booen says SBIRS High probably will need less than a minute to transmit missile-launch data from space to troops in the theater. The new system will do better pinpointing a launch location. David R. Tanks, a space analyst with the Institute for Foreign Policy Analysis, estimates that the new infrared sensors should be able to get within a kilometer, whereas that figure today is five kilometers. With the proliferation of mobile ICBM systems, shrinking the size of the possible launch area could be crucial to targeting a "shoot-and-scoot" launcher before it can scoot. Experts believe SBIRS High should throw out fewer false alarms than DSP, which sometimes "detects" a missile launch in the flare of an oil derrick or the lighting of a fighter's afterburner. SBIRS High ought to be sophisticated enough to identify what type of missile has been launched.

Moreover, SBIRS High will also be able to track missiles much more accurately in the early part of flight. Unlike the DSP satellites, whose sensors conduct a sweep at 10-second intervals, SBIRS High has both a "scanning" sensor and a "staring" sensor. That means it can simultaneously sweep a broad area and focus on a small area. When a missile is launched, the SBIRS High scanning sensor will quickly detect the sudden hot plume of exhaust as the staring sensor follows the plume continuously. That technique should allow SBIRS High to keep an accurate record of the missile trajectory until the booster burns out at an altitude of 100 miles or so above Earth.

It is at that point that the second constellation, SBIRS Low, is supposed to take over. This network of 24 satellites in low Earth orbit—the progeny of the Brilliant Eyes component of Ronald Reagan's Strategic Defense Initiative—is meant to track missiles during the midcourse portion of their flight, after the booster has burned out and its heat plume has disappeared. The innovation of SBIRS Low is that in addition to being able to detect hot objects, like the plume of fire belching from a missile, it will also be able to track very cold ones—like warheads flying through the vacuum of space.

The Critical Moment

When the missile is launched, a SBIRS Low satellite will either pick it up with its own sensors or get a location cue from SBIRS High. Then it will begin its own tracking. The critical moment comes when the missile's booster burns out and the missile ejects its warhead, decoys, and penetration aids onto a ballistic flight path through space. Pentagon officials hope that SBIRS Low at that point will be able to track all of the objects hurtling through space. With several different satellites looking on from different angles, defenders on Earth should be able to develop an accurate, three-dimensional view of where the warhead is, its location, and ultimate destination.

Those data will be crucial. In order to shoot down a high-performance warhead traveling at 15,000 miles per hour through space, interceptors will have to be launched shortly after launch of the missile itself. Unless interceptors are close enough to shoot down the ICBM in its very brief boost phase (DOD has not yet begun to develop that technology) it will be SBIRS Low data that guide the interceptor toward the incoming ICBM during its midcourse phase. Getting the interceptor close to the warhead is essential for guiding the kill vehicle—launched from the interceptor in the final moments of flight—into the missile to destroy it in space.

SBIRS Low could help solve another vexing problem—distinguishing the warhead from decoys and other countermeasures meant to confuse a missile shield and let the warheads leak through. Missile experts say the best way to do that is to begin tracking all of the objects the moment they have been ejected from the rocket. That lets different sensors gather data

on the characteristics of each object and gives computers time to process it. While discrimination tactics are highly classified, missile experts say constant tracking is the key to determining what to worry about and what to ignore.

Critical Handoff

The final step in birth-to-death tracking of missiles will be the handoff of the tracking mission to powerful, surface-based X-band radars that follow incoming warheads once they come over the horizon. Current plans call for basing one such radar on Shemya Island, at the far western tip of Alaska's Aleutian Islands chain.

Missile defense experts say that, if a system can track a missile throughout its flight, there should be a high likelihood that it will be able to identify the warhead by the time it is picked up by the radars that will guide the kill vehicle to its target. "Once you fuse infrared [data] with radar," says Booen, the SBIRS program manager, "it makes it very hard to defeat [our system] with countermeasures."

Building a system to shoot down ballistic missiles, of course, ranks as one of the most ambitious projects the Pentagon has ever undertaken. Guiding a kill vehicle into an ICBM—at a combined speed of 17,000 miles per hour—is the easy part. (DOD still has to figure out how to do that with high confidence; in three tries to "hit a bullet with a bullet," one succeeded.) Harder still is developing the "system of systems" that, theoretically, would enable nearly 30 satellites, several ground-based radars, and numerous ground stations to shoot gigabytes of data back and forth in nanoseconds. During the 1999 NATO war against Serbia, it was common for hours to pass between detection and location of a critical target and a pilot's release of a bomb onto that target. That was simple in comparison to shooting down a ballistic missile with less than 20 minutes' notice.

Not surprisingly, SBIRS has encountered much of the same kind of skepticism that once attended Reagan's Strategic Defense Initiative. While SBIRS High is based on proven technology that has been fielded for 30 years, the two-year delay in the first launch reflected difficulties with software integration and other problems. "Continuing delays ... remain a concern," reported Philip E. Coyle, the Pentagon's top weapons evaluator during the Clinton Administration, in his annual report for 2000. Air Force officials are quite a bit more optimistic. Booen, for example, cited another factor that partly explains the delay in the SBIRS High schedule: The DSP satellites were lasting longer than expected, and thus there was no need to rush the program.

Fast Track?

Far more controversial is SBIRS Low, a technology the Pentagon has never before fielded. In its February report, the GAO cited many problems. Traditionally, the Pentagon requires satellite software to be finalized one year before the first satellite of a new system is to be launched. SBIRS Low is so complex that the software isn't set to be done until March 2010, more than three years after the first satellites are set to go into orbit. The current SBIRS Low schedule doesn't call for a series of key tests until more than five years after production of the satellites has begun. That means the Air Force would have to incorporate any needed design changes into satellites that already are in production, raising the danger of cost growth and delays. When queried by the GAO, the SBIRS Low program office explained that six critical technologies had to be in place for the system to work properly and that five were at maturity levels that constituted "high risk."

The SBIRS Low program office explained that six critical technologies had to be in place for the system to work properly and that five were at maturity levels that constituted "high risk."

Senior Pentagon officials have instructed the Ballistic Missile Defense Office to review SBIRS Low to see whether there might be a less expensive or more effective way to conduct midcourse tracking of ICBMs. One alternative may be construction of a series of X-band radars that would be placed in strategic locations throughout the world. The obvious drawback of such a system is that, if based on land, it would require political cooperation from nations that may not even be US allies.

SBIRS Low has attracted the attention of members of Congress, especially those who are strong proponents of the Bush Administration's plans for missile defense. When the Air Force delayed from 2004 to 2006 the fielding of the first SBIRS Low satellite, it did so without consulting Congress. The result was a passage in the authorization bill for Fiscal 2001 that transferred management authority of SBIRS Low from the Air Force to BMDO. While the Air Force will still execute the program, it cannot make any further changes without consulting the director of BMDO.

Without doubt, much is riding on the program.

Rep. Jerry Lewis (R–Calif.), chairman of the House Appropriations Defense Subcommittee, in a March 2 statement, put the situation this way: "Our plans for a shield against attack by foreign nuclear missiles depend on a highly reliable and comprehensive detection. It is essential that we know that any such system will work when needed and provide the most accurate information possible. Without this detection system, we cannot be fully protected from foreign threats." ■

Richard J. Newman is a Washington–based defense correspondent and senior editor for US News & World Report. *His most recent article for* Air Force *Magazine, "From Khobar to* Cole," *appeared in the March 2001 issue.*

Moving the Space Based Infrared System (SBIRS) Low from concept to operation takes the know-how and proven performance of an experienced industry team — a team that can turn the complex requirements of critical national systems into reality.

Today the TRW/Raytheon team is tackling the tough issues.

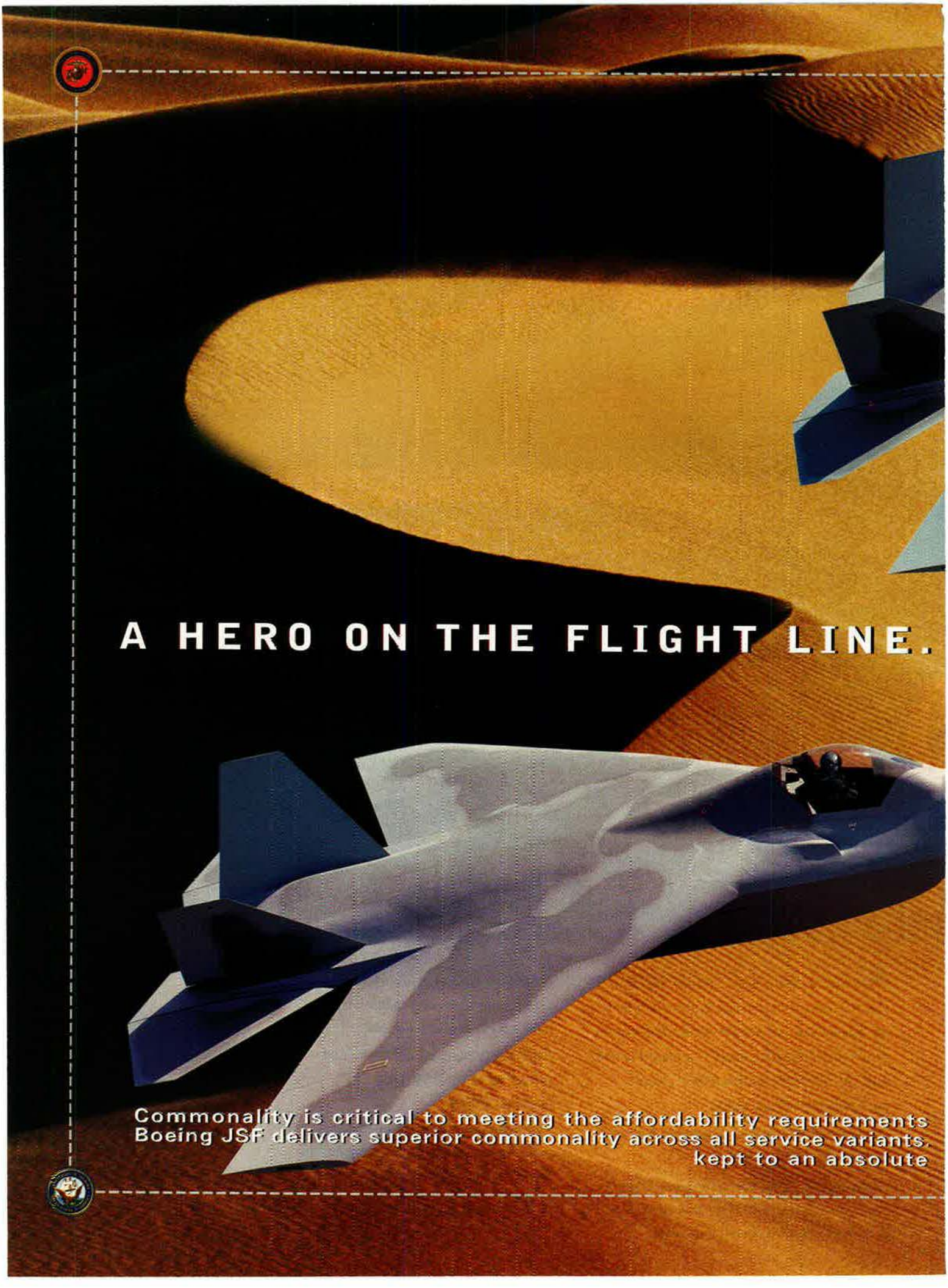
Manufacturability: *designed in from day one across all elements of the system architecture.*

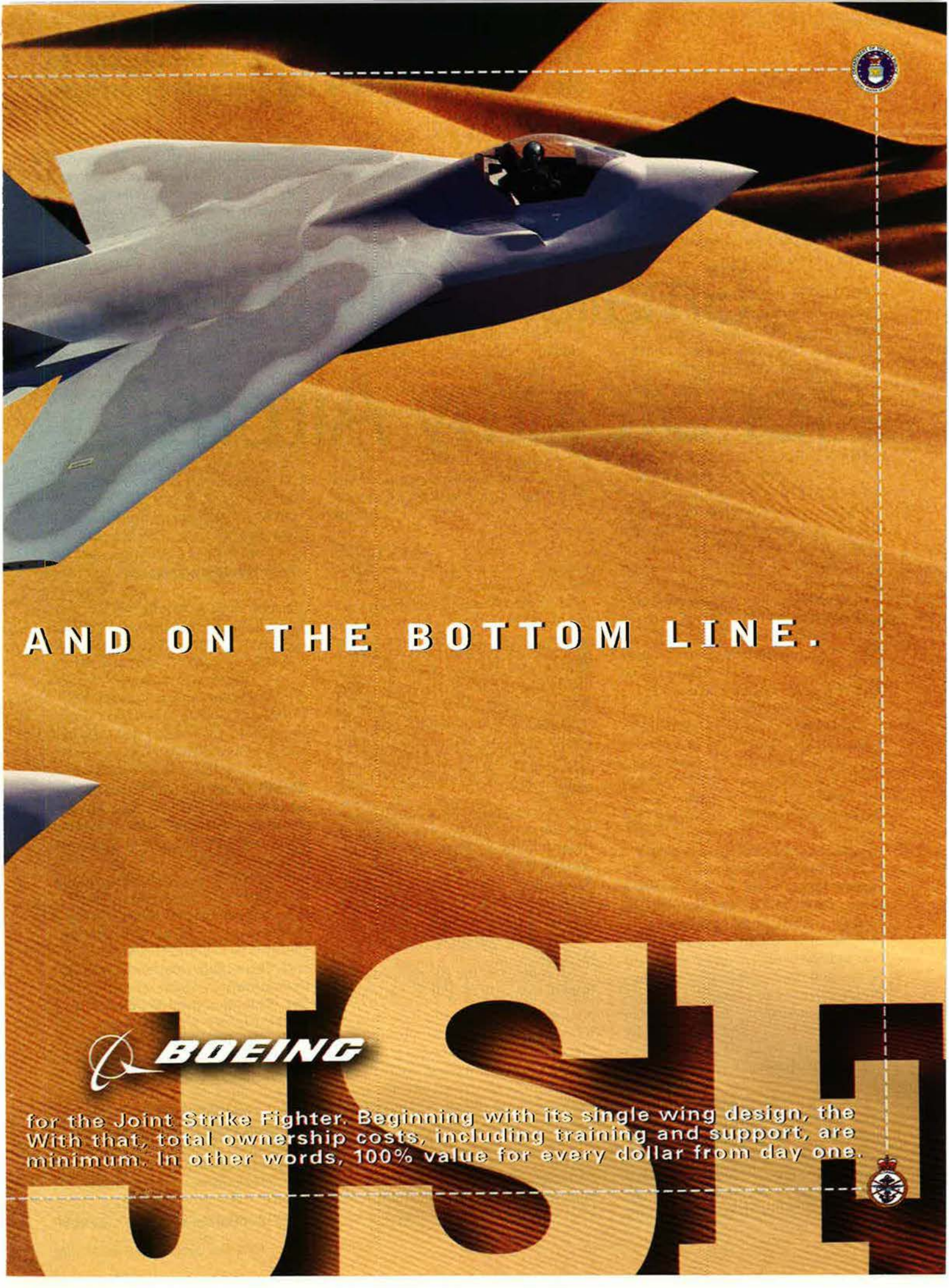
Discrimination: *thoroughly analyzed using real system components embedded in comprehensive simulations.*

Software: *planned, developed and integrated in sync with early hardware design.*

Our approach is founded on heritage and focused on innovation to ensure that ***SBIRS Low*** *goes the distance.*

TRW/Raytheon*...for the long run*


A HERO ON THE FLIGHT LINE.
Commonality is critical to meeting the affordability requirements
Boeing JSF delivers superior commonality across all service variants.
kept to an absolute


AND ON THE BOTTOM LINE.
BOEING
for the Joint Strike Fighter. Beginning with its single wing design, the
With that, total ownership costs, including training and support, are
minimum. In other words, 100% value for every dollar from day one.
JSF

The Small Diameter Bomb is emerging as one of the Air Force's top weapon priorities.

Smaller Bombs for Stealthy Aircraft

By Adam J. Hebert

In 1999, the US Air Force faced a war over Kosovo that was very different from the Persian Gulf War almost a decade earlier. Foul weather regularly hindered attack aircraft, while enemy air defenses kept fighters at high altitude. Hidden, mobile targets were difficult to locate and destroy.

Further complicating Allied Force was the dense urban environment of Belgrade, the Serbian capital, which was the focus of many US attacks. In the attempt to end Serb aggression against Kosovo, collateral damage became a large concern, as military targets were often located among civilians.

After the war, the Air Force determined that Allied Force validated USAF's push for smaller and more accurate weapons. The need to destroy specific targets in populated areas showed the value of precision attack.

In addition, using a smaller bomb to destroy a target by delivering it precisely on target fit into USAF's increasing emphasis on stealth. Today's F-117 and B-2 stealth aircraft carry their weapons internally to maintain a radar-eluding profile. The upcoming F-22 and Joint Strike Fighter will also have limited space for weapons, if flown in a stealthy configuration without bombs hung from hardpoints on the wings.

"F-22 and JSF still have relatively small bomb bays," one official noted,

"and with precision, it doesn't take as much raw power to achieve the desired effect."

The 1997 requirements document that led to current small bomb efforts had this to say: "Internal carriage aircraft ... possess a very limited capability to employ multiple weapons per pass with current munitions systems. The munitions addressed by this [mission needs statement] should be independently targetable over a wide area and have multiple carriage capability on aircraft and space delivery platforms, beyond the capability of current munitions."

The "Key Enabler"

Bruce Simpson, Armament Product Group deputy manager, Eglin AFB, Fla., once noted that miniature munitions are becoming a "key enabler." Smaller warheads are needed because "JSF and F-22 really need that additional capability," and during Allied Force, "most targets [that] we were addressing needed less damage than were given to them," Simpson said.

A senior officer added that the 2,000-pound AGM-130, despite its accuracy, "was often the wrong weapon for Kosovo" because of the potential for collateral damage.

The mission needs statement for a miniaturized munitions capability had already begun the process of creating a new small bomb program when Allied Force took place.

An Analysis of Alternatives completed by Air Combat Command last year determined that each of 26 small, precision weapons evaluated in the AOA offered new warfighting capability for the Air Force, service officials say. The 26 small bomb concepts "all had merit," reported one senior officer.

These miniaturized munitions trends evolved into what was temporarily known as the Small Smart Bomb program. That program has now become the Small Diameter Bomb—one of the service's new weapon priorities and a program that is being accelerated from earlier schedules, thanks to support from top Air Force leaders.

The name change was made "to ensure that [SDB] didn't get associated with a single concept [from the AOA and] to set it aside as the next step," explained Brig. Gen. Daniel P. Leaf, Air Force director of operational requirements. The new name "emphasizes a couple of things," he said.

"The small diameter is important because it could be [carried by an Unmanned Combat Air Vehicle], or it could be increasing the weapons capacity of an F-22, a Joint Strike Fighter, or the weapons carriage capacity of a B-2," Leaf said.

Although the SDB concept is still being developed and no contractors have been selected, service officials estimate the weapon will produce a fourfold increase in the number of independently targetable weapons that stealthy aircraft can carry.

"From my perspective," said Leaf, "I really like what it does for our stealth aircraft capacity, because as SA-10s and [SA]-20s continue to proliferate, [stealth is] going to be increasingly important, and the only way to be stealthy is to put the stuff inside."

Future Star

In the words of Maj. Gen. Michael C. Kostelnik, Air Armament Center commander at Eglin: "If we had the [SDB] in numbers in Kosovo, it would have been the star."

The mission needs statement notes, "Several of the current platforms (such as the F-15E, F-16C/D, F-117, B-1, B-2, and the ballistic missile) and next-generation platforms will be capable of carrying only a limited number of existing and planned munition systems," which makes miniaturization critical.

These needs include:

- Multiple kills per pass.
- Reduced airlift support.
- Ability to locate and destroy small and mobile targets in real time.
- Resistance to camouflage, concealment, and deception.
- Minimal collateral damage.
- Resistance to countermeasures.

The program also meshes with service desires to better tailor weapon inventories to true requirements. A key finding in Air Force reviews of future weapon plans was the fact that USAF needed to take a harder look at inventories, said Lester McFawn, director of plans and programs for the Air Armament Center. The service must evaluate the efficacy of making one-for-one replenishments as weapons are used and determine whether the service should instead be moving toward future precision weapons that minimize collateral damage, such as SDB, McFawn said.

Everyone agrees that, because precision weapons have been so popular in recent operations, something needs to be purchased to replenish the supplies. And as Leaf said, "We already had some concerns about munitions shortfalls [and SDB] helps us meet it. ... It will be a very cost-effective solution."

In April, the service established an SDB system program office at Eglin, using funds left over from weapon experiments and a Fiscal 2001 increase from Congress.

The SDB program is developing a new, small-payload precision weapon for use aboard almost every Air Force combat aircraft, beginning with the F-15E Strike Eagle, according to SDB Program Manager Terry Little.

From the beginning, USAF officials sought to create a new weapon that would have not only the ability to precisely attack fixed targets but also to go after the more difficult mobile and relocatable targets. A phased approach was selected in order to get the SDB capability into the field while more advanced versions of the weapon are still under development.

"You could almost consider it a four-phase program, if you count 500 [-pound Joint Direct Attack Munitions] as an initial phase," Leaf said. The service is still pushing for the smaller JDAM, as the larger 1,000-pound variant proved its effectiveness and relatively low cost during Allied Force.

Officials say the goal is to make SDB smaller while giving it a capability that is even greater than the 500-pound JDAM. Still, said McFawn, the Joint Direct Attack Munition was cited as a prototype for future weapons development because it cost much less than early estimates—"and was ready in about half the time of traditional weapons, which often take 12 years to develop." McFawn said, "The real desire is to do even better than JDAM."

Ready in 2006

Therefore, Little said, SDB will be developed in stages, with the first capability guided by inertial navigation and Global Positioning System guidance. Phase 1 will be for fixed targets and is scheduled to achieve

operational capability in 2006, Little said.

Last year, this capability was expected to become available in about a decade, but since then, the Air Force has funded a faster pace for the program. Col. James Uhle, chief of the weapons division under Leaf at the Pentagon, has observed that it "takes way too long to get [new precision weapons] on our aircraft."

Responding to this concern, Little said he hopes the SDB program will be in development for four years, much less than the time needed for similar programs in the past. Little said $38 million is needed in Fiscal 2002 to continue the program. The source of that money has not yet been identified, but it likely will come from other Air Force programs.

"Air Combat Command will prioritize, look at what requirements it supplants, and make those trades," Leaf said. SDB has "very, very high potential—it will be worth making the trades," he said.

Beyond the weapon itself, the cost of integrating the weapons with the software, carriage, and targeting requirements involved in the certification process can slow weapons programs down, but officials say this certification process is essential for SDB—in order to get the full capability from the weapon.

"Integration into the aircraft, and making sure we get all the capability out of it—that's going to be key," Leaf said.

SDB Phase 1 will provide the ability to attack fixed targets with a common carriage system. The smart multiple ejector rack will be used to integrate SDB onto aircraft, and according to Air Armament Center commander Kostelnik, prototype racks have already been demonstrated.

Phase 2 will focus on going after mobile and relocatable targets and will "begin looking at automatic target recognition as a component of the capability," Leaf said. Plans call for fielding this capability by 2009. Officials emphasize that all schedules are tentative and that new SDB capabilities will be added to the program when it is cost-effective to do so.

In a proposed Phase 3, the SDB will acquire loiter, wide area search, and automatic target location and recognition in its kit. This will mark an evolution of SDB from a conventional bomb to something more like a loitering attack missile. The proposed third phase will involve the addition of an "autonomous search and attack" capability, said Greg Jenkins, chief of Air Armament Center's advanced concepts team.

Little, who is also program manager for the stealthy, Air Force–led Joint Air-to-Surface Standoff Missile, said that seeker development will likely begin around 2006, when the needed technology is more developed and affordable.

The service is currently drafting formal standards for an operational requirements document, said Maj. Ben Quintana, an Air Force officer who led the miniaturized munitions capability Analysis of Alternatives for ACC at Langley AFB, Va. Quintana said industry groups are now preparing proposals. Little added that Lockheed Martin, Boeing, and Raytheon are expected to compete for the developmental contracts, with a Request for Proposals coming this summer.

The RFP will be for the program's early development phase, officials say. The service will select the two most promising contractor proposals for the first phase, later narrowing down to a single contractor for subsequent production phases.

Little said the warhead size could be around 150 pounds, considerably smaller than the 1,000-pound Joint Direct Attack Munition currently seen as the standard in low-cost precision attack. Unclassified program goals call for a range of up to 35 miles and accuracy of 13 meters, with a 250-pound warhead seen as the probable size, officials say.

"Stunning"

"Small Diameter Bomb will reduce the time it takes ... to service a target set, because you get more bang per sortie," Leaf said, adding "it will significantly reduce both the time required to achieve [commander in chief] objectives and delivery platform attrition," through the bomb's standoff-range capability. "It was a pretty stunning Analysis of Alternatives," he added.

The analysis validated the small bomb concept by demonstrating that a small smart bomb can significantly increase combat capability compared to other weapons, including the 500-pound JDAM, Quintana said. The 500-pound JDAM was the "baseline capability" other proposals were evaluated against. The analysis "was a big project that looked at all fighters and bombers," he added.

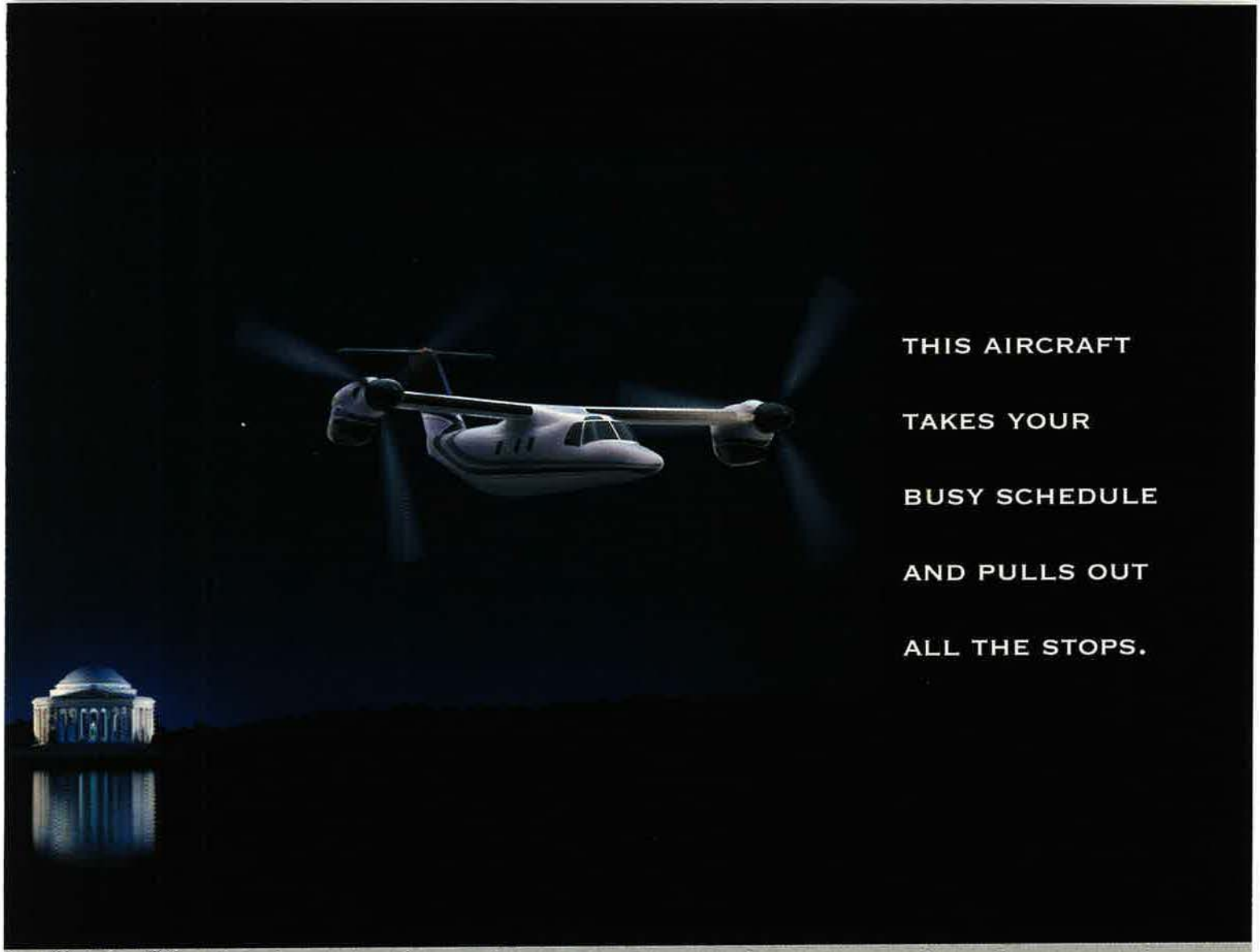
Leaf said the shift to a smaller size will be effective against many targets and will simplify targeting and logistics. "It takes care of business without having [a] broad area [that] it destroys," he noted. "It's a smaller weapon, so it will take up less space. There's a big difference between that size weapon and a 2,000-pounder, in terms of explosive safety. ... When I was at Aviano [AB, Italy] during the air war over Serbia, one of our very big concerns was very tight, cramped areas. We had a lot of explosives pre-positioned and hung on airplanes, and there's some risk to that. You reduce that risk and you reduce... the logistics requirement" by moving away from reliance on 1,000-pound weapons, he said.

The new small bomb, despite its potential, doesn't mean elimination of big bombs. "The key is the effects," Leaf said—whether or not a small bomb can destroy the target. There are certainly cases where a larger bomb will still be required, he said.

SDB would not be appropriate if "you can't achieve the necessary precision because of the nature of the target, and you need the greater explosive weight" that larger bombs deliver. Hardened targets, reinforced facilities, and large-area targets are other examples where larger bombs will continue to be weapons of choice.

"In real general war, there are times when the brute force of a big explosion has value, too, not necessarily limited to its destructive power. War is a human endeavor," Leaf noted. "In a real tough, big fight, sometimes tidiness isn't the objective. You are trying to compel the enemy [with] brutishness beyond just the ability to service a target." ■

Adam J. Hebert is the senior correspondent for InsideDefense.com, an Internet defense information site, and contributing editor for "Inside the Air Force," a Washington, D.C.–based defense newsletter. His most recent article for Air Force *Magazine, "Why the Allies Can't Keep Up," appeared in the March 2001 issue.*



THIS AIRCRAFT

TAKES YOUR

BUSY SCHEDULE

AND PULLS OUT

ALL THE STOPS.

GET THERE FASTER WITH THE BA609.

IT'S THE ONLY AIRCRAFT WITH THE SPEED AND RANGE OF A FIXED WING AND THE CONVENIENCE OF A HELICOPTER. GO FROM WHERE YOU ARE TO WHERE YOU NEED TO BE. AND MAKE NO STOPS IN BETWEEN.

BELL/AGUSTA AEROSPACE COMPANY

An Aviation Company Built For Your World.™

BellAgusta.Aerospace.com

The Return of Kelly Field

Most of the huge Texas base is now "KellyUSA," but USAF will keep the field as a part of Lackland.

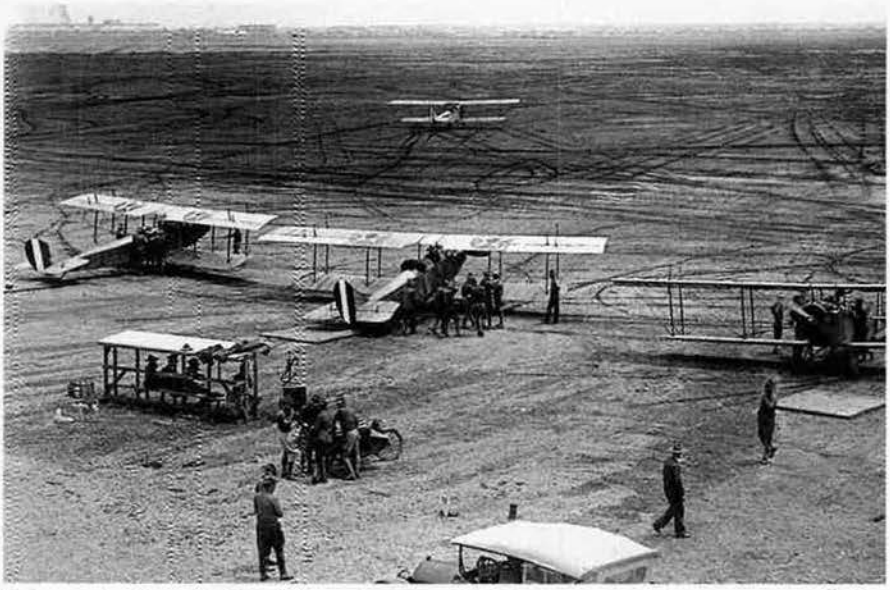
NEARLY 85 years after it first set up shop as a flight school for pilots in the Army's Aviation Section, Kelly Field, which grew into one of the nation's oldest and most colorful military bases, has regained its original name and returned to its original mission of training airmen.

On July 13, much of the sprawling Texas complex that has been Kelly Air Force Base officially becomes "KellyUSA," a vast industrial park for aerospace firms, major corporations, and San Antonio businesses. Major elements of the logistics operations that have been the base's primary mission since World War II already have shifted to other installations. Many of the Air Force facilities are passing to civilian hands.

However, under the conversion plans, the base's airfield and flight operations will remain under the Air Force and become part of Lackland AFB, Tex., which itself was carved out of the Kelly complex during World War II.

Now called Kelly Field Annex, it is home to the 149th Fighter Wing (ANG) and the 433rd Airlift Wing (AFRC). Joint-use arrangements will allow the businesses that move into KellyUSA to use the runways as well.

Interestingly, it is the Guard wing that has brought Kelly back to its function as a training base. Although Kelly served that role for two world wars, it later evolved into a major supply and maintenance depot. Two years ago, however, the 149th FW was transferred to Air Education and Training Command and launched a four-month course to retrain experienced fighter pilots in the F-16. Since



In its early days, Kelly Field truly was a field—an unpaved former cotton field. Here, cadets awaiting their turn to fly sit in a shelter watching the Jennys being prepared for take off from the grass.

By Bruce D. Callander

then, the F-16 training has expanded into a full seven-month course to give newly graduated pilots their first taste of combat aircraft.

Beginnings

Kelly cannot claim to be the first training ground for military aviators or even the first in Texas. The Army's first air school was at College Park, Md., where Wilbur Wright in 1909 taught Lts. Frank P. Lahm and Frederic E. Humphreys to fly as part of the Wright's first airplane deal with the Army. As a bonus, he also gave Lt. Benjamin Foulois a couple of lessons, but he did not let him fly solo.

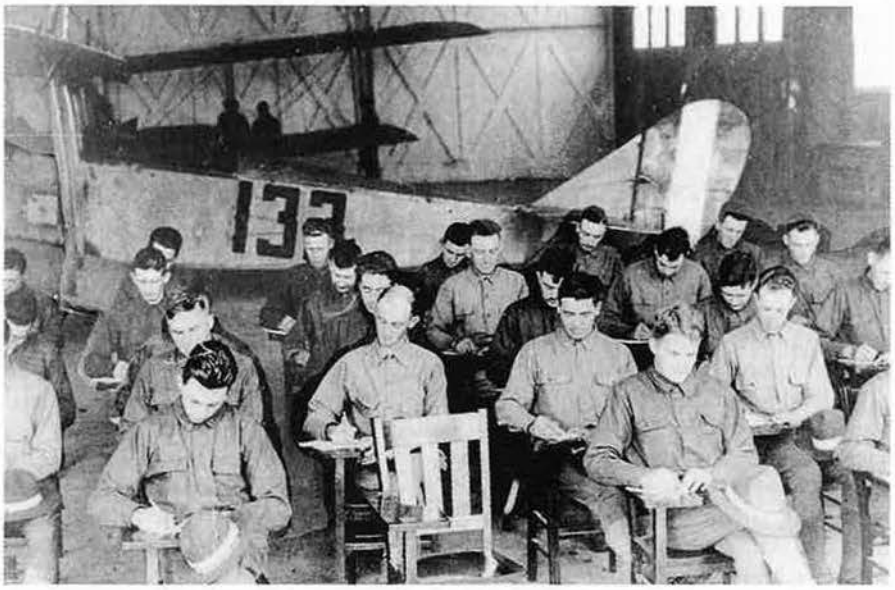
In February 1910, the Maryland weather turned sour and the two qualified Army pilots had gone on to other duties, so the Army sent Foulois to San Antonio with the flying machine and orders to teach himself to fly and explore military uses of the airplane. He set up shop on the parade ground at Ft. Sam Houston and later was joined by three other officers who had begun their flight training at Glenn H. Curtiss's school at North Island, San Diego. Among the three was Lt. George E.M. Kelly.

On May 10, 1911, Kelly took off in a Curtiss Model D for what turned out to be his final qualifying flight. He damaged the machine trying to land, and then he tried again and was killed. An investigating board ruled that Kelly had died trying to steer his damaged airplane away from a group of soldiers.

The accident was the last straw for officials at Ft. Sam. Foulois himself had survived numerous accidents. The Curtiss had been wrecked and repaired shortly before Kelly's fatal flight. Army officials banned all flying at the fort, flight training returned to College Park, and Foulois went on to a desk job in Washington.

In November 1915, however, Foulois returned to Ft. Sam as a captain in command of the 1st Aero Squadron. The following spring, he took the unit south to support Brig. Gen. John J. Pershing's punitive expedition against Mexican revolutionary Pancho Villa. Air operations in Mexico were disappointing, but they were a valuable learning experience. One of the lessons the Army learned was that it needed training centers to more fully prepare pilots before they reported to operational units.

With war already under way in Europe, the importance of airpower was becoming apparent. In 1916, Congress approved $13.3 million to beef up the Aviation Section and part of the money went into setting up new schools. Foulois was ordered to scout out a suitable site in the San Antonio area and chose a 700-acre tract south of the city. Congress authorized the Army to lease the property and on April 5, 1917, the first four JN-4 Jenny trainers landed on what had been a cotton field.



With a Jenny in the background, aviation cadets take an exam. In World War I, Kelly trained not only pilots but also those going into aviation mechanics and other aviation skills. It was also a reception and testing center for recruits.

The next day, Congress declared war on Germany and, three months later, the installation was named Kelly Field in honor of the lieutenant who had been the first American military aviator killed while piloting a military aircraft.

During the war, the base grew rapidly. It became a reception and testing center for new recruits and trained not only pilots but mechanics and specialists in other aviation-related skills. It also served as the birthplace for new combat units.

Operations soon outgrew the available real estate and the Army leased more land to the north. The original site, now known as Kelly Field No. 1, took on maintenance and supply, and the new area, Kelly Field No. 2, became the flying training center. In February 1918, a satellite area called Kelly Field No. 5 was set up as a flying school and named Brooks Field. Later, the School of Aviation Medicine would move there.

During the war, the airmen at Kelly organized some 250,000 men into units, including such combat outfits as the 17th, the 148th, and the 94th ("Hat in Ring") Aero Squadrons. The flying school graduated 1,459 pilots and 398 flight instructors in the course of the war, and enlisted courses had turned out an average of 2,000 mechanics and chauffeurs a month.

Kilner's Complaint

The training program, however, was not as seamless as officials might have wished. Col. Walter Kilner, chief of the Army Air Service's Training Section in Europe, wrote a blistering postwar critique of Stateside schooling. He complained that too many men received their wings and commissions before they could actually fly, there was no efficient way to eliminate worthless students, and the sheer magnitude of the program was causing delays in training and in assigning trained officers to units.

Writing about what he called the lack of proper "trade testing" and placement, Kilner specifically cited Kelly Field for the way it formed men into aero squadrons. "Wood workers were rated as machinists," he said, "farmers as mechanics, and good mechanics were given fatigue duties. Clerks were made mechanics and good mechanics were made clerks, and then the entire squadron would be turned over to a supposedly technical officer for further training and assignment to duty.

Under such conditions, it is not strange that mechanical work progressed slowly and that much of it was not properly done."

With the end of the war, the Air Service cut back sharply, and most of the smaller fields that had been set up to train men for the American Expeditionary Forces closed. Training and maintenance operations were consolidated, and although Kelly itself shrank, it continued to function in both areas.

Kelly Field No. 2 became the advanced flying school for the Air Service and, later, the Air Corps. It trained pilots in pursuit, bombardment, attack, and observation. Most Army aviators who were trained between the wars graduated from this school. They included future Chiefs of Staff Gens. Thomas D. White, Curtis E. LeMay, John P. McConnell, Hoyt S. Vandenberg, and John D. Ryan.

A Distinguished Group

Other distinguished alumni included Gen. Ira C. Eaker, the World War II commander of Eighth Air Force; Lt. Gen. William H. Tunner, boss of Military Air Transport Service; Maj. Gen. Claire Lee Chennault, leader of the Flying Tigers; and Charles Lindbergh, the first to fly solo nonstop across the Atlantic. Gen. Carl A. Spaatz once commanded the base, and Gen. James H. Doolittle served at Kelly with the 104th Aero Squadron and later attended the Air Service Mechanical School.

The names of several other men with ties to Kelly have since been given to other bases. Among them were Brig. Gen. Frank D. Lackland, a former Kelly Field commander who campaigned for a separate cadet center, and Sidney Johnson Brooks Jr., who was killed at Kelly on his last training flight and awarded his wings posthumously. Both gave their names to bases once attached to Kelly. Other Air Force installations named for men with Kelly connections, included Ellsworth, Castle, Vandenberg, Chennault, Moody, and Pease.

Over the years, however, Kelly took on new chores that eventually would lead it away from training and become its principal mission. During World War I, the aviation general supply depot had moved to Kelly Field No. 1 from downtown San Antonio. In 1921, the aviation repair depot in Dallas joined Kelly's supply depot to form the San Antonio Intermediate Air Depot.

In the mid-1920s, Kelly Field No. 1 was renamed Duncan Field for Lt. Col. Thomas Duncan, a pilot formerly stationed at Kelly Field and later killed in a crash. Field No. 2 became simply Kelly Field and the two installations functioned separately for the next 18 years.

The now-smaller Kelly Field continued not only as a training base but as a major maintenance center and showcase installation. It hosted flying circuses and was the site of the 1924 National Elimination Balloon Race. In 1926 it was the starting point for the Pan American Goodwill Flight, a 133-day mission to "show the flag" in 23 Central and South American countries. Kelly graduate Capt. Ira Eaker was one of the pilots.

In that same year, Kelly became the filming location for the World War I epic, "Wings," which starred Buddy Rogers and Clara Bow and included bit player Gary Cooper. The base supplied airplanes and pilots for the movie, and many base personnel served as extras. Lt. Hoyt Vandenberg gave Rogers flying lessons. The actor later flew with Navy Ferry Command in World War II.

In the 1920s, Kelly also was home to Maj. William C. Ocker and Capt. Carl J. Crane, who did pioneering work in the field of instrument flying and developed a "blind flying" curriculum for the base's training school.

The airmen at Kelly, like the rest of the Army Air Corps, limped into the 1930s short of airplanes and personnel while the nation struggled under the Great Depression. In 1938, however, Hitler began his move in Europe and the strength of the German military and, particularly, its Luftwaffe, shocked the US into a buildup. Congress voted $300 million for Air Corps expansion, and Kelly received funds to build new classrooms, cadet housing, dining halls, offices, and training facilities, many of which still survive. Over the next four years, the base's advanced flying school would graduate more than 6,800 pilots and 1,700 instructors.

In June 1942, the War Department broke off a piece of Kelly Field and named it the San Antonio Aviation Cadet Center. SAACC's main mission was to provide preflight and officer training to cadets, but as the flood of students grew, it opened a tent city annex to accommodate cadets waiting for preflight and those who had washed out of one type of training and were waiting to try another. It was that area that became Lackland Air Force Base.

Air Congestion

With several flying fields operating in the same neighborhood, congestion in the air posed a safety problem. Thus, Kelly and Duncan were reunited and again called Kelly Field.

An aerial photo of Kelly in the 1920s to 1930s. After World War I, Kelly Field No. 2 was used as an advanced flying school. Several future Air Force Chiefs of Staff and other distinguished fliers trained there.

Gradually its mission shifted to that of supply and maintenance, and the base evolved into a giant industrial complex under Air Service Command, headquartered at Patterson Field, Ohio.

The base's maintenance work included overhaul, repair, and modification of aircraft, engines, and related equipment. It handled B-17s, B-25s, B-29s, P-51s, and the ubiquitous C-47 cargo airplane. It also worked on bombsights, guns, and electrical equipment. To add storage space, the base annexed Normoyle Ordnance Depot, which became known as East Kelly. In 1945, Kelly also was used as an out processing center for soldiers being discharged.

By war's end, the workforce at Kelly had grown to more than 16,000 military and 15,000 civilian workers. Almost 40 percent of the latter were women, known as "Kelly Katies," who worked in almost every area, including engine overhaul.

In the postwar drawdown, Kelly cut back on some functions but continued its depot and supply missions. In 1946, the San Antonio Air Technical Service Command (ASC was redesignated Air Technical Service Command in 1944) became the San Antonio Air Materiel Area. The following year, Congress created the independent United States Air Force and in January 1948, Kelly Field became Kelly Air Force Base.

The shooting war was over, but a new Cold War developed and Kelly would play a major role in it. In June 1948, when Soviet forces blocked ground access to Berlin, the C-54 Skymaster became the workhorse of the Berlin Airlift. Kelly was the only US depot performing repair and replacement of the airplane's PW R-2000 engines. Within six months, the base handled more than 1,300 power plants for aircraft used in Operation Vittles.

When war erupted in Korea, Kelly put in a night-lighting system and worked around the clock to recondition B-29s for duty. With arrival of the jet-powered B-36D, the base took on a new generation of aircraft and engines.

By the mid-1950s, it was handling the B-47. And when SAAMA opened its B-58 Logistics Support Management Office, Kelly became a model for a major organizational realignment. Under the new arrangement, a weapon system manager's responsibilities included budgeting, funding, computing requirements, and arranging for maintenance.

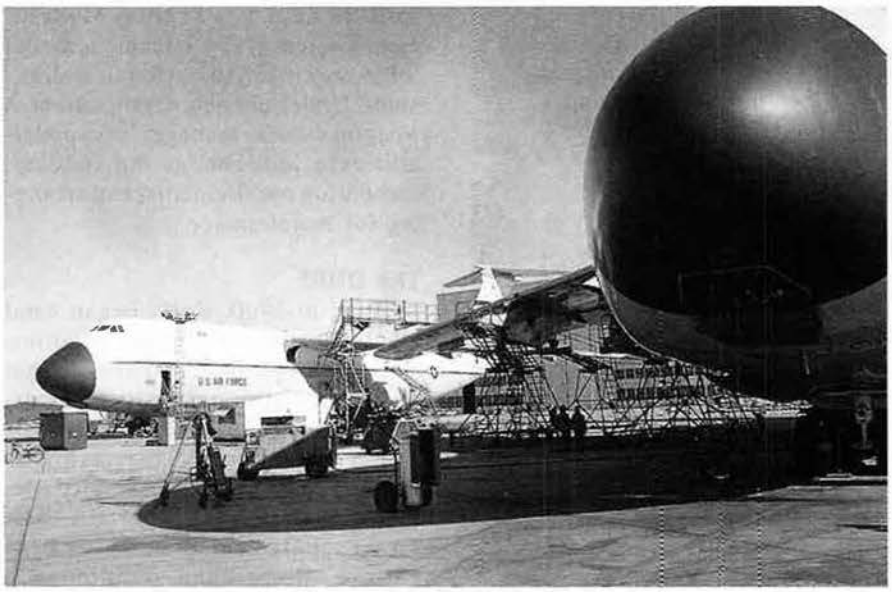
The BUFF

Then, in 1960, Kelly began what would become a 33-year relationship with the B-52 bomber. What started as traditional repair and overhaul evolved into extensive modification of the bomber, increasing its load capacity, range, and service life.

During the Vietnam War, SAAMA set up supply centers in the western Pacific, dispatched maintenance teams to Southeast Asia, and opened an aerial port to provide airplane cargo service to the war zone. Kelly also took on responsibility for USAF's entire watercraft program, including landing craft and combat ships. It managed weapon systems such as the F-102, F-106, A-37, O-2, and F-5 aircraft and did maintenance on life support systems and aerospace ground equipment.

As that war wound down, Kelly became involved with the Vietnamization Program, aimed at withdrawing US troops and preparing South Vietnam's forces to carry on alone. SAAMA developed plans to turn Bien Hoa Air Base into an engine over-

The aircraft maintenance hangar, here and above, at the San Antonio Air Materiel Area at Kelly could house 13 B-52s at once. The same hangar was later used to overhaul eight C-5s at a time. By then, SAAMA had become the San Antonio Air Logistics Center.



The skilled workforce at Kelly extended the service life of C-5s and many other USAF aircraft. The base is evolving again, this time into an industrial park, but USAF retains the airfield, as Kelly Field Annex, home to ANG and AFRC wings.

haul facility and to transfer A-37, F-5, and T-38 aircraft, engines, and support spares to South Vietnam. Then, in 1973, Kelly became the reception area for prisoners of war returning to the San Antonio area for medical treatment and family reunions.

In 1974, San Antonio Air Materiel Area changed its name to San Antonio Air Logistics Center but continued to manage some of the Air Force's largest aircraft programs. It helped extend the life and airlift capacity of the C-5, ramped up work on the F100 engines as the numbers of F-16s and F-15s increased, and continued to support the space program and handle maintenance responsibility for items in the Air Force's Nuclear Weapons Program. It moved into areas such as advanced metallics, nondestructive inspection, artificial intelligence, and robotics.

During Operation Just Cause, Kelly served as a transit point for more than 8,200 troops deploying to Panama and as a reception site for some 250 incoming wounded service members. Later, the base moved more than 10,000 short tons of material and 4,700 passengers and deployed 17 million pounds of munitions to Southwest Asia for Operation Desert Storm. More recently, it has supported US operations in Kosovo.

In 1992, a major defense reorganization had shifted ownership of most of Kelly's warehouse space from the Air Force to the new Defense Logistics Agency. The following year, the Base Realignment and Closure Commission added Kelly and three other logistics centers to the list of installations marked for closure. Local officials convinced the commissioners to spare the base, but it was only a temporary stay. The 1995 BRAC voted to close the San Antonio ALC, shift some base missions and organizations to Lackland, and cut between 10,000 and 13,000 local jobs.

Roots of KellyUSA

With Kelly's future uncertain, San Antonio City Council created a not-for-profit group to develop plans for converting the base to commercial and industrial use. That panel evolved into the Greater Kelly Development Authority, which developed a master plan for what it dubbed "KellyUSA."

Rather than manage the conversion itself, GKDA opted to contract that job to EG&G Inc., a global technology company that supplies support services to government and industry. The company's local subsidiary, EG&G Management Services of San Antonio, also contracted with Defense Logistics Agency to manage the privatization of the DLA distribution depot at the base. GKDA then leased other parts of the base to major aerospace firms such as Pratt & Whitney, Boeing, and Lockheed, which will continue to work for the Air Force, and to a variety of local and international businesses and industrial firms.

Under separate but similar agreements, the Air Force will transfer most of Brooks Air Force Base to the city. San Antonio then will lease back some facilities to the Air Force and develop the rest into a high-tech business and academic park.

While the transition is going forward, however, a parallel effort is under way to undo the environmental damage that nearly 85 years of use have wrought on the base. As early as 1983, Kelly began a clean-up effort to correct past waste management practices that had left some areas of the base contaminated by hazardous substances and wastes.

The service already has spent close to $200 million on the effort and expects the final bill to come to some $480 million when the job is finished in 2004. Much of the money is going into systems to clean up contaminated ground water, but some of the base's civilian neighbors are not satisfied with the results.

The real problem, they say, is that solvents and other wastes from the base seeped into the aquifer and contaminated the water for miles around. The Air Force contends that some of the pollution has been caused by off-base sources. Even so, some residents are suing the service for the damage to their property.

The final word on whether the Air Force has done its clean-up job properly will be rendered by two agencies, the Texas Natural Resource Conservation Commission and the US Environmental Protection Agency. USAF officials have pledged not to stop the effort until both are satisfied.

Meanwhile, the environmental disputes have not slowed the development of KellyUSA. Billing itself as "the center for global business," the base that began with Wright Flyers and Curtiss biplanes now sees itself as a futuristic industrial park, a distribution gateway to the Americas, and one of the nation's largest commercial aviation maintenance centers. ■

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 story for* Air Force *Magazine, "The WASPs," appeared in the April 2001 issue.*

In China, the reckless F-8 pilot has become a national hero.

The Last Flight of Wang Wei

By Bill Gertz

When the alarm sounded, Lt. Cmdr. Wang Wei was at Lingshui air base, located on Hainan Island in the South China Sea. It was 8:45 a.m., local time, April 1. The Chinese fighter pilot and his wingman, Zhao Yu, took off from the People's Liberation Army base in F-8 interceptors—Chinese versions of the old MiG-21 fighter. The Chinese jets carried Israeli Python air-to-air missiles.

This would prove to be the last flight of Wang Wei—and the first step in the creation of a mythic figure.

Within 15 minutes of takeoff, the Chinese warplanes had intercepted a US Navy EP-3E Aries II surveillance aircraft flying some 80 miles off China's coast. The lumbering American turboprop had been spotted by Chinese regional air defense radars set up on Hainan. Technicians there had flashed the information about its location to Lingshui.

As the world would soon learn, Wang's fighter and the American EP-3 then suffered a catastrophic midair collision, one that sent the Navy aircraft to an emergency landing on Hainan and the Chinese pilot to his death in the South China Sea. With his fighter breaking apart around him, Wang ejected over the ocean, but his body never was found.

Wang's death is now being exploited by the Communist government in Beijing, which has launched a propaganda offensive to deify the dead fighter pilot and harangue the United States, all under the rubric of battling "hegemonism"—Beijing's word to describe US power and influence in the Pacific.

The Good Old Days

The theme is echoed throughout the main organs of Chinese government–run media. The campaign is reminiscent of the days of Mao's Red Guards and the Great Proletarian Cultural Revolution, the period in the late 1960s and early 1970s when Communist fervor tore apart Chinese society, wrecked its economy, and set back the nation's development by decades.

In a commentary typical of the Wang campaign, *Liberation Army Daily*, the PLA's official newspaper, had this to say: "The struggle against hegemonism and power politics will be a prolonged and complicated struggle. It requires powerful political and national defense strength and national unity to safeguard state sovereignty and national dignity."

The new propaganda offensive features the most incendiary anti–US rhetoric since NATO's accidental bombing in 1999 of the Chinese

US Navy photo

This Pentagon photo taken from a US Navy aircraft shows how close a Chinese F-8 was flying on Jan. 24. Wang Wei's F-8 veered into a USN EP-3 aircraft on April 1. The F-8 went down and Wang, lost at sea, has become a hero in China.

Embassy in Yugoslavia, an event that galvanized Chinese government efforts to fan nationalist sentiment among a restive population anxious to see political reform along with its new economic reforms of the past decade.

As for Wang, Chinese President Jiang Zemin conferred upon him a special honor—the title "Guardian of the Seawaters and Airspace." US defense officials said this new title comes as close as the officially atheistic Communist government can come to attributing a god-like status to a human being.

In fact, Wang has been compared to an "immortal" Chinese revolutionary figure from around the year 200. That's not all. He also was declared a "revolutionary martyr." The Chinese government's propaganda campaign has praised Wang in terms that are highly similar to those used in an earlier effort to deify Communist hero Lei Feng, a PLA soldier who died in 1962 after a telephone pole fell on his head. His devotion to the Communist Party was captured in Lei's motto: It is glorious to be "a small cog in the machine" working for the Party and Chairman Mao. The Chinese media portrayal of Wang is just as excessive as that tricked up for Lei. Wang was shown to be a great poet, painter, and musician who frequently led his fellow pilots in song.

There's more. The *People's Daily*, the mouthpiece of the Chinese Communist Party, even reported that Wang asked his wife, pregnant with their first child, to have an abortion so that the pregnancy and responsibilities of fatherhood would not interfere with the great man's flying career. "I want to make the most of my youth and fly eight or 10 models," Wang reportedly told his wife, who "tearfully agreed" to the abortion.

Wang's hero status was heralded in the *People's Daily* in an April 24 editorial. The editorial said the pronouncement was a sign of the Chinese military's determination to protect national security and "rejuvenate" the Chinese nation.

Those stories of Wang's demise that were published only in China also stated that Wang was eaten by sharks in the South China Sea. US defense officials said the death by shark appeared to be part of the propaganda campaign to give Wang a more heroic death so as to further enhance his standing among the Chinese people.

Earlier Encounter

Wang, thought to be 33 years old, was a squadron leader in the 8th PLA Naval Air Force Wing's 22nd Regiment, based at Lingshui. Most official Chinese reports refer only to "a certain unit," highlighting the PLA's extreme reluctance to disclose any military information to the public. Hainan is a major PLA military base.

Wang was no stranger to intercepts. During a Jan. 24 aerial encounter, which was videotaped and later made public in Washington, he flew dangerously close to another EP-3E. The F-8 was shown flying to within 20 feet and slowing its speed to the point where it was having difficulty flying with the EP-3E. The Chinese themselves confirmed US suspicions that Wang was the pilot in the Jan. 24 incident. The military said that Wang and another pilot were sent to intercept an American reconnaissance aircraft near southern China.

On April 1, Navy Lt. Shane Osborn had his aircraft on autopilot, flying level at around 180 knots airspeed while his 23 crew members carried out their duties, most of them conducting electronic vacuum cleaning of all communications along China's coast.

"We were obviously being intercepted," said Osborn, "and the [Chinese] aircraft was approaching much closer than normal, about three to five feet off our wing. So, I was just guarding the autopilot, listening to the reports from the back end and from my other pilot, Lt. [Patrick] Honeck, who was in the window watching the aircraft approach."

Osborn went on, "The aircraft made two close approaches, [with the pilot] making gestures. And then, on the third one, his closure rate was too high, and he impacted the No. 1 propeller, which caused a violent shaking in the aircraft. And then, his nose impacted our nose, and our nosecone flew off, and the airplane immediately snap-rolled to about 130 degrees in low bank and became uncontrollable."

Asked if he had had "eyeball-to-eyeball" contact with Wang, Osborn told CNN: "I did on the second time he joined up on us. He came out a little bit front and was making gestures, and we could all see him." What kind of gestures? "I don't care to comment on that," Osborn said.

Osborn later recalled, "He had his oxygen mask off and was waving us away and mouthing some words." Osborn could not tell what Wang was saying.

Another EP-3E crew member, Lt. John Comerford, was the one who got the best look at Wang's deadly flying. "I was actually out of my seat and kind of down on my haunches, looking out of the port side, left side, over-wing exit window at the fighter as it approached," Comerford told

US Navy photo

This is an EP-3 like the one US Navy Lt. Shane Osborn was piloting April 1. He managed to land it after Wang's F-8 had clipped the EP-3's No. 1 propeller and had caused the aircraft to lose its nosecone.

CNN. "I was taking notes on a clipboard about the condition of the flight and things like that and was watching the approaches that he was making to our plane." Comerford was thrown backward by the collision and pinned to the ground as the aircraft rolled over.

China told a very different story. Zhao Yu, who piloted the F-8 next to Wang gave this account in *Liberation Army Daily:*

"I saw the head and left wing of the US plane bump into Wang Wei's plane. At the same time, the outside propeller of the US plane's left wing smashed the vertical tail wing of the plane piloted by Wang Wei into pieces. I reminded Wang Wei, 'Your plane's vertical tail has been struck off. Pay attention to remain in condition, pay attention to remain in condition.' Wang Wei replied, 'Roger.' About 30 seconds later, I found Wang Wei's plane was rolling to the right side and plunging. The plane was out of control. Wang Wei requested to parachute. I replied: 'Permission granted.' Afterward, I lost contact with Wang Wei."

"Wild and Arrogant"

The Chinese government insisted that the EP-3E, to shake the intercepting aircraft, slowed down to make it difficult for the jets to fly alongside. Beijing also claimed the surveillance aircraft would make sudden movements. "The wild and arrogant planes also often jumped up and down and suddenly turned steep left and right to provoke the pilots of our side again and again with extremely dangerous actions," the military newspaper stated.

Osborn rejected China's claim that the EP-3E suddenly turned and rammed Wang's jet. "It's not very common for a big, slow-moving aircraft to ram into a high performance jet fighter," he said. "And we definitely made a sharp left turn. That was called uncontrolled flight—inverted in a dive after he impacted my propeller and my nose."

According to Osborn and other Pentagon officials, Wang was preparing to "thump" the EP-3E by flying in front of the slower aircraft and hitting his jet's afterburners. The maneuver is an unfriendly gesture designed to disrupt the flight of the target aircraft. But he didn't get the opportunity to do any thumping because the airplanes collided. Osborn's initial reaction to the collision was matter-of-fact. "The first thing I thought was, 'This guy just killed us,' " he recounted later, noting that he remembered looking up and "seeing water" close up—an unhappy sight for any pilot.

In an interview, Osborn spoke of the ordeal and the encounter with Wang. "He was joining up on us and had too high of a closing rate, and instead of going low, he went up," Osborn said. "He could have shot underneath us and never hit anything."

Zhao Yu said he flew to within about 9,000 feet of the sea and spotted the wreckage of Wang's airplane, along with a flight seat stabilizing parachute and a rescue parachute "floating in the air." At about 9:30, Zhao landed at Lingshui and 10 minutes later, the damaged EP-3 arrived.

The Chinese government's search effort was massive, according to both US and Chinese accounts. The operation lasted about 10 days and covered more than 52,000 square miles of water. Some 110 aircraft, more than 100 warships and at least 1,000 other ships, including salvage vessels, fishing boats, and civilian boats took part, along with more than 55,000 people.

Jiang's Broken Heart

Jiang was among the first of Beijing's leaders to praise Wang Wei. "For a dozen days, the people of all nationalities throughout the country have all worried about comrade Wang Wei," Jiang said. "This fully illustrates that the Chinese nation has a strong cohesion."

The crew's release followed delivery of a letter from US Ambassador to China Joseph W. Preuher to Chinese Foreign Minister Tang Jiaxun expressing "sincere regret" for the loss of Wang and a "very sorry" that the crippled EP-3E had entered Chinese airspace without verbal clearance.

China's embassy in Washington had quietly put out word through a sympathetic American academic that if China would be allowed to misinterpret the US statement as a blanket apology for the entire affair, the crew would be released. The crew was released April 11. However, Secretary of State Colin Powell made clear the apology was carefully worded to state that the United States was not at fault for the collision. To Americans, the fault lay entirely with China—specifically, Wang Wei. ■

Bill Gertz is a defense and national security reporter for The Washington Times *and author of the book* The China Threat: How the People's Republic Targets America *(Regnery). His most recent article for* Air Force *Magazine, "Flash Point Taiwan," appeared in the March 2001 issue.*

USAF is about to lose huge numbers of civilian workers, with too few replacements in sight.

The Civil Service Time Bomb

By Peter Grier

In the years just ahead, the Air Force likely will face a personnel crisis of unparalleled scope and magnitude as thousands of civilian employees with crucial technical, scientific, and program management skills approach retirement age.

More than 40 percent of these employees will be eligible for retirement in the next five years. Less than 10 percent of Air Force civilians are in their first five years of employment.

It's a problem found throughout the Department of Defense. Years of constrained hiring in the drawdown decade of the 1990s has left the Pentagon with a civilian workforce that is both heavily skewed toward older employees and dogged by skill imbalances.

At a minimum, the Air Force and Pentagon will experience problems with the orderly transfer of institutional knowledge as they struggle to attract younger civilian workers willing and able to make a difference in the high-tech future military.

F. Whitten Peters, Secretary of the Air Force in the last years of the Clinton Administration, issued one of the sternest warnings yet. He said, "I cannot stress enough that the age and experience [problem] in our civilian workforce is a time bomb waiting to go off."

To stop that ticking, officials in recent years have convened two civilian workforce summits. Legislation allowing the service to pay for civilian academic degrees and to offer voluntary early retirement bonuses may help meet force-shaping requirements.

Even so, recruitment will likely be the key to maintaining civilian workforce quality. Personnel officials are doing everything from developing an e-recruiting process to planning direct-mail outreach to potential candidate groups.

Business Will Boom

"In five years ... our business is going to be big," says Hong Miller, chief of the recruitment unit in the Directorate of Civilian Personnel Operations, Air Force Personnel Center, Randolph AFB, Tex.

The Air Force civilian workforce, like its uniformed counterpart, needs to be a balanced mix of new, midlevel, and senior employees if it is to function at peak efficiency.

Over the last decade, however, the flow of new employees into the service has slowed considerably, in part because the Air Force was just not hiring. Restrictions on bringing in new civilian recruits may have been an easy and relatively humane way to handle the downsizing needs of the 1990s, but it led to a graying of the existing workforce and sent potential workers a message that an Air Force career really was not for them. The result: The Air Force's civilian workforce today is more likely to watch "Murder She Wrote" reruns than MTV.

At the same time, the service has experienced dramatic growth in the need for civilians with cutting-edge high-technology skills. The explosion in new computer and communications technologies is one reason for this change.

Another, less obvious reason is the rise of the Expeditionary Aerospace Force. Says the 2001 Report of the Secretary of the Air Force: "The EAF has extended the role of civilians [to encompass the task of] providing reachback support to deployed troops, requiring a different mix of midlevel and senior civilian employees." Reachback is the process by which forward deployed troops use highly sophisticated telecommunications to tap into knowledge and databases in the United States or some other rear location.

Increasingly, the best and brightest techies are finding more money and greater challenge elsewhere. Consider the state of the Air Force laboratory network. In only four years, 30 percent of its civilian scientists and engineers will be eligible to retire. Only two percent are younger than 30.

Nor is the Air Force alone. The Department of Defense as a whole is facing a civilian personnel shortfall unforeseen only a few years ago. Today, the American public has become less and less aware of defense employment opportunities and less and less favorably disposed toward any kind of government service.

Annual accessions of new Pentagon civilian employees have fallen to about 20,000 a year—a figure 61 percent smaller than it was in 1989, before the collapse of the Soviet Union ended the Cold War. In general, those hires are older than they used to be. The number of new employees under 31 has fallen by three-quarters over the last decade.

Analysts used to warn about an impending "bow wave" of spending needs that would crash over the Pentagon as expensive weapon systems entered production. Today they might as well talk about a bow wave of future retirement parties for DOD's increasingly gray-haired civilian population.

Scarce Engineers

The problem is particularly acute in such highly educated sectors as science and engineering.

One factor causing concern is the renewal rate—that is, number of accessions divided by total number of employees—of the DOD science and engineering workforce. In 1989, the annual rate stood at about eight percent. In 2000, it was four percent. Now, at least, the trend line is moving in the right direction. The renewal rate for scientists and engineers was even lower in 1998, when it bottomed out at two percent, but more needs to be done.

"It is now time for the department to focus its attention on shaping an effective civilian force for the future and developing effective tools to support this effort," according to a Defense Science Board statement.

The Air Force will need to mount a comprehensive effort to avoid being caught with too few civilian employees with the wrong mix of skills by the middle of this decade. David M. Walker, the comptroller general of the General Accounting Office, told service personnel that gathering good data is the first step. The Air Force needs a "strategic workforce plan" that addresses "where you've been, where you are, and where you're going," said Walker during a May conference sponsored by the Air Force Directorate of Civilian Personnel.

This does not mean that service personnel officials have just been sitting around bemoaning their fate and drafting Help Wanted ads to post in supermarkets. Last year two civilian workforce shaping summits gathered representatives from the Air Staff, major commands, and Air Force Personnel Center to compare notes and draft lists of possible initiatives.

Among summit areas of interest: legislation allowing more flexible hiring practices and a model capable of crunching personnel accession, sustainment, and separation data to produce more accurate projections of future skills requirements.

Department of Defense officials have already won some legislative relief from Congress. Last year lawmakers passed provisions authorizing DOD to pay buyouts to current employees, in the name of rebalancing the civilian skill-and-age mix.

Similarly, the Pentagon has now been given the money to assist civilian workers seeking to obtain advanced degrees and to repay student loans for all workers, regardless of their bureaucratic occupation.

In an effort to improve morale and fire up a sense of mission, DOD has also started the Defense Leadership and Management Program, an educational initiative aimed at key early and midcareer civilians.

DLAMP rotates key personnel through defense-oriented graduate education at such locations as the National Defense University and a one-year job assignment outside their primary occupation. The first DLAMP class graduated last year; the program counts nearly 1,400 people who have participated in some capacity.

Recruitment, however, remains the front line of the workforce battle. Even though the economy has slowed somewhat, USAF officials expect fierce competition from private industry for prized talent throughout the foreseeable future.

The Air Force civilian recruitment effort works on two levels. AFPC's Recruiting Unit at Randolph sets overall strategy and conducts general activities. Then, civilian personnel flights at local bases address local issues and needs.

Vast Challenge

One of the unit's tasks is to figure out where to focus recruiting efforts. Its annual Recruitment Needs Assessment identifies hard-to-fill, high-turnover occupations. The issue involves more than skilled tech workers. AFPC looks at everything from Ph.D.–level employment to the guards who check in visitors at installation gates. The task, notes Miller, is "vast."

Engineers, unsurprisingly, are the No. 1 recruitment problem. Others in the top 10 include contract specialists, meteorological technicians, and aircraft engine mechanics.

Jobs requiring specialized technical skills are not the only ones that go begging. Security guards and secretaries are on the RNA list, as well. "During the summer we even have a hard time recruiting enough lifeguards" for base pools, says Miller.

One of the new initiatives AFPC has adopted as it looks to the coming employee crunch is e-recruiting. That entails posting information about jobs on specialized headhunter Internet sites.

E-recruiting has helped fill 300 vacancies at 48 different bases since last fall, according to AFPC. In some

cases hiring time has been as short as four days. "It's very new to this point," says Miller. "We think it's successful."

AFPC is also trying to pinpoint effective national-level job fairs. Officials inform local bases if open jobs are eligible for special pay. Information Technology workers, for example, recently became eligible for a special boost in pay, but IT is one area where the Air Force can only remain in hailing distance of private sector pay scales. Recruitment requires emphasis on other attractions, such as job security, generous leave allowances, and travel opportunities.

"Private industry can offer lots of money, fast," says Miller. "We try to focus on longevity and benefits."

The recruitment unit has only been operational since last September and still has much basic work to do, says its chief.

Not all USAF institutions are planning a head-on battle to maintain in-house civilian workforces. Air Force Research Laboratory, for one, is planning to outflank the developing problem via collaboration with industry and academia.

Coming Exodus?

AFRL's civilian workforce has already been reduced by a third by downsizing pressures. Of its remaining workforce, half will be eligible to retire in six to 10 years.

Aware of the need to head off an onrushing Air Force brain drain, Peters, the former Secretary, several years ago commissioned a study, "Science and Technology Workforce for the 21st Century." The study's proposed solution: outsourcing.

AFRL's nine research sites would contract out to private contractors, universities, not-for-profit organizations, and federally funded research and development centers most of the research and technical development work. In-house work would focus on core expertise and outsource management. The goal is to reduce the share of the workforce made up of permanent civil service employees from the current 51 percent to 42 percent. Officials report that all service labs are headed in that direction.

"Our military and permanent government personnel will perform inherent government functions and provide continuity, while a mix of nonpermanent government personnel and collaborators will bring agility and fresh ideas to the team," said retired Maj. Gen. Richard R. Paul, who was AFRL commander at the time the report was released.

To some extent, the data pointing out the percentage of workers eligible for retirement in the years ahead exaggerates the Air Force's personnel problem. Just because someone is up for a gold watch does not mean he will take it. Most federal employees do not retire immediately upon reaching eligibility, notes a recent General Accounting Office study. In fact, there is some evidence that they are putting off retirement longer than in the past.

"Private industry can offer lots of money, fast. We try to focus on longevity and benefits."

In 1988, 40 percent of federal workers retired in the first year in which they could, according to GAO. By 1997, that figure had fallen to 21 percent.

The retirement problem is only too real. GAO estimates that the number of workers retiring from the federal government as a whole over the next five years will be somewhat higher than the downsizing and retirement losses of the past eight years.

According to GAO, roughly 493,000 employees in the 24 largest agencies will be eligible to retire between now and 2006. GAO believes actual retirements will claim about 236,000—roughly half of these. In Congress, these numbers are viewed with alarm, and some lawmakers talk about a "human capital crisis" within the federal government.

In some ways, the upheaval in the civilian workforce is also an opportunity. Officials will have a chance to shape the service's mix of skills and age in a manner reflective of today's need for flexibility.

Consider the Pentagon's acquisition professionals. More than 50 percent could retire by 2005. That would require a surge in recruiting at all levels, according to a study released last October by the undersecretary of defense, acquisition, technology, and logistics and undersecretary of defense for personnel and readiness.

Yet in recent years DOD has seen a profound shift in what top officials expect from the acquisition corps. Outsourcing, base closures, and technical innovation have all created a need for a more multifunctional, multiskilled staff, according to the report.

The retirement of a mass of baby boomers could thus represent a once-in-a-generation chance at rebuilding. "Demographics and downsizing have given DOD a unique window of opportunity to transform the acquisition workforce to meet future challenges," concludes the study.

Whatever the potential benefits, the civilian personnel situation contains more than a few serious dangers. Among those concerned about the problem is Sen. Fred Thompson, the Tennessee Republican who until last month chaired the Senate Governmental Affairs Committee.

"We have a much more complex world with many more vulnerabilities than we've had before, and we're losing good people—the very kind of people that we need to address those kinds of problems," said Thompson. "In a town where a new crisis is invented every 48 hours, ... this is really one. This is the real McCoy." ■

Peter Grier, a Washington editor for the Christian Science Monitor, *is a longtime defense correspondent and regular contributor to* Air Force Magazine. *His most recent article, "The Force and Space," appeared in the February 2001 issue.*

From the U-2 to the F-117A, it's a dicey issue deciding what to say and do when classified airplanes go down.

When Secrets Crash

WHEN a passenger airliner crashes, investigators from the National Transportation Safety Board quickly arrive on the scene to try to determine what went wrong. Press conferences and press coverage follow. The NTSB Web site notes that media are briefed at least once a day by one of the board members accompanying the investigating team and that a public affairs officer maintains contact with the media. Viewers of the nightly news often see aerial images of the crash site. The flight and airplane involved will be precisely identified by the airline and NTSB. Eventually, the public can expect a detailed report on the conclusions.

Things can be very different when the crash involves a military aircraft—particularly if it is an airplane whose existence or mission the United States has not yet acknowledged or that carries particularly sensitive equipment. Over the years, a variety of secret intelligence and military aircraft have crashed, and the specifics of US government responses have varied—sometimes as the result of the different circumstances of the crashes, other times as the result of different rules for dealing with the press queries concerning classified programs. However, preserving secrecy has been a constant objective.

Often times, details of the crash and investigation will emerge only many years later, after the existence and mission of the aircraft have been acknowledged and documents have been released in response to Freedom of Information Act requests or as a result of government declassification programs. The U-2, A-12 Oxcart, SR-71A, and F-117A all are aircraft whose existence was at one time a tightly held secret but which suffered crashes.

Spyplane on Display

By September 1959, the U-2 had been flying operational missions for more than three years. It had survived Soviet attempts to knock it out of the sky with surface-to-air missiles and MiGs. At the time, of course, its espionage mission was an unacknowledged one. It was, the US government declared, an airplane used for high altitude weather research and was operated by "weather reconnaissance" squadrons. It was a cover story that few believed; in May 1957, the *London Daily Express* wrote of the U-2's espionage missions behind the Iron Curtain. However, weather reconnaissance was Washington's story, and it was sticking with it.

One of the weather reconnaissance squadrons, whose covert designation was Det. C, was located at the US naval air station at Atsugi, Japan. Since 1957 that detachment had been

By Jeffrey T. Richelson

In 1959 when this U-2 suddenly lost power, the pilot, a major from Taiwan in training to overfly China, was able to glide in and land at a small airfield in Colorado. A very short wire service article only described the pilot as an Air Force major on a weather reconnaissance flight.

flying missions over the USSR and China, photographing the Klyuchi ICBM test area in June 1957 and monitoring Chinese troop movements in the fall of 1958. By fall 1959, despite flying some actual weather reconnaissance missions in an attempt to add credibility to its cover, political problems were beginning to inhibit U-2 operations. Those operations were difficult to conceal. Atsugi was a busy airbase, with a variety of Japanese military and civilians on the base. US military deployments and movements in Japan were followed closely by outside observers.

On Sept. 24, 1959, Thomas L. Crull was flying a newly arrived U-2C, Article 360, on a local flight, heading back to Atsugi after setting an altitude record. As the U-2's fuel ran low, the airplane suffered a flameout—forcing Crull to make a deadstick, wheels-up landing at the Fujisawa glider strip, 10 miles from Atsugi. Crull emerged unhurt, but his airplane overran the runway and slid onto the grass.

Letting the airplane simply sit there unguarded was not an option. A short time later several security personnel, apparently wearing loud Hawaiian shirts and packing large revolvers, showed up and began to order the growing crowd at gunpoint to stand away from the secret aircraft. The tactic proved counterproductive as it only led to extensive publicity about the crash landing. Eventually, the airplane would be packed off to the US, repaired, and returned to service with Det. B in Turkey.

From there, that airplane would make its final flight. It came on May 1, 1960, and its pilot was Francis Gary Powers. Powers was flying high over Sverdlovsk, USSR, when his U-2 came under attack by some 14 surface-to-air missiles. The U-2 broke apart, but Powers parachuted down safely and was captured, given a trial, and sentenced to 10 years in a labor camp. He was freed in 1962 in an exchange for the Soviet spy, Rudolf Abel.

Less than a month before Powers's fateful flight, another U-2 had made a crash landing, this time into a rice paddy in Thailand. In contrast to the Atsugi incident, the only publicity in this case was an article in a local newspaper reporting on the crash of a jet airplane. Because the area was inaccessible to large vehicles, the airplane could not simply be hauled out of the rice paddy. Instead, it had to be cut into pieces. Then, with the assistance of local villagers, those pieces were hauled by oxcart to a place where they could be loaded on trucks. One night, the trucks carried the dismembered aircraft through Bangkok to Don Muang airfield. There, it was loaded onto a C-124 cargo airplane and flown back to the US. The CIA, to show its appreciation for the villagers' efforts, provided $500 to build a new school.

A Different Kind of Oxcart

On May 26, 1963, the *New York Times* carried a front page story under the headline, "New Test Delay May Doom RS-70," which reported that, according to authoritative sources, "the first prototype for the Air Force's RS-70 reconnaissance bomber will not be flight-tested until September at the earliest." Intended to fly at 2,000 mph, the airplane might not fly at all, the paper reported, as a result of the repeated delays that plagued the program.

What the *Times* did not report, and apparently did not know, was that the CIA was already testing another reconnaissance airplane that was projected to fly at speeds greater than Mach 3, at altitudes of up to 100,000 feet, and with the equipment to photograph huge expanses of territory. This airplane was the result of a 1958 decision by President Eisenhower to authorize devel-

opment of aircraft that would fly higher and far faster than the U-2 in the expectation that its speed and altitude would make it invulnerable, if not invisible, to Soviet air defenses. Nor did the paper report that one of these top secret A-12 aircraft, which had been developed under a program designated Oxcart and looked unlike anything that had ever flown, had crashed just two days earlier.

On May 24, 1963, Kenneth S. "Dutch" Collins was making a subsonic engine test flight, flying very slowly just above a solid layer of clouds. He was accompanied by Jack W. Weeks in an F-101 Voodoo chase airplane. When Collins saw that Weeks's F-101 could not stay up with his A-12, he told Weeks to continue on to the base alone. Shortly afterward, when Collins flew into the clouds, his A-12 suddenly stalled, pitched up, and went completely out of control—the result of an erroneous airspeed reading. Collins was able to eject safely from the airplane, which went into an inverted flat spin and then crashed 14 miles south of Wendover, Utah.

Because Collins was on a low-altitude subsonic flight, he was wearing a standard-issue flight suit instead of a pressure suit. The more conventional flying attire prevented him from facing a difficult set of questions from the truck driver who stopped to pick him up and then at the highway patrol office. From there, he contacted officials at Area 51 in Nevada, where the airplane was based, to let them know that their top secret airplane had gone down.

A combination of means was used to prevent unwanted attention and discussion among the local population as well as accurate press reports on the incident. Individuals at the crash site were requested to sign agreements committing them to remain silent about what they had seen. Two farmers, who arrived near the crash scene in a pickup, were told that the airplane had been carrying atomic weapons—which was not true but effectively curtailed their interest in getting any closer to the CIA's secret spyplane. Meanwhile, the press was told a different and less alarming but also false story—that the airplane that crashed was a very unclassified Republic F-105 Thunderchief. Even official records listed the crashed airplane as being an F-105.

Shattered Fighter

In addition to producing aircraft like the U-2, Oxcart, and SR-71, Lockheed's Skunk Works produced the F-117A stealth fighter. In 1982, eight years after the experimental Have Blue program began testing the concept of a faceted aircraft to reduce radar cross section, Lockheed delivered the first of the new, odd-looking fighter–bombers. By July 1986, trade journals and writers had turned out a number of articles on what some called the "F-19" stealth fighter. The Testors company even produced a model of what the airplane was supposed to look like, but it bore no resemblance to the real thing. That fact undoubtedly pleased those working on the secret program.

On July 11, 35-year-old Maj. Ross E. Mulhare, assigned to the 4450th Tactical Group, took off from Tonopah Test Range in Nevada and flew his aircraft into California airspace on what would prove to be his last flight. Mulhare, a 1974 graduate of the Air Force Academy, told his friends and members of his family in New Jersey that he flew F-5E fighter airplanes in mock combat missions against pilots from Tactical Air Command. From April 1978 to March 1980, he had flown such missions from Nellis AFB, Nev., the official home of the 4450th. That was followed by F-15 assignments in the US and overseas. In August 1985 he joined the 4450th. The group was an F-117A squadron and Mulhare was one of the squadron's pilots.

Shortly before his flight, Mulhare was overheard telling a colleague that he was tired and "couldn't shake it." Despite his physical condition, Mulhare took off at 1:13 a.m. Pacific Daylight Time—such late night flights were intended to prevent discovery of the airplane's unique shape—and proceeded westbound into the eastern portion of the San Joaquin Valley. He flew down the eastern side of the valley toward Bakersfield. At about 1:45 a.m., Mulhare's airplane went into a steep dive and smashed into a hillside about 17 miles northeast of that city, just inside the Sequoia National Forest. Mulhare was killed.

The physical damage to the aircraft was such that one of the crash investigators described it as "without exception ... the worst crash I have worked." He went on to observe that while there was only light fire damage to the airframe, "the structural breakup was almost absolute" and that " 'shattered' may best describe the aircraft after impact." As a result, identification of special components was frequently impossible.

The crash also started a moderately intense ground fire, which spread through the surrounding hills, eventually burning 150 acres of range. While the aircraft fire had gone out

Lockheed photo via Jay Miller

In 1963, curiosity seekers heading for the crash site of a CIA top secret A-12 like this one turned away on hearing that the airplane had been carrying atomic weapons. The press was told the aircraft was a commonplace F-105.

by itself, the range fire had to be controlled by the forest service, an effort not completed until about 16 hours after the crash. Local fire and police were first on the scene. At 3 a.m., authorities began assembling a "divert" team at Tonopah. It arrived at the crash site around 11 a.m.

In the wake of the crash, Air Force spokesmen had little to say. The head of Air Force public affairs said the airplane had only one crew member and "was definitely not a bomber." Air Force officials at Nellis acknowledged that Mulhare had not been a member of the base's aggressor squadrons, which emulated Soviet air combat tactics in order to train USAF pilots. An Air Force spokesman also acknowledged that Mulhare was a member of the 4450th Tactical Group but said that all information about the unit was classified, and he could not discuss any of it.

The Kern County sheriff's office, whose jurisdiction included Bakersfield, did relay some further information from the Air Force—telling reporters that the "whole area has been restricted, including the airspace above the crash site" and that "there will be military aircraft in the area and anyone entering the area will be dealt with appropriately by the Air Force."

The airspace restrictions called for low-flying aircraft to remain about six miles away from the crash site and other aircraft to maintain altitudes of more than 5,000 feet when within that radius. While civilian aircraft were kept away from the crash site, there were plenty of military helicopters arriving and departing. The Air Force brought in officials and other personnel from Edwards AFB, Calif., and Meadows Field in Bakersfield. As many as four helicopters at a time were in operation from Meadows Field. A helicopter gunship was observed circling the crash site the day following the crash.

At ground level, armed sentries carrying M-16 automatic rifles kept unauthorized visitors away. Not even firefighters were permitted within the guarded perimeter, which one paper described as a "ring of steel."

At the crash site investigators collected evidence and evaluated the remains of the aircraft for clues to the cause of the tragedy. Then came the task of cleaning the site and leaving no pieces of the highly classified aircraft for scavengers, the media, or others to find. A clean-up team moved out a thousand feet from the last of the recognizable debris and then dug and sifted all the dirt in the area.

On July 23, controlled explosive charges were detonated on the hillside to free pieces of the aircraft buried as the result of the crash.

To mislead anyone who might try to search the area for pieces of the F-117A, the recovery crew had the remains of an F-101A Voodoo, one that had crashed and been stored at Area 51 for over two decades, broken up. They returned to the crash site and scattered the debris throughout the area. On Aug. 7 the Air Force announced it had withdrawn its guards from the crash site and would no longer restrict access to the area.

The very next day, a reporter and photographer from Bakersfield's KERO-TV were transported to the crash site by helicopter. They later said they didn't expect to find anything because they assumed the Air Force had cleaned the area thoroughly. But to their great surprise, they found countless pieces of debris scattered within 100 to 150 feet of a dirt helicopter landing pad built by the Air Force. They filled three bags with the material, and it was displayed on the station's Friday evening news broadcast. They then turned the bags over to an Air Force public affairs officer. An Edwards spokesman said the debris would be examined as a precaution, but that there were no immediate plans to return to the crash site to recover more.

Another F-117 Death

On Oct. 14, 1987, Maj. Michael C. Stewart was flying his F-117A on a night training flight over Nellis. About three-quarters of the way into his mission, local air traffic control radars showed the aircraft descending to the left of the flight path. The aircraft crashed shortly after, at 8:33 p.m., into scrub desert terrain, broke up, burned for a short time, and exploded. Stewart was killed.

The extensive investigation that followed produced information on maintenance, the condition of the pilot, transcripts of recorded communications between Stewart and ground control, and testimony from Lt. Col. Roger C. Locher, leader of the search team. The ultimate result was a detailed 322-page report with 27 sections.

In contrast, information provided to the media by the Air Force was sparse. A decision in favor of declassification, which would take place a little over a year later, had yet to be made, and the world at large was still unaware of the airplane's shape or actual designation. Neither the Air Force nor the Pentagon was going to help out. Air Force officials at Nellis issued a sketchy five-sentence press release about 2 p.m. on Oct. 15, only after news agencies had called the base for information. In Washington, the Pentagon observed, "There is a plane that is missing. ... That is all that we are saying."

Even though Mulhare's July 1986 crash had taken place outside of Nellis and Stewart's airplane crashed inside it, the latter proved the more difficult of the two to locate. At the time of the Air Force's press release, a USAF search may have just located the airplane.

The Air Force started its search on the night of the 14th, using a C-12 aircraft carrying four pilots wearing night vision goggles. The airplane surveyed an area about 45 miles north of Scotty's Junction—an area between Goldfield and Tonopah—based on a Forest Service request for confirmation of a fire at that location. At approximately 1 a.m. on Oct. 15, the search team secured the use of an H-3 helicopter and spent another two-and-a-half hours searching before retiring.

The search resumed at 6:15 that morning, and the airplane was finally located early that afternoon—45 miles to the *northeast* of Scotty's Junction. Locher, leader of the search team, later noted that the aircraft could have been located much earlier if they had had access to a variety of existing information—including the observation of a pilot of a flash in the area of the crash and the detection of a hot spot in the same vicinity by a US satellite (presumably a Defense Support Program infrared sensor).

Recovery at Sea

Lt. Col. Daniel House and Maj. Blair Bozek, took off from Kadena AB, Japan, on the morning of April 21, 1989, in an SR-71A, the Air Force

Lockheed photo

The Air Force tightly managed the aftermath of two F-117 crashes in the mid-1980s. By the time an F-117 was shot down during Allied Force, Pentagon officials said there was little need to take measures to protect its secrets.

airplane that had supplanted Oxcart in 1968. Their mission was to perform peripheral reconnaissance of Southeast Asia. Not long into their flight, they experienced a series of problems that forced them to bail out about a half-mile off the coast of the Philippines. Fortunately, they were rescued in good condition by Filipino fishermen and eventually made contact with the US authorities. At times, their experience became surreal. It included standing in flight suits to make a call from a town's only public telephone.

The airplane, however, had no parachute to brake its fall. When it smashed into the water, both engines sent the sensors and other equipment through the airplane's upper surfaces. Those items were distributed across the ocean's bottom at varying distances from the primary wreckage.

By 1989, the SR-71A's existence had been acknowledged for 25 years. It remained the most advanced reconnaissance aircraft in the world, by a large margin. It carried optical, radar imagery, and signals intelligence sensors as well as defensive systems to allow it to operate over hostile territory. It was not an airplane that the US would want to allow material exploitation specialists in Moscow or Beijing to have in their hands.

On their way to Clark AB, Philippines, House and Bozek had the helicopter in which they were riding fly over the area of the crash. A P-3 also conducted search operations, as did a couple of naval vessels. Sonar operations on April 29 and 30 located the debris. USS *Beaufort*, a 280-foot salvage ship, equipped with 10- and 15-ton cranes, was directed to the site to extract the wreckage, as well as locate the sensors and defensive systems. Navy SEALs were aboard, since the recovery operations were conducted near a portion of the Philippine coast controlled by the Communist New People's Army.

On May 2, both SR-71 engines were lifted out of the ocean and swung over onto the *Beaufort*. Two days later, salvagers brought up many of the sensors. The forward fuselage section was recovered May 7 and the main structure was raised the next day.

Shootdown

Another F-117A crashed March 27, 1999, but this crash was quite different from those which took the lives of Mulhare and Stewart. The airplane did not crash in the western United States, but in northwest Yugoslavia, near Novi Sad. The cause was not fatigue or pilot error but hostile action—specifically, a Serb–launched surface-to-air missile.

The most significant contrast was that the pilot was able to bail out and survive. Search and rescue teams were dispatched on specially equipped HH-60 Black Hawk helicopters and HH-53 Super Jolly Greens on a clandestine recovery mission. The helicopters were protected by a contingent of fighter aircraft as they headed toward the crash site. Fortunately, they were able to rescue the pilot, which produced a "huge sigh of relief," according to the Pentagon's chief spokesman at the time, Kenneth Bacon.

There was no hope of recovering an airplane downed in hostile territory, but to the surprise of some, the Air Force made no attempt to bomb the wreckage into oblivion. By 1999, of course, the existence of the F-117A had been acknowledged for more than a decade, and stealth fighters often appeared at air shows. A 1988 CIA assessment had concluded, "The Soviets likely have a good understanding of US stealth programs and technology from successful Western technology acquisitions."

Senior Pentagon officials argued that it was no longer necessary to protect the F-117's 1970s vintage low observable technology or its infrared targeting system. At a Pentagon briefing, then–Maj. Gen. Bruce Carlson, the Air Force's director of operational requirements, observed that if Serbia passed some of the airplane's technology to Moscow, the effect would be "minimal."

Others were less sanguine. Destruction of the wreckage would, according to some analysts, have prevented reverse engineering of the sensitive technology carried on the airplane and the radar absorbent materials. An anonymous Air Force official was reported to say, "It's our normal practice to bomb the wreckage when there is sensitive equipment on the aircraft." A pilot who expressed surprise that the remains were not bombed wondered if the US had the coordinates of the wreckage site.

Within a week, the wreckage site was visited by a Russian trade delegation to Yugoslavia, and materials and system components were salvaged. What, if any, benefit Moscow might have gained remains to be seen. ■

Jeffrey T. Richelson is a senior fellow and consultant of the National Security Archive in Washington, D.C., and author of nine books on intelligence and military topics. This is his first article for Air Force *Magazine.*

Verbatim

By Robert S. Dudney, Executive Editor

Top Gun

"What would we [the Navy] be like without naval aviation? ... [W]e would be like everybody else in the whole world. Naval aviation is what truly sets our Navy apart. ... I'm working in Washington, in the environment now ... where everything is being challenged. I want you to know that I'm not intimidated by that. ... [W]e don't have to worry about bumper stickers and writing a new concept paper. It is really all about delivering the kind of capability that is required for our nation to be able to fight and win. ... Let me assure you, carriers are not going away. That's not going to happen, not anytime soon, anyway. Hello! The product is in huge demand."***—Adm. Vern Clark, Chief of Naval Operations, May 26 remarks to the Association of Naval Aviation, quoted by Christopher Castelli in "Inside the Navy."***

It Is Written

"[D]espite a protracted strategic air campaign employing thousands of sophisticated precision guided munitions, airpower achieved none of the initial war aims articulated by the Clinton Administration. For the Kosovars, the political and human costs of this failure were appalling. ... The key to future success remains as it has always been—presenting real options for the [National Command Authority] that can translate into tailored joint forces for the CINCs. Such options necessarily include land power."***—Army Lt. Col. Steven Sifers, Office of the Deputy Chief of Staff of the Army for Programs, in letter published in May* **Armed Forces Journal International.**

USAF's Two Big Problems

"It's clear that the costs of trying to maintain these aging [transport, tanker, bomber, and fighter] aircraft across the board for our Air Force are eating our lunch. They're not getting anything new and it's costing more and more to repair the old ones. I hope that this review that the Secretary has going on really looks at and emphasizes the problem of aging aircraft and our readiness capability. ... The aging problem for our Air Force [and] the pilot retention problem [are] the two greatest problems for the Air Force."***—Sen. Ted Stevens (R–Alaska), remarks at a June 6 Senate Appropriations Defense Subcommittee hearing.***

Cold War II

"The biggest single issue related to National Missile Defense is whether or not a deployment commitment at this time would make our nation less or more secure. ... [T]here surely is doubt that unilaterally deploying NMD would increase our security. But there is a serious possibility that, if we take the wrong approach, it would decrease our security and increase the risk of nuclear proliferation. I think we could even start a second Cold War, Cold War II."***—Sen. Carl Levin (D–Mich.), now chairman of the Senate Armed Services Committee, May 11 address in Washington, D.C.***

Shut Up, He Explained

"I was called away from dinner to take an urgent telephone call from [the JCS Chairman, Gen. Henry H.] Shelton. 'Wes, at the White House meeting today, there was a lot of discussion about your press conference,' Shelton began. 'The Secretary of Defense [William Cohen] asked me to give you some verbatim guidance, so here it is: 'Get your f——g face off the TV. No more briefings, period. That's it.' I just wanted to give it to you like he said it. Do you have any questions?"***—Retired Gen. Wesley K. Clark, NATO commander in Operation Allied Force, in June 4* **Time** ***excerpts of Clark's book,* Waging Modern War: Bosnia, Kosovo, and the Future of Combat.**

Open to Suggestions

"This is a real consultation [on missile defense] that President Bush launched on May 1 ... and not a phony consultation. We really want to hear back from our allies. We are an alliance. We believe in this alliance, and we're going to consult with our colleagues as we move forward. But, at the same time, I made it clear to them that we know we have to move forward. We can see the threat. The threat is clear, and we have to deal with that threat."***—Secretary of State Colin Powell during May 29 news conference in Budapest after talks with NATO allies about missile defense.***

Bunker Mentality

"It is important that nobody forgets that the Foreign Service is, in many respects, more on the front lines of the nation's defense than even the military."***—Marshall P. Adair, president of the American Foreign Service Association, as quoted in May 28* US News and World Report.**

On Strategy I

"I don't know whether there will be a change in strategy. There may or there may not, but there certainly won't be without a great deal of discussion and thought and care and attention. ... It [the idea that there would be a major change] certainly never came out of my mouth that way."***—Defense Secretary Donald Rumsfeld, in May 25 interview on the PBS "NewsHour."***

On Strategy II

"Any suggestion that the United States is going to, and wants to, or might, turn away from Europe is fundamentally flawed in logic. ... I think the Asia thing [reports that Rumsfeld will put new emphasis on Asia] is overemphasized. Asia is different than Europe, and how you are arranged for Europe is one thing, and how you ought to be arranged for Asia is conceivably something else. The distances are different, the needs are different, the circumstances are different, and it would be unwise for the United States to not recognize those distinctions. It's perfectly possible for the United States to address that in a way that in no way diminishes the importance of the Atlantic alliance."***—Defense Secretary Donald Rumsfeld, in June 3 remarks to reporters.***

Helicopters have a low profile in the Army's transformation plan.

What About Army Aviation?

By Erin Q. Winograd

In October 1999, Gen. Eric K. Shinseki, the Chief of Staff of the Army, proposed a far-reaching plan aimed at making the force lighter, swifter, and more versatile. He called for nothing less than a "transformation" of the force, but many noticed that he left out a key component.

His plan hinged on fielding a new family of 20-ton land vehicles, fleets of which would be networked over the battlefield. Each "Future Combat System" would punch like a 70-ton M1 Abrams tank and yet possess far greater tactical mobility and strategic deployability. The implication was that, with this "system of systems" approach, the Army would be able to rush its forces to virtually any hot spot and prosecute any type of conflict.

Shinseki's speech startled many, but not just for what it said. Equally surprising was what was left out—Army aviation. The Chief simply did not mention the helicopter force, an omission that sparked immediate questions about aviation's role in the "transformed" Army of the future.

Shinseki later acknowledged aviation's exclusion from his plan that October, but defended its absence by noting that transformation was still in the early stages of development. Meanwhile, Gen. John M. Keane, vice chief of staff, reassured aviators they were "an integral part

of where we're going." He pledged support for two main aviation programs—the RAH-66 Comanche and AH-64D Apache—and promised a comprehensive aviation plan.

Nearly two years later, the Army is still struggling to define aviation's role in the transformed force, and the branch's ultimate shape remains in flux. Simultaneously, key modernization programs face problems. Maintaining high warfighting readiness has become a constant battle. And one round of recent Army budget drills found that, in the 2002–07 period, aviation programs were underfunded to the tune of $7.8 billion.

USAF photo by SrA. Diane S. Robinson

The RAH-66 Comanche (shown here at a UK air show) is the centerpiece of the Army's aviation modernization plan. The armed reconnaissance helicopter is one of four rotary-wing types envisioned for the transformed force.

The New Blueprint

Six months after the "vision" speech, Army leaders did finally produce a new aviation blueprint. It was at an April 4, 2000, press conference that officials unveiled the "2000 Army Aviation Modernization Plan," about which Army briefers were relentlessly upbeat. "I want everyone to understand that our senior leadership, our Army, and Congress acknowledge this as a good news story," said Brig. Gen. Craig Hackett, the Army's director of requirements.

The "good news story" of Army aviation had three basic and interrelated objectives. The Army sought to:

- Winnow down the force to four helicopter types—AH-64D Apache gunships, UH-60 Black Hawk transports, RAH-66 Comanche armed reconnaissance craft, and CH-47 Chinook heavy lifters.
- Equip active and reserve units with identical types of aircraft to make them interchangeable.
- Reorganize all active and reserve helicopter forces into "Multi-Functional Battalions" containing several types of aircraft, not just one, as is the case today.

Step one—and a key to the first two goals—was a wholesale retirement of the National Guard's hundreds of AH-1 Cobra gunships and UH-1 Huey utility helicopters. Keeping such a huge number of creaking aircraft airworthy is expensive. Shedding them would free up money to update and procure modern helos and allow a rebalancing of forces among active and reserve units.

Under the plan, the Hueys were to be replaced with Black Hawks and the Cobras with OH-58 Kiowas, AH-64 Apaches, and in time, RAH-66 Comanches. Many Chinooks would be updated as well.

Equally important, Army officials committed the service to the concept of the Multi-Functional Battalion to make aviation troops more deployable, sustainable, and flexible. This basic building block would enable the Army to tailor helicopter forces for different missions, especially contingency operations. Each basic battalion would include a mix of 10 Comanches, 10 Apaches, and 10 Black Hawks. Chinooks would provide support.

The MFB, they said, would also be more adaptable to joint and coalition warfare, keeping Army aviation attuned to the transformed ground force.

Today, a typical Army division would go to war with an aviation brigade comprising two chopper battalions—one battalion containing 24 attack and scout helicopters and a second with 24 heavy-lift aircraft. Each division has a 16-helicopter air cavalry squadron. All told, the Army's divisional structure has 51 combat units—33 attack–scout battalions and 18 cav squadrons. Full implementation of the MFB concept would reduce the total number from 51 regular units to 40 MFBs.

The Momentum Fades

It was an ambitious plan. With its announcement, Army aviation finally seemed to gain some much-needed momentum. But it did not last long. After a full year of study by several high-level task forces and much deliberation at the general officer level, the Army clearly is treading water.

The original plan pinpointed 2002 as the year the service would start converting aviation units to the multifunctional design. That target date has slipped badly, however.

Maj. Gen. Anthony R. Jones, commanding general of the Aviation Center and School, Ft. Rucker, Ala., recently announced that there would be no change in aviation units until 2008. The reason, said Army officials: The conversion to the MFB structure would likely prove too difficult and costly in the near term.

Over the past year, possible paths for aviation transformation were studied by a special task force convened by Keane. As part of its assessment, the panel calculated the overall cost of transformation in the period 2002–07 to be more than $3 billion. That sum never made it into the funded column in the Army's budget plans.

A large portion of the cost was associated with changes which would take place after retirement of the Army's Vietnam–vintage Cobras (by the end of 2001) and equally aged Hueys (by the end of 2004).

Officials discovered that the act of striking those aircraft from the inventory generated a new and expensive problem. The Army faced a need to spend roughly $1.7 billion to

retrain all of the pilots, crew members, and maintainers who had been associated with these graveyard-bound helicopters. Otherwise, they could not be shifted to Apache, Kiowa, and Black Hawk aircraft in the new aviation units.

That was not all. Army officials noted that replacing the old aircraft with newer types would have forced the Army to carry out expensive upgrades of old Cobra and Huey facilities, which were not equipped to conduct modern aircraft maintenance, repair, and operations. The estimated cost of these modifications: $671 million.

Aviation transformation also stimulated new personnel requirements, which collectively posed a major burden. According to the Keane task force, implementation of the MFB concept would have forced the service to create 2,106 new aviation spaces. In that additional complement would be nearly 600 new pilots, each representing a training bill of more than $800,000.

Without an overall personnel increase, it would not be possible to fill aviation's needs, officials said. Why? No other Army sector would agree to give up even a single officer or soldier.

First, the Ground Force

The aviation plan also has run into service politics, which have contributed to delays. In the Army, several officers explained, there was mounting concern that the aviation branch, by following its plan, was about to get ahead of the other components on the transformation path.

They note that the overall design of the transformed Army—the so-called "Objective Force"—has not been determined. That is because the centerpiece of the ground force, the Future Combat System, is only a concept at present. It will not be fielded until 2008 at the earliest and possibly as late as 2012.

The idea is that, until FCS takes a definitive shape, the Objective Force should remain somewhat fluid, and large-scale aviation changes would be premature. "We have to decide what the ground force looks like before we settle on aviation," remarked one Army officer. "We need it to match. If we're not certain, it's not the right thing to do yet."

Service sources said the status of the Comanche armed reconnaissance helicopter—with deployment to come no earlier than 2008—was a factor in delaying aviation transformation. The Army does not have enough attack and reconnaissance aircraft to meet active and reserve requirements. Without the Comanche, the Army faced the prospect of under-resourcing aviation formations, possibly for as long as a decade. Active units, with some exceptions, would have 80 percent of requirement; reserve components would be filled at 60 percent or less.

Waiting for the Comanches would help alleviate this aircraft shortage, officials said.

Keane and others have said the planned divestiture of Cobras and Hueys will remain on schedule. These moves, when completed, will have brought about the mass retirement of up to 400 Cobras and 800 Hueys in a matter of just a few years.

These aircraft are concentrated in the Guard. Previously, Army leaders said they would replace at least some of the Guard losses with helicopters taken from the active component. However, that transfer was predicated on switching to the MFB structure, which would have freed up a certain number of active duty attack, lift, and reconnaissance assets for use in Guard units.

Now that the MFB changeover has been postponed, an obvious question arises: Where will the Army get functional helicopters to equip the Guard and Reserve aviation units?

No one has yet officially acknowledged this problem. One Army source suggested the service may be able to pull enough OH-58A/C Kiowa choppers out of mothballs to keep the Guard flying hour program at minimally acceptable levels.

In this way, he said, the Guard might be able to maintain basic pilot proficiency, but units would not have enough assets to take part in any real-world operation.

Congress—the Senate Armed Services Committee, in particular—is keeping an eye on the tribulations of the aviation branch.

For years, Congressional defense panels have directed Army leaders to write a comprehensive aviation strategy, one that would be executable and financially feasible. The April 2000 plan had provided a glimmer of hope that Army aviation could right itself. Recent developments have undercut that view.

According to one Congressional aide, the decision to put aviation transformation into the deep freeze will not, by itself, generate anger on Capitol Hill—not, that is, unless Guard officials in the States raise a ruckus over the lack of materiel resourcing. So far, Guard leaders have not bombarded lawmakers with pleas for help, but they might yet.

Massive Recapitalization

Lawmakers express doubts that the service will be able to address the

US Army photo by Spc. Tracey L. Hall-Leahy

The Army plans to replace Vietnam War–vintage Cobras, most of them used by the Guard, with the Kiowa and eventually the Comanche. Here, Army personnel at Schweinfurt, Germany, push an OH-58 into a hangar at Tuzla, Bosnia.

recapitalization needs of its current fleet. All of the Army's aviation assets require some degree of overhaul and modernization. This is particularly true of the AH-64 Apache attack helicopter.

That helicopter, first fielded in the mid-1980s, has generated numerous safety-of-flight messages in recent years. Its Reliability and Sustainability will likely continue to be a problem even as the Army converts its older AH-64s into new D model Longbows. The aircraft's basic components, such as the airframe, are not currently being upgraded as part of the process.

OH-58 Kiowas also must undergo recapitalization if they are to continue serving the Army over the next two decades. Under the aviation transformation strategy, the Army identified a cost of $105 million through 2007 for upgrades to the A and C models. Kiowas will likely stay in the fleet through 2020, perhaps in greater numbers than assumed. As a result, the cost to recapitalize this aircraft likely will go even higher.

The Army, in fact, faces an enormous recapitalization bill. A Reliability and Sustainability task force commissioned by Keane recommended a series of steps to improve aviation R&S over the next seven years. The minimum amount of additional money the Army should spend to resolve its R&S problems, concluded the task force, is $1.3 billion.

Especially vulnerable to budget pressures is the Apache Longbow. Because the Army must fix the basic Apache aircraft at a time when little money is available, the service will be forced to trim its overall procurement of Longbows.

The Army originally intended to convert its entire Apache fleet of about 741 A models to the Longbow configuration, but the number has steadily dwindled. In 1998, the service said it would buy only 530 Longbows. After substantial internal debate early this year, Army officials again recalculated procurement objectives downward. Plans now call for buying only 501.

The cut in Longbow production will likely create another headache: the emergence of a mixed fleet of standard Apaches and more-advanced Longbows.

US Army photo by William Cronk

An AH-64D Apache Longbow in flight at Ft. Irwin, Calif. The Army intended to convert all its A model Apaches to Longbow configuration but now may end up with a mixed fleet of standard Apaches and more-advanced Longbows.

At present, the Army intends to keep in service about 200 older A model Apaches, which have different training and maintenance requirements. As a result, the service will lose much of the anticipated benefit of economies of scale. Congress disapproves of a two–Apache inventory, and a staff member reports that discontent is brewing.

The Centerpiece

Concern also has begun to envelop the Army's other critical aviation program, the RAH-66 Comanche.

The Army states forthrightly that Comanche is the centerpiece of aviation. It intends to procure 1,213 of these stealthy aircraft for $43 billion.

Still, investigators in the General Accounting Office and certain officials in the Office of the Secretary of Defense claim the program runs a high risk of missing its performance, cost, and schedule goals. It has too much concurrent development, argue these critics, and should be stretched out even further to give the program a chance to straighten itself out.

Despite recent Army moves to address Comanche's challenges, GAO remains skeptical of the prospects for success. At the top of GAO's problem list is rising cost.

The bill for Research and Development has grown $85.3 million since GAO's last audit in 1999 and production costs have increased $4.8 billion.

GAO notes the production cost increases are the result of OSD direction to add 10 percent to the helicopter's unit cost to ensure enough cash is available for planned procurement. As a result, the Army was forced to change its peak production rate from 72 aircraft per year to 62 per year, stretching fielding three additional years.

However, the Army counters that Comanche is at no higher risk than any other aviation development program and that the aircraft will meet all key performance goals.

Defense acquisition officials this year determined Comanche has a weight problem, but it is not significant enough to require immediate action, as requested by a Pentagon Cost Analysis Improvement Group.

CAIG officials have long voiced concerns about the RAH-66's weight. They said the helicopter has not met its objectives and is unlikely to do so. Technical advances on which officials had counted to limit Comanche's heft have not worked. The Army also has added capability to the helicopter, which in turn added to its weight.

Comanche proponents assert that a recently ordered new engine will provide enough horsepower to compensate for any extra pounds the helicopter does not shed prior to production.

For the far term, the outlook is not bright. Now under consideration is just a single new platform, the Fu-

US Army photo by SSgt. James V. Downen Jr.

A UH-60 Black Hawk, loaded with soldiers and supplies, lands in Kosovo. Black Hawks and CH-47 Chinooks would handle the transport and heavy-lift requirements in the Army's four-helicopter plan.

ture Transport Rotorcraft. If fielded, it would take up the Chinook's heavy-lift duties and carry the 20-ton Future Combat System.

The Army has had trouble generating momentum behind this project. It had hoped to make it a joint effort with the Marine Corps, but the Corps hasn't committed itself.

Also, the Army has not been able to settle on a target date for system fielding. Originally, the Army said FTR would take to the skies in 2020; the date was accelerated to 2018 and again last fall to 2015, but it does not appear to have adequate R&D backing to meet that timetable.

No one is even talking about a next-generation attack helicopter, even though the Apache will be nearly 50 years old when the Objective Force is completed. Instead, Army officers contemplate using the Comanche in that role.

However, many aviation observers doubt the Comanche will be as effective as Apache or that the planned Comanche fleet will be big enough to provide aircraft for two mission areas.

The UAV Question

With no new aircraft development programs firmly locked in, Army aviation may be able to expand its portfolio through other means. For several years, aviation officials have asserted they should "own" Unmanned Aerial Vehicles. Currently, UAVs belong to the Army's intelligence community, which is responsible for developing their warfighting doctrine, procuring the systems, and operating them on the battlefield. But, aviation branch proponents argue, as a platform that flies, UAVs should be melded into the aviation domain.

A new project, approved by the Department of Defense this year as an Advanced Concept Technology Demonstration, may help solidify aviation's claim on UAVs. One portion of the effort, called the Hunter Standoff Killer Team ACTD, focuses on pairing UAVs with rotorcraft such as the Apache Longbow and the Comanche. The pilot of the helicopter would be able to control the UAV in flight, setting and resetting its course and directly tasking it to conduct surveillance of certain targets. Ultimately, the effort could help equip UAVs with laser designators which the helicopter could then use to guide in its rockets and missiles, thereby increasing standoff range and improving pilot survivability.

Though top Army aviation officials have lobbied hard for control of UAVs, the Army so far has declined to implement the change. Troops are scheduled to start receiving the service's new, brigade-level UAV, the Shadow 200, in 2003, while the ACTD project officials intend to field the teaming technology in 2006. Between now and then, the Army must resolve the dispute and find the most effective and logical home for UAVs.

"Controlled Substitution"

Worries about readiness rates also abound. While aviation warfighting units usually meet their readiness requirements, it does not come easily.

In fact, Army sources have said, the apparently healthy state of front-line aviation forces is at least partly illusion. Widespread use of "controlled substitution" is masking a deep and serious readiness problem that must be addressed, they say.

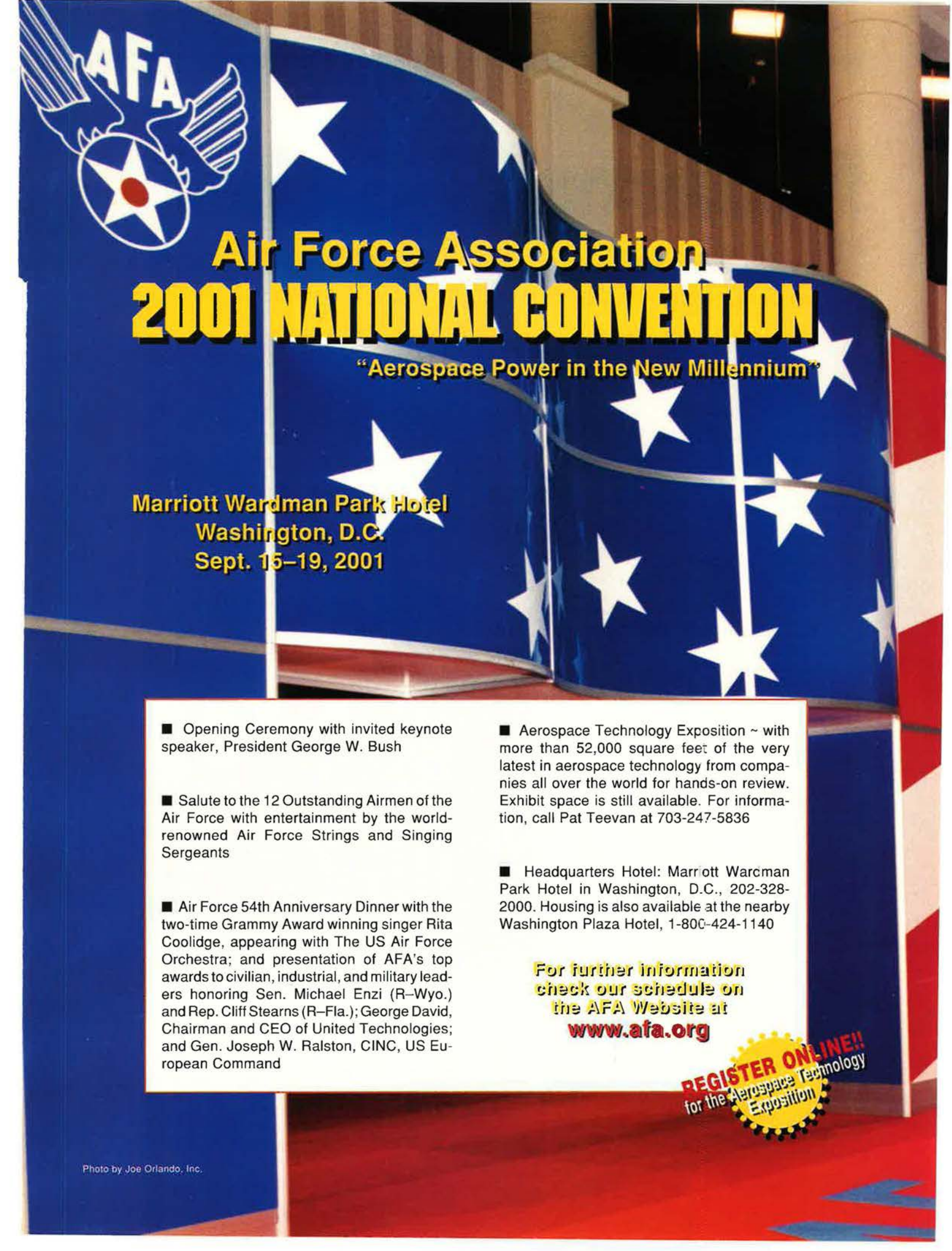
Controlled substitution, though not officially sanctioned, has become a way of life. The drill goes like this: Troops take one helicopter out of service because of a failure, for example, in the nose gearbox. They don't have an immediate replacement, so it sits in the hangar. In the meantime, a second aircraft suffers a rotor blade failure. That part, too, is not available. Rather than have two helicopters out of service, the unit commander tells the maintainers to take a blade off the first aircraft and install it on the second. Now, the second aircraft is ready to go, but the first aircraft is in even worse shape.

Aviation commanders say that, without resorting to such tactics, their units would fail to achieve a C-1 readiness rating. The Army must employ controlled substitution because older aircraft are tearing through parts at a quick pace and the spares inventory is not sufficient to meet demand, officials say.

It is difficult to predict how far warfighting readiness rates would drop should the Army ban controlled substitution, but some warn that aviation could enter a dangerous decline.

Top Army leaders claim the service is committed to the aviation branch, and the service will not proceed into battle without airborne platforms, now or in the future. However, the cost of restoring the health of Army aviation is high, especially in light of other transformation priorities, and success is not assured. ■

Erin Q. Winograd is chief editor for "Inside the Army," a Washington, D.C.–based defense newsletter. This is her first article for Air Force *Magazine.*



Air Force Association
2001 NATIONAL CONVENTION

"Aerospace Power in the New Millennium"

Marriott Wardman Park Hotel
Washington, D.C.
Sept. 15–19, 2001

■ Opening Ceremony with invited keynote speaker, President George W. Bush

■ Salute to the 12 Outstanding Airmen of the Air Force with entertainment by the world-renowned Air Force Strings and Singing Sergeants

■ Air Force 54th Anniversary Dinner with the two-time Grammy Award winning singer Rita Coolidge, appearing with The US Air Force Orchestra; and presentation of AFA's top awards to civilian, industrial, and military leaders honoring Sen. Michael Enzi (R–Wyo.) and Rep. Cliff Stearns (R–Fla.); George David, Chairman and CEO of United Technologies; and Gen. Joseph W. Ralston, CINC, US European Command

■ Aerospace Technology Exposition ~ with more than 52,000 square feet of the very latest in aerospace technology from companies all over the world for hands-on review. Exhibit space is still available. For information, call Pat Teevan at 703-247-5836

■ Headquarters Hotel: Marriott Wardman Park Hotel in Washington, D.C., 202-328-2000. Housing is also available at the nearby Washington Plaza Hotel, 1-800-424-1140

For further information check our schedule on the AFA Website at
www.afa.org

REGISTER ONLINE!! for the Aerospace Technology Exposition

Photo by Joe Orlando, Inc.

Terror attacks are on the rise again—but their focus is shifting.

Patterns of Global Terrorism

In the latest version of its annually updated survey, "Patterns of Global Terrorism," the State Department reports that the worldwide toll for acts of international terror in Year 2000 was 405 killed and 791 wounded.

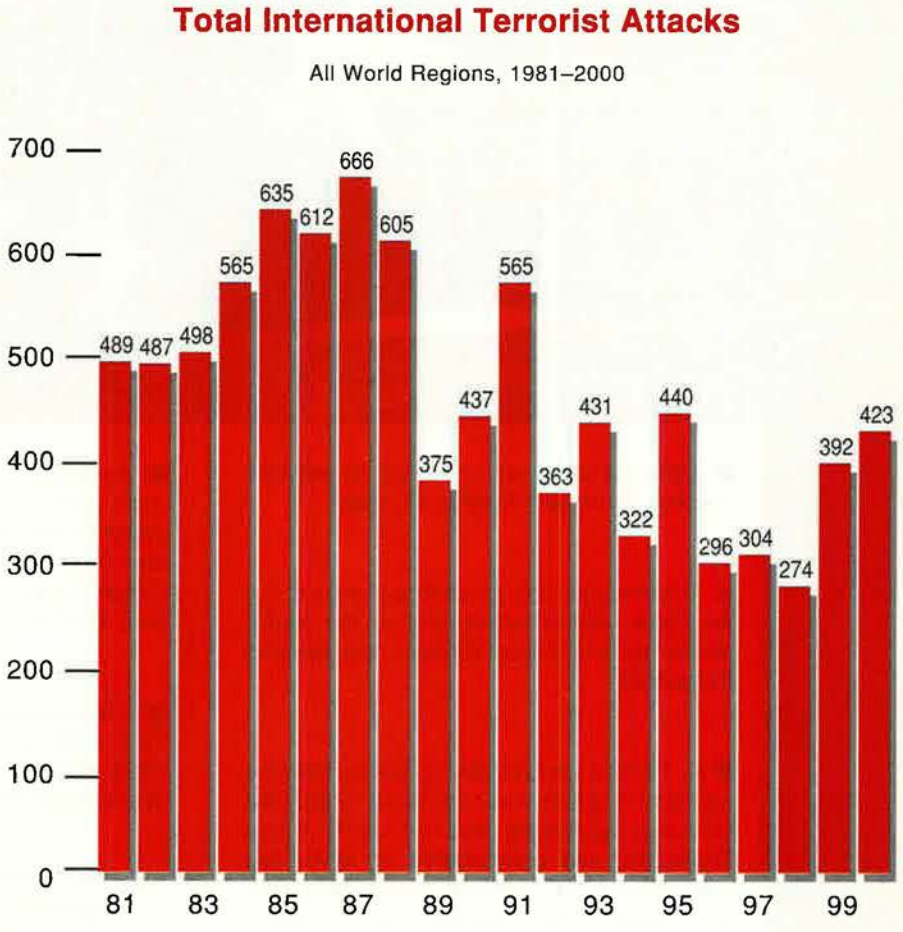
These figures, taken together, marked a significant increase over the 233 dead and 706 wounded in 1999.

In terms of the number of attacks, the year just past produced the second straight year-over-year increase, a fact the report attributed mainly to an upsurge in attacks against an oil pipeline in Colombia. However, terrorism, at least in numerical terms, is well down from peak levels in the mid-1980s.

Asia was the continent with the largest number of killings and woundings. The countries with the most killings were Colombia, a nation in the throes of a major battle with leftist guerrillas and right wing paramilitary groups with holdings in coca-growing areas, and India, where the Kashmir conflict has led to large-scale massacres.

The number of US deaths during the year rose from five in 1999 to 19, all but two of them as a result of the attack on the US destroyer *Cole* in Aden harbor in Yemen in October. Seventeen US sailors died in that blast.

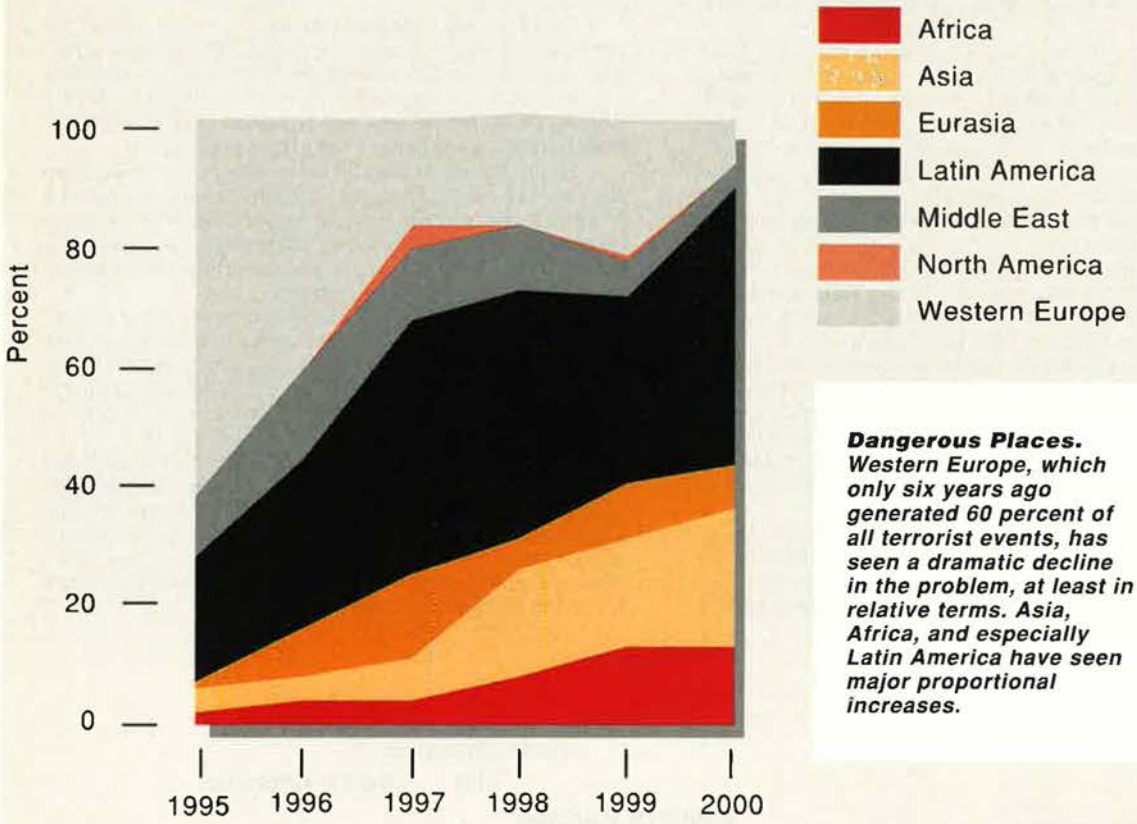
The report was released April 30 by the State Department's Office of the Coordinator for Counterterrorism. It concluded, "The year 2000 showed that terrorism continues to pose a clear and present danger to the international community."



Toll of Two Decades. *Since the mid-1980s, the frequency of international terrorist incidents has slowly and fitfully drifted downward. The number of events seems to have bottomed out in the late 1990s, but it has now turned back up.*

Where Terrorists Struck

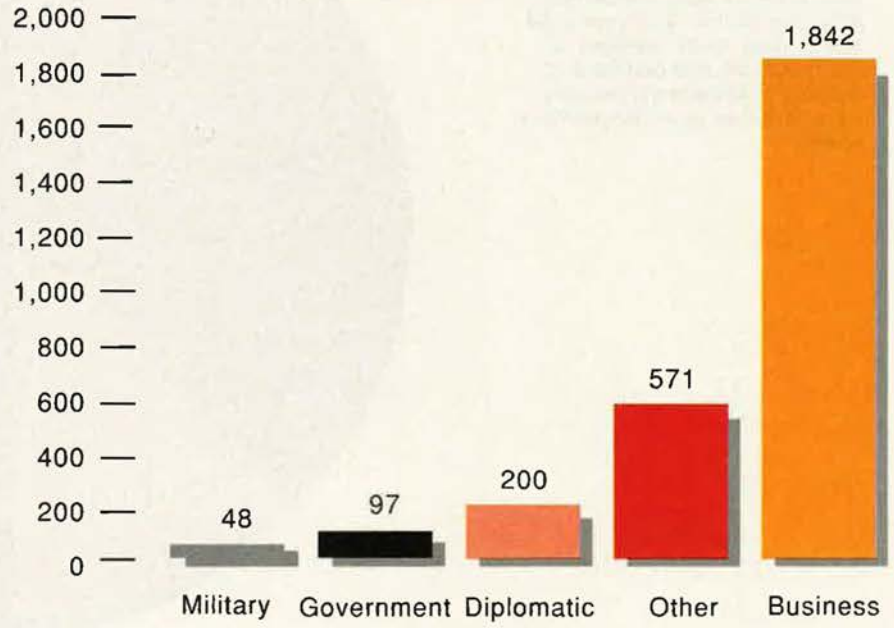
Attacks by World Region, 1995–2000



Dangerous Places. *Western Europe, which only six years ago generated 60 percent of all terrorist events, has seen a dramatic decline in the problem, at least in relative terms. Asia, Africa, and especially Latin America have seen major proportional increases.*

Prime Targets of Terror

All World Regions, 1995–2000



Jackpots and Paydays. *Military, government, and diplomatic installations pose "hard targets"; they work diligently to thwart terror attacks. At the other end of the spectrum are business targets, which not only are "soft" in terms of security but also are lucrative, offering a terrorist group the chance to extract a rich ransom.*

The Unholy Seven (At Least) of State Terror

Though state-sponsored terrorism has declined during recent years, Washington keeps seven nations on the watch list of those who provide aid, comfort, and support to the killers. They are:

Iran. Remains the most active state sponsor of terrorism. Provided increasing support to numerous terror groups, including the Lebanese Hezbollah, Hamas, and the Palestine Islamic Jihad (PIJ), which seek to undermine the Middle East peace negotiations through the use of terrorism. It encourages Hezbollah and Palestinian groups to coordinate their planning and to escalate their activities against Israel.

Iraq. Continued to provide safe haven and support to a variety of Palestinian rejectionist groups, as well as bases, weapons, and protection to the Mujahedin-e-Khalq, an Iranian terrorist group fighting against Tehran. Regime has not attempted an anti–Western attack since its failed plot to assassinate former President Bush in 1993 in Kuwait.

Syria. Still provides safe haven and support to several terrorist groups. The Syrian government allowed Hamas to open a new main office in Damascus in March, although the arrangement may be temporary while Hamas continues to seek permission to re-establish its headquarters in Jordan. Syria granted several terrorist groups basing privileges or refuge in areas of Lebanon's Bekaa Valley.

Libya. Attempting to change its international image following its surrender in 1999 of two Libyan suspects for trial in the Pan Am 103 bombing. However, it still maintains contacts with groups that use violence to oppose Middle East peace, including the Palestine Islamic Jihad and the Popular Front for the Liberation of Palestine–General Command.

Cuba. Offers safe haven to several notorious terrorists and US fugitives and maintained ties to state sponsors of terror and Latin American insurgents. Colombia's two largest terror organizations, the Revolutionary Armed Forces of Colombia and the National Liberation Army, maintained a permanent presence on the island.

North Korea. Harbored several hijackers of a Japan Airlines flight to North Korea in the 1970s and maintained links to other terrorist groups. Some evidence also suggests Pyongyang may have sold weapons directly or indirectly to terrorist groups, including the Moro Islamic Liberation Front in the Philippines.

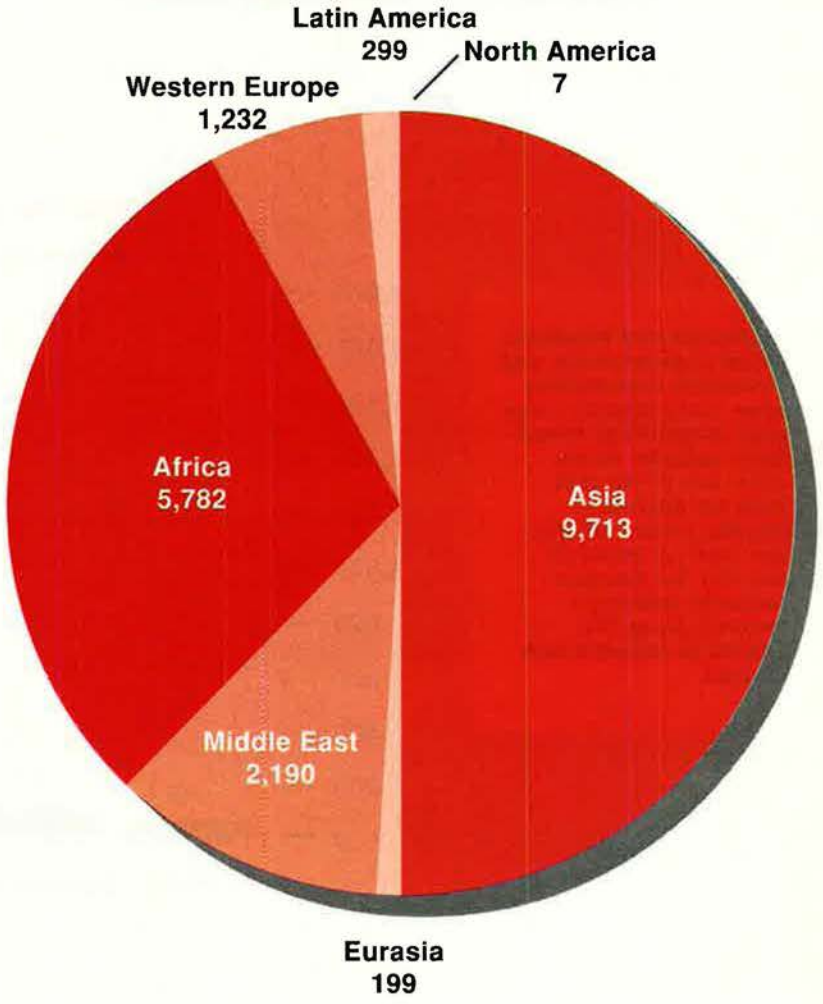
Sudan. Provider of safe haven for members of al-Qaida, Lebanese Hezbollah, al-Gama'a al-Islamiyya, Egyptian Islamic Jihad, the PIJ, and Hamas. Khartoum has not handed over to authorities three Egyptian Gama'a fugitives linked to the assassination attempt in 1995 against Egyptian President Hosni Mubarak in Ethiopia.

Afghanistan is not on the US list, but only because Washington doesn't recognize it as a state or the Taliban as a government. Even so, Afghanistan is what the State Department calls "a primary hub" of terrorists as well as a safe haven for Osama bin Laden, a notorious anti–Western operator. The US also hints at possible future inclusion of **Pakistan** and **Lebanon**.

Terror Casualties

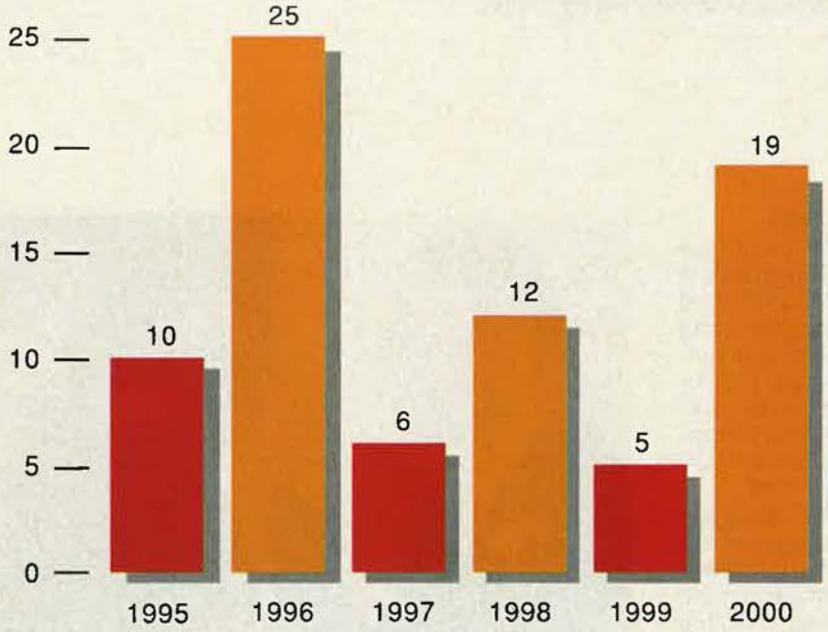
Deaths and Serious Injuries, 1995–2000

The Pain Is Concentrated. *Asia and Africa have provided the venues for 80 percent of the nearly 20,000 deaths and injuries that terrorist groups have inflicted over the past six years.*



US Citizen Deaths

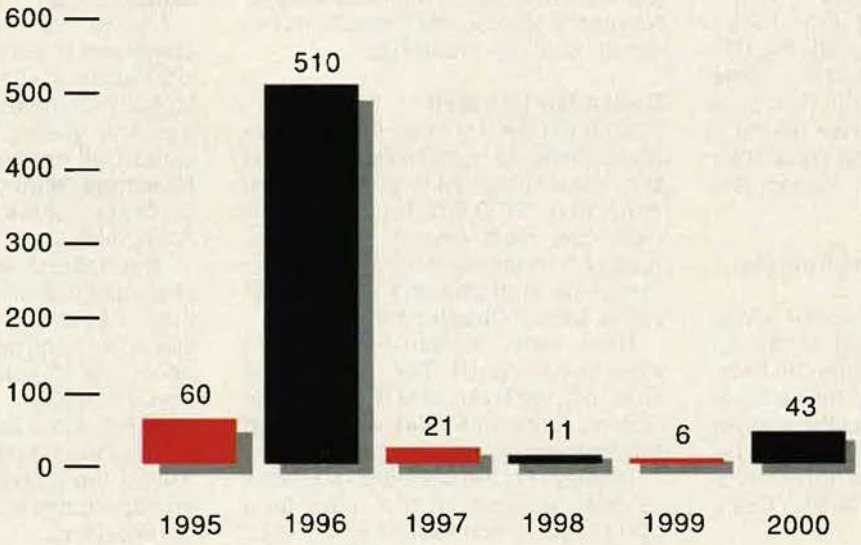
All World Regions, 1995–2000



Year to Year. *The terror bombing of USAF's Khobar Towers complex in Dhahran, Saudi Arabia, makes 1996 the worst year by far for US casualties. Of the 25 American deaths that year, 19 were US airmen killed at Khobar Towers. More than 400 were wounded.*

US Citizen Wounded

All World Regions, 1995–2000



AFA / AEF National Report

afa-aef@afa.org

By Frances McKenney, Assistant Managing Editor

Focus on Recapitalization

Nineteen members of Congress were among more than 300 guests at a reception on Capitol Hill, sponsored by the Air Force Association and USAF's Office of Legislative Liaison. The May event focused on the Air Force's recapitalization needs and was the latest in a series of receptions organized to help inform US representatives and their staff.

Storyboards lining the reception area highlighted key elements of the "Requirements, Resources, and Readiness" theme: shortage of personnel, higher operations tempo, marginal resources, and aging aircraft.

Gen. Michael E. Ryan, Air Force Chief of Staff, and Lawrence J. Delaney, then acting Air Force Secretary, led the list of USAF guests. AFA National Chairman of the Board Thomas J. McKee represented AFA.

The US Representatives who attended the event included Floyd Spence (R–S.C.), James A. Gibbons (R–Nev.), James V. Hansen (R–Utah), Edward L. Schrock (R–Va.), and Gene Taylor (D–Miss.) from the House Armed Services Committee.

Other attendees: Reps. Henry E. Brown Jr. (R–S.C.), Howard Coble (R–N.C.), Shelley Moore Capito (R–W.Va.), John C. Cooksey (R–La.), Benjamin A. Gilman (R–N.Y.), Paul E. Gillmor (R–Ohio), Darrell Issa (R–Calif.), Mark Kennedy (R–Minn.), Dale E. Kildee (D–Mich.), Ken R. Lucas (D–Ky.), John E. Peterson (R–Pa.), Mike Simpson (R–Idaho), Dave Weldon (R–Fla.), and Don Young (R–Alaska).

New President for AFM Foundation

Retired Maj. Gen. Edward F. Grillo Jr. was named president of the Air Force Memorial Foundation in June.

Grillo retired from the Air Force in 1996 as director of operations at Air Mobility Command, Scott AFB, Ill. He then became executive director of the Reston Community Center Complex in Reston, Va.

Grillo will focus on the next phase of fund-raising for the Air Force Memorial: gaining final design approval from the oversight commissions and National Park Service and actual construction of the memorial.

White House photo

Memorial Day Activities. *Air Force Association National Chairman of the Board Thomas McKee presents an AFA coin to President Bush at a White House reception. The reception followed a ceremony in which the President signed legislation approving construction of the World War II Memorial on the National Mall. Secretary of Defense Donald Rumsfeld is in the background. McKee mentioned to the President that he had already presented an AFA coin to his brother, Florida Gov. Jeb Bush. McKee also attended a Memorial Day breakfast for veterans organizations at the White House and later placed an AFA wreath at the Tomb of the Unknowns at Arlington National Cemetery.*

Dallas Military Ball

With the Air Force as host service and assistance from the **Dallas Chapter,** the Dallas Military Ball raised more than $130,000 for area charities—"the most ever in its 37-year history," reported William A. Solemene, general chairman of the ball and a Dallas Chapter member.

Reps. Sam Johnson (R–Tex.) and Pete Sessions (R–Tex.), Air Force Chief of Staff Ryan, and AFA National Board Chairman McKee were among the honored guests at ball events.

Highlights of the ball included Ryan's keynote address to the more than 900 guests, a video salute to Air Force astronauts, and music by the Top Brass ensemble from the USAF Band of the West, Lackland AFB, Tex.

Enlisted Call

CMSgt. Kenneth F. Van Holbeck, command chief master sergeant for US Transportation Command and Air Mobility Command at Scott AFB, Ill., was the guest speaker for an Enlisted Call hosted by the **Gen. E.W. Rawlings (Minn.) Chapter** and a local chapter of the Air Force Sergeants Association.

Van Holbeck spoke to an audience of about 60 guests, who asked questions about pay and benefits, the operations and personnel tempo, and about the Expeditionary Aerospace Force concept.

AFRC Col. Paul R. Groskreutz, chapter president, said the visit gave AMC's top active duty enlisted man an opportunity to meet a varied group of reservists.

Groskreutz, who is commander of the 934th Support Group, noted that in addition to the 934th Airlift Wing

(AFRC), the area is home to the 133rd Airlift Wing (ANG) at Minneapolis–St. Paul IAP/ARS, and the active duty 342nd Recruiting Squadron. The 934th and 133rd are AMC–gained units, he said, which is why the chapter invited Van Holbeck to be guest speaker.

Van Holbeck was no stranger to the area, having served as logistics chief for the 3556th Recruiting Squadron in St. Paul from 1980 to 1984.

Lindbergh and Sikorsky

Reeve Lindbergh, daughter of aviators Charles A. and Anne Morrow Lindbergh, and Sergei Sikorsky, son of helicopter and flying boat pioneer Igor I. Sikorsky, were guest speakers at a recent program sponsored by the **Lindbergh/Sikorsky (Conn.) Chapter** and the International Order of Characters.

Lindbergh is the author of more than 20 books and is the youngest of the six Lindbergh children. Sikorsky is an aviation executive.

Speaking to the gathering at the New England Air Museum at Bradley IAP, Conn., the two described childhood visits between their families, both then living in Connecticut. Lindbergh helped design the Sikorsky–built flying boats and piloted the "American Clipper" on its maiden flight in 1931.

Al Hudson, chapter vice president, presented Reeve Lindbergh with an Aerospace Education Foundation plaque that marks her father's designation as a Jimmy Doolittle Fellow.

Teacher Award

The **Ladewig–Shine Memorial (S.C.) Chapter** presented its first annual award for an outstanding math or science teacher to Kenneth J. Healy of Socastee High School in Myrtle Beach, S.C.

According to Jack Boyd Jr., chapter president, Healy was selected by his peers as the unanimous choice for the award.

Healy teaches physical science, meteorology, and Earth science to about 160 10th- and 11th-graders each year. He has taught for 32 years, 18 of them at Socastee. His emphasis on meteorology and Earth science is reflected in six computers that run 24 hours a day in his classroom and two satellite dishes on the school's roof that allow direct collection of information, mostly from Earth satellites. Healy said his students are interested in meteorology because it is high tech and because they can, for example, watch a hurricane develop in real time.

Boyd, Ronald E. Crow, chapter vice president, and James Wood, a chapter member who also heads the school's AFJROTC program, presented Healy with $100 and a plaque.

USAF photo by TSgt. Jim Varhegyi

AFA was well-represented in this Easter holiday reunion of the Petrina family at Andrews AFB, Md.: Maj. Gil Petrina (kneeling) is president of the Earl D. Clark (Mo.) Chapter. Back row (l–r) are Capt. Jenifer Petrina, an AFA national director; Lt. Cmdr. Carolyn Petrina, a naval aviator; ANG Maj. Julie Petrina of the Baltimore Chapter; and 1st Lt. Amy Petrina of the Lufbery Campbell (Germany) Chapter. Air Force News Service described this as an opportunity for the relatives "to compare multiservice career notes."

Three Scholars

The **Scott Berkeley (N.C.) Chapter's** Educational Foundation recently awarded three $1,000 scholarships to students from the local area.

SrA. Lorine Grosso, from the 4th Operations Support Squadron/Intelligence at Seymour Johnson AFB, N.C., attends Mount Olive College in Mount Olive, N.C. She is majoring in human resource development and plans to apply to Officer Training School to become a foreign area officer.

AFROTC cadet Jeanette Rivera–Breznai is a student at North Carolina State University, majoring in political science. She plans to apply to

AFA Conventions

July 19–21	Virginia State Convention, Charlottesville, Va.
July 20–21	Iowa State Convention, Des Moines, Iowa
July 20–22	Texas State Convention, Fort Worth, Tex.
July 27–29	Florida State Convention, Tampa, Fla.
Aug. 10–11	Michigan State Convention, Oscoda, Mich.
Aug. 10–11	Oklahoma State Convention, Enid, Okla.
Aug. 10–12	Georgia State Convention, Robins AFB, Ga.
Aug. 10–12	Indiana State Convention, Indianapolis
Aug. 10–12	Minnesota State Convention, Sioux Falls, S.D.
Aug. 10–12	North Dakota State Convention, Sioux Falls, S.D.
Aug. 10–12	Wisconsin State Convention, Sioux Falls, S.D.
Aug. 24–25	Missouri State Convention, Lake of the Ozarks, Mo.
Sept. 15–19	AFA National Convention, Washington
Sept. 21–22	Colorado State Convention, Colorado Springs, Colo.
Sept. 21–23	Delaware State Convention, Dover, Del.
Sept. 28–30	New Hampshire State Convention, Portsmouth, N.H.
Oct. 12–14	Pennsylvania State Convention, Altoona, Pa.

John Alison (left), an AFA national director emeritus, and Anthony Principi, secretary of veterans affairs, were among the dignitaries at the first-day-of-issue ceremony for the US Postal Service's postage stamp commemorating veterans. The dedication took place in May on the National Mall.

USAF's Funded Legal Education Program, a Judge Advocate General program that sends selected active duty officers to law school. Her husband is SSgt. Emery Breznai, 4th Logistics Support Squadron at Seymour Johnson.

A freshman at North Carolina State, Stanley Gracyk III, was the third award recipient. He is an engineering major and plans to join the AFROTC program. Gracyk's father is MSgt. Stanley Gracyk Jr., 4th Security Forces Squadron also at Seymour Johnson.

Don Tanner, president of the chapter's educational foundation, made the awards presentations. Funds for this third presentation of scholarships came from contributions from local businesses and a golf tournament.

More AFA/AEF News

■ Several **Billy Mitchell (Wis.) Chapter** members celebrated Mardi Gras with patients at the Clement J. Zablocki Veterans Affairs Medical Center in Milwaukee. Joining several organizations in hosting the annual February party for more than 250 clients were Charles W. Marotske Jr., state president and chapter vice president for leadership development; Gilbert M. Kwiatkowski, state treasurer; Robert E. Meinecke, chapter treasurer; and Anthony J. Laporte, an AFA charter member. The volunteers brought the clients down from their rooms in wheelchairs and wheeled them around to various "stations" for games, food, and gifts. Marotske said chapter members also attend other holiday functions at the center.

■ The **Thomas W. Anthony (Md.) Chapter** hosted an AFA table at Aviation Career Day, April 27, at Andrews AFB, Md. Chapter President Charles X. Suraci and Civil Air Patrol cadets distributed copies of *Air Force* Magazine and brochures on AFA among the 700 ROTC cadets at the event. Local CAP cadets frequently provide support services for the chapter's activities.

■ Oscar Curtis, **Enid (Okla.) Chapter's** vice president for aerospace education, attended the annual dining-out for AFJROTC cadets at Enid High School and presented the chapter's outstanding cadet award to Jennifer Chown. A junior at the school, Chown received a $200 savings bond. The chapter has sponsored this award for four years, ever since the AFJROTC program began at the school.

■ **Total Force (Pa.) Chapter** President Patricia Accetta attended the 34th annual Military Ball and Banquet at North Allegheny Senior High

AFA National Board Chairman McKee talks with Dutch Fork High School AFJROTC cadets (l–r) Buddy Metz, Marvin Howard, and Christopher Robinson as they explain their exhibit at the South Carolina State Convention in May at Ft. Jackson, S.C.

Photo by Wayne Corbett

School in Pittsburgh to present an AFA plaque to AFJROTC cadet Rudy Smith, winner of an Outstanding Aerospace Level II award.

Have AFA/AEF News?

Contributions to "AFA/AEF National Report" should be sent to *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Phone: (703) 247-5828. Fax: (703) 247-5855. E-mail: afa-aef@afa.org. ■

Unit Reunions

reunions@afa.org

2nd AFDS, Sandia Base and UK. Sept. 6–9 in Albuquerque, NM. **Contact:** Dick Riley, PO Box 587 Humbolt, NE 68376.

4th Emergency Rescue Sq Assn, Oct. 3–6 in Montgomery, AL. **Contact:** Chet Gunn, 237 Franklin St., Reading, MA 01867-1030 (781-944-6616).

9th AF Assn, 358th FG, 363rd Tac Recon Gp, and 405th FG. Oct. 4–6 in Charleston, SC. **Contact:** Ray Lowman, 10104 Calle de Palencia, Navarre, FL 32566 (850-936-0269) (raylow@juno. com).

39th BG, Guam (1945). Oct. 11–14 in Wichita, KS. **Contacts:** James W. Wyckoff, 2714 E. Hayts Corners Rd., Ovid, NY 14521-9768 (607-869-2574) or Robert E. Weiler, 2045 Hyde Park #3, Sarasota, FL 34239-3941 (941-365-8287).

39th Troop Carrier Assn. Sept. 19–22 at the Adams Mark Hotel in Denver. **Contacts:** Kay Nehring, 2305 W. Mosely Loop, Alpine, TX 79380 (915-837-9913) (knehringlaw@overland.net) or E.L. Miller, 7478 S. Glencoe Ct., Littleton, CO 80122 (303-694-6623) (edandjoymiller@aol. com).

46th FIS, Dover AFB, DE (1952–58). Sept. 17–20 at the Peppermill Hotel/Casino in Reno, NV. **Contacts:** George Butler, 12555 Clearwater, Reno, NV 89511 (775-851-3273 (gjbutler1@juno.com) or George Peckham (303) 721-0094.

56th FG Assn and allied units (1941 to present). Oct. 16–18 in Galveston, TX. **Contact:** Ronald C. Brubaker, PO Box 57, Red Creek, WV 26289 (304-866-4415) (ronbru@neumedia.net).

65th TCS. Aug. 4–5 in Dayton, OH. **Contact:** Bud Hawkey, 106 Union Dr., New Madison, OH (937-996-3851).

168th BS, Bordeaux, France (1951–52). Sept. 4–6. **Contact:** Gene Westerman (847-742-8711 (westy895@juno.com).

359th FG Assn (WWII), 368th, 369th, and 370th FSs and support units, East Wretham, UK, Eighth AF. Oct. 11–14 in Branson, MO. **Contact:** C.W. Staley, 2546 Austin Pl., Beloit, WI 53511 (608-362-5513).

362nd FG Assn (WWII). Oct. 6–9 in Charleston, SC. **Contact:** William E. Plummer, 2104 Salem Church Rd., Goldsboro, NC 27530 (919-734-5310).

416th TFS/NFS (WWII–present). Sept. 20–23 at the Embassy Suites, Tucson, AZ. **Contacts:** Ron Green, 6303 E. Mesquite Rd., Cave Creek, AZ 85331 (480-595-8693) (bargranch@aol.com) or Dick Hoover, Box 5666, Carefree, AZ 85377 (480-585-0734).

487th BG Assn, Lavenham, UK. Oct. 3–7 at the Sheraton West Port Hotel, Lakeside Chalet in St. Louis, MO. **Contact:** Howard and Betty Todt, 13502 Featherstone Dr., St. Louis, MO 63131-1207 (314-821-5449).

665th AC&W Sq, Calumet, MI (1951–88). July 20–22 at Bi-Centennial Arena, Laurium, MI. **Contacts:** Willie Wilson (906-337-1980) or Gene Rice (715-926-3451) (www.reunion665.freeyellow.com).

801st/492nd BG Assn, including 856th, 857th, 858th, and 859th Sqs and all supporting units, Harrington, UK. Aug. 22–26 at the Sheraton Hotel Braintree, MA. **Contacts:** Bill Becker (phone/fax: 619-463-3454) or Sebastian Corriere (phone/fax: 414-464-8264).

906th ARS, Minot, ND. Oct. 25–28 in Houston. **Contact:** Bill Warwick, 343 Hawl Central, Lindale, TX 75771 (903-882-8740).

6924th Security Sq, Da Nang, Vietnam, Ramasun Station, Thailand, and Kunia, HI. Sept. 27–29 in San Antonio. **Contact:** Mike Gilkerson, PO Box 132, Mascoutah, IL 62258 (618-566-7887) (n9yal@accessus.net).

7167th Air Transport Sq and 2nd Aero Medical Gp, Rhein Main and Wiesbaden, Germany (1950s and 60s). Oct. 21–25 at the Palace Casino Resort, Biloxi, MS. **Contacts:** Bonnie L. Stewart, 6200 J.F. Douglas Dr., Ocean Springs, MS 39564-2406 (228-875-5367) or Ray Smith (cakepan29@aol.com).

7499th Support Gp and 7499th, 7405th, 7406th, 7407th Sqs; 7580th Operations Sq; and 6916th Security Sq, Fuerstenfeldbrueck, Wiesbaden, Rhein Main, Germany (1948–90). Oct. 11–15 in Washington, DC. **Contacts:** Al Brown (703-455-3828) (aebrown@erols.com) or John Bessette (703-569-1875) (jcbesseette@aol.com).

AF Navigator Observers Assn. Oct. 24–28 at the Town & Country Resort and Convention Center, San Diego. **Contact:** Dan McPherson, 6075 Erlanger St., San Diego, CA 92122 (858-453-3950).

FTD Mobileer. Sep. 28–30 at the Holiday Inn and Suites in Wichita Falls, TX. **Contacts:** Jim Kincaid, 511 S. Hilltop Cir., Burkburnett, TX 76354 (940-569-0408) or Leo V. Watts, 2 Kevin Cir., Wichita Falls, TX 76306-2107.

OCS Class 58-A Alumni Assn. Oct. 4–7 at Wright–Patterson AFB in Dayton, OH. **Contact:** Merle Browning (318-641-9683) (mbrow@cox-internet.com).

P-40 Warhawk Pilots Assn. Sept. 19–23 at the Best Western Landmark Hotel in New Orleans. **Contact:** Albert Gunther, 720 Tete L'ours Dr., Mandeville, LA 70471 (bertgunther@aol.com).

Pilot Training Class 72-03, Columbus AFB, MS. Sept. 14–15 at the Hyatt Hotel, Reston, VA. **Contacts:** Ron Prynne, 4904 20th Ave. N.W., Gig Harbor, WA 98335 (253-851-2257) (rcprynne@compuserve.com) or Rick Larson, 1400 Earnshaw Ct., Reston, VA 20190 (703-435-7337) (eylarson@aol.com).

Vietnam Security Police Assn. Oct. 4–7 at the Chamberlin Hotel in Hampton, VA. **Contacts:** Steve Gattis (909-986-6991) (gattis@gte.net) or Reunion BRAT (509-582-9304) (bratemail@aol.com).

Seeking those who served at **H-1, H-2, H-3, and H-4 AC&W, Iceland,** for reunion in spring 2003. **Contacts:** William Chick (803) 932-9596 (littlechick@msn.com) or Lowell Woodworth (904-620-9635) (kathylowell@earthlink.net). ■

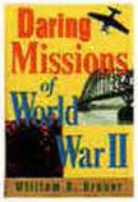
Mail unit reunion notices four months ahead of the event to "Unit Reunions," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198 (E-mail: reunions@afa.org) Please designate the unit holding the reunion, time, location, and a contact for more information. We reserve the right to condense notices.

Books

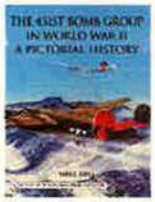
Compiled by Chequita Wood, Editorial Associate

The 4th Fighter Wing in the Korean War. Larry Davis. Schiffer Publishing, 4880 Lower Valley Rd., Atglen, PA 19310 (610-593-1777). 224 pages. $45.00.

Daring Missions of World War II. William B. Breuer. John Wiley & Sons, Distribution Center, 1 Wiley Dr., Somerset, NJ 08875-1272 (800-225-5945). 237 pages. $24.95.

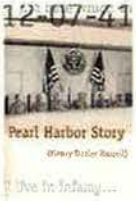


Luck of the Draw: Reflections on the Air War in Europe. Frank D. Murphy. FNP Military Division, 6527 Main St., Trumbull, CT 06611 (203-261-8587). 344 pages. $35.00.



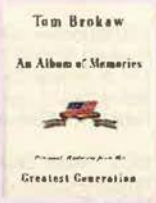
The 451st Bomb Group in World War II: A Pictorial History. Mike Hil , Schiffer Publishing, 4880 Lower Valley Rd., Atglen, PA 19310 (610-593-1777). 160 pages. $45.00.

Every Tiger Has a Tale. Albert V. Toney. Impact Publishing, 2661 Midway Rd., Suite 224, Carrollton, TX 75006 (972-733-0480). 291 pages. $28.45.

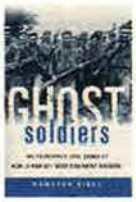


Pearl Harbor Story. Henry Dozier Russell. Mercer University Press, 6316 Peake Rd , Macon, GA 31210-3960 (478-301-2880). 160 pages. $18.00.

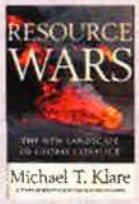
An Album of Memories: Personal Histories From the Greatest Generation. Tom Brokaw. Random House, 299 Park Ave., New York, NY 10171 (800-726-0600). 314 pages. $29.95.



Ghost Soldiers: The Forgotten Epic Story of World War II's Most Dramatic Mission. Hampton Sides. Doubleday, 1540 Broadway, New York, NY 10036 (800-726-0600). 342 pages. $24.95.



Resource Wars: The New Landscape of Global Conflict. Michael T. Klare. Metropolitan Books, 115 West 18th St., New York, NY 10011 (888-330-8477). 289 pages. $26.00.



The B-2 Goes To War. Rebecca Grant. IRIS Press, 235 Massachusetts Ave N.E., Suite 204, Washington, DC 20002-4980 (202-544-2130). 125 pages. $14.95.

Glory Denied: The Saga of Jim Thompson, America's Longest-Held Prisoner of War. Tom Philpott. W.W. Norton & Co., 500 Fifth Ave., New York, NY 10110 (800-233-4830). 457 pages. $26.95.

The Sea Eagles: The Luftwaffe's Maritime Operations, 1939–1945. Peter C. Smith. Stackpole Books, 5067 Ritter Rd., Mechanicsburg, PA 17055-6921 (717-796-0411). 72 pages. $14.95.

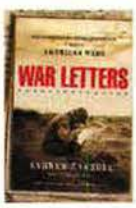
Boeing C-17A Globemaster III: WarbirdTech Series Vol. 30. Bill Norton. Specialty Press Publishers and Wholesalers, 11605 Kost Dam Rd., North Branch, MN 55056 (800-895-4585). 104 pages. $16.95.

Hawaii Goes to War: The Aftermath of Pearl Harbor. Wilbur D. Jones Jr. and Carroll Robbins Jones. White Mane Publishing Co., 63 W. Burd St., PO Box 708, Shippensburg, PA 17257 (717-532-2237). 136 pages. $14.95.

Three Wings for the Red Baron: Von Richthofen, Strategy, Tactics, and Airplanes. Leon Bennett. White Mane Publishing Co., 63 W. Burd St., PO Box 708, Shippensburg, PA 17257 (717-532-2237). 240 pages. $39.95.

Breaking Out: VMI and the Coming of Women. Laura Fairchild Brodie. Vintage Books, 299 Park Ave., New York, NY 10171 (800-726-0600). 367 pages. $14.00.

Home To War: A History of the Vietnam Veterans' Movement. Gerald Nicosia. Crown Publishing Group, 299 Park Ave., New York, NY 10171 (800-726-0600). 690 pages. $35.00.



War Letters: Extraordinary Correspondence From American Wars. Andrew Carroll, ed. Scribner, 1230 Avenue of the Americas, New York, NY 10020 (800-233-2348). 493 pages. $28.00.

This Is AFA

NATIONAL OFFICERS

BOARD CHAIRMAN
Thomas J. McKee
Fairfax Station, Va.

PRESIDENT
John J. Politi
Sedalia, Mo.

SECRETARY
Daniel C. Hendrickson
Layton, Utah

TREASURER
Charles A. Nelson
Sioux Falls, S.D.

REGION PRESIDENTS

Information regarding AFA activity within a particular state may be obtained from the president of the region in which the state is located.

Central East Region
Delaware, District of Columbia, Maryland, Virginia, West Virginia

Thomas G. Shepherd
HCR 61, Box 167
Timber Ridge Rd.
Capon Bridge, WV 26711
(304) 856-3868

Far West Region
California, Guam, Hawaii

Rich Taubinger
12 Century Ct.
Roseville, CA 95678-1088
(916) 771-3639

Florida Region
Florida, Puerto Rico

David R. Cummock
2890 Borman Ct.
Daytona Beach, FL 32124-6846
(904) 760-7142

Great Lakes Region
Indiana, Kentucky, Michigan, Ohio

W. Ron Goerges
4201 W. Enon Rd.
Fairborn, OH 45324-9412
(937) 429-6070, ext. 102

Midwest Region
Illinois, Iowa, Kansas, Missouri, Nebraska

W. Graham Burnley Jr.
112 Elk Run Dr.
Eureka, MO 63025
(636) 938-6113

New England Region
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Eugene M. D'Andrea
P.O. Box 8674
Warwick, RI 02888-0599
(401) 461-4559

North Central Region
Minnesota, Montana, North Dakota, South Dakota, Wisconsin

Gary H. Olson
3610 90th Ave. N.
Moorhead, MN 56560-7238
(218) 233-5130

Northeast Region
New Jersey, New York, Pennsylvania

Raymond "Bud" Hamman
9439 Outlook Ave.
Philadelphia, PA 19114-2617
(215) 677-0957

Northwest Region
Alaska, Idaho, Oregon, Washington

Steven R. Lundgren
4581 Drake St.
Fairbanks, AK 99709
(907) 452-1751

Rocky Mountain Region
Colorado, Utah, Wyoming

Boyd Anderson
1120 Canyon Rd., Apt. 15
Ogden, UT 84404-7649
(801) 621-2639

South Central Region
Alabama, Arkansas, Louisiana, Mississippi, Tennessee

Billy M. Boyd
LSI Bldg. 268
166 Liberty St.
Columbus AFB, MS 39710-2001 (662) 434-2644

Southeast Region
Georgia, North Carolina, South Carolina

Zack E. Osborne
306 Lake Front Dr.
Warner Robins, GA 31088-6064 (912) 929-3384

Southwest Region
Arizona, Nevada, New Mexico

Scotty Wetzel
628 Via Linda Ct.
Las Vegas, NV 89144-1501
(702) 362-1767

Texoma Region
Oklahoma, Texas

M.N. "Dan" Heth
3000 Steve Dr.
Hurst, TX 76054-2118
(817) 498-2880

Special Assistant Pacific

Gary L. McClain
Komazawa Garden House D-309
1-2-33 Komazawa
Setagaya-ku, Tokyo 154-0012
Japan 81-3-3405-1512

Special Assistant Europe

Frank M. Swords
PSC 3, Box 1469
APO AE 09021-1466
011-49-6308-7237

NATIONAL DIRECTORS

R. Donald Anderson
Poquoson, Va.

Eric W. Benken
San Antonio

Roy A. Boudreaux
Venice, Fla.

Dan Callahan
Centerville, Ga.

Robert J. Cantu
Universal City, Tex.

Stephen P. "Pat" Condon
Ogden, Utah

John E. Craig II
Arlington, Va.

Theron G. Davis
Fort Worth, Tex.

Ted Eaton
Sun City West, Ariz.

Ronald R. Fogleman
Durango, Colo.

Richard B. Goetze Jr.
Arlington, Va.

Richard E. Hawley
Newport News, Va.

Sam Johnson
Washington, D.C.

Thomas J. Kemp
Fort Worth, Tex.

Stephan R. Kovacs Jr.
Grand Island, N.Y.

Doyle E. Larson
Burnsville, Minn.

Ivan L. McKinney
Bossier City, La.

Robert E. Patterson
Shalimar, Fla.

Jenifer J. Petrina
Alameda, Calif.

Jack C. Price
Pleasant View, Utah

Coleman Rader Jr.
Maple Grove, Minn.

William T. Rondeau Jr.
Lompoc, Calif.

I. Fred Rosenfelder
Renton, Wash.

Phillip J. Sleeman
Tolland, Conn.

William L. Sparks
Katy, Tex.

Thomas J. Stark
O'fallon, Ill.

Jack H. Steed
Warner Robins, Ga.

William G. Stratemeier Jr.
Quogue, N.Y.

Charles G. Thomas
Albuquerque, N.M.

Arthur F. Trost
Walnut Creek, Calif.

Howard R. Vasina
Colorado Springs, Colo.

Robert M. Williams
Omaha, Neb.

Mark J. Worrick
Denver, Colo.

Joseph A. Zaranka
Bloomfield, Conn.

directors emeritus

John R. Alison
Washington, D.C.

Joseph E. Assaf
Sandwich, Mass.

Richard H. Becker
Oak Brook, Ill.

David L. Blankenship
Tulsa, Okla.

John G. Brosky
Pittsburgh

Robert L. Carr
Pittsburgh

George H. Chabbott
Dover, Del.

Charles H. Church Jr.
Lenexa, Kan.

O.R. Crawford
Blanco, Tex.

R.L. Devoucoux
Portsmouth, N.H.

Jon R. Donnelly
Richmond, Va.

Russell E. Dougherty
Arlington, Va.

George M. Douglas
Colorado Springs, Colo.

Charles G. Durazo
Yuma, Ariz.

Joseph R. Falcone
Ellington, Conn.

E.F. "Sandy" Faust
San Antonio

Joe Foss
Scottsdale, Ariz.

John O. Gray
Washington, D.C.

Jack B. Gross
Harrisburg, Pa.

Martin H. Harris
Montverde, Fla.

Gerald V. Hasler
Encinitas, Calif.

Monroe W. Hatch Jr.
Clifton, Va.

H.B. Henderson
Ramona, Calif.

John P. Henebry
Winnetka, Ill.

David C. Jones
Arlington, Va.

Arthur F. Kelly
Los Angeles

Victor R. Kregel
Colorado Springs, Colo.

Jan M. Laitos
Rapid City, S.D.

Nathan H. Mazer
Roy, Utah

William V. McBride
San Antonio

James M. McCoy
Bellevue, Neb.

Edward J. Monaghan
Anchorage, Alaska

Bryan L. Murphy Jr.
Fort Worth, Tex.

Ellis T. Nottingham
McLean, Va.

William C. Rapp
Williamsville, N.Y.

Julian B. Rosenthal
Durham, N.C.

Peter J. Schenk
Pinehurst, N.C.

Walter E. Scott
Dixon, Calif.

Mary Ann Seibel-Porto
Clayton, Mo.

Joe L. Shosid
Fort Worth, Tex.

James E. "Red" Smith
Princeton, N.C.

William W. Spruance
Las Vegas

Thos. F. Stack
San Francisco

Harold C. Stuart
Tulsa, Okla.

James M. Trail
Tucson, Ariz.

Walter G. Vartan
Chicago

A.A. West
Hayes, Va.

Sherman W. Wilkins
Issaquah, Wash.

Richard Carr
National Chaplain Emeritus
Springfield, Va.

ex officio

John A. Shaud
Executive Director
Air Force Association
Arlington, Va.

Donald J. Harlin
National Chaplain
Albuquerque, N.M.

Eleane M. Beadle
National Commander
Arnold Air Society
Portland, Ore.

For information on state and local AFA contacts, see www.afa.org

Pieces of History

Photography by Paul Kennedy

Medevac

Memorabilia courtesy Mike Keefe. C-141 courtesy 459th Airlift Wing (AFRC), Andrews AFB, Md.

The interior of this C-141 has been configured for an aeromedical evacuation mission. Beneath the mannequin on the litter is equipment typically used for inflight patient care. Aeromedical evacuations first came into their own in World War II, an era symbolized here by a flight suit from that time (hanging alongside a more contemporary one). A flight nurse's uniform, ball cap worn by hospital personnel, and a patient's blue bathrobe complete the tableau. Peacetime medevac flights are carried out by active duty, Air National Guard, and Air Force Reserve Command personnel. They take place routinely and keep flight crews and medical crews well trained. The aircraft primarily used for medevacs are modified C-9 Nightingales, the only USAF aircraft designed specifically for moving litter and ambulatory patients. C-130 and C-141 aircraft are also sometimes used for patient transport.

NAVIGATING THE FUTURE DEPENDS ON A RELIABLE CONSTANT.

For 25 years, Boeing has been as reliable and constant a partner to our USAF customer as the 40 GPS satellites we've built. Designed to last an average of 6 years, these satellites are still going strong after 10 years on orbit. Performance beyond expectation is also why our role was expanded to include upgrading and managing the ground control system. Now, we're looking to the future and the next generation system, GPS III. Designed to be more capable and less expensive to own and operate for both government and civil application, GPS III is more than just a goal, it's a future you can count on.

www.boeing.com

BOEING®
Forever New Frontiers