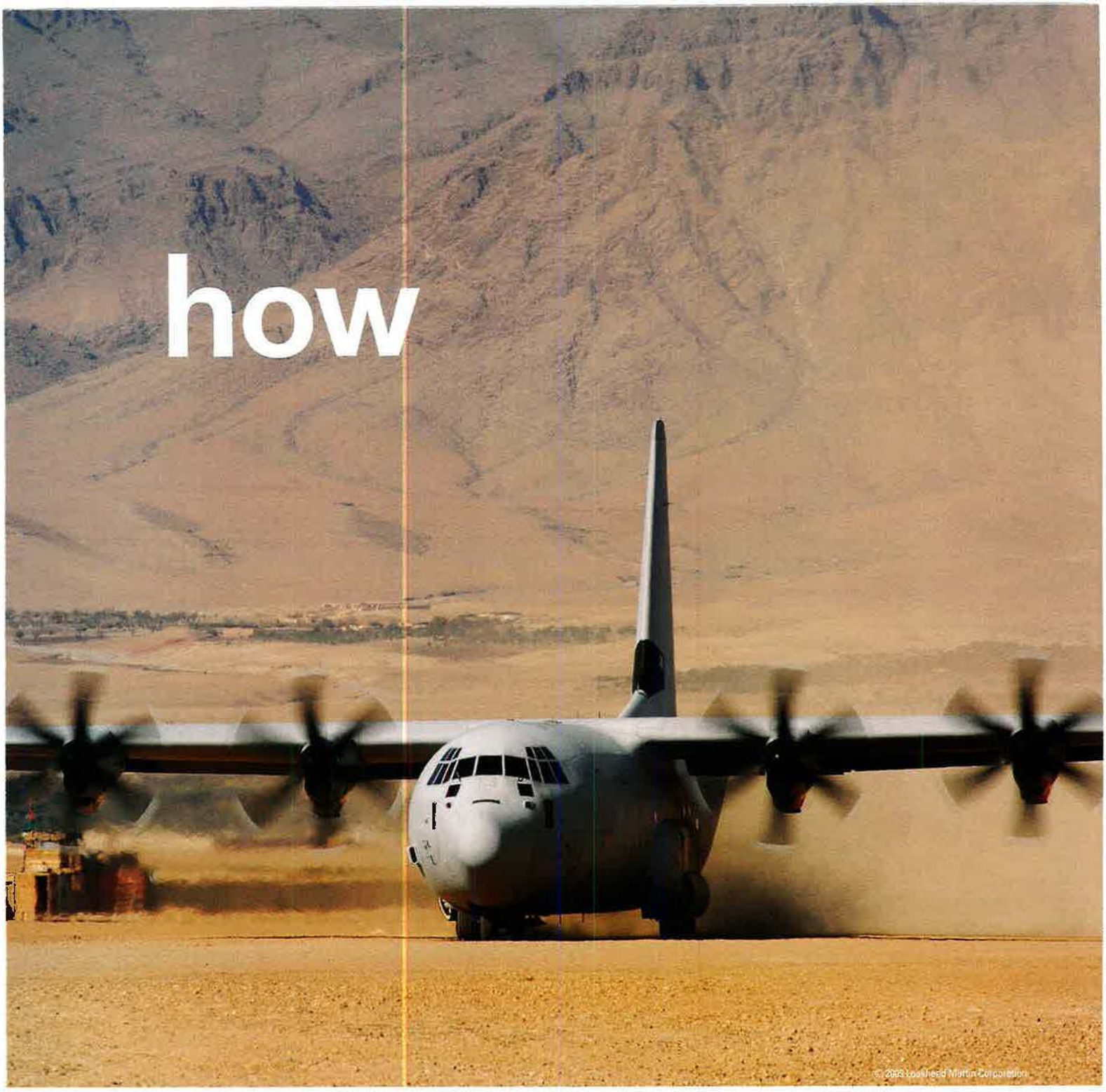
February 2009/$4

AIR FORCE MAGAZINE

JOURNAL OF THE AIR FORCE ASSOCIATION

The Nuclear Force Revival

Building Iraqi Airpower
Red Flag Goes Global
Where Stealth Is Headed



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AIR FORCE MAGAZINE

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About the cover: A B-2 bomber is refueled by a KC-135 over the western United States. Photo by Ted Carlson. See "The Nuclear Force Revival," p. 24.

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Editorial

By Robert S. Dudney, Editor in Chief

Schlesinger's Second Bite

On Jan. 8, former Secretary of Defense James R. Schlesinger and other members of a blue-ribbon task force publicly identified a slew of failings undermining the US nuclear deterrent. This time, though, the target was not the US Air Force.

Schlesinger's "Task Force on DOD Nuclear Weapons Management," empaneled by Pentagon chief Robert M. Gates in June, found lack of focus, inattentiveness, and other ills. Gates thanked the panel for identifying problems "both recent and long-term." What he could have said, but did not, is that these shortcomings existed within his own senior leadership.

Schlesinger's report was unsparing. Nevertheless, Gates declared that America's nuclear deterrent force "remains safe, secure, and reliable." He disciplined no one, unlike on June 5 when, citing nuclear weapons problems, he dismissed Secretary of the Air Force Michael W. Wynne and Gen. T. Michael Moseley, Chief of Staff.

When Mr. Gates took that unprecedented action, his stated rationale was their failure to ensure proper control over nuclear arms. The point, he said, was to "underscore the importance of accountability."

Now, we have Schlesinger's Phase II report. (Phase I, examining USAF, ended in September.) It makes for somber reading. It cites "a serious lack of attention to policy formulation and oversight of nuclear deterrence within the OSD [the Office of the Secretary of Defense]." Some officials, it went on, lack the foundation of experience for understanding nuclear deterrence.

The problem has been building for some time. In the past two decades, the panel reported, nuclear offices and personnel have dispersed widely. There has been a downgrading and dilution of the authority of nuclear officials. Franklin C. Miller, a panel member, noted that, today, the Office of the Secretary of Defense has some 40 offices dealing with nuclear issues and programs.

Schlesinger said that, since the end of the Cold War, nuclear weapons have declined in US military thought. This is reflected in a sharp reduction in the numbers of weapons. In fact, the number of warheads has been reduced by about 90 percent since the height of the Cold War. The average age of weapons in the stockpile has tripled since cessation of testing in 1991. Spending on nuclear capabilities has shrunk and now consumes just two percent of the Pentagon budget, said Schlesinger.

Zeroing in on OSD, the task force noted that there is no long-range roadmap for ensuring sustainment and modernization of nukes and their delivery platforms. There is a "legitimate near-term concern" about US ability to design and build warheads, given the loss of highly skilled workers. Moreover, the panel warned of "a significant shortfall" in the DOD nuclear surety inspections.

The task force found "a serious lack of attention" to the nuclear deterrent in the Office of the Secretary of Defense.

OSD's lassitude has spread to the joint world. In the panel's view, the Joint Staff is now a "minimal contributor" to nuclear deterrence. JCS-sponsored exercises rarely entail nuclear training. The Joint Staff no longer conducts offensive nuclear analysis. The Joint Staff recently halted the development of joint nuclear operations doctrine, the most recent version of which was published in 1993. The top Joint Staff nuclear officer used to be a general; now, he's a colonel.

US European Command, once a big nuclear arms proponent, has essentially checked out. It no longer recognizes a political role for US nuclear weapons in NATO, and it has allowed its nuclear planning staff to wither away to "unacceptable levels." For its part, US Strategic Command has been "overloaded." Retired Adm. Edmund P. Giambastiani Jr., a panel member, said the command has been weighed down with nine major missions, and has difficulty focusing on deterrence issues.

The upshot, in short, is that the Pentagon for many years has paid lip service to demands of nuclear deterrence. The effect was predictable. "The services, indeed, have picked up clues over the years ... that the interest in deterrence at the highest levels of DOD has diminished," said Schlesinger. As a result, they reduced their own interest accordingly.

Retired USAF Gen. Michael P. C. Carns, another panel member, pointed out that Washington in 1991 ordered bombers off of alert and set about reorienting B-52s, B-1s, and even B-2s to conventional missions in a smaller force structure. Said Carns: "The sense was this [nuclear deterrence] was not an important mission."

The Navy gets high marks for doing more than just keeping up nuclear appearances. Even so, the panel found some "fraying at the edges." The Navy has not adequately inspected its E-6B nuclear command post aircraft. Though ordered to maintain a nuclear cruise missile program, it has not done so.

The panel set forth 82 specific suggestions. Among them: Send senior leaders to deterrence classes, ramp up nuclear training, consolidate authority over nuclear missions. Members called for Gates to name a new high-level nuclear deterrence czar.

More important than any specific item, however, are two points that emerge from the Schlesinger report.

First is the importance of senior leadership. "We emphasize that deterrence must start from the top," Schlesinger said. "It is a political statement that must come from the very highest offices of the government." The decline of US credibility—if indeed that has occurred—must be laid to a large degree at the feet of the last three Presidents and their SECDEFs, all of whom have been in the most influential positions since the end of the Cold War.

The second point is that accountability is in the eye of the beholder. When he decapitated the Air Force's leadership in June, Gates sought accountability. What, however, if the fault, or much of it, lay within the vast and confused DOD system itself? Who, then, should be held accountable? The answer might not be so easy and clear-cut. Failing to find the right answer could have harmful consequences.

Understanding these factors will go far to determine whether the US deterrent will long remain "safe, secure, and reliable," not to mention credible. ■

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Letters

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Air Supremacy in a Downdraft

I must point out an error in your recent editorial, "Air Supremacy in a Downdraft" *[December, p. 2].* You state that there have been no fatal air attacks on US ground forces for over 56 years. I believe that is wrong; on Feb. 25, 1991, an Iraqi Scud missile killed some 28 service men and women sleeping in their barracks in Dhahran, Saudi Arabia. Is that what you call total, unquestioned, and suffocating air dominance provided by USAF for 56 years?

Lt. Col. Tim Trusk,
USAF (Ret.)
Kansas City, Mo.

Losing the War of Ideas

Has anyone wondered why the Air Force has not been winning the war of ideas with respect to recapitalizing our fighter forces? *["Losing Air Dominance," December, p. 24.]* Some airpower advocates blame "foolish" policies by our civilian leadership. I submit that we, the Air Force and advocates of airpower, have not presented credible arguments, given political, economic, and threat realities of the past decade plus.

Our credibility will rise when we acknowledge that "air dominance" extends beyond the F-22 issue and beyond major theater war with a near peer. Let's get a seat at the table and publicize all the things that airpower IS doing and CAN do in the small wars arena. This is not a zero-sum game—American airpower can and will succeed across the spectrum of conflict, due to its flexibility. Pushing for capitalization in the realm of permissive air environments to maximize effectiveness in COIN and irregular war will pay dividends on the ground and in the halls of political power.

Traditionalists fear not—airmen will need to articulate better the historical fact that the character of war is cyclical as adversaries probe each other for weaknesses. As the US becomes inevitably better at fighting COIN, more conventional foes will seek advantages in traditional forms of military power. We must be ready. This is not "next-war-itis"; it is simply an understanding of the phenomenon of war and human nature (an area airmen can certainly improve in). By increasing our credibility in the broader context of the current national security debate, we can show our leadership that we are not unreasonably clinging to past paradigms, but are rationally assessing all the available data and historical facts to form a coherent, achievable way ahead. I think in the end, we'll prove that reports on the death of air dominance are greatly exaggerated.

Lt. Col. Geoffrey F. Weiss,
USAF
Edmond, Okla.

Focused Lethality

I found "Focused Lethality" a fascinating update *[December, p. 36].* [There is a] minor error: On p. 37, you say "GPS-guided 250-pound warhead." I think you mean a 250-pound bomb with a 60-pound warhead. [Regarding the] second increment of the SDB [and its] ability to hit moving targets at 46 miles: Wow!

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

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To educate the public about the critical role of aerospace power in the defense of our nation.

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"Planners also are pursuing the idea of weapons that can carry out air-to-air and air-to-ground functions"? Please, this sounds like another F-111 which tries to do everything. The differences between an AIM-120, which has to track another aircraft, and an SDB that has to penetrate a target are just too great. Let's avoid spending money on this concept.

William Thayer
San Diego

Rex Remembrances

It's always fun to read John Correll's articles, like the one on the B-17 intercept of the Italian liner *Rex* 70 years ago *["Rendezvous with the Rex," December, p. 54]*. In these days of political corruption, obscene CEO ripoffs, and the chase of the almighty dollar, I am reminded how much we owe to our military: Air Force, Navy, and Army. They have always put their country first. Giants like LeMay and Eaker set an example our leaders, enlisted and commissioned, keep going today.

Bill Lehmann
Port Aransas, Tex.

The excellent article "Rendezvous with the *Rex* fails to mention the part played by the Army Air Forces on the sinking of that vessel on Sept. 7, 1944. Two flights of Mustang fighters from Fifteenth Air Force escorted the British Beaufighters and strafed *Rex* before the rocket-bearing Beaufighters attacked. The fighters were assigned to the 52nd Fighter Group, and were led by Maj. James Tyler, commander of the 4th Fighter Squadron.

Col. Thomas L. Thacker,
USAF (Ret.)
Fairborn, Ohio

Parr Belonged There

In your November 2008 article "Airpower Classics" on the F-86 Sabre *[p. 88]*, under the Famous Fliers section, I believe there should be at least one more name added to the list. Col. Ralph Parr should be listed under the Air Force Cross (he also holds the Distinguished Service Cross), and the Aces. The Randolph AFB, Tex., Officers Club was recently named for him and is now The Parr Club, and the San Antonio Pack of the Red River Valley Fighter Pilots Association renamed our pack The Ralph Parr Pack.

Col. Tom Moe,
USAF (Ret.)
Universal City, Tex.

Thanks for bringing back some fond memories of the old "Dollar Nineteen." In 1967, as a young buck sergeant, I was assigned to Hamilton Field in northern California and handed my very own airplane, a "beaver tail" C-119J. I was in heaven, and the next two years were some of the most satisfying of my career.

After a distinguished assignment snatching satellites out of the air with Project Corona, our nine aircraft had endured the humiliation of a sentence to the boneyard (excuse me, AMARC). After getting a reprieve by Air Defense Command, "045" was pretty shabby, and I spent a lot of time trying to make her look better. I ordered a case of spray paint and, a little at a time, I carefully repainted the entire flight station AF blue.

Whenever the plane was scheduled to fly, I made sure it was as spotless as possible, and I quickly discovered that the flight crews responded with less maintenance discrepancies. In fact, they once flew it on a week-long trip to the East Coast and back with zero write-ups! Forty years ago, that was a really big deal, and it taught me something that realtors have known for years: Make a good first impression.

MSgt. Stephen L. Childers,
USAF (Ret.)
Wyoming, Del.

Washington Watch

By John A. Tirpak, Executive Editor

CSAF seeks a different course; Force structure cuts coming; F-22 vs. F-35, according to Schwartz ....

Schwartz Looks Ahead

The new Air Force Chief of Staff says he believes common sense, cooperation, and less confrontation will win arguments for the Air Force as it recasts its role for the near- and long-term future.

Gen. Norton A. Schwartz, in a late December interview with *Air Force* Magazine, waved off the notion of refighting battles to win the service executive agency for unmanned aircraft or for retrieving that status in space systems.

He conceded that the Air Force may have to live with a smaller force structure, that it probably has enough C-17s, and that the Army has a legitimate need for some fixed wing transports.

However, Schwartz also said that the Air Force needs more than the currently approved number of F-22 fighters, that the Pentagon should accelerate the current planned F-35 fighter production rate, and that the Air Force can and must build a new long-range bomber soon.

Schwartz provided a sneak peek at some of the Air Force's newly blessed roles and missions, and offered his forecast of key issues for this year's upcoming Quadrennial Defense Review.

Heated battles for supervision of the UAV enterprise, fought under Schwartz' two predecessors, have created tensions that get in the way of cooperation, he said.

"I think we are at a point where executive agency is an emotional issue that interferes with what we really want to do, which is strive for common requirements [and] common equipment," Schwartz said.

That cooperation is happening anyway, in the form of close collaboration with the Navy on Global Hawk and with the Army on Predator variants, and in the creation of joint concepts of UAV operation, Schwartz explained.

Schwartz added, "We are proceeding along a path [that] is producing the right kinds of outcomes without these contests over ownership. If someone wants to ask questions about ownership, fine, but ... frankly, I do not see value ... in those kinds of contests. There's much more to be gained with just common sense cooperation."

Space "is different," Schwartz asserted. Most of the expertise in space system design, operations, and development resides in USAF, he said, adding, "I think that's going to remain the case."

Still, the Chief continued, "whether we're the executive agent for the department or not is frankly less of an issue for me than our ability, No. 1, to support the combatant commanders ... and, ... No. 2, to deliver [space systems] on time, on schedule, at the cost predicted."

The Air Force's executive agency role for space was rescinded in 2005 by the Office of the Secretary of Defense, in the wake of several high-profile failures in space procurement. Pentagon acquisition chief John J. Young Jr. has resisted restoring that authority to the Air Force.

Schwartz said he was satisfied with the outcome of the Pentagon's in-house roles and missions review, which concluded in December.

The review, he said, was useful in that it helped "crystallize, really, our thinking about what the Air Force core functions are" and created a "coherent position across the Air Force" on what the service's priorities should be. This will be important as USAF heads into the 2009 QDR.

USAF photo by A1C Jason Epley

Schwartz offers a forecast.

The Air Force has been handed 12 core missions. Among them are air, space, and cyber superiority, special operations, rapid global lift, and agile combat support.

Schwartz said these 12 core missions will form the basis of how "we organize ourselves ... [and how] we manage portfolios—not a small thing." In the review, disputes were minimal, Schwartz continued, noting, "I think the issues related to lift and particularly the C-27 have been resolved, certainly to my satisfaction."

The Air Force and the QDR

Among key questions for the QDR, raised by the roles and missions review, will be deterrence, but "not just nuclear. It's more sophisticated" than that, Schwartz said, suggesting that some conventional capabilities may also deter enemies from starting fights they know they can't win. Other QDR issues will be workforce, training, and whether the services possess the expertise in-house to do cost estimation and other essential acquisition skills. The QDR should set the stage for acquisition success "as we go down the road."

In the roles and missions review, there had been some concerns that Army acquisition of a fixed wing airlifter larger than it had previously operated was poaching on USAF's

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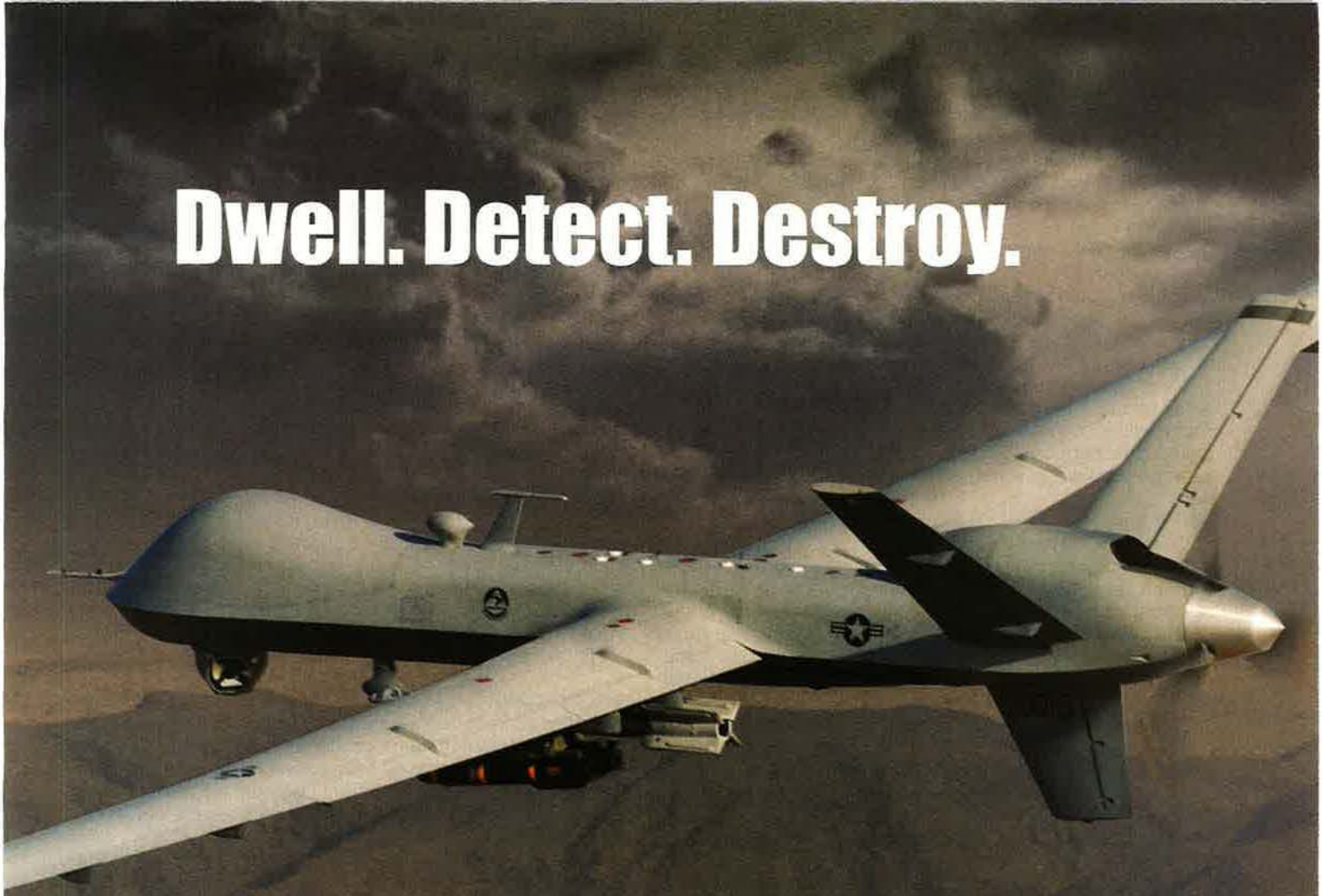

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traditional mission in fixed wing lift, but Schwartz said he agrees that "there is a place" for the C-27 in meeting the Army's need for time-critical resupply.

He said that, as long as both the theater commander and US Transportation Command know what the aircraft are carrying, where they are operating, and when they are operating—and as long as they contribute to the overall theater lift task—"I'm comfortable that this arrangement will work efficiently."

The Air Force and Army are working to streamline the program to avoid duplication of effort, he said.

There's no doubt, though, that any future airlifters are strictly the province of the Air Force, Schwartz insisted.

"Rapid global mobility is a core mission," he asserted. The Army has its own way of doing things, and he said the Air Force will learn to adapt to how the Army wants to do what it calls "direct support" in the future. But for now, "we certainly have no problem ... with the current division of labor."

Force Structure Cuts Coming

The Air Force is likely to shave force structure in order to pay its bills, Schwartz said. He acknowledged press reports that the service has proposed cutting more than 300 fighters from its inventory, but said reductions would not come "exclusively" from the fighter force. He did not elaborate.

"The question is, is there some way to tailor the force structure in a way that ... will serve the needs of the national security strategy?" The proposed cuts, he said, had "not yet been approved" by defense higher-ups.

The force reduction is "not a risk-free proposal, but it is a manageable risk proposal," Schwartz said, in view of the prevalent near-term threat from Gen 4 and 4+ fighters in foreign service. For the longer term, however, the Air Force will need more F-22s and a faster ramp-up rate to 110 or more F-35s a year.

Schwartz noted in his confirmation hearing that the Air Force would re-examine its long-held requirement for 381 F-22s, and that has been done. He declined to give the new number, but it is less than 381, which he described as a "low-risk" figure. The new number is a "moderate-risk" inventory of F-22s.

Schwartz did allow that Joint Chiefs Chairman Adm. Michael G. Mullen was close to the mark when he suggested the Air Force wants 60 more F-22s. He didn't want to be more specific because the Air Force has yet to "make [its] case" to the new defense leadership team.

The mix of new and old fighters, and taking into account a new bomber, will provide a moderate-risk "balance" of capabilities, Schwartz said.

"Getting this balance right is a technical and analytical matter, and some military judgment [is] involved as well."

Separate and Unequal

Schwartz disputed the contention that the F-22 and F-35 are essentially similar aircraft, and that the F-22 can safely be terminated in favor of the cheaper F-35.

"They are different machines," he said. "They are complementary aircraft, to be sure, but clearly the F-22 was designed for the high-threat air-to-air mission" as well as the toughest air defenses. The F-35, by contrast, "is more of a multirole machine with good qualities in those same areas," but not with the F-22's level of mastery.

"Will the F-35 be able to do air-to-air? Sure, just like the F-15E can now. Would you want to put the F-35 up front against a Gen 5 adversary? Probably not." The F-35 can do what it needs to do, Schwartz said, "in some mix with the F-22 ... and with standoff munitions."

Schwartz noted it's important to realize that, in the current fight, American airpower hasn't been challenged, but the service has to be prepared for other threats, as well. "We cannot ignore the future," Schwartz asserted. "And so, we're doing our best to be loyal partners in today's fight, while still keeping an eye on needs for the future. I don't think that's controversial."

If the Obama Administration decides that maintaining F-22 production "for a couple more years" is what it wants to do, said Schwartz, then "I think there's good rationale for that."

Schwartz believes there is "general agreement" that a new bomber is needed, given that the B-52 is old, and the B-1 is "no spring chicken, either."

Recent and ongoing upgrades are multiplying the uses of the bombers, he said. However, range, persistence, and payload will all rise in importance in the future, especially as access to overseas bases comes into question.

The Air Force can make a deadline of 2018 to have a new bomber flying, but it will be a developmental version, and not yet fully operational, Schwartz said. He said he remains confident that the Air Force can do it in 10 years or less because of classified development work under way for some time.

"Let me put it this way," Schwartz said. "John Young's guidance has been to make maximum use of 'mature' or nearly mature technologies. We intend to be loyal to that guidance." The new bomber, he said, will make use of technology largely in hand. "We are not breaking new ground. ... This is not Buck Rogers," he added.

It's 316 Tails

Schwartz restated a long-held opinion that an inventory of 205 C-17s is sufficient for the airlift fleet, in conjunction with 111 C-5s, of which 52 have been modified with both the Avionics Modernization Program upgrade and the Reliability Enhancement and Re-engining Program—better known as AMP and RERP.

"I still believe that's the case," Schwartz said, adding that too many airlifters would reduce the work available for the Civil Reserve Air Fleet and endanger the continued industry participation in that program, which Schwartz said is critical to the overall lift equation.

The end of C-17 production for the Air Force is "in sight," he said, but he expressed confidence that Boeing will win more international orders to keep the line open a while longer. Should Congress provide more C-17s to the Air Force, Schwartz said it's likely that the oldest C-5As would then be retired to preserve an inventory of about "316 total tails," which he said seems to be "the sweet spot" for strategic lift.

He understands that ending production of a strategic airlifter before its successor program is under way is troublesome for some, but said both TRANSCOM and Air Mobility Command are making the "intellectual effort" now to define what a next airlifter should be. They are thinking beyond traditional airlifters, he said, to include "vertical lift or airships or any number of things," especially ideas that "are less hydrocarbon-intensive, like lifting bodies."

Schwartz, formerly the commander of TRANSCOM, said it's important to note that not all cargo goes by air, and the proper amount of airlift must be considered in context with sealift and pre-positioning.

Two mobility studies are under way which should set the course for lift. One, by the Institute for Defense Analyses, will report early in the year, and will focus just on the right airlift mix, Schwartz said. The broader Mobility Capabilities/Requirements Study-2016 will report late in the spring or early summer and will look at the overall lift equation.

The MCRS "will be more comprehensive, and presumably, more decisive," Schwartz predicted.

Schwartz also believes there is probably excess infrastructure in the Air Force, but doesn't think "there's the will" to conduct another round of base realignment and closure just now. ■

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Air Force World

By **Michael Sirak,** Senior Editor, with **Marc Schanz,** Associate Editor

Bolling Is Interim Nuke HQ

The Air Force leadership announced Dec. 12 that Bolling AFB, D.C., would be the temporary headquarters site for Air Force Global Strike Command, the new nuclear-focused major command that is expected to assume initial operations in September. AFGSC will oversee the service's Minuteman III ICBMs and B-2A and B-52H nuclear bombers.

Six days later, Air Force Secretary Michael B. Donley named Brig. Gen. James M. Kowalski to be its provisional commander. Kowalski, the Joint Staff's deputy director for global operations, will oversee the standup of the permanent command, including work toward identification of the final headquarters location—which officials said would not be Bolling—and manpower requirements.

The interim HQ stood up on Jan. 12 at Bolling. A three-star general officer will lead AFGSC once the permanent command is formed. For more on AFGSC, see "The Nuclear Force Revival," p. 24.

TSAT Program Revamped

John J. Young Jr., undersecretary of defense for acquisition, technology, and logistics under the Bush Administration, on Dec. 3 instructed the Air Force to "act immediately" to execute a restructure of the Transformational Satellite Communications System program that will achieve the first launch of a TSAT satellite no later than Sept. 30, 2019.

Under the "phased approach" that Young approved, the initial TSAT spacecraft will not feature previously planned laser cross-links to move the vast amounts of secure communications data that these satellites will process around the constellation. Instead, the first satellites will rely on radio-frequency links, like those used in current Milstar communications satellites, to move data through space and to troops on the move.

Before the restructure, the Air Force had been aiming to choose the satellite provider by around the end of 2008. Boeing and Lockheed Martin have been competing to build the satellites. As of mid-December, no date had been set for the release of the solicitation requesting bids.

ANG Tankers Gain Active Airmen

The Air Force announced Dec. 10 that three Air National Guard KC-135 wings will become active associate units beginning this summer, and are expected to assume full operations under the new construct by September 2011.

Under this Total Force initiative, active duty airmen will be assigned to the 117th Air Refueling Wing in Birmingham, Ala., the 126th ARW at Scott AFB, Ill., and the 157th ARW at Pease ANGB, N.H. These airmen will start reporting in July. The Guard units will act as the host organization.

The active duty aircrews and maintenance and support personnel will work side by side with their Guard counterparts in operating the ANG tankers at home and on overseas deployments. The Air Force says the associate unit construct provides greater day-to-day mission capability by increasing full-time manning, while reducing duplication of effort.

Renuart Wants New Arctic Policy

Air Force Gen. Victor E. Renuart Jr., commander of NORAD and US Northern Command, said Dec. 17 he favors a "good relook" at US Arctic policy since he thinks the current strategy in the region is "dated" and does not reflect the developments and interests that are converging there today.

There's been an increase in traffic in the region, as shelf ice melts and opens up long inaccessible corridors to exploration and territorial disputes for reputed oil and gas deposits, said Renuart while speaking to reporters in Washington, D.C. "Any time nations converge on an area to either compete for or to collec-

Proceed Cautiously on Strategic Airlift

With questions still surrounding the future of the C-5 Galaxy transport fleet, the Department of Defense should apply "careful planning" to ensure that C-17 Globemaster III production is not ended prematurely and then restarted at a substantial cost, stated the Government Accountability Office in a Nov. 21 report on strategic airlift.

The Air Force plans to upgrade the cockpits and communications and navigation gear on all 111 of its C-5s under the C-5 Avionics Modernization Program. And it is installing new engines on 52 of them under the Reliability Enhancement and Re-engining Program. These 52 will be known as C-5M Super Galaxy aircraft.

GAO stated that the Air Force's $9.1 billion budget for both C-5 modernization efforts "may be understated" due to DOD's lack of proper risk and uncertainty analysis. Moreover, the Congressional watchdog agency said the RERP is "underfunded by almost $300 million" and may be unachievable if the engine production schedule is not met.

The Air Force's current plan is to acquire 205 C-17s to operate along with the C-5s. But this mix may change, GAO noted, based on the results of a new mobility capability and requirements study, the findings of which are expected around May.

The current C-17 production schedule calls for line termination in September 2010. "Both the manufacturer and Air Force agree that shutting down and restarting production would not be feasible or cost effective due to the costs to reinstate a capable workforce, reinstall tooling, and re-establish the supplier base," GAO wrote.

Less than three weeks after GAO's report, Lockheed Martin on Dec. 9 delivered the first C-5M to the Air Force at Robins AFB, Ga. Three C-5s have been modified to the M-model configuration to date. The other two are scheduled for delivery at Dover AFB, Del., this month.

These three C-5Ms completed developmental testing in August 2008; the Air Force anticipates beginning operational tests with them later this year.

It must be a job for early risers. Maneuvering around a huge, four-bladed propeller (nearly 14 feet in diameter), members of the 86th Aircraft Maintenance Squadron get to work at dawn on the engine of a C-130 transport. This Hercules is part of the 86th Airlift Wing located at Ramstein Air Base in Germany. The C-130 is a key instrument for various duties, including dropping troops and equipment into Afghanistan. The wing conducts airlift, airdrop, and aeromedical evacuation operations.

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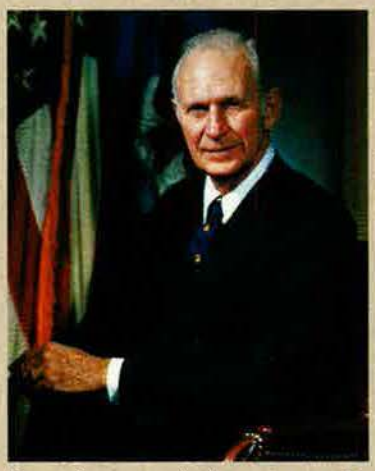
Verne Orr, 1916-2008



Verne Orr, 14th Secretary of the Air Force, who served under Ronald Reagan, died Nov. 27, 2008 at the age of 92.

Appointed as Secretary at the outset of the Reagan Administration, Orr served from February 1981 to November 1985. He implemented Reagan's campaign promise to resurrect the B-1 bomber program, while also pursuing development of the B-2 stealth bomber. He also bought the KC-10 aerial tanker, restarted production of the C-5 transport to bolster airlift, and made good on Reagan's push to expand the fighter force by building hundreds of F-15s and F-16s.

The F-15E Strike Eagle aircraft program was launched during his tenure, as was the Peacekeeper missile program, known then as the MX. Orr also saw to it that the first stealth combat aircraft, the then-secret F-117, was produced.

Orr insisted on competition in weapons acquisition, a stance most famously manifested in the so-called "Great Engine War," which pitted Pratt & Whitney against General Electric to build comparable fighter engines. The successful initiative drove down cost while increasing quality.

Orr also supervised the growth of the Air Force by more than 30,000 personnel during his watch.

Born in Des Moines, Iowa, as George Vernon Orr Jr., he moved with his family to California as a young teen. He earned a Bachelor of Arts degree from Pomona College and a master's degree in business administration from Stanford University.

During World War II, Orr served as a Navy supply officer. He remained in the Reserve until 1951, leaving as a lieutenant commander. He then joined his father's used car business and later the family's investment business. In 1963, he became president of a bank in Pasadena.

Three years later, Reagan, then governor of California, tapped Orr to head the state's Department of Motor Vehicles. He held several senior positions in California state government, lastly serving as director of finance from 1970 to 1975.

Orr taught government finance at the University of Southern California from 1975 to 1980 and was made a regent in 1977.

In 1980, Orr worked on Reagan's Presidential campaign and became deputy of Reagan's transition office after the election. Reagan appointed Orr as Air Force Secretary shortly thereafter.

After leaving his Air Force post, Orr returned to Pasadena where he formed a management consulting firm. From 1999 to 2002, he was dean of the University of La Verne's School of Business and Global Studies. The Air Force Association annually presents an award named after Orr for best utilization of human resources in USAF.

In 2004, at the age of 88, Orr completed a doctoral dissertation on the development of the B-1 bomber

—John A. Tirpak

tively mine natural resources, there is a possibility ... that their interests will not coincide," he said.

NORAD has been active in trying to build a dialogue with the Russian military, he said, as Russia has ramped up its power projection and training activities in the Arctic. Even commercial cruise vessels are now a more frequent sight; because of this there is the need for a search and rescue capability to serve the newly accessible areas.

Missile Wing Muffs Inspection

The 90th Missile Wing at F. E. Warren AFB, Wyo., came up short in its most recent nuclear surety inspection in December due to "deficiencies in several areas," Air Force Space Command said Dec. 17. The wing remained certified to perform its strategic mission, but would have to be retested within 90 days, AFSPC said.

The 90th MW joined the 341st MW at Malmstrom AFB, Mont., and 5th Bomb Wing at Minot AFB, N.D., that failed their respective NSIs last November and May, respectively, for minor infractions. As of mid-December, the 341st MW still faced a retest, while the 5th BW had already passed a week-long reinspection. At the same time, the 2nd Bomb Wing at Barksdale AFB, La., apparently did well in November in its first no-notice NSI in more than 15 years.

Recent NSIs and related inspections have become much more stringent than those run in recent years, with Air Force and Defense Threat Reduction Agency inspectors leaving no margin for error. These changes are meant to help overcome the nuclear enterprise problems that led to the ouster last summer of the Air Force's previous top leadership.

ILO Taskings Get New Moniker

The Air Force announced Dec. 17 that airmen serving "in-lieu-of" roles in place of ground forces in the War on Terror would now be serving in a "joint expeditionary tasking," or JET.

The terminology swap, said Chief of Staff Gen. Norton A. Schwartz, "reinforces our commitment to the joint fight as an equal member of the joint team." He added, "The amazing contributions airmen make around the world every day are not in lieu of anything."

DOD Moves On Reserve Matters

Secretary of Defense Robert M. Gates issued a memorandum on Nov. 24 instructing the Department of Defense to pursue 64 additional recommendations—18 were already in the works—out of the 95 put forth by the Commission on the National Guard and Reserves in its final report issued in January 2008. Implementation plans were expected for each by the end of 2008.

Gates noted that "some of the corrective actions" he was proposing differed from those of the commission. Among them, DOD was working out how to reduce the number of different duty status codes for the reserve components from the current 29. The commission members favored going down just to two—on (active) duty and off (active) duty. This idea created a firestorm on Capitol Hill because it implied cutting reserve pay, something the commission said was not its aim.

Thomas F. Hall, assistant secretary of defense for reserve affairs, said in late November the likely outcome is a reduction down perhaps to eight codes, with no impact on reserve pay or benefits. Hall said moving out on the majority of the commission's recommendations means that the "transition from a strategic

Photo by Jonathan Chuck

***Pit Stop:** This F-22 of the 27th Fighter Squadron, Langley AFB, Va., made a brief stop in January at Hickam AFB, Hawaii, on its way to Kadena AB, Japan. This aircraft and 25 more Raptors from Langley and Elmendorf AFB, Alaska, together with 500 USAF personnel, were deployed to Kadena as part of US Pacific Command's theater security package in the Western Pacific.*

reserve to an operational reserve [is a] mission almost complete."

New CSAR-X Amendment Issued

The Air Force released the newest update to its Combat Search and Rescue Replacement Vehicle solicitation, amendment 7, on Dec. 5. The service said the amendment contains "minor changes" meant "to further clarify" how it would choose the winning rescue helicopter design to replace its aging HH-60G Pave Hawks. No target date was given for when the decision will be made this year.

Before two rounds of successful legal protests by Lockheed Martin and Sikorsky nullified the Air Force's original choice of Boeing's HH-47 in November 2006, the service had planned to field the first unit before the end of Fiscal 2012.

Eglin F-35 Decision Postponed

The Air Force announced Nov. 21 that it was postponing until sometime this year the release of the record of decision on the use of Eglin AFB, Fla., as the initial joint training site for the F-35 Lightning II joint strike fighter. At the same time, it did sign the ROD to begin the beddown of the Army's 7th Special Forces Group at Eglin.

Both Eglin actions are part of the same environmental review process, but the F-35 issue was deferred due to the concerns of officials and residents in nearby Valparaiso over the higher noise levels of the F-35, compared to the F-15s that currently fly from Eglin. The Air Force is exploring alternatives to offset the noise increase and may not actually render a decision until sometime in 2010, the *Northwest Florida Daily News* reported on Nov. 21.

Meanwhile, Eglin's 33rd Fighter Wing deactivated its 60th Fighter Squadron of F-15s after the unit's final sortie on Dec. 4 as the wing continued its drawdown as part of the base's transformation into the F-35 schoolhouse.

Medical Center Expansion Starts

Air Force and Army officials, including the surgeons general of both services, broke ground Dec. 8 in San Antonio, on the new $724 million construction and renovation project to unify the Air Force's Wilford Hall Medical Center and the Brooke Army Medical Center.

This expansion is set for completion in September 2011. It is occurring as a result of BRAC 2005, which called for the consolidation of Wilford Hall and Brooke into one jointly operated medical center, to be called the San Antonio Military Medical Center, with two integrated campuses. Wilford Hall is now known as SAMMC-South, while Brooke is now called SAMMC-North.

Among the changes under the project, SAMMC-North will add a new hospital tower, and about 186,000 square feet of SAMMC-South will be renovated. SAMMC-North will become the complex's inpatient tertiary care center, while SAMMC-South will serve as the ambulatory care center.

KC-X Philosophies Emerge

James F. Albaugh, president and CEO of Boeing Integrated Defense Systems, said Dec. 17 the Air Force's KC-X tanker recapitalization program, set to restart this year, likely would be "more susceptible" to a new legal challenge if the service sets additional requirements to presage a best-value solution.

Speaking at a defense conference in Washington, D.C., Albaugh said he hoped that the Air Force would "take a very pragmatic view" by limiting requirements and choosing the lowest cost solution. Conversely, Ronald D. Sugar, chairman and CEO of Northrop Grumman, Boeing's rival in the tanker competition, said Dec. 15 at the same conference that a "low-ball" solution would not serve the US military well. Instead, he called for the competition to be run on a "best-value" basis "very much as the F-22 and the F-35 were conducted."

Northrop won the original KC-X competition in February 2008, but Boeing successfully protested, thereby reopening the contest.

DSP Satellite in Trouble

The last Defense Support Program missile warning satellite to join the highly classified DSP constellation is malfunctioning and potentially could pose a problem for other spacecraft, MSNBC.com reported Dec. 3.

A Russian optical tracking network discovered last year that the DSP spacecraft, launched in November 2007, had ceased making station-keeping maneuvers and appeared to be drifting out of its orbit, according to MSNBC. But an earlier Reuters news service report on Nov. 24 noted that the six to 10 DSP satellites still func-

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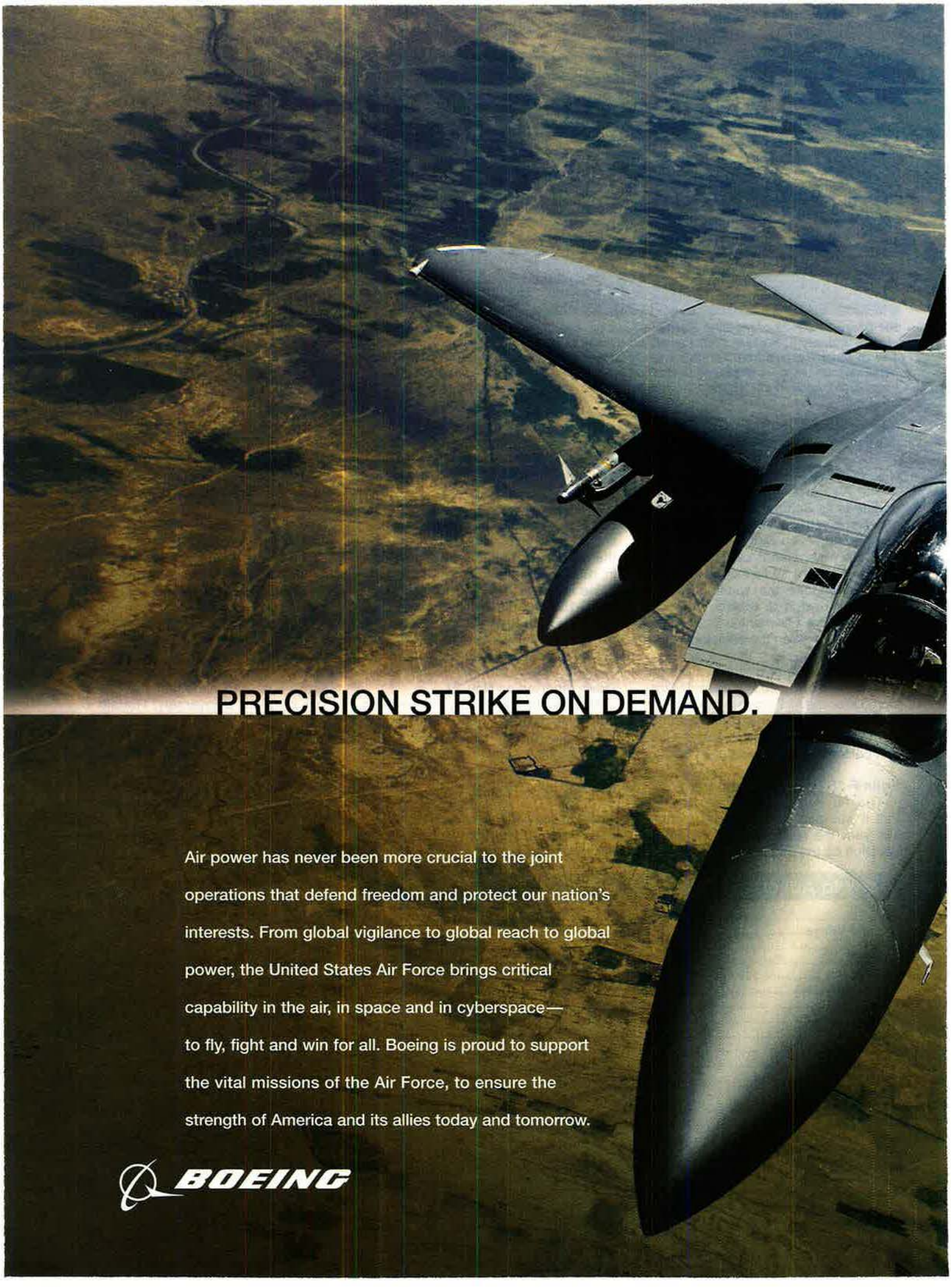
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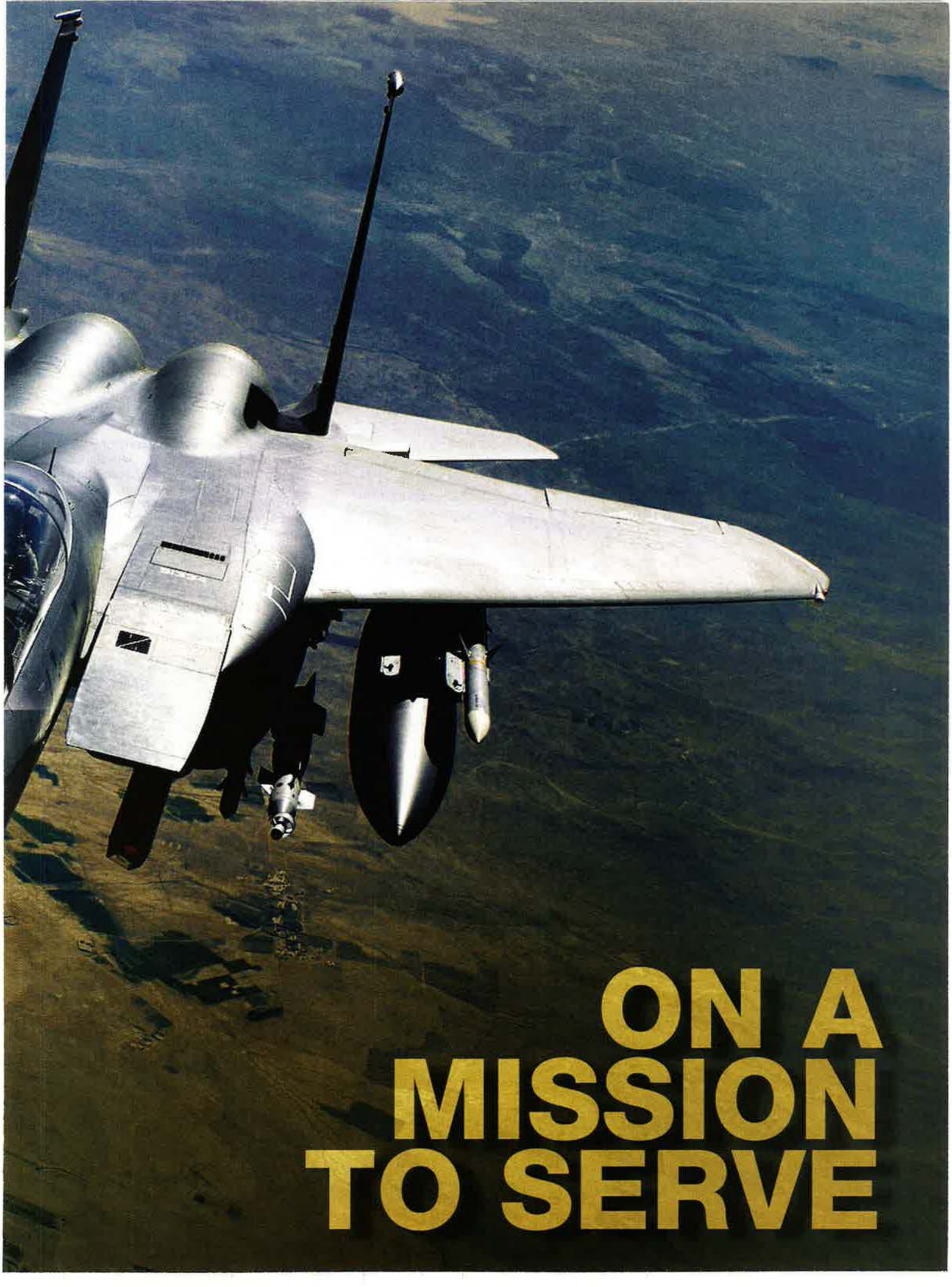


ON A MISSION TO SERVE

Air Forces Africa Takes Flight

Less than two months after beginning initial operations on Oct. 1, 17th Air Force (US Air Forces Africa) had yet to secure its full staff, but was already increasing its operations tempo with a dedicated airlift squadron, said Maj. Gen. Ronald R. Ladnier, commander of 17th Air Force and AFAfrica.

The numbered air force still had a lot of work before it to meet the goal of being fully operational by October 2009, said Ladnier during a Nov. 16 interview at 17th Air Force headquarters at Ramstein AB, Germany. "We're trying to bring in the right folks," he said, noting that 17th Air Force is adding a range of personnel from communications and intelligence specialists, logisticians, and refuelers, to operators of airlift and intelligence-surveillance-reconnaissance platforms.

With the standup of the 404th Air Expeditionary Group and its subordinate, the 42nd Expeditionary Airlift Squadron, AFAfrica's first operational flying squadron, the new NAF is ramping up operations fast. As of November 2008, two C-130s from the 19th Airlift Wing at Little Rock AFB, Ark., with aircrew and support personnel, were deployed to Ramstein to fly for the 42nd EAS.

These missions frequently run over three to four days down and back, said Maj. Jason W. Havel, 42nd EAS commander. They include cargo and supply runs, delivery of small arms, and the rotation of forces for activities such as medical missions and security training with African partners.

The aircrews must frequently apply improvisation and patience on their missions, as aircraft cargo loading machines are often not available at some African fields, and many areas still lack basic infrastructure such as air traffic control, said Havel.

On any given day, 17th Air Force has small teams of airmen conducting six to eight security cooperation activities across the vast continent. Ladnier said AFAfrica also has heavy-demand ISR capability to monitor refugees and natural disasters and keep tabs on terrorists and hostile forces.

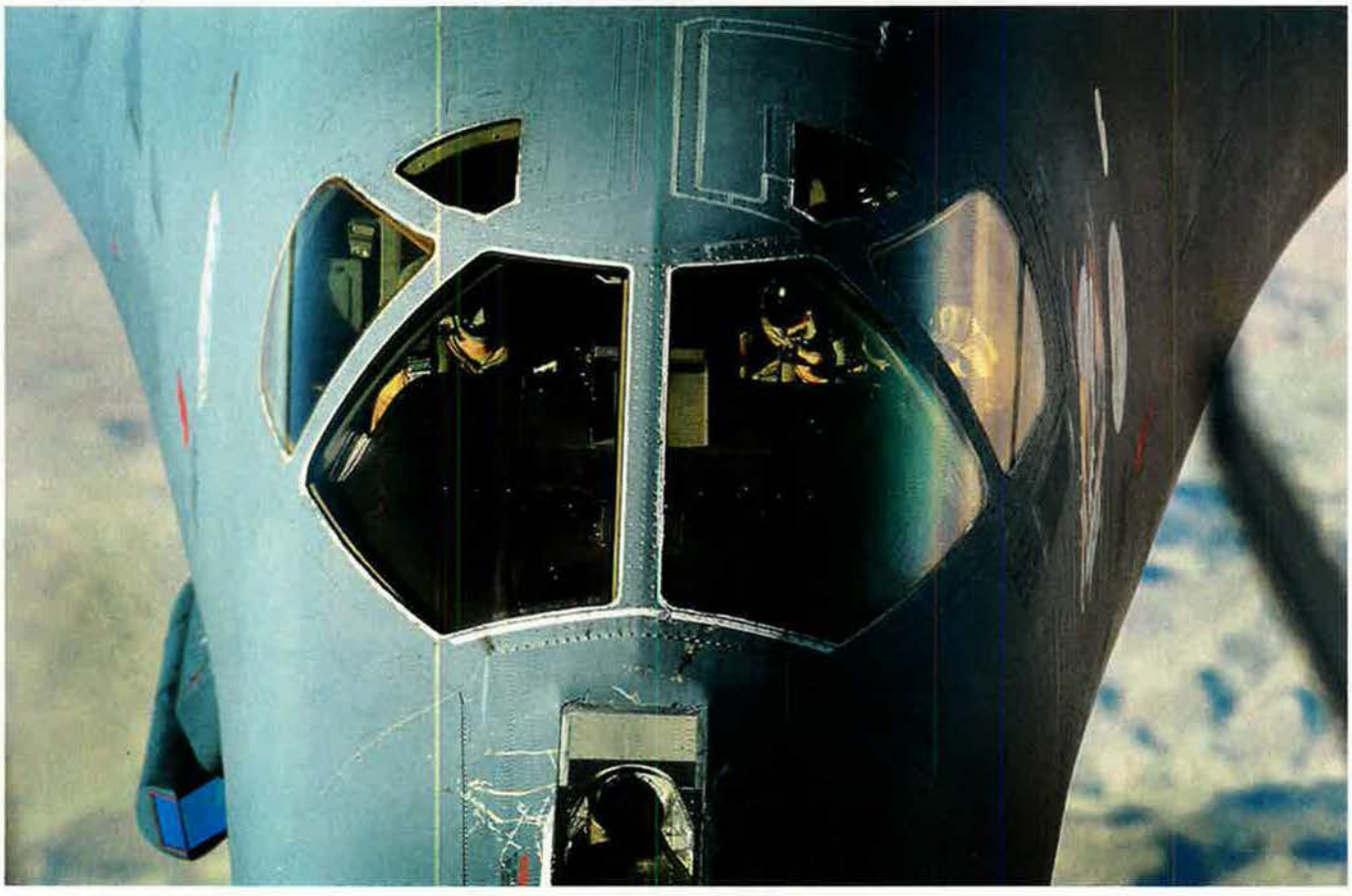
tioning are "about double the number needed to watch the entire Earth at once," so there is little concern about an immediate gap in missile warning until Space Based Infrared System satellites replace them.

US Strategic Command certified the first of two SBIRS highly elliptical orbit payloads, already in space, for operations, lead contractor Lockheed Martin announced Dec. 15. Air Force space officials had approved HEO-1 for operational use in November.

ABL Succeeds in Full-up Test

The Boeing-led Airborne Laser industry team said it successfully fired the fully integrated directed-energy laser system aboard the YAL-1 prototype aircraft for the first time at high energy

Bombs on Target: *The crew of a well-worn B-1B assigned to the 34th Expeditionary Squadron is viewed from above while flying a combat patrol over Afghanistan Dec. 10. On that date, a "Bone" successfully attacked enemy forces near Sangin with a 500-pound JDAM after insurgents were seen moving weapons from one compound to another. The B-1s are prized by ground forces and commanders in Afghanistan for their combination of speed, long loiter time, and ability to deliver a wide range of weapons with precision accuracy.*



USAF photo by SSgt. Aaron Allman

The War on Terrorism

Operation Iraqi Freedom—Iraq

Casualties

By Jan. 21, a total of 4,229 Americans had died in Operation Iraqi Freedom. The total includes 4,218 troops and 11 Department of Defense civilians. Of these deaths, 3,404 were killed in action with the enemy while 825 died in noncombat incidents.

There have been 30,960 troops wounded in action during Operation Iraqi Freedom. This number includes 17,325 who were wounded and returned to duty within 72 hours and 13,635 who were unable to return to duty quickly.

Combined Reaper Maintenance Unit Deploys to Balad

A joint Air Force-Royal Air Force aircraft maintenance unit from 432nd Expeditionary Aircraft Maintenance Squadron at Creech AFB, Nev., deployed late last year to Joint Base Balad, Iraq, to help sustain operations of the MQ-9 Reaper unmanned aerial vehicles assigned to the 46th Expeditionary Reconnaissance and Attack Squadron.

The deployment marked the first time that the joint Reaper AMU was sent either to Iraq or Afghanistan since the introduction of the MQ-9 in combat in Southwest Asia. The Reaper joined operations in Afghanistan in September 2007 and Iraq in July 2008. Previously, contractors employed by MQ-9 manufacturer General Atomics Aeronautical Systems maintained the Reapers in theater.

The AMU combines aircraft maintenance expertise with satellite communications technical capabilities, said USAF Capt. Antonio Camacho, the Reaper AMU officer in charge. Members of the unit are responsible for the Reapers as well as their satellite uplinks, local ground control stations, and the remote GCS at Creech.

Maj. Tim Bolen, commander of the 46th ERAS, said during an interview at Balad in November that the MQ-9 is in high demand in theater. It has a sensor ball system similar to that on the MQ-1 Predator UAV, but offers ground commanders more robust weapons options for attacking targets.

Operation Enduring Freedom—Afghanistan

Casualties

By Jan. 21, a total of 635 Americans had died in Operation Enduring Freedom. The total includes 634 troops and one Department of Defense civilian. Of these deaths, 417 were killed in action with the enemy while 218 died in noncombat incidents.

There have been 2,648 troops wounded in action during OEF. This number includes 933 who were wounded and returned to duty within 72 hours and 1,715 who were unable to return to duty quickly.

Air Strikes Deter Convoy Attackers

Afghan National Security Forces and coalition troops conducted operations in several areas of southern Afghanistan Dec. 11-12, killing five militants and destroying improvised explosive devices and caches of bomb-making materials, according to US officials.

On Dec. 11, combined forces were conducting a patrol in Nahr Surkh District, Helmand Province, when they were ambushed by militants who attacked with small-arms fire and rocket-propelled grenades from embankments along a heavily traveled road.

The combined forces returned fire with small-arms fire and heavy weapons, killing four militants and discovering six IEDs, which were destroyed.

In the vicinity of Nangalam, Air Force A-10s dropped a GBU-38 and fired rockets and cannon rounds against anti-Afghan forces that were launching RPGs at a coalition convoy. An on-the-scene joint terminal attack controller confirmed that the strikes were successful.

On Dec. 12, combined forces approached a known IED storage and manufacturing facility when they were fired on by militants with small-arms fire and RPGs. Combined Afghan and coalition forces responded with small-arms fire and heavy weapons, killing one militant and later destroying the contents of the facility.

levels in ground tests on Nov. 24 and 25 at Edwards AFB, Calif.

Boeing's ABL Program Director Michael Rinn told reporters Dec. 1 that technicians gathered valuable data on the ABL sensors and the laser's bore sight alignment during the laser shots, which were two one-second firings. Ground tests featuring "a longer series of engagements" were planned through January.

The ABL team expects to resume flight testing this spring, when the YAL-1 will demonstrate the entire system in flight against instrumented test missiles before progressing to the attempted shootdown of a "foreign missile asset" later in the year, Rinn said.

It's About More Than UAVs

The Department of Defense's push to send more and more unmanned aerial vehicles to satisfy ever-growing battlefield demands for intelligence-surveillance-reconnaissance capability is exacerbating a shortage of communication satellite resources, according to a joint Defense Science Board-Intelligence Science Board report issued in December.

As directed, the Air Force has been rapidly increasing its UAV capability. However, the report said, instead of just throwing more UAVs into the mix, the Pentagon must expand its satellite communications resources (i.e., deploy the Transformational Satellite Communications System "as soon as possible") and invest in more ground terminals. According to the report, supporting the greater number of UAVs "cannot be sustained without deployment of additional communications satellite resources."

The report also emphasized that DOD and the intelligence community must "accelerate the transition" to a shared and easily accessed data storage and retrieval capability, and that DOD must speed its drive—begun around 2003—to implement metadata tagging of sensor-collected data to make it easier to access relevant information.

Expert Doubts Rivet Joint Safety

George Sarris, a senior civilian aircraft mechanic at Offutt AFB, Neb., warned in late November that there are continuing maintenance issues creating safety-of-flight concerns for the base's RC-135 Rivet Joint electronic eavesdropping aircraft.

The *Kansas City Star* reported Nov. 29 that Sarris and several other current and former Offutt mechanics who work on the Rivet Joints took their concerns to the newspaper when they felt stymied by the Air Force. Offutt officials told the newspaper that the problems with the

Senior Staff Changes

RETIREMENTS: Maj. Gen. David S. **Gray,** Maj. Gen. Larry D. **New,** Lt. Gen. Michael W. **Peterson,** Maj. Gen. Melissa A. **Rank.**

NOMINATIONS: To be Major General: David J. **Scott. To be Brigadier General:** James J. **Carroll,** Bart O. **Iddins,** Michael W. **Miller.**

CHANGES: Maj. Gen. Charles R. **Davis,** from Dir., Jt. Strike Fighter Prgm. Office, Office of the Undersecretary of the Defense for Acq., Tech., & Log., Arlington, Va., to Cmdr., Air Armament Ctr. & PEO, Weapons, AFMC, Eglin AFB, Fla. ... Maj. Gen. David W. **Eidsaune,** from Cmdr., Air Armament Ctr. & PEO, Weapons, AFMC, Eglin AFB, Fla., to Dir., Air, Space, Info. Ops., AFMC, Wright-Patterson AFB, Ohio ... Brig. Gen. James M. **Kowalski,** from Dep. Dir., Global Ops., Jt. Staff, Pentagon, to Cmdr., AF Global Strike Command (Provisional), Bolling AFB, Washington, D.C. ... Lt. Gen. John C. **Koziol,** from Cmdr., Jt. Info. Ops. Warfare Command, STRATCOM, Lackland AFB, Tex., to Dep. USD (Intel.) for Jt. & Coalition Warfighter Spt., Pentagon ... Brig. Gen. Joseph A. **Lanni,** from Dir., Air, Space, & Info. Ops., AFMC, Wright-Patterson AFB, Ohio, to Cmdr., AF Security Assistance Ctr., AFMC, Wright-Patterson AFB, Ohio ... Brig. Gen. Thomas J. **Masiello,** from Dep. Dir., Ops., Natl. Mil. Command Ctr., Ops. Team 2, Jt. Staff, Pentagon, to Dep. Dir., CJ9 Strat. Effects, Multinational Forces-Iraq, CENTCOM, Baghdad, Iraq ... Brig. Gen. Clyde D. **Moore II,** from Dir., Spec. Prgms., Office of the Undersecretary of Defense for Acq., Tech., & Log., Arlington, Va., to Dep. Dir., Jt. Strike Fighter Prgm., Office of the Undersecretary of Defense for Acq., Tech., & Log., Arlington, Va. ... Lt. Gen. Loren M. **Reno,** from Cmdr., Oklahoma City Air Log. Ctr., AFMC, Tinker AFB, Okla., to DCS, Log., Instl.,& Mission Sppt., USAF, Pentagon ... Brig. Gen. Jay G. **Santee,** from Vice Cmdr., 14th AF, AF Strat., AFSPC, Vandenberg AFB, Calif., to Principal Dir., Office of the Dep. Asst. SECDEF (Strat. Capabilities), Office of the Asst. SECDEF, (Spec. Ops/Low-Intensity Conflict & Interdependent Capabilities), Office of the Undersecretary of Defense for Policy, Pentagon ... Brig. Gen. Rowayne A. **Schatz Jr.,** from Cmdr., 19th AW, AMC, Little Rock AFB, Ark., to Dep. Dir., Global Ops., Jt. Staff, Pentagon ... Lt. Gen. (sel.) Harry M. **Wyatt III,** from the Adjutant General, Oklahoma City, Okla., to Dir., ANG, Pentagon.

SES CHANGES: Pamela C. **Schwenke,** to Assoc. Dep. Asst. Secy., Contracting, Office of the Asst. SECAF for Acq., Pentagon ... Katherine A. **Stevens,** to Dir., Material & Manufacturing AF Research Lab, AFMC, Wright-Patterson AFB, Ohio ... John S. **Wilcox,** to Assoc. Dir. for Weapons, Munitions Directorate, AF Research Lab, AFMC, Wright-Patterson AFB, Ohio. ■

elderly RC-135 aircraft identified by these mechanics have been and are being fixed. The RC-135s have an "outstanding flying safety record," Brig. Gen. James J. Jones, commander of Offutt's 55th Wing, told the newspaper.

But the issue isn't going away that easily as Sen. Charles E. Grassley (R-Iowa) has asked the Department of Defense inspector general to investigate and also ensure that Sarris was not a victim of reprisals for coming forward.

Nellis Battles Encroachment

Nellis Air Force Base in Nevada has already altered flight patterns to accommodate area development and, despite a newly enacted state law, is confronting renewed encroachment threats, the *Las Vegas Sun* reported Dec. 8.

Graded A: ***Airmen with the 7th Bomb Wing at Dyess AFB, Tex., move a B-1 bomber engine during the base's operational readiness inspection Jan. 6. Dyess received an overall "satisfactory" rating for its performance in its first readiness inspection since 2006. Inspectors graded the bomb wing on its ability to generate sorties and deploy and regenerate aircraft. The ORI took place during an anomalous cold snap that featured high winds and freezing rain at the base near Abilene, Tex.***

USAF photo by SrA. Domonique Simmons

USAF photo by Capt. Daniel Uchtmann

Piggyback Ride: *The space shuttle* Endeavour *rides atop a modified Boeing 747 as it lands at Barksdale AFB, La., on its way to its final stop at Cape Canaveral, Fla.* Endeavour *had just returned from a 16-day mission to the International Space Station, where astronauts made improvements to the interior of the orbital complex.*

The Las Vegas area is one of the five fastest growing metro areas in the US since 2000. According to the *Sun,* the Air Force's efforts to accommodate growth in the area have reduced the available flight patterns to those on the north side of the base. That is the area North Las Vegas developers are eyeballing now for some 50 high-density projects.

Col. Howard D. Belote, commander of Nellis' 99th Air Base Wing, said that without that area for combat aircraft training, "the reason for Nellis to exist is almost gone."

Missing Airmen Identified

The Department of Defense announced Dec. 15 that the remains of four airmen who served during the Vietnam War had been identified. They are: Maj. Bernard L. Bucher, of Eureka, Ill.; Maj. John L. McElroy, of Eminence, Ky.; 1st Lt. Stephen C. Moreland, of Los Angeles; and SSgt. Frank M. Hepler, of Glensdale, Pa.

They were flying a C-130 evacuating Vietnamese citizens from Kham Duc Special Forces Camp near Da Nang, South Vietnam, on May 12, 1968, when their aircraft reportedly exploded in midair after taking ground fire as they took off.

Excavations of a crash site in 1993 and 1994 produced remains that analysts recently identified as those of the four airmen.

Airmen Earn Bronze Star Medals

The Air Force awarded three airmen Bronze Star Medals in November. CMSgt. David R. Nordel, a medical service noncommissioned officer from Fairchild AFB, Wash., received his award for overseeing more than 200 medics engaged in direct-combat casualty care while superintendent of the 332nd Expeditionary Medical Group at Joint Base Balad, Iraq.

CMSgt. Thomas Perry, currently assigned to the 53rd Combat Communications Squadron at Robins AFB, Ga., earned his medal for his work while deployed to the Combined Air and Space Operations Center in Southwest Asia. And, TSgt. Michael Allen of Andersen AFB, Guam, was recognized for his actions as a contingency contracting officer for the Multinational Security Transition Command-Iraq Support Division in aiding efforts to rebuild the Iraqi military infrastructure.

Also receiving a Bronze Star Medal—awarded in July, but not announced until December—was SMSgt. Randal Williams, superintendent of the 437th Force Support Squadron Military Personnel Flight at Charleston AFB, S.C. He was honored for his actions in establishing the Iraqi Training School while serving as superintendent and senior enlisted advisor for the Coalition Air Force Training Team, Multinational Security Transition Command-Iraq.

Thunderbirds Finish F-16 Swap

The Air Force's Thunderbirds air demonstration squadron at Nellis AFB, Nev., took delivery of its final two F-16 Block 52 aircraft on Nov. 17, completing its new set of 10 upgraded F-16s to replace its previous Block 32 airplanes in time for the start of its 2009 flying season that begins in March.

The swap, which began in mid-2006, actually concluded one year ahead of schedule. The unit's "new" F-16s have advanced avionics and a more powerful Pratt & Whitney engine, improvements that are expected not only

F-22 Numbers Under Review, Again

The Pentagon plans to conduct new reviews to determine the appropriate number of F-22 fighters for the Air Force, Secretary of Defense Robert M. Gates, said Dec. 2.

Gates, though appointed by President Bush, is staying on in the Obama Administration.

"I think that the key here is to do the analysis, examine the Air Force's requirements, talk to the senior leadership of the Air Force, talk to the new appointees who will come into the department, and then make a decision how to go forward," he said during a Pentagon press briefing.

The Air Force has long held that it requires 381 F-22s, and even independent studies said the service would need at least 275 or more. Chief of Staff Gen. Norton A. Schwartz has said he thinks 381 is too high a number, while the 183 F-22s provided under the current program of record—a cap imposed by the Office of the Secretary of Defense—are too few.

As of mid-December, the Air Force had yet to release any new figures publicly, saying it was still mulling a new inventory goal to present to the new Administration. But Adm. Michael G. Mullen, Chairman of the Joint Chiefs of Staff, divulged during a Pentagon press briefing Dec. 10 that Schwartz has spoken of "60 or so more" F-22s.

Mullen expressed concern that the F-22 is "such an expensive system," but he appeared to be open to the idea of more of them. It's "very important," he said, to have a capability to bridge the gap to the F-35 Lightning II stealth fighter since "new systems usually struggle ... meeting exact deadlines."

Congress has mandated that the new Administration inform it by March 1 whether it intends to keep Lockheed Martin's F-22 production line going beyond the 183 aircraft already ordered.

USAF photo by MSgt. Kevin J. Gruenwald

***Go, No Go:** This KC-135R tanker taxis in at Andersen Air Force Base on Guam after arriving for a rotational deployment Dec. 30. The Stratotanker, from Grissom Air Reserve Base in Indiana, will provide refueling support for US Pacific Command's "presence" mission in the Western Pacific. The long-range bombers get all the glory in these rotations, which bolster US military power in the region, but there's no "go" with no gas.*

to expand the performance capability, but also provide improved reliability and maintainability.

The 10 Block 32 aircraft are being reconverted to a combat-coded configuration and will remain at Nellis to serve as part of the Air Force Warfare Center's aggressor force.

WWII Pilot Presented With DFC

Edward Ireland, a former Army Air Forces pilot, in early December took hold, for the first time, of the Distinguished Flying Cross that he received for his heroic service in the skies over Europe during World War II.

Fox News 4 of Kansas City reported Dec. 6 that Ireland was formally presented with the DFC during a ceremony that same day at Whiteman AFB, Mo. According to the news report, Ireland flew 30 missions during the war.

Obituaries

■ Retired Maj. Gen. David M. Jones, one of the famed World War II Doolittle Raiders, died Nov. 25. Jones, 94, passed away in Tucson, Ariz., reported the *Arizona Daily Star.* Jones served as a pilot on the initial evaluation flights in Florida for the Doolittle Project, precursor to the April 18, 1942 raid on the Japanese homeland by Army Air Forces B-25 bombers that launched from USS *Hornet.* He piloted the bomber of Crew 5 and was among those who bailed out over China. He then served in North Africa, was shot down in December 1942, and spent more than two years as a POW. He held various staff and command assignments after the war, led B-58 test force efforts, and served in other research and development positions, ending his career as commander of the Eastern Test Range in Florida.

■ Retired Brig. Gen. Maurice A. Cristadoro Jr., a ballistic missile pioneer, died Nov. 22 at age 88. Cristadoro began his Air Force career in 1941 as an aviation cadet, receiving his wings in November of that year and serving in the European Theater in 1944-45 as a flight leader and squadron commander of a P-51 unit. Following the war, he served as chief of the special weapons branch at Wright Air Development Center in Ohio and then on the Air Staff in advanced systems planning. He took over acquisition of the Atlas ballistic missile and later directed ballistic missile programs at Air Force Systems Command. He last served as AFSC's assistant deputy chief of staff for development plans. In 2006, Air Force Space Command inducted Cristadoro into the Space and Missile Pioneers Hall of Fame.

■ Retired MSgt. Edward W. Horton Jr., who flew on the famous Doolittle bombing raid against Japan in April 1942, died Nov. 26. Horton, 92, died in Okaloosa County, Fla., where he had lived since 1947, reported Panama City's *News Herald.* Horton, who joined the Army in 1935, served as gunner on Raider Crew 10. After the war, he served at the Climatic Lab at Eglin Field in Florida. After retiring, he spent another 20 years as a civilian employee at the lab. ■

News Notes

■ The Air Force announced Nov. 26 that the 353rd Special Operations Group at Kadena AB, Japan, has earned the Air Force Outstanding Unit Award with Valor for its "exceptionally meritorious service" from Oct. 1, 2006 to Sept. 30, 2008.

■ Air Combat Command said Nov. 21 that Minot AFB, N.D., is the "preferred location" to host the new operational B-52 bomber squadron that the Air Force intends to establish by late 2009 or early 2010.

■ A combination of pilot missteps and aircraft anomalies caused the crash of a two-seat F-15D fighter in July 2008, during a Red Flag training exercise at Nellis AFB, Nev., Air Combat Command said Nov. 24. The crash killed lead pilot Lt. Col. Thomas Bouley.

■ The Air Force said in December it will pay Boeing $1.387 million in compensation for the legal costs that the company incurred in its successful legal protest of the service's February 2008 choice—now nullified—of Northrop Grumman's KC-30 over Boeing's KC-767 in the original KC-X tanker contest.

■ John Dolan, Michael Fantini, and David Romuald, three colonels assigned to the 332nd Air Expeditionary Wing at Joint Base Balad, Iraq, each surpassed 3,000 flying hours in an F-16 during sorties on Dec. 2.

■ A C-130 transport serving with the 386th Air Expeditionary Wing in Southwest Asia, surpassed 30,000 flight hours during a Nov. 23 mission.

■ Northrop Grumman in December began military certification flights of the Pratt & Whitney JT8D-219 engine on the E-8C Joint Surveillance Target Attack Radar System test bed aircraft. The Air Force intends to install these engines on its operational fleet of E-8Cs.

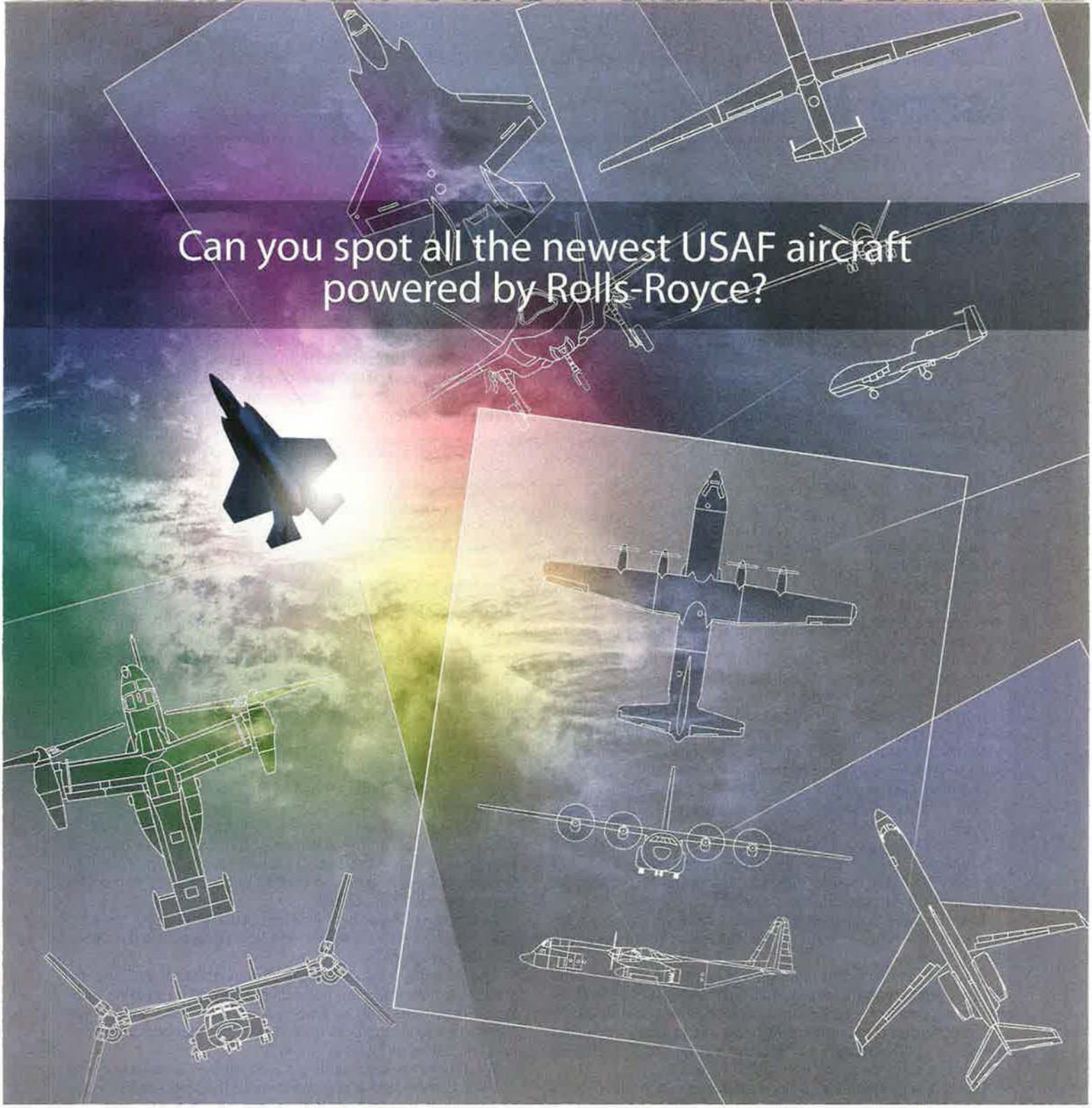
■ Lt. Col. David Dressel, an A-10 pilot with the 75th Fighter Squadron at Moody AFB, Ga., on Nov. 21 surpassed 3,000 flying hours during a mission over Afghanistan.

■ The Air Force Flight Test Center at Edwards AFB, Calif., on Nov. 25 received the diaries of the base's namesake, Capt. Glen W. Edwards, a military test pilot who died in June 1948 while co-piloting a YB-49 flying wing bomber prototype.

■ SSgt. Michael Baker, a fuels specialist from Minot AFB, N.D., pumped 610,487 gallons of fuel in October at Bagram AB, Afghanistan, breaking the previous monthly record by more than 73,000 gallons.

■ Lockheed Martin announced Dec. 9 that, together with the US Air Force Test Pilot School at Edwards AFB, Calif., it demonstrated the first fully autonomous landing of a modified F-16 fighter.

■ Officials at Robins AFB, Ga., announced Dec. 3 that the base's elementary school would close its doors for good at the conclusion of the current academic year, after 45 years of operations, due to sharply declining enrollment. ■



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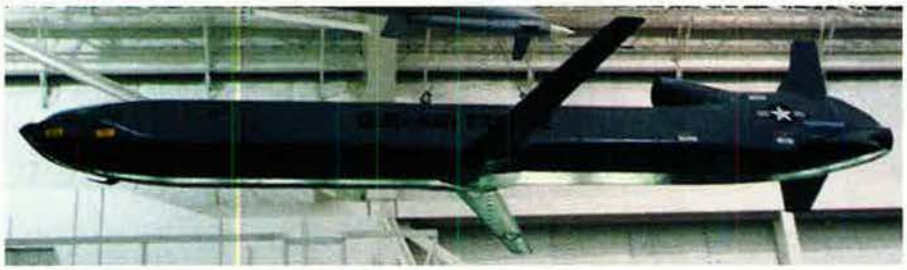
Issue Brief

By Adam J. Hebert, Executive Editor

The Wages of Nuclear Abolition

If it sticks with its current plan to preserve the long-term health of the US strategic deterrent, the Defense Department will assuredly find itself embroiled in a lengthy, contentious political struggle.

Americans expect a secure and credible nuclear deterrent. Still, there is scant public or Congressional support for new weapons. Controversy even dogs DOD's plan to replace today's aged warheads with a safer and up-to-date model—the so-called Reliable Replacement Warhead.



The US is cutting nuclear weapons, such as this ALCM.

As a candidate, President Barack Obama voiced a generalized opposition to nuclear arms. His victory not only has stirred hope for further nuclear cuts but has revived political forces that seek outright nuclear abolition.

On Dec. 9 in Paris, Jimmy Carter, Desmond Tutu, and about 100 other international peace parsons, under the label "Global Zero," launched a new campaign to abolish nukes. The idea is to bring about a total phaseout of these weapons over the next 25 years. First targets, of course, include the US deterrent.

Abolition Day may yet come. For the foreseeable future, though, the world remains too dangerous and unpredictable to allow it.

The Cold War is over, but the danger has not vanished. The strategic environment today is different "purely [in] intent—not capability," said Gen. Kevin P. Chilton, commander of US Strategic Command. "Intent can change overnight."

Threats to the United States or its interests could come from unpredictable major powers, rogue nations, and nonstate and terrorist groups.

Russia is modernizing its large nuclear force. Its programs include road-mobile and silo-based SS-27 ICBMs, SS-30 SLBMs, new ballistic missile submarines, a long-range nuclear cruise missile, and modernized bombers. Moscow has explicitly increased the role of nuclear weapons in defense planning and retains the means to churn out large numbers of warheads.

China is engaged in a comprehensive transformation of its military forces, and nuclear arms are a key part of this. China's improving military capabilities include a variety of ballistic missiles. China's nuclear-capable ballistic missiles include a wide range of submarine-launched, medium-range, and intercontinental delivery systems.

US officials regard North Korea's nuclear program as a great concern, especially when viewed in conjunction with the erratic nation's development of long-range missiles.

North Korea and Iran belong to a particularly troubling group of nations that have demonstrated a willingness to export sensitive weapons technology to others.

Among terrorist organizations, al Qaeda has shown both the willingness and capability to mount attacks specifically designed to maximize casualties. Osama bin Laden's followers seek nuclear weapons and no doubt would use them, given an opportunity.

Terrorists do not operate in a vacuum, however, and US policy is to hold state sponsors of terrorism accountable for the actions of their proxies. US officials have made it clear that nuclear retaliation would not be excluded from the list of retaliatory options if the US is attacked by weapons of mass destruction. This serves to discourage rogue nations from providing too much technology or refuge to extremists.

For decades of the Cold War, America's nuclear forces deterred acts of aggression, reduced the threat of conventional attack on US allies, and held otherwise invulnerable targets at risk.

Nuclear weapons have immense destructive power, and, for that reason, are unique deterrents. Ever since World War II, the world has avoided major-power conflict of the scale seen regularly in the prenuclear era. With nuclear weapons in the threat calculus, great nations have approached each other with great caution.

Extended deterrence—opening the US "nuclear umbrella" over friends and allies—has been key to alliances in Europe and Asia, assuring one and all of the credibility of US security commitments.

In fact, self-induced US nuclear disarmament could actually spur proliferation. In the absence of the US nuclear umbrella, some non-nuclear allies such as Japan, South Korea, Germany, Greece, or Turkey might perceive a need to develop and deploy their own nuclear capability.

And despite 16 years of American cuts and testing moratoriums, rogue states such as Iran and North Korea have not slowed their own programs.

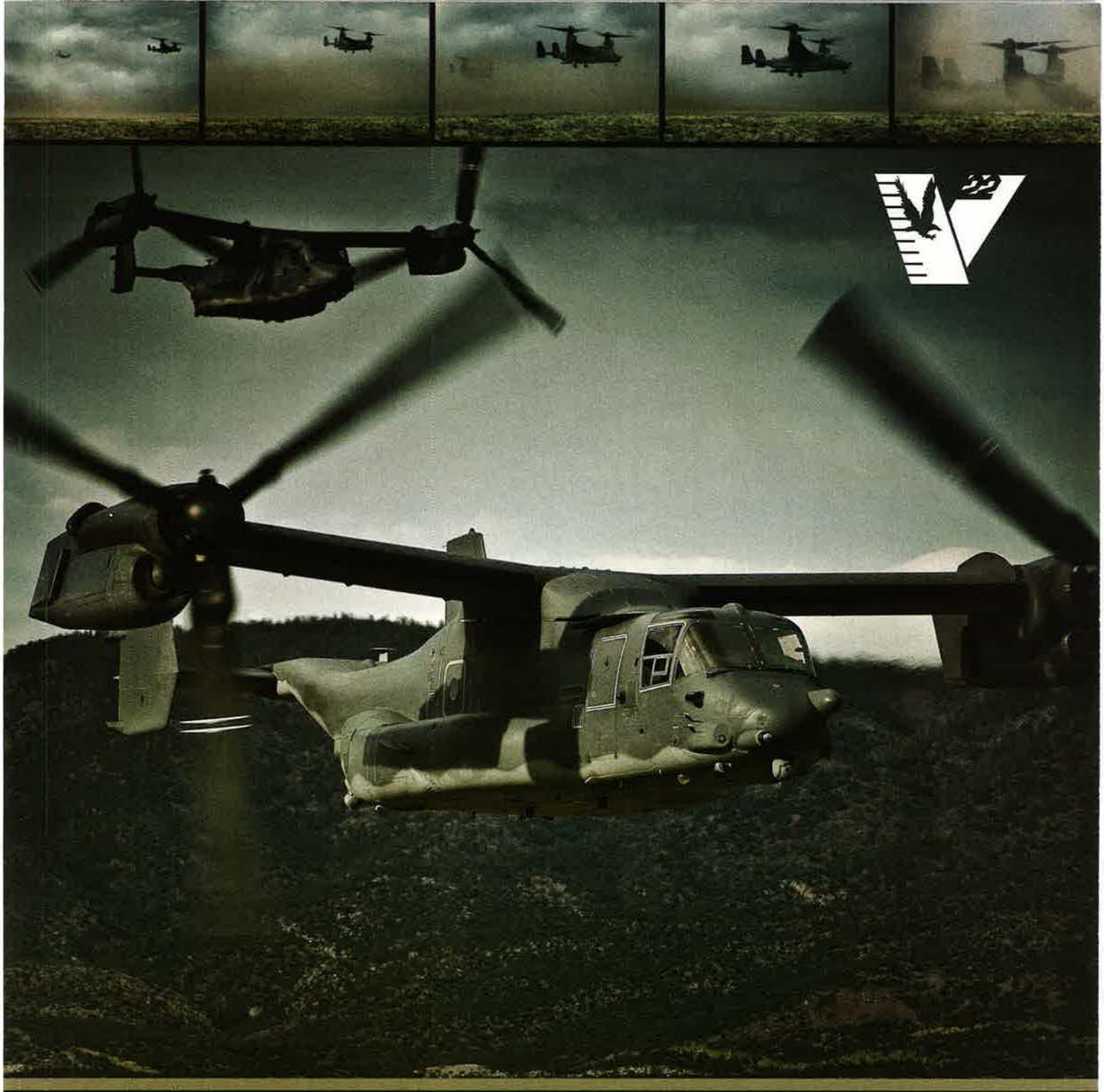
The US today is the only declared nuclear power that is neither producing new weapons nor actively upgrading existing ones. Both Britain and France, among America's treaty allies, have launched major programs to revitalize their nuclear complexes and maintain their nuclear forces.

Washington has vowed to be a leader in nuclear reductions. The US, Chilton said, is on pace to reach the Moscow Treaty goal of no more than 2,200 operationally deployed nuclear weapons early—perhaps as soon as the end of this year.

According to a recent policy paper by the Defense Department and the Department of Energy, US nuclear forces support four goals: reassuring allies and friends, dissuading potential adversaries from even attempting to build nukes, deterring actual attacks on the US or allied nations, and defeating an enemy in a war.

In what can only be called an enormous understatement, the DOD-DOE report asserts: "Nothing in the developments [of recent years] suggests that US nuclear weapons are no longer needed." ■

More information: http://www.defenselink.mil/news/nuclearweaponspolicy.pdf



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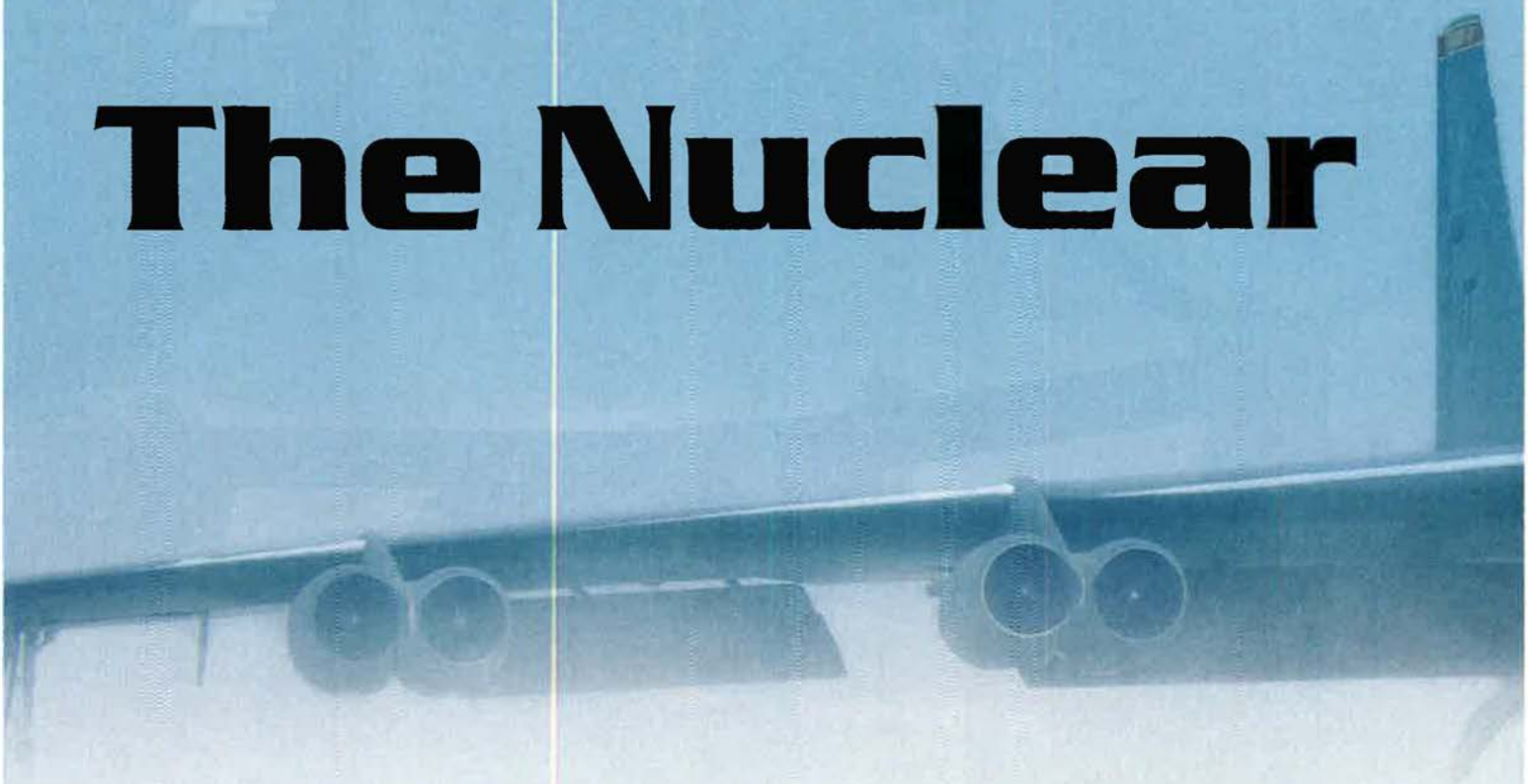
For the Air Force, getting nuclear operations back on track has become Job 1.

The Nuclear



With the release last October of the strategic planning document "Reinvigorating the Air Force Nuclear Enterprise," USAF unveiled a comprehensive plan to strengthen its handling of ICBM forces and nuclear-capable bombers. The service says that implementing this plan is top priority.

Now under way are numerous projects that seek to transform Air Force organizations, operations, and culture. They include the mammoth task of establishing a new major command, Air Force Global Strike Command, to bring together oversight of nuclear-armed Minuteman III missiles and B-2A and B-52H bomber units.

The goal is to restore high-quality, Cold War-style stewardship to USAF's daily execution of its nuclear mission and, in the process, remove any lingering doubts about the service's dedication on this score. Indeed, the standard by which airmen are judged will be nothing less than perfection.

According to Maj. Gen. C. Donald Alston, assistant chief of staff for strategic deterrence and nuclear integration, "The roadmap is not about just overcoming deficiencies that have been exposed. It is about making sure that we are on this pathway to excellence that is our legacy."

Alston, who spoke with *Air Force* Magazine in a November interview, heads the newly activated Air Staff A10 office that now serves as the focal point for nuclear matters at the headquarters level.

Several high-profile problems in the past several years caused the Air Force's nuclear stewardship to come under extreme scrutiny, and shook the service. Centered on the mistaken shipment of Minuteman III nosecone components to Taiwan in August 2006 and the unauthorized transfer of nuclear-armed cruise missiles on a B-52 flight from North Dakota to Louisiana one year later, these missteps were considered by Secretary of Defense Robert M. Gates as "serious lapses" of oversight. They were cited as principal reasons for firing Air Force Secretary Michael W. Wynne and the Chief of Staff, Gen. T. Michael Moseley.

The roadmap is the Air Force's way of showing how it is applying lessons of those disconcerting events. It incorporates insights and recommendations from senior-level internal

A B-52 Stratofortress is prepped for flight on the frigid flight line at Minot AFB, N.D.

Force Revival

By Michael C. Sirak, Senior Editor

USAF photo by A1C Christopher Boltz

and external reviews led by notables such as retired Gen. Larry D. Welch, a former Chief of Staff; James R. Schlesinger, a former Defense Secretary and Energy Secretary; and Adm. Kirkland H. Donald, director of naval nuclear propulsion.

Creating Strike Command is one of three pillars of the roadmap and is probably the action most visible to the outside world. In some ways, the new command harkens back to Strategic Air Command, the organization that oversaw nuclear bombers and ICBMs until June 1, 1992, when it was shut down.

Establishing the A10 office is the second pillar of the plan, and is already in place.

The third pillar is consolidating all nuclear sustainment functions under the Air Force Nuclear Weapons Center (AFNWC) at Kirtland AFB, N.M. Together, these three initiatives are seen as critical for the overall success of the reinvigoration efforts.

Supporting these pillars are activities such as more robust training for airmen, a stricter nuclear inspection regime, and new educational curricula and career opportunities to attract a new cadre of airmen in nuclear-related fields.

Merging Initiatives

Some corrective activities were already in progress prior to the roadmap's release on Oct. 24, 2008, such as strengthening the AFNWC's role and instituting nuclear-only wing rotations for the B-2s and B-52s under a construct called the Global Deterrence Force. But the document merges new initiatives with the earlier activities, many of which are now strengthened, and shows how they all fit together.

"This is long-term work, where success will be measured in years and not weeks," said Secretary of the Air Force Michael B. Donley, in a November speech at the Center for Strategic and International Studies in Washington, D.C.

However, the impact is already being felt, even by Gates.

"Based on everything I have seen, heard, and learned in recent months," said the Pentagon chief, "I strongly believe that the Air Force is now moving in the right direction to reclaim the standards of excellence for which it was known throughout the Cold War."

Positive Inventory Control

The Air Force has always maintained precise tabs on its nuclear weapons in storage, but with the end of the Cold War, let oversight of its nuclear weapons-related materials, or NWRM, wane. This is changing as positive inventory control is being reinstituted in phases. At first, the process will be manually intensive until greater automation is introduced.

Under Phase I, the service has already identified all NWRM items, about 160 national stock numbers mostly associated with the ICBM fleet. They had been dispersed at various locations within the Defense Logistics Agency's standard supply chain, and there were limits on tracking their whereabouts.

The Minuteman III nosecone components sent mistakenly to Taiwan in 2006 are examples of NWRM.

Plans are to start moving NWRM early this year into a single facility, a refurbished 48,000-square-foot warehouse on the grounds of Hill AFB, Utah, that the Air Force will run.

"We are going to control every component ... until it is released to the maintenance organization," said Brig. Gen. Everett H. Thomas, commander of the Air Force Nuclear Weapons Center at Kirtland AFB, N.M., in explaining what PIC will mean. In the case of an ICBM part, for example, "we will issue it, and when it is put on the ICBM, we will be able to tell you exactly which ICBM that part is on," he said.

In Phase II, several hundred so-called nuclear-related materials will be incorporated under PIC and tracking automation will be enhanced. NRM are auxiliary pieces and parts, like a shim on an ICBM.

Phase III is scheduled for completion in 2013. It involves migrating control of the NWRM and NRM to the Expeditionary Combat Support System, a new logistics electronic records program. This will allow for fully automated PIC with real-time visibility and serial number tracking.

Gates made these remarks to an audience of airmen at Minot AFB, N.D., on Dec. 1, about five weeks after the roadmap's release. Minot was the starting point for the errant B-52 flight with the cruise missiles in 2007.

The standup of Strike Command, to be led by a three-star general, will be phased, according to service officials involved in the process. In December, the Air Force leadership announced that Bolling AFB, D.C., will host the command's provisional headquarters, which will be led on an interim basis by Brig. Gen. James M. Kowalski.

Initial operations of Strike Command are planned to commence at the end of September 2009, and the command is expected to be fully operational about one year after that.

The permanent headquarters location is undetermined, but members of Congress from states that host bomber bases or ICBM fields—such as Louisiana and North Dakota—have already begun lobbying hard to attract the HQ.

The headquarters could have upward of 900 personnel billets, including hundreds that transfer over from Air Combat Command and Air Force Space Command. These two commands are relinquishing their nuclear-capable bombers and ICBMs, respectively, to Strike Command.

ACC and Space Command are forming detachments in their respective headquarters at Langley AFB, Va., and Peterson AFB, Colo., to support the standup of the command, including working out the detailed basing plans and unit-manning issues. They will support the Strike Command commander remotely until the permanent HQ location is identified and Strike Command personnel may begin setting up there.

"My No. 1 concern is making sure that we get the right people in the right place at the right time and that we take care of them," said Col. Sandra E. Finan, chief of Space Command's nuclear operations.

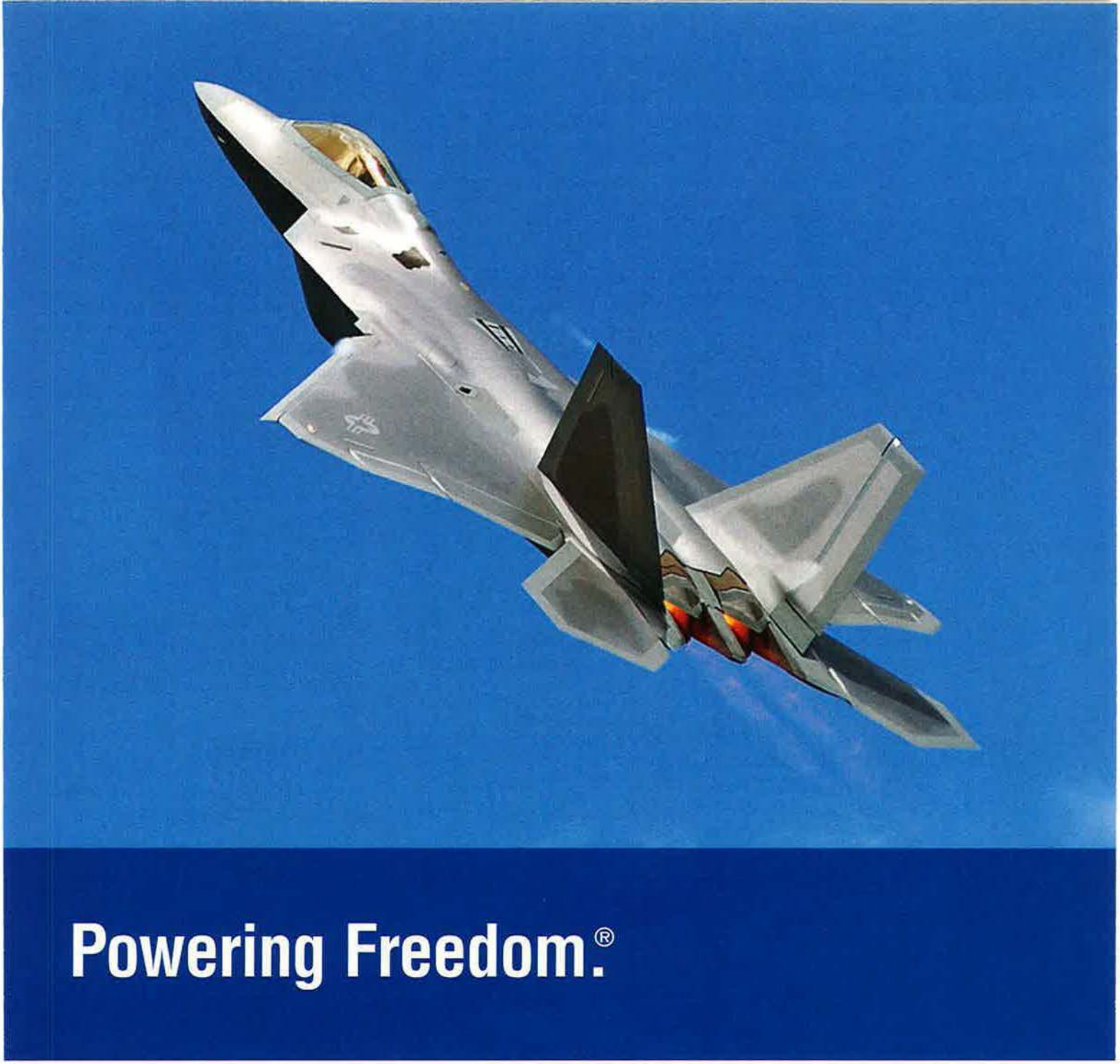
The Real Challenge

Filling the new command's headquarters with personnel having nuclear expertise is going to be a demanding task, noted Col. James Dunn, ACC's nuclear enterprise director, in a December interview. "The real challenge for us," he said, "is not in the spaces," referring to the billets. "It is going to be in the faces—making sure that we have well-qualified people to actually go in there and perform the duties."

Strike Command will oversee the nation's 450 nuclear-tipped Minuteman III ICBMs, its 20 B-2As and soon-to-be 76 B-52Hs, and their subordinate units. This oversight will eventually include all of the functions for organizing, training, and equipping these forces. In addition to conventional munitions, the B-52s are capable of delivering nuclear-tipped cruise missiles and nuclear gravity bombs, while the B-2s can carry nuclear and non-

USAF photo by A1C Stephen Linch

The B-2* Spirit of Texas *runs through a "touch-and-go" exercise at Whiteman AFB, Mo. The dual-capable stealth bombers will become part of Global Strike Command.



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Global Deterrence Force

Three weeks before the Air Force in October issued its nuclear roadmap, the service began the Global Deterrence Force rotation for its B-2A and B-52H bombers.

The idea for the force came from a February 2008 recommendation of the Defense Science Board Permanent Task Force on Nuclear Weapons Surety. The GDF is designed to sustain nuclear expertise among the B-2A and B-52H units and create a balance between their nuclear deterrence mission and current conventional operational requirements.

"We are using the GDF to provide a focused training venue so that we can increase nuclear experience and the readiness of our force. ... But we intend to retain conventional ability and credibility also," said Col. James Dunn, nuclear enterprise director for Air Combat Command.

The GDF construct calls for the Air Force's two B-52H bomber wings, the 2nd Bomb Wing at Barksdale AFB, La., and the 5th BW at Minot AFB, N.D., to switch in and out of the GDF on one-year intervals. During the year in the GDF, the respective B-52H wing will focus primarily on training for the nuclear deterrent mission; each of its two operational squadrons will spend an interval of six months of that year specifically concentrating on that training.

The 2nd BW is now in the GDF with its 96th Bomb Squadron first up for the nuclear concentration. The initial GDF rotation of B-52s is not for a full year, as the 2nd BW will conclude its stint already at the end of March. When the 5th BW takes over in April, it will be for a full year.

The service's sole B-2A wing, the 509th BW at Whiteman AFB, Mo., is part of the GDF at all times, but some of its elements will continue to support conventional Air and Space Expeditionary Force (AEF) deployments or the four-month rotations to Guam, where the US maintains a continual bomber presence to dissuade aggression in the Pacific.

The units of the B-52H wing outside of the GDF will continue to be a part of AEF deployments to support conventional operations in places such as Southwest Asia, or will deploy to Guam.

To support the GDF, the Air Force is bringing back to combat status about one dozen B-52Hs that had been maintained in a lesser state of readiness so that it may establish a fourth B-52H operational squadron, for proposed basing at Minot. Initial operations of the squadron are anticipated at the end of September, but are dependent upon the completion of the environmental impact analysis.

nuclear bombs.

The Minuteman IIIs fall under 20th Air Force, headquartered at F. E. Warren AFB, Wyo. This numbered air force manages the 90th Missile Wing at F. E. Warren, 91st MW at Minot, and 341st MW at Malmstrom AFB, Mont. Each wing has 150 Minuteman IIIs.

The B-2s and B-52s fall under 8th Air Force, headquartered at Barksdale AFB, La. The lone exception is Air Force Reserve Command's 93rd Bomb Squadron, a combat-coded B-52 unit at Barksdale that is transitioning to become the Air Force's B-52 training squadron. Eighth Air Force's B-52s are divided between the 2nd Bomb Wing at Barksdale and the 5th BW at Minot. Its sole B-2 wing, the 509th BW, is located at Whiteman AFB, Mo.

While all of 20th Air Force is transferring over to Strike Command, not all elements of 8th Air Force will join the B-2s and B-52s. Eighth Air Force's intelligence-surveillance-reconnaissance aircraft will not transfer. Neither will its command and control platforms nor its cyber functions. ACC will redistribute them to other organizations. The cyber mission will move under Space Command's 24th Air Force, a new organization.

While a transfer of fielded forces is anticipated at or around the time Strike Command begins initial operations, the Air Force is moving deliberately because the nuclear mission is so critical, the officials said.

"This is the nuclear business," said Alston, architect of the roadmap, and now a leading figure in its implementation. "We are not going to transfer responsibility to operate forces in 20th Air Force and 8th Air Force until the commander of Global Strike Command says he is ready."

In the case of the bombers, for example, not all command functions will shift from ACC until perhaps the time when Strike Command reaches full operational capability, said Dunn. This means that, upon assuming initial operations, Strike Command would focus primarily on its duties as a component major command to support US Strategic Command, while ACC still handles the administrative elements of the bombers' operations.

The 2018 Bomber?

The Air Force wants to field a new nuclear-capable bomber around 2018. Right now, ACC is establishing the re-

USAF photo by SrA. Alexandra Sandoval

An Air Combat Command nuclear surety inspection team evaluates a Barksdale AFB, La., weapons load team from the 2nd Maintenance Squadron.

Regardless of Size

The changes that the Air Force is making to bolster its nuclear stewardship are meant to be equally effective regardless of any changes in the size of the service's bomber and ICBM forces.

"Indeed, I would argue that our commitment to this mission needs to be independent of size," said Air Force Secretary Michael B. Donley during a Nov. 12, 2008 speech at the Center for Strategic and International Studies in Washington, D.C.

But if President Barack Obama does reduce the size of the nation's nuclear forces, he should keep in mind that maintaining the flexibility of options across the deterrent "becomes even more important," Donley said.

That's why the nuclear-capable bomber leg would still have a valuable role to play, along with the land-based ICBMs and submarine-fired ballistic missiles, because it "complicates attack planning and allows the United States to signal, to deploy forces without fully committing [them]," he said.

Obama has said that his Administration will "maintain a strong deterrent as long as nuclear weapons exist." But it will otherwise "stop the development of new nuclear weapons," and "seek dramatic reductions in US and Russian stockpiles of nuclear weapons and material."

The United States is already obligated under the 2002 Moscow Treaty to reduce the number of its deployed strategic nuclear warheads to between 1,700 and 2,200 by the end of 2012, but is expected to meet that goal by the end of 2010.

quirements for the aircraft. But as Strike Command comes on, its commander will play a leading role in the process, just as he would be expected to be at the forefront of advocating any other Air Force nuclear program, said Alston.

Strike Command's role will not be strictly nuclear; it will also be responsible for supporting STRATCOM's conventional global strike missions. Unlike Strategic Air Command, the new command will not have embedded ISR, command and control, or tanker assets.

While Air Force Space Command anticipates eventually relinquishing all functions related to the ICBM force, Air Combat Command will retain some functions tied to the bombers. Among them, Dunn said, ACC will remain the lead for ensuring that the B-2s and B-52s can continue to integrate with the combat air forces in nonnuclear roles to support theater commanders and contingencies.

"There is no doubt that ... our priority is on the nuclear mission of those bombers, but they also have immense conventional capability that we want to retain," he said.

The Air Force has F-15E and F-16 fighters that can strike with nuclear weapons, if called upon. These will not be moved under Strike Command, however. And USAF's B-1 bomber force, capable today only of conventional missions, will remain under ACC.

Strike Command will be supported by the Air Force Nuclear Weapons Center, which opened in 2006, but is being expanded under provisions of the nuclear roadmap.

From 1950 until 1995, the Air Force maintained one central hub for nuclear sustainment at Kelly AFB, Tex. A base-closure decision in 1995 led to the shutdown of the base, and sustainment functions thereafter have been dispersed.

In the early 2000s, the Air Force realized that nuclear sustainment had become too fragmented and could lead to problems. This led to creation of AFNWC to be the center of excellence for these activities and primary interface with the Department of Energy for nuclear weapons.

However, in the wake of the 2006 errant shipment of Minuteman III components to Taiwan—a slip-up that came to light only last March—the Air Force decided to do even more with the center to streamline the sustainment.

"We are totally involved," said Brig. Gen. Everett H. Thomas, AF-

USAF photo by Joe Davila

A Minuteman III ICBM blasts away from Vandenberg AFB, Calif., toward a test target near the Kwajalein Atoll in the Marshall Islands.

NWC commander, of the center's strengthened role during a November interview. Thomas assumed his post in April 2008.

This involvement starts from the very first inkling about sustaining a nuclear weapon system, Thomas said, referring to this comprehensive approach as "lust-to-dust" vigilance.

The center is now the hub for ensuring the safety, security, and reliability of Air Force nuclear weapons as well as the certification of nuclear delivery systems and integration of their equipment. (ICBM sustainment moved from Air Force Space Command under AFNWC's authority last May.)

To support this oversight, the center is adding about 280 personnel, including growing its professional staff from 14 to 98, he said. The expanded staff will have expertise in areas such as contracting, plans and programs, requirements, systems engineering, and logistics.

The center is also taking over responsibility from the Defense Logistics Agency for all Air Force nuclear weapons-related materials and will exercise positive inventory control over them. Lack of PIC was cited in reviews such as Donald's as a contributing factor in the errant shipment of Minuteman III components to Taiwan.

Further, to bolster the sustainment chain, the commander of Air Force Materiel Command is now "the single voice for nuclear sustainment" and the biggest advocate for its funding across the Air Force, Thomas said.

More To Come

Some changes are yet to come. For example, Alston said, when the time comes, any new-start nuclear-related major acquisition programs likely would be moved under the authority of the AFNWC as opposed to residing in an Air Force product development center, as they have in the past.

Now that the A10 office has stood up—its formal activation date was Nov. 1, 2008—the focus is on fortifying its role, said Alston. The office reports directly to the Chief of Staff. Creation of the office elevated nuclear matters to the highest levels of the Air Force, replacing the post-Cold War organizational construct in which no general officers across the Air Force occupied themselves daily with nuclear issues.

The A10 will always be closely integrated with other functions on the Air Staff, but it is "growing more organic capacity," said Alston. For example, he intends to build a robust capacity in-house for generating nuclear requirements. Functions such as nuclear security will also come under the control of his office.

USAF photo by SrA. Alexandra Sandoval

Gen. Norton Schwartz, USAF Chief of Staff, speaks to maintainers at Barksdale about their mission.

Alston said there is "a sense of common purpose" across the Air Staff in reinvigorating the nuclear mission. "I have got nothing but great support for everything that I am doing," he said, adding that he has had "fantastic access" to Donley and Gen. Norton A. Schwartz, USAF Chief of Staff.

The A10 head will also be the executive secretary of the new Nuclear Oversight Board that is chaired by the Air Force Secretary and Chief of Staff, and includes members such as USAF's inspector general and the heads of the major commands with nuclear responsibilities. The board is expected to meet quarterly; its inaugural session took place Dec. 10.

"Job 1 is to implement the roadmap, and ... this is also going to be a key body by which we expose progress," Alston said of the NOB.

Alston's office is also solidifying relationships with the Air Force's defense and interagency partners in the nuclear mission such as the Defense Threat Reduction Agency and Department of Energy's National Nuclear Security Administration. And it is ironing out how to best support Strike Command and the Air Force Nuclear Weapons Center, he said.

The A10 will also partner with the senior-level civilian who will occupy the post that is being created in the Office of the Undersecretary of the Air Force with responsibility of policy oversight for nuclear matters in the Secretariat.

The Air Force spends about 3.5 percent to five percent of its annual budget on the nuclear mission. This amount is expected to grow. But Alston said right now it is difficult to look at dollar figures and draw meaningful conclusions as to how they reflect the Air Force's commitment to the nuclear mission.

This is because the service's forthcoming Fiscal 2010 multiyear budget plan focuses on accelerating existing programs and standing up a fourth B-52 operational squadron for the GDF. "We are not advocating for new starts of programs at this time," he said.

Observers will be able to glean better insights in the next full budget cycle when the Air Force is able to take "a more proactive stance with regards to nuclear requirements," he said.

Just as finding headquarters personnel for Strike Command will be a challenge, so, too, will be finding qualified personnel to populate the A10 and the expanded AFNWC fully, Alston said.

Nuclear specialties will receive new authorizations as the Air Force grows from an active duty end strength of 316,000 to 330,000.

"The authorizations do not become the challenge. It is the talent and the nuclear expertise that becomes the challenge. We need to ensure that we have the right guys in the right jobs," said Alston. ■

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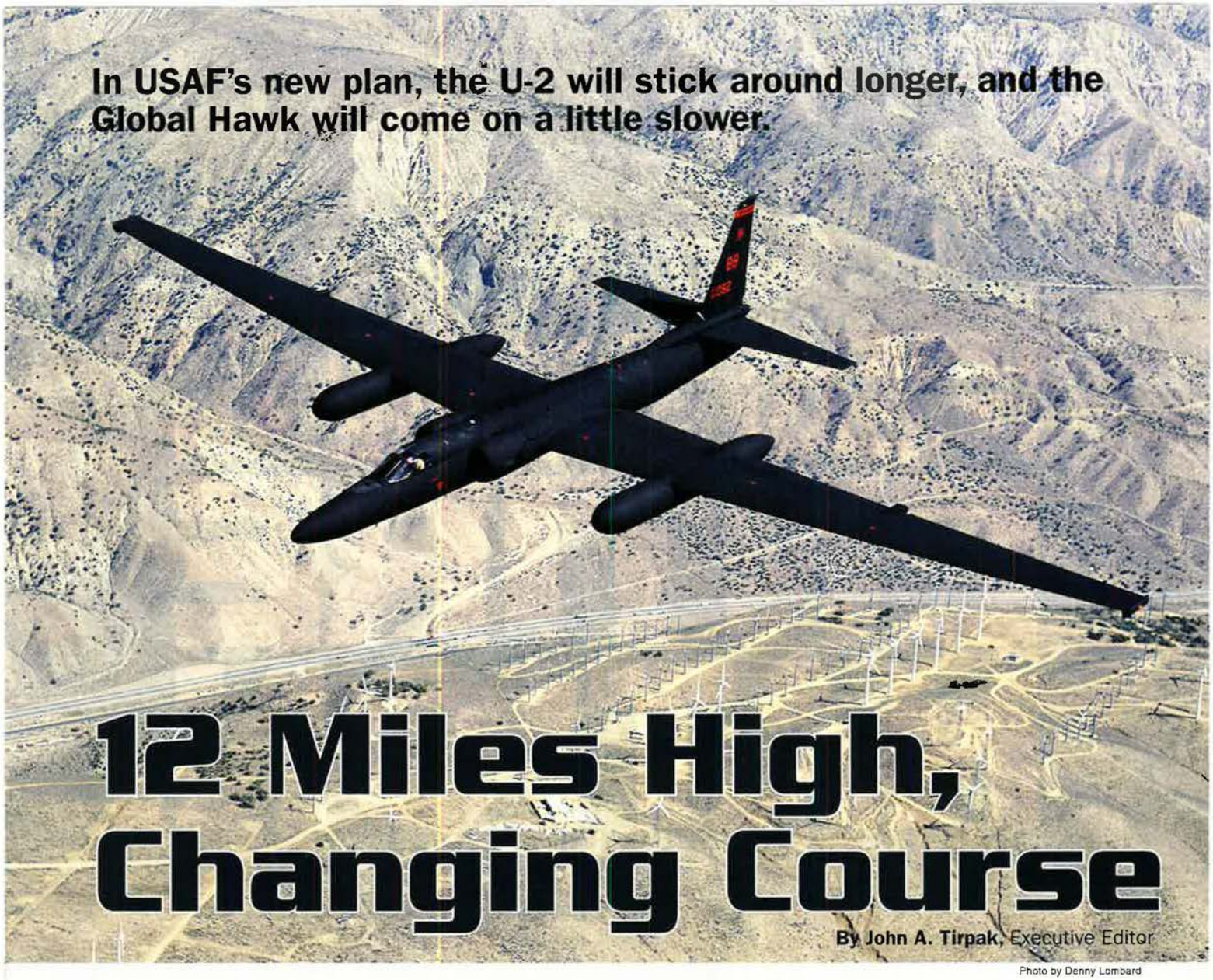
In USAF's new plan, the U-2 will stick around longer, and the Global Hawk will come on a little slower.



12 Miles High, Changing Course

By John A. Tirpak, Executive Editor

Photo by Denny Lombard

The reports of the imminent demise of the venerable U-2 spyplane are proving to be greatly exaggerated.

Initially, USAF had planned to retire every one of these intelligence-surveillance-reconnaissance (ISR) aircraft no later than 2012. Now, the Air Force says it is firming up a new scheme that would keep the high-flying, Cold War-era U-2 aircraft in front-line service until 2014, at least.

This is not the result of sentimentality. USAF needs more time to bring to maturity the U-2's designated successor—the new RQ-4 Global Hawk unmanned aerial vehicle.

"The technologies aren't quite ready yet for Global Hawk to pick up the load," explains Lt. Gen. David A. Deptula, Air Force deputy chief of staff for ISR.

USAF once regarded the RQ-4 as a complement to U-2, said Brig. Gen. Robert P. Otto, commander of the 9th Reconnaissance Wing, Beale AFB, Calif., the unit that operates both airplanes. Then, said Otto, the cash-strapped service decided to retire the U-2 "once the Global Hawk meets our agreed capabilities."

However, that is taking longer than anticipated. Thus, said Deptula, "we are modifying our high-altitude transition program."

Deptula added that he had no real doubts that the RQ-4 eventually would replace the U-2 and shoulder all of the high-altitude reconnaissance mission, and believes only that it's "going to be a bit longer than the current plan."

Thus, the U-2 will be flying for quite a few years yet.

The U-2 and Global Hawk are often mentioned in the same breath. There is a common misperception that, except for the fact that the U-2 carries a human pilot and the Global Hawk does not, the two aircraft are virtually interchangeable. This is not so.

They both fly at very high altitudes. Both aircraft carry a variety of sensors. Yet the two machines are marked by major differences. Each has capabilities that the other lacks, and their ISR products do not completely overlap.

The U-2 can stay airborne for half a day at altitudes of around 70,000 feet. Its highly advanced sensors suck up electronic signals, electro-optical and infrared images, and high-resolution synthetic aperture radar pictures.

The Air Force has a total of 33 U-2 aircraft. The entire fleet has just undergone a lengthy series of upgrades comprising, among other things, installation of a new digital cockpit and new engines. These and other improvements have brought every U-2 up to the most advanced U-2S configuration.

The U-2's main limitation is the endurance of the pilot. During the Cold War, typical missions lasted about nine hours and were strictly scripted. Aircraft rarely deviated from "the black line"—the planned route.

Over the past few years, though, missions have grown steadily longer, and now flights of more than 11 hours are not uncommon. This is a result of increased "dynamic taskings": flight operations in which the pilot deviates from the flight plan to add additional, pop-up ISR targets to a mission.

The U-2's unique feature is the optical bar camera sensor, which takes extremely fine-detail photos of broad swaths of terrain. This camera is a "wet" system that produces actual color film on rolls that are thousands of feet long. Once the rolls reach the ground, technicians process the film and then digitally scan it so that the images can be passed to commanders. It is stored for later search and comparison.

So voluminous are these data—measured in terabytes—that the information is put on discs for storage and transport; it would choke a Web server.

Left: One of 33 modernized U-2S reconnaissance aircraft over California. Below: An RQ-4 Global Hawk is readied at Beale AFB, Calif.

Meanwhile, non-film intelligence can be transmitted from the U-2 while it is still aloft, in near real time. It can, in a fast-moving situation, transmit directly to a joint terminal attack controller 13 miles below.

Staring Overwatch

The Global Hawk is a different story. It emerged in the 1990s as a developmental system. There was immediate recognition that this aircraft offered unprecedented powers to maintain persistent, "staring" overwatch of a given area. It can cruise at about 60,000 feet, and remain airborne for 30 hours straight.

In the wake of the Sept. 11, 2001 attacks, the Air Force put the still-developmental RQ-4 to work over Afghanistan, and pressed for models with more versatility and power.

The current operational version is the RQ-4A—known as the Block 10. This UAV carries the Integrated Sensor Suite, which includes synthetic aperture radar and moving target indicator—not unlike the equipment of the E-8C Joint STARS—as well as a high-resolution electro-optical digital camera with an advanced infrared sensor.

Unlike the U-2, however, the RQ-4A's optical field of view is narrow. In the words of one analyst, observing the battlespace with the RQ-4A is like "looking through a soda straw."

USAF today flies a total of seven RQ-4A aircraft. Air Force plans call for flying these first models through 2011. They would then enter a replacement cycle, supplanted by the first of an eventual fleet of 70 RQ-4Bs.

The B variant will have more capabilities and provide the basis of Block 20, Block 30, and Block 40 upgrades.

The Air Force would buy these aircraft through the middle years of the 2010-19 decade.

The new airframe has a longer wingspan, thicker fuselage, and more powerful engine. The increased size offers a sensor payload 50 percent greater than that of the RQ-4A, and features better sensors with the ability to collect radar, EO/IR imagery, and signals intelligence all at once.

Flight testing of the Block 20 and development of sensor payloads for the Block 30 are under way. The RQ-4B will eventually carry the Air Force's most sophisticated ground-mapping radar with moving target indication, the Multiplatform Radar Technology Insertion Program, or MP-RTIP.

The optical bar camera has many fans, particularly at the highest levels of government, because its wet film resolution is, as Otto noted, "still better

USAF photo

Staff photo by John A. Tirpak

Left: A U-2 pilot—this one is Lt. Col. Eliot Ramey, 99th Reconnaissance Squadron commander—must be sealed in a spacesuit and then wedged into a tight cockpit for sorties that can last more than 11 hours. Below: Capt. Stephen Mathews flies a practice RQ-4 mission using nothing but a keyboard and mouse, as Tim Burns, a contractor from Northrop Grumman, looks on.

Staff photo by John A. Tirpak

than anything we can get through digital imagery," which is all the RQ-4 takes.

Can the Air Force make the RQ-4 everything the U-2 is today?

"Not necessarily, no," said Deptula. "But then, the U-2 isn't what the Global Hawk is."

Deptula noted that the drone's ability to stay aloft for 30 hours at a time and transmit products in near real time is highly valuable. So, while it's not a one-for-one replacement, the RQ-4 brings capabilities that the U-2 simply doesn't have.

Still in Fine Fettle

The Air Force is looking to UAVs to perform more missions where persistence offers value. Air Combat Command recently launched a broad analysis of alternatives on how UAVs can pick up additional roles traditionally handled by manned aircraft.

No particular technical problem would force the U-2 to the boneyard, according to Col. Stephen P. Sheehy, 9th Maintenance Group commander at Beale, which is responsible for both the U-2 and RQ-4.

While the U-2's sensors do suffer from some "vanishing vendor" problems—in which some of the parts are no longer made—Sheehy said that's typical throughout the Air Force, and is an issue for the Global Hawk as well. It's "nothing we'll ever get away from," he said.

He went on to note that the U-2, "structurally, is in better condition" than some F-15s and F-16s in frontline service.

Studies carried out by Air Force Materiel Command and Lockheed Martin, the U-2 prime, say the airplane could soldier on for another 15 years or so. That is because its flight profile is relatively gentle—pilots can't pull more than two Gs because of the long, fuel-laden wings—and it is usually "parked" at high altitudes, where buffeting is minimal.

Of Beale's 33 U-2s, most are of 1980s vintage, though a handful date to 1968. "Flying, [you] can't tell the difference," Sheehy said.

Indeed, the real issue is the sensor package. How long does the Air Force want to keep funding hard-to-maintain systems that are of a type different from those on the RQ-4?

At the 9th Wing, Otto noted, pilot training for the RQ-4 and U-2 has been largely merged. Student pilots for each aircraft "attend core academics together ... and then they branch off" into their specific weapon systems.

Getting Up There, and Getting Down Here

U-2 pilots show up for a mission about two hours before becoming airborne. Because missions can last 12 hours, crew rest of 12 hours prior to a flight is carefully timed.

It takes just about five minutes for a U-2 pilot, assisted by life support technicians, to get sealed into the orange pressure suit that will keep him or her alive at extreme altitude. Once it's airtight, the pilot must breathe 100 percent oxygen for at least an hour prior to becoming airborne. This practice helps prevent nitrogen bubbles in the blood from giving pilots "the bends" upon landing.

The U-2 pilot must also quaff large quantities of water, via a long straw snaked through a one-way flap in the helmet, to prevent the dehydration that comes with breathing pure oxygen.

To taxi, the pilot must keep the U-2 balanced on a set of bicycle landing gear. He or she is assisted on takeoff by "pogos," detachable wheels that keep the fuel-laden wings off the ground. On takeoff, they fall away, and are collected and reused. The pilot can't see the horizon once the U-2's long nose is raised, so another U-2 pilot, chasing close by in a sports car, calls on the radio with observations of the aircraft's attitude and condition.

The U-2 roars off the runway and ascends like a rocket, but will take up to an hour to reach cruising altitude, depending on how crowded the intervening airspace is.

On landing, the sports car again chases the U-2, the pilot inside calling out the number of feet until touchdown for the pilot in the cockpit. The airplane is flown to a total stall, so a second pair of eyes outside the airplane is crucial.

Once the aircraft has settled down, the U-2 pilot must work the rudders, ailerons, and throttle to keep the wingtips off the ground during taxi.

Finally off the runway, the pilot slowly allows one wingtip to touch the tarmac. Titanium skids on the bottom of the wingtip prevent damage, but the skids show barely any wear, such is the skill of the U-2 pilots.

Some savings have been achieved by consolidating the schools.

The Navy flies early RQ-4As as demonstrators for its Broad Area Maritime Surveillance program, which will field RQ-4Bs. Navy UAV pilots also have trained at Beale. The Air Force and Navy are considering making this arrangement permanent.

Otto also believes the Air Force and Navy could save serious money by coordinating their RQ-4 and BAMS operations. On a recent deployment of RQ-4s to US Central Command, Beale sent the aircraft first to NAS Patuxent River, Md., and used the Navy's BAMS equipment to land, service, and relaunch the RQ-4s from there.

Gen. Carrol A. Chandler, the commander of Pacific Air Forces, and Gen. Roger A. Brady, the commander of US Air Forces in Europe, have expressed interest in partnering with other countries on use of the RQ-4. Germany is buying the airplane; Australia, Canada, and South Korea have shown strong interest in doing so.

"I think there's a lot of opportunity for synergy with the Navy ... BAMS program, and I'm pushing for commonality of equipment so that Navy pilots and sensor operators could help us with our airframes and we could help them with theirs," Otto asserted. Cooperation can make the overseas aircraft's "footprint"—the people and equipment necessary to operate from a forward location—"as small as it can be," he added.

Beale's operators and maintainers have also learned a lot from nonstop deployments of the still-developmental RQ-4 to Southwest Asia. The first deployment to Guam, for example, required 26 maintainers and 11 pallets. The next one took just 12 maintainers and two pallets, along with some "modest prestationing of equipment" at the facility, Otto reported.

Support Problems

The RQ-4 Global Hawk, as the product of an advanced concept technology demonstration, has at times been difficult to support, Otto acknowledged.

"We rushed the Global Hawk into service without shaking it out fully, without understanding the repair problems, and quite frankly, that's [been] the Achilles' heel of the Block 10," he admitted. Support has been an issue "not so much for the airframe, but for the sensors." Otto said there has never been enough test equipment to support both operations and the test program at once, and "we need to do better on that."

The 9th Wing has put top priority on making sure a sufficient number of airplanes are available when the

USAF photo

At 70,000 feet, the U-2 pilot gets a grandstand view of the curvature of the Earth. Radar and infrared sensors can cut through the clouds for a clear picture of the ground.

Split Remote

The RQ-4 uses "split remote" operations. That means a Launch and Recovery Element gets the aircraft airborne and later lands it at the forward operating base. In between, it is flown remotely by pilots back at Beale, in the Mission Control Element. The aircraft is flown with keyboard and mouse; no joystick is involved. Flight status is displayed on one screen while mission and sensor information is displayed on others. This feed can be sent anywhere the operators wish to direct it.

Because the RQ-4 flies much of its mission autonomously, an exquisite series of communication links must be functioning properly before a launch can take place. The aircraft must have a solid connection to UHF, GPS, and Inmarsat satellites, and have a solid link to the LRE housed nearby in a transportable "shelter" (they're not called "cockpits") and the MCE at Beale.

Once given the go-ahead, the RQ-4 rolls on its own, almost magically following the yellow line on the taxiway, using a high-fidelity GPS signal. After it lines up on the runway, and after a last double-check of connections, the LRE releases the brakes and the aircraft accelerates to takeoff speed. Almost immediately after getting airborne, its engines become almost too quiet to hear. Indeed, they are hardly noticed in the traffic pattern above the base.

Once the aircraft is safely airborne and checked out, the MCE takes over the RQ-4. As automated as the craft is, a trained pilot is still needed to communicate with civil air traffic control and safely navigate controlled airspace as the RQ-4 ascends to its operating altitude. Even after years of operations, the Federal Aviation Administration has yet to grant permanent permission for RQ-4s to transit the skyways; waivers must be obtained on a weekly basis.

During the mission, the pilot sends the RQ-4 where it is to go, and the aircraft's onboard processors decide how to get there, using engine and aileron inputs (the aircraft has no flaps). The sensor operator, seated next to the pilot, coordinates the combination of sensor activations needed, and passes the data in near real time to whoever has requested it.

Pilots and sensor operators fly their own "black line" but likewise deviate at the request of the air operations center to respond to urgent calls from troops in contact to provide signals and imagery information. It can overlay this information, providing the first true near-real-time hyperspectral image.

combatant commanders ask for them, and so have sometimes had to operate with less than enough airplanes for training, Otto said. Because RQ-4 is still a new system and not yet at maturity—indeed, initial operational test and evaluation will only get going this summer—there simply aren't enough spare parts to go around.

Sheehy said that of the seven RQ-4 airplanes, three are always available for the combatant commander's use. Two more fully operational aircraft are at Beale for pilot training, and, typically, the other two are not fully mission capable. One is likely to be flyable but incomplete due to a missing sensor part, and the other is usually being cannibalized. The parts are sent forward to the RQ-4's combat operating location in the CENTCOM area of responsibility.

A comprehensive spare parts pipeline wasn't created when RQ-4 was rushed from development to front-line service because the Air Force never intended to operate the system as anything other than a short-run stopgap. The parts problem should be addressed with the arrival of Block 20 and later versions.

To keep the combatant commander fully equipped, when it came time to do major repairs and maintenance on the initial RQ-4s, "we did a swap out," Otto said. Beale-based airplanes were sent to CENTCOM, and the war-weary aircraft came home for service. If the aircraft had been kept in theater, they might have been out of action for "weeks, perhaps months."

Ramping Down U-2 PDM

Moreover, if most of the aircraft back at Beale are down for service issues, Otto said pilots will be sent forward and actually fly combat missions as part of their training program. An experienced instructor is always sitting next to the pilot, "and neither one of them is in harm's way" if something goes wrong. The students get the most realistic training possible, and it adds to efficiency.

"What does the taxpayer want? They want effectiveness, and 75 percent of Global Hawk's hours have been supporting combat operations. That's a pretty good [measure] of effectiveness," Otto said. The RQ-4 and similar UAVs offer "some opportunities as an Air Force to rethink some of the traditional notions" of where it is appropriate to conduct training.

Sheehy said one of the key factors in whether the U-2 could go on beyond 2014 is the contractor, Lockheed Martin.

Programmed depot maintenance on the U-2 is done at Lockheed Martin's facilities. The Air Force does not have an organic capability to do this work.

Once PDM is stopped, Lockheed has said there's no going back, Sheehy noted. The Air Force has already told Lockheed that it is ramping down U-2 PDM, and has slid from six aircraft per year to four. To go back up to five would be possible, but it would take months, Lockheed Martin officials told Sheehy.

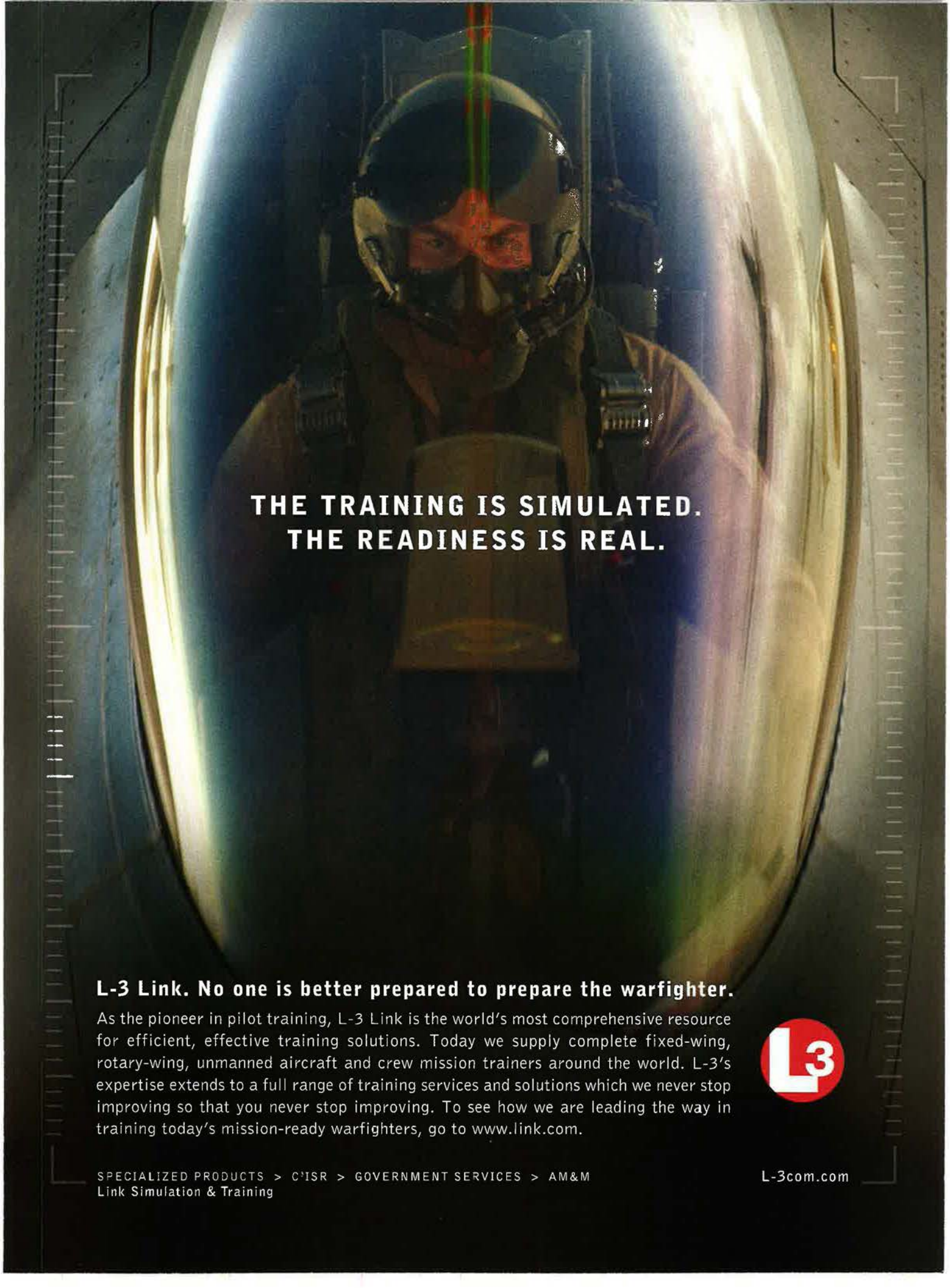
However, Sheehy believes that Beale should be the central location doing RQ-4 maintenance and phase inspections.

With 30-hour endurance and thousands of miles of range, "you can fly anywhere in the world [and] back to Beale on one sortie," he said. That makes more sense than setting up many repair locations wherever the aircraft is being based at the time, he asserted. He sees Beale as the worldwide "center of excellence" for RQ-4—for the Air Force, Navy, and foreign customers as well.

Based on nearly a decade of Air Force experience with the RQ-4, Sheehy doesn't expect that the mainly composite aircraft will have any trouble lasting a long time.

"I think ... Global Hawk will fly a lot longer than people expect. We have two aircraft past 5,000 hours, [and] a third approaching 5,000 hours, and they are still going strong." The airplanes are performing well, he said, and the only issue is that the paint doesn't stick to the composite fuselages very well. Northrop Grumman, he said, never expected to paint the airplanes, but Sheehy said paint is necessary to keep moisture from getting into the composite structure.

"Moisture is the 'rust' of a composite," he said. ■



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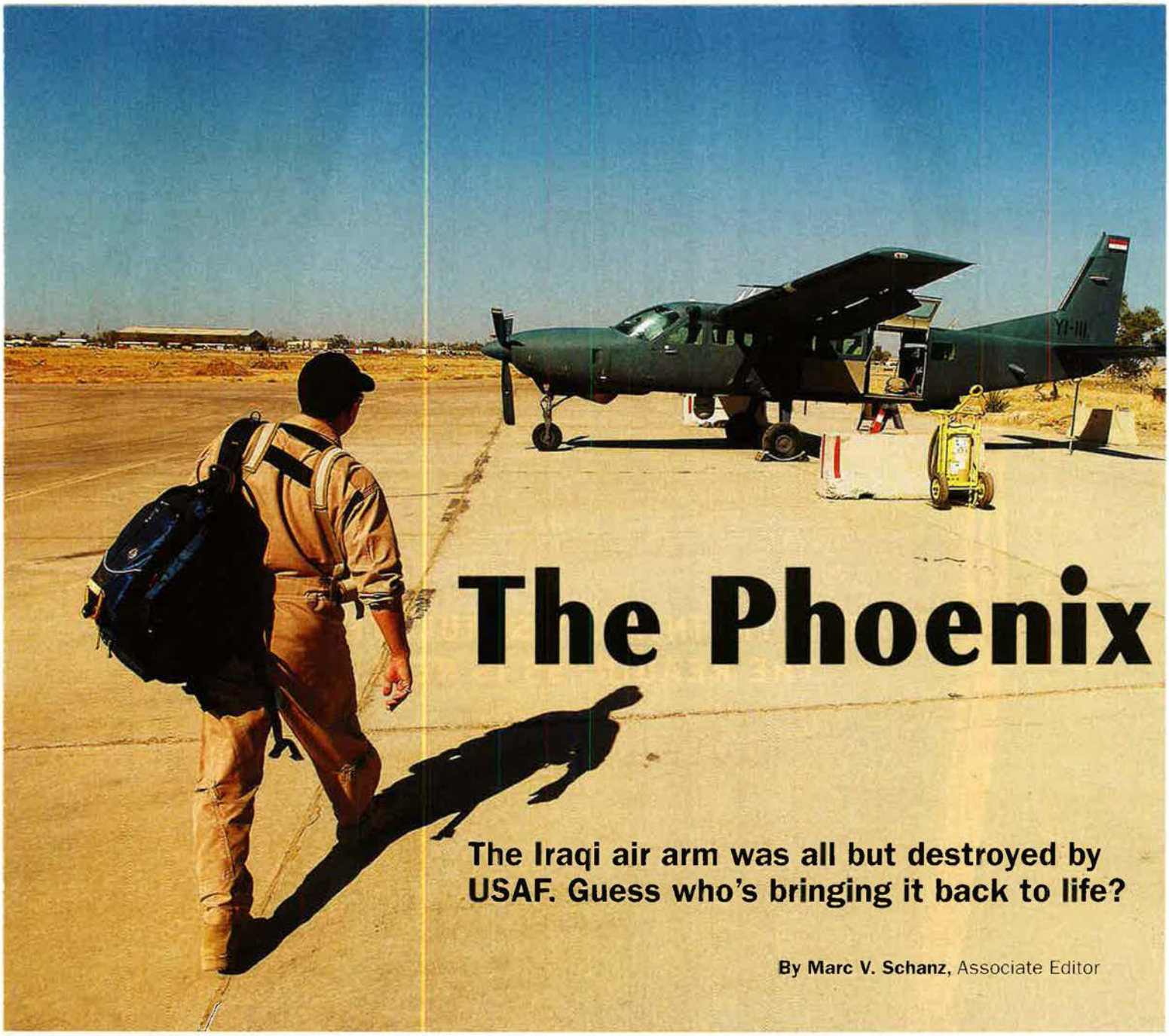


The Phoenix

The Iraqi air arm was all but destroyed by USAF. Guess who's bringing it back to life?

By Marc V. Schanz, Associate Editor

As he starts up the engine of a Cessna 208B Caravan in Baghdad, Lt. Col. Nathan Brauner is at pains to inform those on board that this flight to Kirkuk, while short, should not be considered routine. He achieves his goal with a few well-chosen words: "If we go down, and if you can't drink it or can't shoot it, leave it behind."

The Cessna that Brauner pilots bears the markings of the Iraqi Air Force. He is taking it north to the Kirkuk Regional Air Base. There, he advises US trainers in what is now a critical mission: the resuscitation of Iraq's battered but still breathing airpower arm.

The Iraqi Air Force—known as IqAF—was once the world's sixth largest military air arm. As recently as 2006, however, it was close to nonexistent, having been all but destroyed in two deadly encounters with the US Air Force. By early 2007, IqAF was down to a scant 30 sorties a week.

The task of turning around this situation was handed to a new unit, the Coalition Air Force Transition Team (CAFTT).

Maj. Gen. Robert R. Allardice, who commanded CAFTT until early 2008, recalled what things were like when he arrived in Baghdad: IqAF had 700 troops, 28 flyable aircraft, no basic training system, no training curriculum, and no functioning air operations center.

By early 2008, change was noticeable. With the help of advisors, the Iraqis had built up to a force of some 1,350 troops and had 450 students in the basic training pipeline. Of more importance was the fact that IqAF's optempo had risen to about 300 sorties a week.

Today, the size of IqAF has doubled again to about 2,100 airmen. The service hopes to meet an interim end strength goal of some 6,000 troops by the end of this year, on its way to a final target strength of 18,000 in 2020. Sorties are up, too.

As of Nov. 8, IqAF had 78 aircraft. This total included eight Cessna 172 and three Cessna Caravan 208B fixed wing aircraft and five Bell Jet Ranger and 10 OH-58 helicopters, all for training.

Iraqi officials have plans to build their fleet to about 174 aircraft by the end of 2010. The fleet also includes 17 Mi-17 and 16 UH-II helicopters (flown by IqAF squadrons based at Taji), one

USAF photo by SSgt. Aaron Allmon

Force

King Air LTA, and three C-130Es, all for battlefield mobility.

IqAF has moved to buttress its battlefield intelligence-surveillance-reconnaissance capability in particular. Included in the current force for that purpose are eight CH-2000, three Cessna Caravan 208B, and four King Air fixed wing aircraft for ISR missions.

The Iraqi Air Force expects to take delivery of 14 additional aircraft in early 2009, including Bell Jet Rangers, Cessna 172s, and Cessna Caravans for training. The acquisition will also include a King Air ISR platform and two armed Cessna Caravans.

Those two Caravans will give Iraq's air force a ground attack capability for the first time since the fall of Saddam's regime. The armed Cessnas, dubbed "Combat Caravans," were to arrive in December with Hellfire missile kits.

Even as the coalition nations embark on a force drawdown, airmen helping to build Iraq's air force are seeing their mission grow in importance, along with the size and capabilities of the recuperating service.

"We're here to help build a credible and enduring air force," said Col. Sean M. Frisbee, CAFTT chief of staff, in November in Baghdad.

Frisbee describes the CAFTT's work as a process of "shrink and share"—as US forces draw back, teams of advisors and support personnel integrate with Iraqi units and allow them to slowly take over operations.

Building a Force

The Air Force will be a factor in Iraqi security for some time to come. Still, USAF seeks to build up its Iraqi counterpart such that it can, on its own, deter external aggression, and act as appropriate to help maintain internal security.

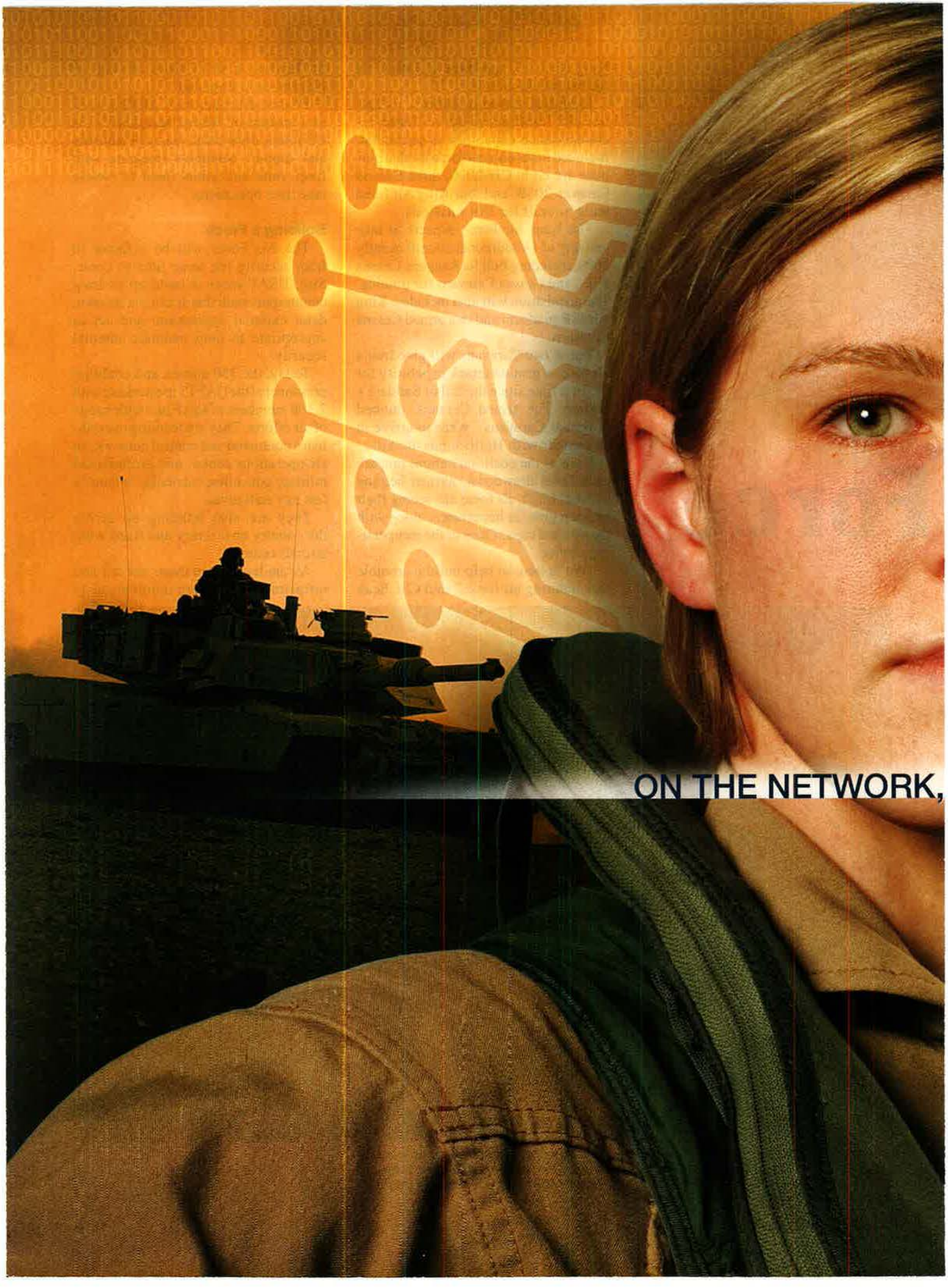
Today, the 350 airmen and coalition personnel of the CAFTT are working with 2,100 members of IqAF in a wide range of air efforts. They are teaming to establish a command and control network, an air operations center, and professional military education curricula, to name a few key initiatives.

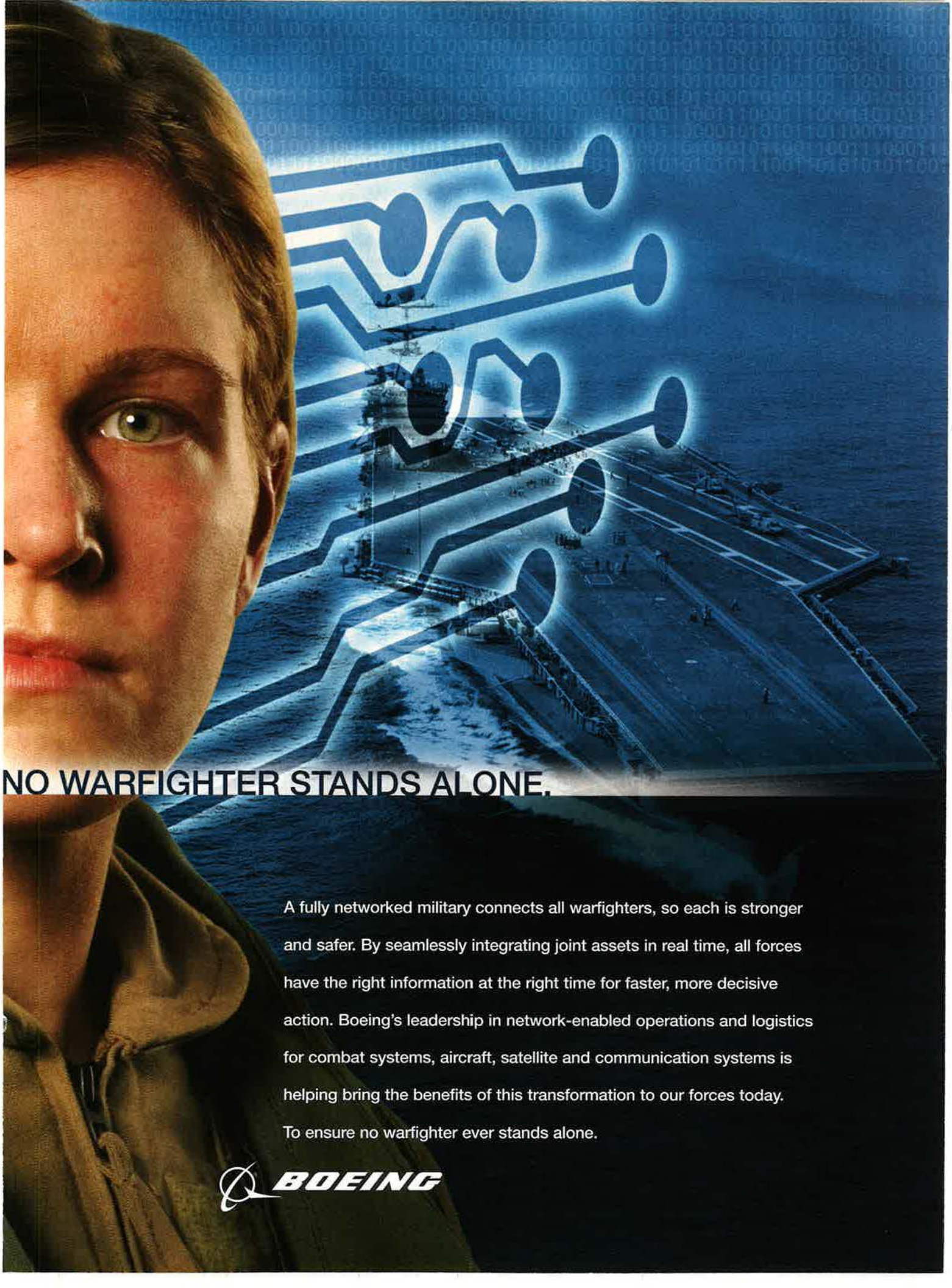
They are also standing up across the country new rotary and fixed wing aircraft centers.

As the Iraqis gain more aircraft and infrastructure, they are simultaneously

USAF photo by A1C Jason Epley

Left: An Iraqi pilot heads to an Iraqi Air Force Cessna Caravan he will fly on a training flight with a USAF instructor. Above: An Iraqi UH-1H Iroquois (l) and an Iraqi Mi-17 Hip at Joint Base Balad. Both helicopter types are being used by the Iraqi Air Force for personnel movement missions.


ON THE NETWORK,


NO WARFIGHTER STANDS ALONE.
A fully networked military connects all warfighters, so each is stronger and safer. By seamlessly integrating joint assets in real time, all forces have the right information at the right time for faster, more decisive action. Boeing's leadership in network-enabled operations and logistics for combat systems, aircraft, satellite and communication systems is helping bring the benefits of this transformation to our forces today. To ensure no warfighter ever stands alone.
BOEING

USAF photo by SrA. SerMae Lampkin

The King Air 350I aircraft, shown here between missions at an Iraqi base, is currently the most advanced ISR aircraft in Iraq's fleet.

integrating into the force new pilots, engineers, and maintainers. Many older Iraqi pilots are expected to retire—Frisbee points out that 148 pilots in IqAF today have more than 10 years of flight experience, but by 2018, the number is expected to dip to 83.

The key to the future of the Iraqi Air Force—oft repeated by Iraqis and advisors—is a buildup of well-trained personnel.

Today, youth is in heavy demand; the average age of the Iraqi airman is 45 years. Many are about to retire and collect pensions, so most effort is directed at recruiting younger troops who will form the nucleus of the future force. Iraqi lieutenants going into pilot training today will be in leadership roles in just a few years.

"We're helping to build the foundation for the future of this force," Frisbee said.

Once, before the Gulf War, IqAF was a force filled with Soviet-produced fighters and bombers. Those are mostly gone. The workhorses of today's Iraqi Air Force are far less conspicuous on the military ramp at Baghdad Airport—now known to Iraqis as New Al Muthana Air Base.

Take, for example, the King Air 350. The Iraqi Air Force possesses several of these twin-engine aircraft, three of which recently were lined up on the base runway. One had just returned from a surveillance mission along the Iranian border, flown by Iraq's own ISR airmen.

These kinds of missions are flown all the time—routes up and down the Iranian border, collecting data and learning how to operate the equipment, said Maj. Bryan Lee, the director of operations for the 321st Air Expeditionary Advisory Squadron.

IqAF uses Baghdad as the hub for the operation of two squadrons—Squadron 87, which flies King Airs, and Squadron 23, which uses US-built C-130Es.

Lee—a B-1B pilot by background—and several other advisors and sensor operators work every day with seasoned Iraqi pilots who just a few years ago were flying MiG-23s, MiG-25s, and other Soviet bloc fighters.

Intelligence in High Demand

"They're great guys, great pilots," Lee said, noting, "Many of the guys I was trying to bomb, now I want to work with them."

In late 2008, the Iraqi King Air crews became mission capable. Two Iraqi pilots and a sensor operator flew their first full ISR mission in early November. The sensor package aboard, including a synthetic aperture radar, infrared, and ground moving target indicator, is among the most advanced equipment in the Iraqi portfolio.

And the data gathered is in high demand at the Iraqi Ministry of Defense and Army units. Lee called the ISR aircraft remarkably similar to USAF's RC-12 Liberty, which USAF is expecting to deploy to the theater.

"We go off and practice with the [ground station operators, and we'll radio and say,] 'Around that next corner is a guy with an AK-47; be careful,'" Lee said of the Iraqi sorties. "We're constantly working the communications piece between here" and wherever the ground stations are deployed.

In Kirkuk, a city on the edge of Iraq's Kurdish region, the young Iraqi Air Force is making more great strides.

Three Cessna Caravan 208Bs flying out of Kirkuk Regional Air Base, supplement IqAF's ISR capabilities by performing daily missions in support of a wide range of Iraqi operations.

Lt. Col. Jean Havens, commander of the 521st AEAS, works with former MiG and Mirage pilots flying in Squadron 3. Squadron 3 is the unit responsible for the Iraqis' primary ISR aircraft, the Cessna Caravan.

The first three Caravans were delivered in mid-2007. As of Nov. 1, the squadron had flown more than 1,180 sorties in the airplanes, for a total of 2,310 hours. The aircraft supports Iraqi Army forces and conducts surveillance of power lines, oil pipelines, and other infrastructure, Havens explained.

In October, Caravan ISR support was instrumental in aiding heavy Iraqi special operations raids in and around Mosul, where Iraqi forces targeted and rolled up 25 "high-value" human targets using information gathered by IqAF, according to Havens.

"The Iraqis just got those Caravans about a year ago; now they are flying 75 percent of their operational missions," said Lt. Col. Robert Schreffler, the 521st director of operations. The Iraqis "perform very well with it."

Operational success aside, the Iraqis and American advisors are constantly working to iron out cultural and organizational differences.

The work includes making sure ISR assets are used in an efficient manner, setting up processes properly, and pushing airmen and field commanders to make decisions without "kicking things upstairs" to senior leadership. (The Iraqi Minister of Defense can monitor King Air ISR feeds from his desk.)

Capt. Emery Breznai, director of maintenance with the 521st, said he works with older Iraqis and younger recruits on "level 1" maintenance skills such as launch, recovery, preflight checks, and other activities. A contractor provides the more involved back shop maintenance.

"We have to keep our minds in the right place," Breznai said of the training challenges. "Let the Iraqis handle the problem as best they can."

Maintainers—just like pilots—must go through tough English language training since much of the technical data on aircraft in the Iraqi force is not available in Arabic. Iraqi officials hope to be able in a few years to conduct basic maintenance

USAF photo by SSgt. Jason Serrit

A USAF maintainer moves to secure an Iraqi Air Force C-130E Hercules during a sandstorm. Iraqi officials want the IqAF to conduct all basic maintenance operations itself.

organically, and only contract on heavy depot-level repair, Breznai added.

Aviation culture can be transmitted, but it takes time.

"Many of these guys are older, and more experienced than me, ... but we were there to help transition to a 'manual driven' air force, and I am there to share what I know," said Capt. Steve DeHaas, a C-130 evaluator pilot from the 61st Airlift Squadron at Little Rock AFB, Ark., and a CAFTT veteran. "You earn trust, and by the end of it, these guys are asking you questions."

IqAF has had battlefield impact. In March, IqAF C-130s played a key role in resupplying Iraqi Army and Interior Ministry troops fighting in Basra during a pitched battle fought between Iraqi military forces and elements of Moqtada al-Sadr's Mahdi Army. The Sadrist forces were routed.

While only three Hercules are currently in the Iraqi inventory, they are heavily tasked with resupply missions and medical evacuation flights.

Iraqi Major Gassan (some Iraqis, for reasons of security, would provide only their first names) is one of Squadron 23's C-130 maintenance officers. He said much of the basic maintenance on the airlifters is done on the ramp or in the hangar.

If necessary, the airlifters can be sent to Jordan for programmed maintenance. Spare parts availability continues to be a problem, though, as the desert is hard on aircraft and parts wear out at a fast clip. Still, Gassan and others do their best to work around problems.

In the new Air Force, older pilots train for new missions with new tactics.

At Camp Taji, a former Republican Guard airfield north of Baghdad, US advisors work with rotary wing pilots to prepare for challenging nighttime operations. These Iraqi special operations forces use the Mi-17 Hip helicopters.

Needed: More Supplies, Logistics

At the squadron building, Iraqi pilots and crew were gathered after dinner to discuss operations and missions. Members of the 15th Squadron went through the night assault mission certification process. While Mi-17 crews have been flying evacuation and transport missions in small numbers, advisors with CAFTT's 721st AEAS are helping prepare them for more advanced missions such as these. Pilots and crew must fly eight sorties to be certified to use night vision goggles, said Maj. Ryan Campbell, an advisor and UH-1 pilot deployed from Andrews AFB, Md.

Near-term plans call for IqAF's Squadron 15 to train exclusively for insertion operations with Iraqi Special Forces units, says Col. Abdel Salaam, a veteran Iraqi pilot.

Not all of the pilots are certified yet, and getting the opportunity to fly brief three-to-four-hour sorties is difficult. "More training and supplies and logistics" are the things that they could use, he said.

Maj. Scott McArtt, a T-6 instructor from Columbus AFB, Miss., and Lieutenant Jawhar, an Iraqi trainee, climb into a waiting Cessna 172, run through checklists, and take off for a training flight over Kirkuk. This is the lieutenant's sixth flight in the 172. The training pipeline, critical to the IqAF's future, is benefiting from major investment as new facilities, simulators, and aircraft are moved to the northern Iraq base.

"We've come a long way," recalled Capt. Jamie Riddle, another training advisor from Mississippi. "I was in the initial cadre when we first started. ... We had aircraft, a sawhorse, a tent, and a few computers. ... Now we're up and running."

After initial screening, Iraqi pilots use state-of-the-art simulators to hone basic skills before moving to the flight line. Trainees first fly about 56 sorties in the 172 before progressing to the 208 Caravan. As of late 2008, the training program at Kirkuk had 39 undergrad students in a one-year curriculum, with four Iraqi instructors.

Brauner, now on his fourth deployment in the CAFTT organization, leads the 52nd Expeditionary Flight Training Squadron. He said the rapid expansion of the force means there is very little room for error. Older members of the Iraqi Air Force who received professional military education were mostly Ba'ath Party members, Brauner said. Most of them fled after the war started, he added.

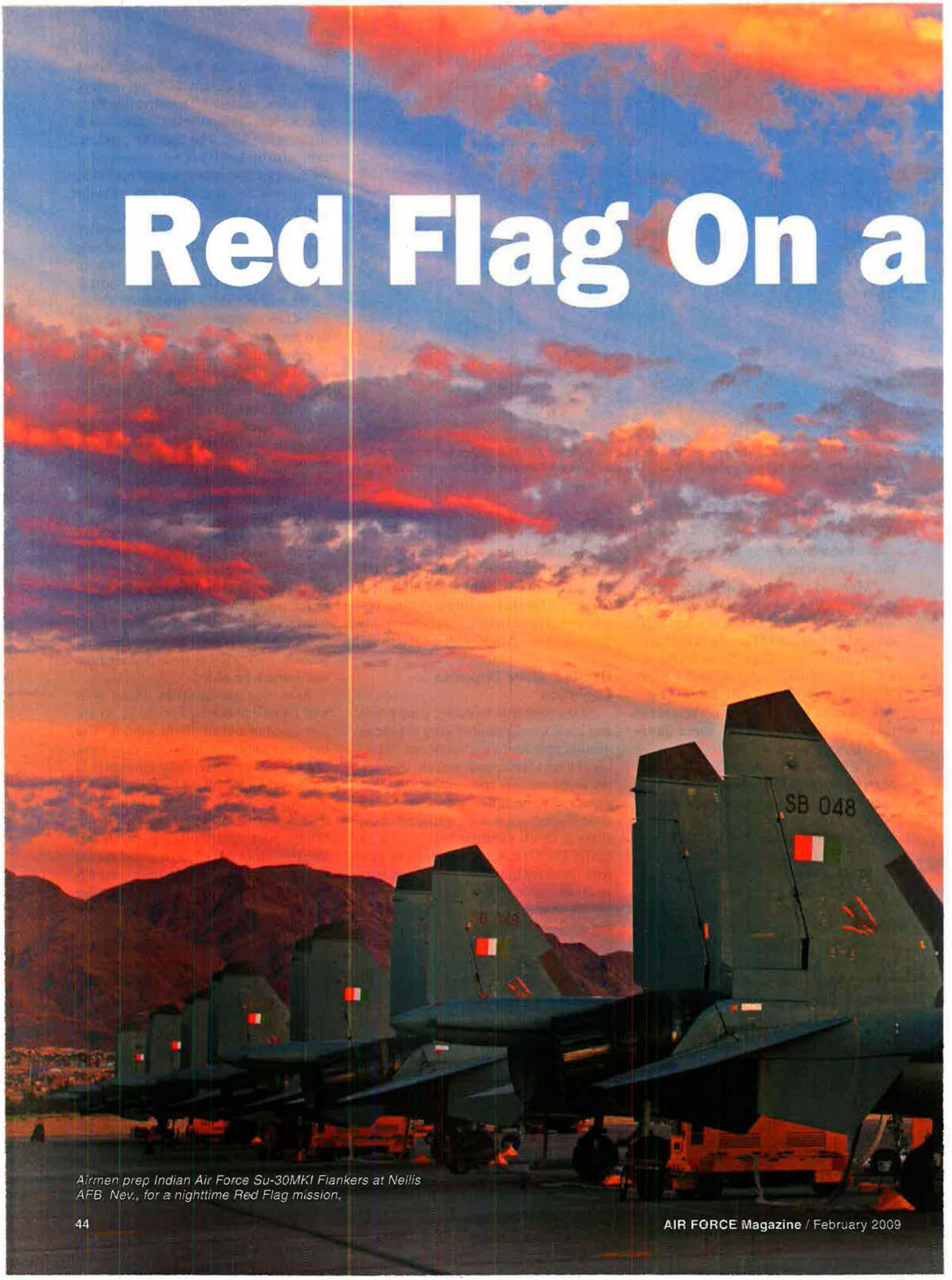
Assuming no attrition, those who will be colonels in a decade or so are just coming out of flight school. The new recruits have initiative; they have drive, said Brauner. "My emphasis is putting the new blood to work."

Colonel Kareem, head of the Iraqi training squadron at Kirkuk, is a veteran Mirage pilot from the old regime. He and his family members fled Baghdad for the north during the turmoil following the US invasion in 2003. He returned when the US and Iraq began to rebuild IqAF.

With a training curriculum in place and more facilities and infrastructure on the way, Kareem said he is eager to get fresh pilots. Things are different from what they used to be, he said. "We are looking for a new kind of pilot," he said, noting many of the pilot candidates need to have advanced English language skills and degrees in science or engineering.

The young Iraqi pilots have an eagerness to learn. "We've done a lot [already], and I want to make sure that the pilots flying today have the skills to take over when I am gone," said Kareem. "They are the new air force." ■

Red Flag On a

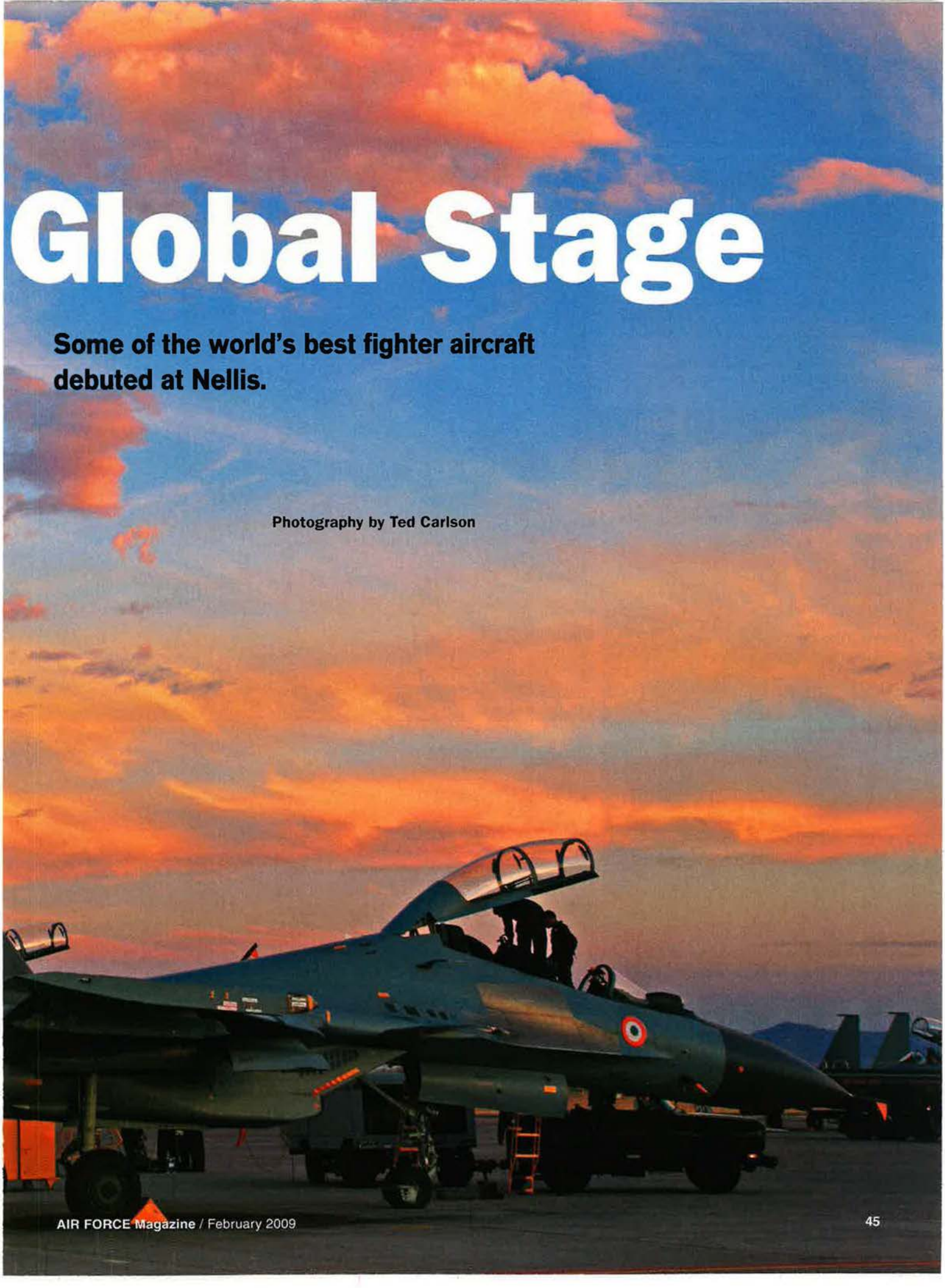


Airmen prep Indian Air Force Su-30MKI Flankers at Nellis AFB, Nev., for a nighttime Red Flag mission.

Global Stage

Some of the world's best fighter aircraft debuted at Nellis.

Photography by Ted Carlson



Three of the world's most powerful fighters have premiered at Red Flag. They are: India's Su-30MKI Flanker; the French Rafale; and South Korea's F-15K, the most advanced version of the Eagle. They were matched with and against operational F-15s and F-16s from USAF in two weeks of exercises meant first to practice large force-on-force battles and then a simulated air campaign. The airmen involved are still digesting what they learned at the August event, with all players emphasizing their own successes. ***[1]*** *An Eglin AFB, Fla.-based F-15D gets a once over before launch.* ***[2]*** *Indian Air Force ground support personnel gear up a Flanker for a mission. India brought eight Su-30s, two Il-78s—a tanker and an AWACS-type variant—and an Il-76 Candid cargo aircraft. Prior to Red Flag, the IAF airmen "spun up" for a week at Mountain Home AFB, Idaho, getting accustomed to high altitudes and the dramatic terrain.*

[3] *An F-15E from RAF Lakenheath, Britain, gets airborne.* ***[4]*** *An F-16CJ of Eglin's 53rd Wing, which flew suppression of enemy air defenses sweeps, but carried air-to-air weapons as well.* ***[5]*** *A Nellis-based Aggressor F-15C of the 56th Squadron, wearing two-tone desert camouflage, pops the brakes after landing.*

I1I Wing Commander Anup Kumar Sen of the IAF flies an Il-78 Midas tanker during a Red Flag mission. I2I A trio of 64th Aggressor Squadron F-16s, with camouflage simulating that of several air forces, gets ready to rumble. The Viper's power and small size can simulate a wide variety of threats. I3I Three of the four French Rafale fighters of EC01.07 squadron that made the trip to Nellis. The Rafales flew with air-to-air armament including MICA radar missiles. I4I A Navy EA-6B Prowler, among those that provided SEAD and jamming support. The Prowlers came from NAS Whidbey Island, Wash. I5I The IAF Flankers have thrust-vectoring nozzles and canards for increased agility. The Flanker is larger than the F-15, but in the right hands, is equally deadly.

[1] Indian flight and ground crews display their Midas tanker. [2] An Aggressor F-15 shows off its wrap-around desert camo. Both Eagles and Flankers flew in full operational configuration, with drop tanks, pods, and weapons, for a more realistic experience. Some visitors to Red Flag fly in "clean" configuration, sporting only imaginary weapons, to enhance performance. [3] A 48th Fighter Wing F-15E taxis back for a postflight check. [4] A Flanker goes wheels-up on takeoff. Note the Litening II targeting pod behind the main gear. The license-built pods were supplied by Israel, and are similar to pods in USAF service. Russian-designed fighters, once handicapped only by inferior electronics, are now the equal of their Western counterparts, thanks to collaboration on avionics. [5] An F-15C of Eglin's 33rd Wing, bristling with air-to-air Sidewinders and AMRAAMs.

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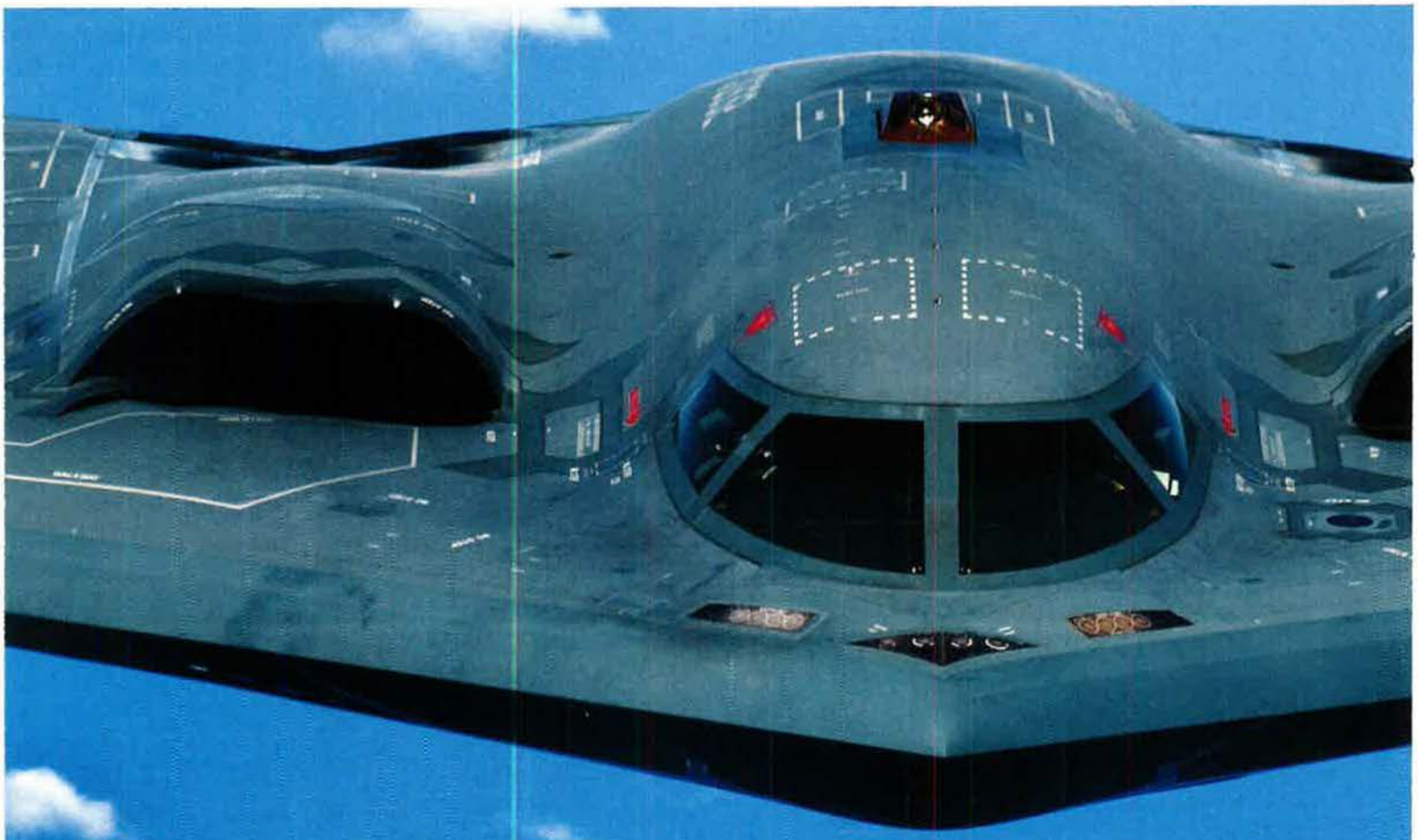
I1I A French pilot slides into his two-seat Rafale B. France also flies a naval variant of the Rafale from its aircraft carriers. Despite years of aggressive marketing, France has yet to win a foreign customer for the Rafale, which was the first non-US fighter to have some stealthy attributes. I2I An E-3B returns to Nellis after a mission. The AWACS are essential in managing the wargame and providing warning that "the bad guys" are coming. I3I A Florida Air National Guard F-15A on afterburner. The ANG unit flew air cover with both A and C model Eagles. I4I In some scenarios, "Red Air" such as this Aggressor F-15 can regenerate and get back in the fight, and allow for multiple engagements per day. I5I The 492nd's "squadron bird" touches down. Although Nellis is facing some "encroachment" issues from nearby civilian construction, the range's premier air combat training space remains a national treasure.

[1] A Flanker from the IAF taxis past a USAF F-15 during a Red Flag exercise. [2] A South Korean F-15K Slam Eagle. The factory-fresh aircraft look externally similar to their F-15E Strike Eagle brethren in USAF service, but carry powerful active electronically scanned array radars not unlike those in the F-22. [3] An F-15C of the 58th Fighter Squadron—the "Gorillas"—loaded for any air-to-air threat. [4] The Prowler has a crew of four, and sometimes flies with a mixed Navy-USAF crew, as the two services jointly use the aircraft. That will end in the next couple of years when the Navy retires the aircraft in favor of the EA-18G Growler. [5] Many squadrons have evolved unique salutes, as this Viper pilot of the 57th Fighter Wing demonstrates. Note his joint helmet mounted cueing system, which enhances situational awareness and allows targeting missiles off-boresight.

I1I Flankers of India's 20 Squadron deployed to Nellis and were assigned air-to-ground missions, aided by their Litening II pods, as well as some air-to-air engagements. These were not handpicked crews, but an operational squadron, with rookies and experienced crew members alike. USAF pilots got to see what a thrust-vectoring Flanker can do—both at long range and at the merge—in the hands of everyday pilots. I2I The Il-76MD airlifter that accompanied India's contingent. It can open its cargo door in flight to drop pallets or parachutists. I3I A ROKAF Slam Eagle awaits a night sortie on the Nellis ramp. I4I To get to Mountain Home, then Nellis, the IAF Flankers transited Turkey, France, Portugal, and Maine. The international participants in Red Flag flew largely as a coalition; it was not intended to be a "bowl game" of the world's best fighters. ■



The Murky Future of

Why, after 35 years, does the US have fewer than 150 stealth aircraft?

Stealth aircraft have been around a surprisingly long time—35 years. The F-117 had its beginning in a 1974 design contest. By the time the last one retired last year, three more stealth aircraft types—the B-2, F-22, and F-35—had been built or were in the works.

Stealth had moved from the pages of obscure physics journals to preeminence in USAF's arsenal.

Proof of the high value of "low observable" airplanes also has been around a long time now. It emerged in the 1991 Gulf War, when a handful of F-117s accounted for 40 percent of all attacks on strategic targets. The Air Force ever since has believed stealth should define its combat air forces.

For all that, the nation's track record on buying low observable aircraft has been dismal. The Pentagon acquired fewer than 60 F-117s. The Air Force was allowed to procure only 21 B-2 bombers—not 132, as originally planned. USAF has been cleared to acquire 183 F-22s; that is 198 short of what the service considers a minimum requirement.

True, Pentagon plans call for buying as many as 4,000 stealthy F-35s for the Air Force, Navy, and Marine Corps, as well as select allies. None are yet operational, however, and that proposed number seems bound to shrink.

On the other hand, at least the Air Force has some LO aircraft. Nearly four decades into the stealth era, the Navy and the Marine Corps have none. The Army is even further behind.

Why, after 35 years of development, does the US have fewer than 150 stealth aircraft on its ramps? The reason does not stem from technology. It stems from politics.

Stealth thrived when it had friends in high places. In the 1970s and 1980s, backing for the secret technology crossed party lines and remained strong and durable through the Nixon, Ford, Carter, and Reagan Administrations. The reason was the demand of national security. Soviet fighters and surface-to-air missiles had evolved to a point at which some feared the B-52 might not be able to reach its targets in the Soviet Union. Credible deterrence was at stake.

A B-2 Spirit from Whiteman AFB, Mo., soars over the Pacific Ocean.

USAF photo by TSgt. Cecilio Ricardo

Stealth

By Rebecca Grant

Harold Brown, Jimmy Carter's Secretary of Defense, and William J. Perry, his undersecretary of defense for research and engineering, saw the problem without any difficulty. "By the mid-1970s," Perry recalled in a speech, "NATO and the United States were looking at a Soviet Union with parity in nuclear weapons and about a threefold advantage in conventional weapons."

Perry noted, "Many in the United States began to fear then that this development threatened deterrence."

Stealth and a series of nascent information technologies were at the center of Brown's so-called "offset strategy." The information technologies would go on to blossom as enhanced situation awareness, better intelligence-surveillance-reconnaissance, and full-fledged precision attack. However, US forces still had to have a way to get an aircraft close enough to the targets, and that's where stealth came in.

When Perry learned of DOD's secret low observable aircraft work, he concluded that, if stealth worked, it would give the Air Force an "overwhelming advantage." He told the director of the Defense Advanced Research Projects Agency that he "would have all the resources needed to prove out the concept as quickly as possible," Perry later recounted in a talk.

Air Superiority—and Stealth

On Perry's watch, the F-117 program leaped from development to fielding after Lockheed's design beat a Northrop contender.

Then, in 1980, USAF began its competition for the Advanced Technology Bomber. Northrop beat Lockheed this time, and went on contract for what became the B-2 bomber.

President Reagan took office on Jan. 20, 1981. The former California governor had campaigned on a platform of renewing American military power. He wanted superiority—and among other things, that meant stealth.

Reagan's Secretary of Defense, Caspar W. Weinberger, became a staunch supporter of stealth for the same reasons that made believers of Brown and Perry.

Soon after he was sworn in, reporters asked what surprised Weinberger most about the Pentagon. "The principal shock was to find out, through daily briefings, the extent and the size of the Soviet buildup and the rapidity with which it had taken place—in all areas, land, sea, and air," Weinberger replied.

Weinberger, during his years as a tight-fisted, budget-cutting senior official in the Nixon Administration, had earned the nickname "Cap the Knife." When it came to stealth, though, Weinberger was no penny-pincher. He met with Air Force officials running the B-2 program every quarter. Even as the bomber struggled through requirements changes and unprecedented development challenges, Weinberger made sure dollars were never holding the program back.

The Weinberger Pentagon was so sure about stealth that it even backed a high-risk Air Force program to develop a supersonic stealth fighter—then known as the Advanced Tactical Fighter.

The early stealth programs were immensely complicated, but strong leadership and a clear calculation of national interest allowed the programs to press on through their difficult times. This continued to be the case, for the most part, in the George H. W. Bush Administration of 1989-93.

When Bill Clinton won election, Perry returned to the Pentagon as the No. 2 official. He rose to become Secretary of Defense, 1994 to 1997. His policy of preventive defense embraced the regional politics of the post-Cold

DOD photo

Secretary of Defense Harold Brown speaks at a press conference in 1980. The Nixon, Ford, Carter, and Reagan Administrations all supported stealth.

Lockheed Martin photo

Have Blue, a low-signature, experimental, subsonic airplane powered by two J85-GE-4A engines, led to the development of the F-117.

War and pushed Pentagon streamlining. It also underscored the importance of dominant military power, even with smaller forces.

The F-22 was completing system development in preparation for the production first flight in late 1997. While Perry was in place, the stealth fighter was safe.

The Air Force opted to cease purchases of non-stealthy fighters in anticipation of an F-22 force that could replace F-15s—and some F-16s—at a rate of one-to-two. The desired end state was a smaller but more capable force.

Research for what became the F-35 began under Perry's supervision, too.

Not long after he left, however, support for the F-22 faltered. The 1997 Quadrennial Defense Review cut the program deeply, and against Air Force wishes, for the first time.

Still, the 1997 QDR left open a chance for the Air Force to request more F-22s at a later date.

William S. Cohen, the next Defense Secretary, was no foe of stealth either. He scolded Congress in 1999 for threatening cancellation of the F-22 program.

"Canceling the F-22 means we cannot guarantee air superiority in future conflicts," Cohen wrote in a letter to Rep. Bill Young (R-Fla.) in July 1999. Cancellation, he went on, would "have a significant impact on the viability of the Joint Strike Fighter program."

Perry explained: "The F-22 will enable the [F-35] to carry out its primary strike mission. The Joint Strike Fighter was not designed for the air superiority mission, and redesigning it to do so will dramatically increase the cost. An upgraded F-15 will not provide this dominance and will cost essentially the same as the F-22 program."

However, the relatively bloodless regional wars of the 1990s had cooled American fervor for advanced technology, and, equally dangerously, made fighter and bomber modernization appear a relatively low priority.

The Essential Point of Stealth

To close observers, the 1999 Kosovo air war should have reconfirmed the valuable role of stealth against unexpected regional adversaries. It didn't, despite the stellar combat debut of the B-2 bomber and the surprise loss of an F-117.

The B-2 was the first aircraft to employ the GPS-guided Joint Direct Attack Munition in combat. It was the only platform capable of conducting precision attacks in all weather.

Serbian airspace was not a friendly place. The old Soviet Union was gone, but its "threats" were not. Ten years after the fall of the Berlin Wall, airmen were still scrambling to defeat Soviet exports. Serbian air defenses gave NATO aircrews a taste of the risks.

What was different about this air war was that NATO airmen faced a significant number of older SA-3s and SA-6s in the former Yugoslavia's arsenal. The missiles continued their attacks, sporadically, during most of the campaign. The integrated, upfront blow—a la Desert Storm in 1991—was not possible in the former Yugoslavia. For example, politics dictated that a pesky pair of early warning radars in Montenegro was off-limits. They functioned throughout the 78-day air campaign.

Stealth was designed in part to break free from the increasingly complex battle of electronic countermeasures. As RAND analyst Benjamin S. Lambeth wrote of the conflict: "The F-117 and B-2, with their first- and second-generation stealth features, now allow [commanders] to conduct vital operations in the most heavily defended enemy airspace [where] no number of less-capable aircraft can perform at acceptable risk."

That was the essential point of stealth.

In fact, the B-2 was the only asset sent into combat without accompanying radar-suppression aircraft. On one

USAF photo

F-117s hold for takeoff at Holloman AFB, N.M. The Nighthawk's retirement has left the nation with just 150 operational stealth aircraft.

particular occasion, two B-2 pilots earned Distinguished Flying Crosses for completing a bombing mission on a night when all other attack aircraft, including suppression of enemy air defenses assets, were grounded due to bad weather.

Not that stealth aircraft got a free pass against air defenses: One F-117 was shot down, probably by an SA-3, but its first generation stealth technologies were far from state-of-the-art by 1999.

Stealth was well-suited to retaining technological superiority even in an era of diverse, regional threats. After development of the F-117, USAF specifically aimed to make its stealth platforms capable of a wide range of missions. The goal was to position stealth bombers and fighters as the centerpiece of USAF's 21st century force structure.

Take the transition from the F-117 to the B-2. The F-117 was a breakthrough, but its original mission was deliberately limited in scope.

The Nighthawk's mission "was to carry two laser guided bombs to strike missile sites in Eastern Europe and leave. That was it," said retired Lt. Gen. Richard M. Scofield, who was program director for the F-117 and later for the B-2. The F-117 lifted avionics and subsystems from other aircraft and wrestled in its early years with difficult maintenance challenges.

In contrast, the B-2 was designed for a full set of nuclear and conventional missions from the outset, and built sturdy to take its place in the force structure for decades.

A few years later, the F-22 requirement was set. As far back as 1983, USAF pinned substantial technological hopes on the F-22 as the major frontline replacement fighter.

The plan was for stealth aircraft to incorporate advanced radar, onboard imaging, defensive systems, and all the best avionics the American aerospace industry could offer.

"We are now looking at an aircraft with tremendous advances over existing systems, including fully integrated defensive and offensive avionics, greatly reduced observables, efficient supersonic cruise, a significant increase in fuel efficiency, greater range, ... and high maneuverability provided by integration of systems, new aerodynamic design, and vectored thrust," said Gen. Robert T. Marsh, commander of Air Force Systems Command.

However, somewhere along the line, the stealth aircraft began to be seen as expensive luxuries, rather than mainstream force structure necessities.

Photo by David Dillman

An F-22 from the 27th Fighter Squadron, 1st Fighter Wing, Langley AFB, Va., performs maneuvers using full afterburner.

Cost was no doubt a factor. The price for maturing technology and conquering the unknown was hefty. Cost influenced curtailment of F-117 procurement, and became lethal for the B-2.

Yet the choice was not attractive.

Quality or Quantity

Had USAF not chosen stealth in the 1970s, the alternative was to go cheap. In an era when the Soviet Union could field 7,000 aircraft, buying cheaper fighters in large quantities—to account for high attrition—was seen by many as a valid approach.

The Air Force chose quality over quantity. Analysis and experience suggested quality alone would allow USAF to get its job done, but the hankering for a low-cost fighter lives on even today.

Aiming for quality has caused USAF to pay a penalty, it seems, for aspiring to acquire topline capabilities, even in a smaller force.

Contrast the decade-long beating the Air Force has taken over its F-22 plans with the case of the Navy.

Stealth aircraft have been flying for more than 30 years but the Navy has never operated them—not entirely by choice. The A-12 stealth attack jet aircraft, which went belly up in 1991, compelled the Navy to move quickly to procure the F/A-18E/F Super Hornet or face a dearth of carrier-capable aircraft. The Navy could not afford to wait.

Left with no other option, the Navy successfully fielded the Super Hornet, which has proved to be a capable near-term fleet solution.

Yet few—even in the Navy—would argue that the Super Hornet is a good "Day 1" choice to send into heavily defended airspace. The Navy's derivative approach may have proved successful precisely because it was modest.

The stealth and other advantages in the F-22 were the path to a smaller, much more capable, and ultimately a more affordable force.

Recent Pentagon overseers have been content with a simpler aircraft, however. So, in part, what happened to stealth was that the Pentagon lost its desire to pursue the best in airpower.

Viewing stealth aircraft as luxuries sets a dangerous course.

What was never adequately explained to the public was that the F-22 was not intended to replace legacy fighters on a one-for-one basis. The F-22 program was to replace more than 700 legacy fighters. The Air Force in the 1990s set a requirement for 442 Raptors to meet that need (since revised to 381), but the Pentagon has mandated repeated cuts. The program of record called for only 183 F-22s at the end of 2008.

Only the F-35 has stayed out of the comptroller's doghouse. On the surface, the F-35 appears to be a bargain because its cost can be amortized over nearly 4,000 aircraft for US and international customers.

Lockheed Martin photo

The F-35 Lightning II has stayed out of the political doghouse—so far. An early test flight of the stealthy attack fighter is seen here.

The final factor holding back stealth is relatively novel. It is the idea that stealth is about to be countered and that, as a result, investment in the F-22, F-35, or a next generation bomber will be moot.

The Soviet Union talked about countering stealth as soon as the B-2 came out of the black world. "For every action, there is a reaction," Marshal Sergey F. Akhromeyev said at the National Press Club in Washington, D.C., in July 1989, days after the first flight of the B-2. Akhromeyev, who was the Soviet Union's top military advisor to President Mikhail Gorbachev at the time, left no doubt that his country would be taking measures to counter stealth.

Stealth engineers have known all along that their work was about a series of trade-offs that could greatly increase tactical advantages for US airmen. Engineers testing cruise missiles in the 1960s observed that low-frequency radar could pick up smooth, stealthy shapes. The idea for the B-2, for example, was that it might be detected fleetingly, but ground controlled interceptors would not be able to establish a track of sufficient quality to engage the bomber.

A Subtle Business

Discussion of countering stealth centers on two topics. The first is how to unmask the radar signature reduction attained through stealth. The second is whether the radio portion of the spectrum—often referred to as the RF spectrum—is still where the fight is. Some contend that infrared will become the next detection arena.

Unmasking radar is a subtle business. If stealth is a handful of methods for altering the expected return to the radar, then counterstealth has to overcome those measures.

There has been great exaggeration about countering stealth. It is based in part on a lingering misconception that stealth aircraft are not detectable. The aircraft were never intended to be invisible, nor was it claimed they would be. What the F-117, B-2, and F-22 designers aimed to do was to overturn the existing tactics for air defense. They did so in several ways:

- Herding radar returns into controlled patterns so that, instead of radiating 360 degrees, the attacking aircraft had minimal spurts of radar return in known areas—which would be pointed away from threat radars, or too fleeting for steady detection and tracking.
- Developing onboard systems for locating threats and showing the aircraft's "best face" to them.
- For the B-2, optimization to fly at high and low altitude.
- With the F-22, combining stealth with extended flight above Mach 1, known as supercruise.

Thus the counters to stealth have always been part of the advanced design concepts. Every low observable feature—from design and coating to seal and antenna—is evaluated for its strengths and weaknesses. Continued maintenance and testing of fielded low observable aircraft is like a daily reminder of the integrated balance required for stealth.

Among the stealth trade-offs, infrared signature is one of the classics. Reducing infrared emissions is difficult, but has long been a design requirement for low observable aircraft. Advances in adversary infrared search and track capabilities are certainly something to keep an eye on.

Against surface-to-air missiles, the challenge is not much changed: delay or obfuscate tracking. Here the continued advantages of stealth still place a nearly insurmountable burden on the defender.

A much bigger concern is the longer detection ranges of the SA-10 and SA-20 missiles against nonstealthy aircraft.

Those who work with stealth are steeped in these trade-offs. That's why stealth continues to be a requirement for new systems such as the F-35, next generation bomber, and the Navy's Unmanned Combat Air System (UCAS) demonstrator. The F-35, too, has banked on stealth as its top survivability feature.

No one is suggesting that there aren't challenges ahead. Air defense systems, radars, and anti-stealth countermeasures will all improve over time. But so too will the low observable features of the aircraft, as can be seen in the evolution of the stealth features on the F-117, B-2, and F-22.

The next wave of enhanced survivability depends directly on making the best use of information, by sharing what stealth aircraft learn over data links that aren't likely to be intercepted. It is certainly time to enhance the ability of stealth platforms—the B-2, F-22, and eventually, the F-35—to swap threat and mission data.

The biggest near-term threat to stealth is not in some foreign workshop. It can be found right here at home.

The clear need for stealth aircraft for air superiority and global strike missions has all but dropped out of the national security discussion.

The ability to act still depends on military superiority in a desired arena. Failure to leverage America's asymmetric advantage in stealth could quickly lead to severe limitations on where the United States military can safely operate.

Potential adversaries must be smiling at the prospect of the United States unilaterally giving up on one of its greatest military advantages. ■

Rebecca Grant is a senior fellow of the Lexington Institute and president of IRIS Independent Research. She has written extensively on airpower and serves as director, Mitchell Institute, for AFA. Her most recent article for Air Force *Magazine, "The Six Phases of Airpower," appeared in the January issue.*

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With the CV-22, special operations forces will be able to do things never before possible.

Finally, the Osprey

By Otto Kreisher

In the endgame to a struggle that has spanned some three decades, Air Force special operations forces are about to acquire the advantages conferred by a unique new aircraft—one that, in a sense, sprang up from the fiery, long-ago Desert One disaster in Iran.

Plans call for Air Force Special Operations Command early this year to declare operational the first squadron of CV-22 tilt-rotor aircraft. The Osprey is the SOF variant of a hybrid with the speed and range of fixed wing transport plus the landing capability of a helicopter.

Availability of such an aircraft on April 24, 1980 might have prevented Desert One. The plan to rescue American hostages in Iran was made overly complex and dangerous by the need to use short-legged helicopters. In a desert refueling stop, an RH-53 chopper struck a USAF C-130, causing a fire that killed eight servicemen.

The calamity gave impetus to a program to develop an aircraft possessing capabilities exceeding those of any standard helicopter. When the first CV-22 arrived at Kirtland AFB, N.M., March 20, 2006, Lt. Gen. Michael W. Wooley, then AFSOC commander, called it "truly transformational."

What became the V-22 program originated in the late 1960s with a Marine Corps study of possible replacements for its Vietnam-vintage CH-46 and CH-53D medium-lift helicopters. The Pentagon then authorized a multiservice program in 1982, with the Marine Corps as lead.

Although the Army soon dropped out, the Navy and Air Force remained in the program. In 1983, the Marine Corps awarded a contract to a team of Bell and Boeing helicopter units to develop a tilt-rotor aircraft.

Air Force personnel have been involved in the Osprey program from

Below: Three Ospreys take off at Kirtland AFB, N.M. (Civilian aircraft share airfield facilities.)

USAF photo by SSgt. Markus Maier

Photo by Jim Haseltine

Lt. Col. Mike Duffy (l) and Lt. Col. James Breck maneuver the No. 2 CV-22A through the mountains of New Mexico on a training mission.

the inception of the joint program. Air Force and Marine Corps colonels have alternated as the V-22 program manager.

Although the program has moved ahead relatively smoothly in recent years, delays and design changes early in the project drove the Marine Corps MV-22's price from a projected cost of $24 million per aircraft in 1986 to an estimated $84 million today.

When US Special Operations Command-funded modifications and specialized equipment are added, the current cost for each CV-22 approaches $100 million. To perform extended-range missions into potentially well-defended areas, the CV-22 is equipped with terrain-following radar, sophisticated navigation systems, and a suite of integrated electronics. It is also equipped with infrared warning and countermeasures designed to ward off heat-seeking missiles.

Special Operations Command says the CV-22 will enable the command to do what it cannot do now, and what the military could not do in 1980: "Conduct long-range, high-speed, vertical lift missions in an aircraft capable of getting troops into and out of an area in one night."

The Osprey's range gives Special Operations Command a self-deploying capability it does not have with any helicopter. This will allow the Air Force's air commandos to quickly take on faraway missions. The CV-22's hover ability also means Special Operations Command will be able to insert, extract, or resupply special operations forces in rugged terrain inaccessible to fixed wing transports.

A Quiet Ride

The aircraft demonstrated that capability in November, when four CV-22s deployed from Hurlburt Field, Fla., to Africa for an exercise, going more than 5,000 miles nonstop with in-flight refueling.

"After that super long flight, we could have easily taken that aircraft out and put another 10 hours on it," said TSgt. Aaron Brown, a flight engineer on one of those Ospreys. "We're all pretty happy with the way it performed."

Special Operations Command said the CV-22, in aircraft mode, is 75 percent quieter than rotary wing aircraft—a valuable attribute in SOF clandestine missions.

The marines have found in exercises that the Osprey's speed and lower noise level allow the aircraft to get in to landing zones before a hostile force can react. Rapid acceleration after lift off and higher operating altitude allow the tilt-rotor to escape many of the automatic weapons and shoulder-mounted rockets so deadly to helicopters.

The 58th Special Operations Wing at Kirtland began CV-22 aircrew training with the first two production aircraft in August 2006. The first operational CV-22 was delivered to the 8th Special Operations Squadron at Hurlburt on Nov. 16, 2006.

The Air Force was scheduled to have 10 CV-22s by the first of this year: six at Hurlburt and four at Kirtland.

Lt. Col. Darryl Sheets, Special Operations Command's CV-22 branch chief of standardization and evaluation, said the 8th SOS is in the "stand-up phase," which includes getting the processes,

Photo by Jim Haseltine

Airmen from the 71st Special Operations Squadron take the Osprey through its paces during a low-level training mission over central New Mexico.

procedures, regulations, and publications written and amended for the CV-22.

The command also "continues to train crews as we look forward to [initial operational capability]. Everything has been focused on training, both unilaterally and in the joint environment with the typical SOF forces," Sheets said.

The initial cadre of pilots and flight engineers were board-selected from a group of volunteers. The first four operational pilots included two with fixed wing experience and two from helicopters. The majority of a later group were experienced rotary wing pilots, he said. There were clearly helicopter crews available, as the Air Force retired its Vietnam-era MH-53s last year.

Currently, Osprey crew assignment follows the normal Air Force selection processes, "so we can get anyone from fixed wing or rotary wing," Sheets said.

The 8th just received its first pilot straight from the training command, which Sheets said was necessary to keep the squadron from becoming too top-heavy with senior aviators.

By IOC, the 8th expected to have six aircraft and nine trained crews. The final number of CV-22s and crews is still being determined, he said.

After filling out the 8th at Hurlburt, Special Operations Command plans to create another CV-22 squadron at Cannon AFB, N.M., in 2010.

The CV-22 went through a rigorous initial operational test and evaluation process last summer. The final report is being drafted, and its findings will help determine if and when the 8th becomes an operational combat squadron.

After the test phase ended, Brig. Gen. Bradley A. Heithold, Special Operations Command's planning director, said he was sure the CV-22 "has proven its capability."

The Ospreys are demonstrating that they can operate in austere conditions.

Ten Marine Corps MV-22s have accumulated hundreds of hours in Iraq, ferrying troops and equipment into forward operating bases and evacuating casualties with a speed and range unmatched by the helicopters they replaced. One even transported then-Sen. Barack Obama during his visit to Iraq last summer.

Rugged Training

Special Operations Command deliberately exposed its CV-22s to challenging conditions. The four aircraft from Hurlburt operated in Mali for three weeks to support Operation Flintlock 09, a multinational exercise arranged by the new US Africa Command.

Capt. Randall Voas, a CV-22 aircraft commander, said self-deploying those aircraft—not having to load them on a ship or into a C-17—"was really a watershed moment."

Voas said the normal mission was to fly local troops and Army Special Forces trainers, 500 to 550 miles one way "to an LZ in the dust," and bring them back later. That took about five hours of total flight time, a fraction of what a helicopter would require. "It gives them a lot more time on the ground to affect the operations they have to affect."

The CV-22 has a cruise speed of 277 miles per hour, and a range of more than 970 miles with normal fuel load (more than 2,400 miles with auxiliary fuel tanks). It can carry 24 troops in

Photo by Jim Haseltine

An Osprey navigates over the White Sands Monument in New Mexico. The state's varied and rugged terrain is an ideal training ground for the special operations aircraft.

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USAF photo by Capt. Bryan Purtell

A Malian local watches incoming USAF Ospreys carrying Malian and Senegalese troops during a training mission in Mali.

shock-absorbing seats—or 32 sitting on the floor—or 10,000 pounds of cargo. It has a normal crew of two pilots and two enlisted flight engineers.

As for aircraft reliability, "we had no mission aborts," Voas said. "Every mission tasking we had, we satisfied."

Lt. Col. Eric Hill, commander of the 8th SOS, called the deployment "an awesome event."

It is a Special Operations Command decision when to declare the CV-22 operational, Hill said, but "from a squadron commander's perspective, ... the 8th SOS is ready for anything, whenever we're called."

The Osprey had to rise several times to get this far. Secretary of Defense Dick Cheney tried to cancel it in 1989, but Congress kept the program alive. The Marine Corps bore most of the costs through two painful decades of development and testing. Thirty marines and Boeing personnel died in four crashes during the prolonged development of the Osprey, which consumed an estimated $22 billion.

The aircraft and its program were significantly restructured after two deadly crashes in 2000 again brought the V-22 to the brink of cancellation.

The tilt-rotor concept had been conceived as early as the 1940s, and several experimental models were built, including the XV-15, which Bell produced for NASA in 1977.

The Bell-Boeing proposal was for an aircraft with two jet engines, which powered large rotor blades, on the end of short wings. The rotors moved from a horizontal position overhead, allowing the aircraft to operate like a helicopter, to a vertical setting, turning it into a turboprop airplane able to fly about twice as fast, three times as far, and much higher than any helicopter.

Going, Going ... But Not Gone

The V-22 prototype flew for the first time in March 1989, but became an easy target for critics in Congress and elsewhere as it suffered through manufacturing defects, design flaws, cost growth, and poor testing.

Notable was its failure to conduct a full range of flight tests needed to determine the response to a flight condition called vortex ring state (VRS), common to all rotary wing aircraft. VRS, which occurs when a rotary wing aircraft descends too quickly with too little forward speed—so the rotors lose lift—caused a crash in April 2000 that killed 19 marines.

After another fatal crash that December, Pentagon officials grounded the Ospreys, and the program appeared doomed.

But because the capabilities the V-22 offers are so great, and on the advice of a blue-ribbon commission of aviation experts, defense officials gave the Osprey one more chance. While the contractors began to substantially modify the Osprey's complex flight control systems and computer software programs, V-22s were subjected to a series of increasingly challenging flight tests.

Eighteen months later, those tests had demonstrated that the tilt-rotor is actually less susceptible to VRS than conventional helicopters and, due to the movable rotors, recovers faster. The redesigned aircraft also provides visual and oral VRS warnings.

Although no expensive defense procurement program is ever safe, the Osprey's future appears to be relatively secure.

The Pentagon signed a $10.4 billion multiyear agreement with Bell and Boeing last year to buy 167 V-22s through 2012.

The current Air Force plan is to purchase 50 CV-22s by 2017. Of the 50 planned aircraft, 44 are to go into operational squadrons and six to the training squadron at Kirtland. Lt. Gen. Donald C. Wurster, head of Air Force Special Operations Command, has said that the requirement will almost certainly grow because of the planned increases in SOCOM.

Wurster said he also would like to accelerate the rate of CV-22 purchases—which has been five or six aircraft a year—partly because Special Operations Command's MH-53 Pave Lows are gone.

The CV-22 is "not a Pave Low replacement," Sheets added. "It's just an additional capability for SOF, and Special Operations Command, to stretch our legs a bit farther and increase our range and capability."

The best way to think about the Osprey, he said, is as "an augmentation for everything we've ever had in SOF. It's an augmentation for rotary wing, and also gives the combatant commanders an additional way to execute their missions, possibly have one aircraft do a mission that previously required two aircraft to complete." ■

Otto Kreisher is a Washington, D.C.–based military affairs reporter for Copley News Service and a regular contributor to Air Force *Magazine. His most recent article, "The Ground Force Taskings Go On," appeared in the March 2008 issue.*

After 42 years, this token of Patrick Wynne's academy days came home at last.

Ring of Remembrance

By Walter J. Boyne

First Lt. Patrick Wynne, a United States Air Force pilot, perished in 1966 in the Vietnam War. He had been flying on Aug. 8 in the backseat of an F-4C during a dangerous raid over North Vietnam. Wynne and the F-4's pilot, Capt. Lawrence H. Golberg, were shot down north of Hanoi, near China.

Wynne, a 1963 graduate of the Air Force Academy, died wearing his class ring. Though his remains were returned in 1977, his ring was not. It was, in fact, missing and all but forgotten until last year. Then, in an astounding turn of events, it was handed over to a former Secretary of the Air Force—Michael W. Wynne, Patrick's younger brother.

This is the story of how that ring, having been in China for four decades, found its way back to the Wynne family.

On that fateful day in 1966, 24-year-old Patrick Edward Wynne volunteered to fly one of the most hazardous missions yet assigned to the 555th Tactical Fighter Squadron, stationed at Ubon RTAB, Thailand. As a "GIB" (guy in back), Wynne was eager to accumulate flight time and move to the front seats of the husky McDonnell Phantoms flown by his unit. For this mission, Golberg's backseater was ill, so Wynne took his place in F-4C serial No. 63-7560.

A superstitious person might have noticed that the flight was Golberg's final scheduled mission. On its completion, Golberg was to receive the customary celebratory wet-down before being sent back to the United States. The intensely competitive Wynne was not the least bit superstitious, however.

Patrick Wynne entered the Air Force Academy determined to graduate with a ranking higher than his father, Edward P. Wynne, had achieved at West Point in 1940. The younger Wynne did so, finishing in the top 10 percent of his class. He received his diploma from Gen. Curtis E. LeMay, the legendary airman who was then the USAF Chief of Staff.

After graduation, Wynne filled the time awaiting pilot training by earning a political science degree from Georgetown University in Washington, D.C.

Young Wynne excelled in flight school, driven by his determination to be a fighter pilot. He won his wings and sought duty in Vietnam. He served with the 555th for only four months, but Patrick was soon noted for his cheerful and relentless push to fly every mission he could.

Few missions in the Vietnam War were more difficult than that as-

USAFA photo

Photo courtesy of Roger Schreiber/Consortium Companies

Patrick Wynne, shown here as an Air Force Academy cadet, Class of 1963. Below, a close-up of the USAFA class ring recently returned to the Wynne family.

signed Ozark Flight on that August day in 1966. The orders called for four Phantoms to fly a minimum-level armed reconnaissance mission in Route Pack 6, with the target area 30 miles north of Hanoi. Each Phantom was armed with four pods of CBU-2 cluster bombs and four Sparrow and Sidewinder missiles.

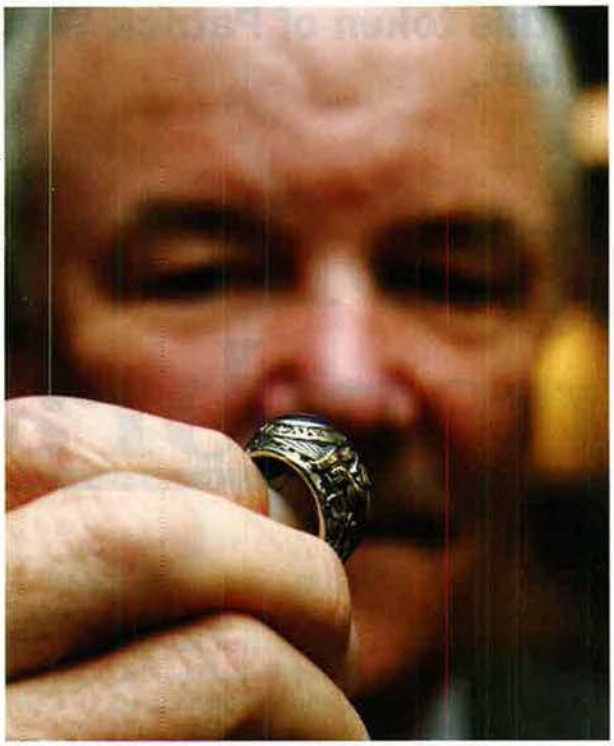
The Ozark Flight

The eight crew members were surprised to learn that their sorties were routed to the target from the coast. This meant the fighters would have to fly over one of the most heavily defended regions in North Vietnam. The previous morning, six fighters had been shot down in exactly the same area.

Ozark Flight, Capt. Daniel Wright leading, was launched on time and climbed to 21,000 feet for its first refueling over the Gulf of Tonkin. Only three aircraft were able to take on fuel. Ozark 2, flown by 1st Lt. John H. Nasmyth, could not get his refueling door to open. He had to return to base.

(This may have looked like Nasmyth's lucky day, but he was shot down less than a month later. He spent six years as a POW. His backseater, 1st Lt. Raymond P. Salzarulo Jr., was killed.)

Photo by Patrick Reddy/The Cincinnati Enquirer



Former Secretary of the Air Force Michael Wynne examines his older brother's ring.

The remaining Ozark aircraft flew in echelon right with Wright still leading. Maj. John Hallgren moved into the No. 2 position, with Golberg and Wynne off his right wing. The three Phantoms dropped down to a mere 50 feet above water so as to penetrate North Vietnam's airspace beneath its radar screen. Going "feet dry" 40 miles north of Haiphong, Ozark Flight initially met no resistance.

The Phantoms found few meaningful targets in the assigned area, but, returning on the reciprocal course, the fighters destroyed some trucks with their cluster bombs.

The flight then dropped over a sharply defined karst limestone formation down into a lush valley. The airmen suddenly were enveloped in a barrage of 37 mm and 57 mm anti-aircraft fire. Hallgren took heavy flak hits in the lower rear of his F-4's fuselage; it knocked out his hydraulics and set off a number of red lights in the cockpit. Golberg radioed that he too was hit. Hallgren saw him pull up and drop back, calling that he had control problems. Hallgren advised Golberg to check his stability augmentation system. He then lost sight of Golberg and Wynne's aircraft.

Ozark 1, Wright's aircraft, returned to Ubon. Ozark 2, streaming fuel and in obvious distress, nevertheless managed to make a brakeless landing at Da Nang, saved by arresting gear.

Ozark 3, with Golberg and Wynne, disappeared into the jungle. Their last known location was 21 degrees 33 minutes north latitude and 106 degrees 46 minutes east longitude—near the village of Lang Son, just south of China.

Golberg and Wynne were listed as missing in action until 1976, when their remains were found and identified.

Staff map by Zaur Eylanbekov

The spot near the southern Chinese border where Ozark 3 crashed into the jungle.

Then-Secretary of the Air Force Michael Wynne speaks at Arnold AFB, Tenn., at the 2007 dedication of an F-4C Phantom exhibit meant to memorialize his brother Patrick and Golberg.

These were returned in 1977. Wynne was buried at the Air Force Academy. Golberg was buried in Minnesota. The government changed their status from MIA to killed in action, and their two names were engraved on the black granite of the Vietnam Veterans Memorial wall in Washington, D.C.

The story was far from over, however.

Everyone had always assumed that the two men had died instantly in the crash of the F-4. When specialists were able to conduct an examination, however, they discovered a fracture in the bone above one of Wynne's knees. They could only conclude from this evidence that Wynne had managed to eject.

The unknown story was that Patrick Wynne, though badly injured, had survived the ejection. He was soon found by a rural Chinese family, living in North Vietnam. They cared for him in his final hours of life. When Wynne died, the family retained his Air Force Academy ring with the intention of somehow returning it to his family.

It took more than four decades, a strange coincidence, and the goodwill of an American businessman for the Chinese family to fulfill its intentions. The story unfolded this way:

After the war, Washington established formal ties with the People's Republic of China. In 2005, Consortium Companies, Inc., of Erlanger, Ky., opened a satellite office in Guangzhou, China. Consortium Companies sent Herbert G. Schaffner to Guangzhou in August 2007 to serve as director of information technology at this southern China office.

Schaffner, the son of a Vietnam veteran, married a Chinese woman. At a family celebration, he was introduced to her uncle. At the time of Wynne's crash in 1966, this uncle was only 10 years old. He related a poignant story to Schaffner. The uncle's family had relocated to North Vietnam to earn a living farming just as the Vietnam War started to intensify. The family had become accustomed to seeing American aircraft flying over, and when they saw an intense fire in the distance, they knew that an airplane had been shot down.

A Long Trip Home

The narrating uncle's father went to investigate, found a badly injured American pilot, and brought him back to his village to be cared for. The family tried to save the young man's life, but failed. (This family wishes to remain anonymous, perhaps out of concern for the consequences, even now, of having aided the enemy airman.)

At this point, the story becomes murky. It is not clear whether Wynne, before he died, was taken into custody by North Vietnamese officials. What is certain is that the Chinese family recognized the sentimental importance of Wynne's ring, and retained it with the intention of somehow getting it back to his family.

The father who found Patrick Wynne gave the ring to the uncle. The uncle later found a translator who read the name inscribed inside the ring: Patrick Edward Wynne. He took the ring to the US Consulate in Guangzhou, in hopes of learning more about the deceased's identity. However, he received no aid.

When the uncle learned that his niece had married Schaffner, he asked Schaffner for help. Schaffner immediately identified it as a ring of the Air Force Academy's 1963 graduating class. He took it to his company's headquarters in Kentucky on his return to the United States. The firm's chief financial officer, Roger Schreiber, looked further into the matter and discovered that the dead pilot's brother had just stepped down as the Air Force's top civilian leader.

It was fall 2008. Schreiber placed the call.

Michael Wynne was overcome. Patrick had been shot down on the very day that the future Air Force Secretary had signed in at his first USAF duty station—Hanscom AFB, Mass. Now, just after leaving as Secretary of the Air Force, Michael Wynne said it felt as though "my brother was reaching across the decades." Patrick's widow, Nancy, also was notified of the ring's return.

For years, the Wynne family had wondered about the circumstances surrounding Patrick's death. Now, 42 years later, essential parts of the story, and Patrick's ring, were recovered. Wynne was relieved to know that kind people had cared for his brother at the end of his life.

At reunions, the Class of 1963 gathers for a toast; they ceremonially turn upside down the cups of deceased. This takes place in the office of the president of the Association of Graduates. More than a decade ago, Michael Wynne added to the office wall a plaque detailing the story of his brother, up to the point of the shootdown. Now the story can be told in full.

The Wynne family has decided to return the ring to the academy as well. It will be housed in a small shadow box. The former Secretary said he hopes it will be permanently displayed in the Association of Graduates building, marking the end of a truly amazing journey. ■

Walter J. Boyne, former director of the National Air and Space Museum in Washington, is a retired Air Force colonel and author. He has written more than 600 articles about aviation topics and 40 books, the most recent of which is Supersonic Thunder. *His most recent article for* Air Force *Magazine, "Forceful 'Argument,'" appeared in the December 2008 issue.*

Using this squat weapon with a funny nickname, a fighter pilot got a satellite kill. Really.

USAF photo

The homing vehicle was a short cylinder that bore more than a faint resemblance to, yes, a tomato can. Fifty-six full-charge and eight half-charge solid rocket motors were arranged around its circumference, for steering. Target acquisition was the job of an infrared seeker in the center.

To work properly, the infrared seeker had to be cooled considerably before deployment. For this, it sat in liquid helium chilled to about -450 degrees Fahrenheit, or near absolute zero.

The ASAT test program required a large helium dewar, or flask, that was "about the size of the robot on the old 'Lost in Space' TV show," according to Gregory Karambelas, who as a young Air Force officer worked on the ASAT program for four years. Test program F-15s were originally two-seat Eagles with their backseats replaced with helium dewars, Karambelas wrote.

The homing vehicle could only point itself in the direction of a target. It had no real forward thrust capability of its own. Thus the release point of the F-15 pilot and the performance of the booster stages were crucial to success.

The delivery aircraft had to fly to an area below the path of an oncoming target satellite. Then, after having pulled itself into a steep climb, the fighter had to release its weapon inside a very small launch window.

"If all went well, the homing vehicle would vector itself directly into the target's path and destroy it by smashing directly into it," said Air Force Flight Test Center historian Raymond L. Puffer. "At the extremely high closing speeds of the two objects, no explosives would be necessary."

The first captive-carry flight of the new ASAT weapon occurred on Dec. 21, 1982. Two free-flight tests took place in 1984. The first of these was on Jan. 21 and was a success, though it did not include a miniature homing vehicle. The second test, on Nov. 2, used a star as a target for the homing vehicle's sensor, and was judged by the Air Force to be only a partial success.

Left: An F-15A launches an ASM-135 ASAT missile on Sept. 13, 1985. Right: The "flying tomato can" on display at the National Air and Space Museum Steven F. Udvar-Hazy Center in Virginia.

The Flying Tomato Can

By Peter Grier

On Sept. 13, 1985, Maj. Wilbert D. Pearson Jr. took off on a flight that required him to follow an extraordinarily exacting mission profile.

Pearson, an Air Force test pilot, flew his F-15A from Edwards AFB, Calif., to a point some 200 miles west of Vandenberg AFB, Calif. Then, while traveling at Mach 1.2, he pitched the fighter upward into a precise 65-degree climb, in the process pulling 3.8Gs. Pearson's fighter rose rapidly.

Then, at an altitude of exactly 38,100 feet, the F-15 automatically launched an experimental two-stage missile called the ASM-135. The missile streaked upward, rocketing through the troposphere and stratosphere. It reached space at some 335,000 feet—more than 62 miles above Earth's surface—and kept going.

The missile was a squat, high-tech projectile, but its warhead carried no high explosives. Rather, this mission called for it to destroy a satellite by means of violent collision.

The ASM-135 did just that, slamming into an obsolete military observation satellite some 345 miles (1.8 million feet) above the Pacific Ocean, turning it into a cloud of metal shards and dust.

Pearson, in that moment, became the first pilot ever to shoot down a space target. Never again has the Air Force fired a missile at a satellite.

Years earlier, the *Washington Post's* defense correspondent had helped put the ASM-135 into the public consciousness. George C. Wilson, in several 1977 articles, offered the first descriptions of the system and gave it a distinctive moniker—the flying tomato can.

Some months later, officials concluded that they were ready to carry out a test against a real target in space. President Reagan gave his approval on Aug. 20, 1985. Originally, the shot was scheduled for Sept. 4, but Congressional restrictions at the time required that lawmakers be notified 15 days in advance. The flight was delayed nine days.

The target was a spacecraft known as Solwind P78-1, a gamma ray spectroscopy satellite launched in 1979. Its purpose had been study of the solar wind, among other things.

At 1:42 p.m. local Pacific time, on Sept. 13, 1985, the ASM-135 fired by Pearson hit P78-1 dead on. Pentagon officials were jubilant. Secretary of Defense Caspar W. Weinberger called the test "a great step forward."

Oddly enough, P78-1 was not an entirely burnt-out case. Naval Research Laboratory physicists were still using its data at the time. In fact, the NRL physicists who showed up at work on Sept. 14 were surprised to learn that they would no longer receive data from P78-1, according to a *Los Angeles Times* article at the time. The spacecraft's major work had been completed, but "the satellite was doing several experiments," observed a Navy spokesman, Capt. Brent Baker.

Following Pearson's flight, Congress banned further anti-satellite shots against orbiting targets. Lawmakers disagreed with the Reagan Administration over the need for an ASAT weapon and worried it might stimulate a Soviet program or throw up additional roadblocks to strategic arms control.

Staff photo by Adam J. Hebert

The politics of arms control, plus cost overruns and technical glitches, eventually killed the program. The Pentagon canceled the ASM-135 in 1988. Yet the ASAT missile was "a major technical achievement," according to AFFTC historian James O. Young.

Young, in a history of the center published in 2007, wrote that Pearson's direct hit on the satellite was "a stunning event," one that "reportedly reverberated through the halls of the Kremlin."

The issue of space security is now receiving renewed attention, due in part to China's test of an ASAT system in January 2007 and the US Navy's February 2008 destruction of an ailing US spy satellite with a ship-fired missile.

Vulnerability in Space

From the dawn of the space age, both the Soviet Union and the United States worked diligently to develop capabilities to attack their adversary's orbiting assets.

For their part, the Soviets were driven by what they perceived as the threat of US reconnaissance satellites. The Americans started emphasizing these spies in the sky in the early 1960s, after it became clear that the USSR would be able to shoot down overflying U-2s.

Soviet officials were so irritated by the recon satellites that they attempted to get the UN to condemn them as incompatible with mankind's peaceful objectives for outer space. Soviet scientists then also set to work on methods of satellite destruction.

The USSR's main system was the Co-Orbital ASAT, a sort of giant hand grenade for space.

Launched via conventional missile, the 1.5-ton Co-Orbital interceptor lurked in orbit close to its target. Guided by onboard radar, this killer satellite would edge closer and closer to its intended target and then detonate when the target was within about half a mile.

In its initial test phase, which ran from 1963 to 1972, this system intercepted seven targets during 20 attempts, and detonated five times.

The US had come to rely on spy satellite intelligence and thus was alarmed by the Co-Orbital ASAT. Officials also worried the Soviets would launch orbiting nuclear weapons.

"This created a sense of paranoia about our vulnerability in space," said retired USAF Gen. Thomas S. Moorman Jr., former vice chief of staff and commander of Air Force Space Command, at a 1995 symposium on the development of space systems and their military applications.

The US had begun working on its own ASAT designs in the late 1950s. The first was Bold Orion, a two-stage rocket fired from a B-47 bomber. This came within four miles of its intended target, which was within expectations, but eventually the Air Force lost interest in the program.

In the early 1960s, the US fielded two ground-based ASAT systems.

The Army's Program 505 used Nike Zeus missiles originally developed as anti-ballistic missile weapons.

The Air Force's Program 437 used Thor missiles as its base.

Neither system depended on pinpoint accuracy—they employed the destructive power of nuclear warheads.

Program 505, based on Kwajalein Atoll in the Pacific, went operational on Aug. 1, 1963. It stood on alert for a year—then was abandoned by Defense Secretary Robert S. McNamara in favor of the Air Force's effort.

Program 437 was based on Johnston Island in the Pacific. Three of four test flights (without live warheads) were successful, and the system was declared fully operational on June 1, 1964.

But after the system was up and running, US scientists began to learn more about the possible deleterious effects of nuclear explosions in space. Tests demonstrated that the electromagnetic pulse from a nuclear explosion traveled a considerable distance. Any attempt to destroy an orbiting Soviet target thus risked unintended destruction of US satellites as well.

In addition, the threat of USSR nuclear weapons in orbit had not materialized. In late 1970, Project 437 was downgraded from alert status to 30-day notice. In April 1975, the launch facilities on Johnston Island were deactivated. Project 437 was abandoned.

"I terminated that project during my tenure as Secretary of the Air Force because I did not see a good match between the likelihood of its eventual use and the cost of maintaining it," said John L. McLucas, who led the service from May 1973 to November 1975, at the 1995 Air Force Historical Foundation symposium.

The next move was by President Ford. Concerned about the increasing US reliance on space systems for national security, Ford in 1976 issued National Security Decision Memorandum 333, which called for devel-

USAF photo by SrA. Erik Hofmeyer

Retired Maj. Gen. Doug Pearson (l) and his son, Capt. Todd Pearson (r), discuss a Sept. 13, 2007 flight commemorating the historic satellite kill. For the event, Captain Pearson flew the same F-15A his father had flown 22 years before.

opment of ASATs "commensurate with planned use in crisis and conflict."

The era of US kinetic-kill anti-satellite systems was born.

Project Spike was the first effort. It involved a two-stage missile launched from an F-106. In space, the missile would release a terminal homing vehicle, which would be guided by solid rocket motors to smash a target.

Project Spike did not progress to development. But in 1978, its concept, and some of its technology, was adopted by a new program initially designated the Prototype Miniature Air-Launched System (PMALS).

PMALS was run out of the Air Force Systems Command's Space Division. Its mission was to build a weapon able to destroy satellites in low Earth orbit.

In 1979, work began on a new Air-Launched Miniature Vehicle ASAT. It also used a two-stage, high-speed missile, launched from a fighter. However, the chosen airframe was the then-new F-15 instead of the aging F-106.

The ASAT's first stage was a modified Boeing anti-radiation missile. Its second stage was an LTV Aerospace Altair 3. The third stage, the miniature homing vehicle itself, was also an LTV product, derived from an older effort funded by the US Army and tested against tanks.

From the inception of the program, the ASM-135 ASAT had been enmeshed in a Washington policy debate over whether the US needed such a system—and whether an arms deal with the Soviets that would limit ASAT weaponry was in the national interest.

Some critics felt that a US ASAT could destabilize the delicate balance of superpower nuclear deterrence. A Soviet leadership blinded by loss of its intelligence satellites might fear the worst and lash out with a nuclear strike, went this theory.

Others felt that the US, with its more sophisticated satellite systems, could potentially reap a disproportionate gain from an ASAT arms control pact.

Another Arms Race?

The Carter Administration had conducted three rounds of ASAT talks with the Soviets before the US suspended all superpower arms negotiations following the USSR's invasion of Afghanistan.

During the Reagan era, the subject of ASATs was addressed in ongoing defense and space talks, but Reagan officials were skeptical of the benefits of such negotiations.

The closed Soviet society made verification of arms deals in general very difficult. "This problem is aggravated for ASAT systems because the satellites which serve US and allied security are few in number," judged a 1984 Administration report. "Cheating on anti-satellite limitations, even on a small scale, could pose a disproportionate risk to the United States."

Beginning in 1983, Congress began enacting a series of increasingly stringent limits on ASM-135 testing. In December 1985, shortly after the system's successful test and destruction of the satellite, lawmakers banned further tests on targets in space.

Continued ASAT experiments could only lead to a superpower arms race in yet another category of strategic weaponry, supporters of the ban said at the time.

However, the ASM-135 was not exactly a silver tomato can. Its flight ceiling was about 350 miles, meaning it could attack only satellites in low Earth orbit. Plus, the Soviets would be able to institute countermeasures against the weapon, though such defensive moves would be of only "limited" utility, according to a declassified CIA report on the subject.

Maneuvering would be the only Soviet method of direct defense against the Air-Launched Miniature Vehicle, according to the 1983 CIA report. An air strike against F-15 launch aircraft, or their base, was also a "theoretical option."

"We believe the Soviets know enough about the ASAT system to develop countermeasures designed to increase the survivability of their satellites," concluded the CIA report.

Initially, the Air Force had planned a force of 100 Air-Launched Miniature Vehicle interceptors. They would be available to two squadrons of specially modified F-15s, split between the East and West Coast. But by 1986, the program was far over budget. Estimated completion costs had risen from $500 million to more than $5 billion.

The Air Force conducted two more live-fire tests of the ASAT, but, in deference to the limits imposed by Congress, both were aimed at stars, rather than satellites.

In 1987, the program was scaled back. The next year, it was canceled "due to technical problems with the homing guidance system and testing delays, both of which had added to the significant cost growth," stated an Air Force-sponsored assessment.

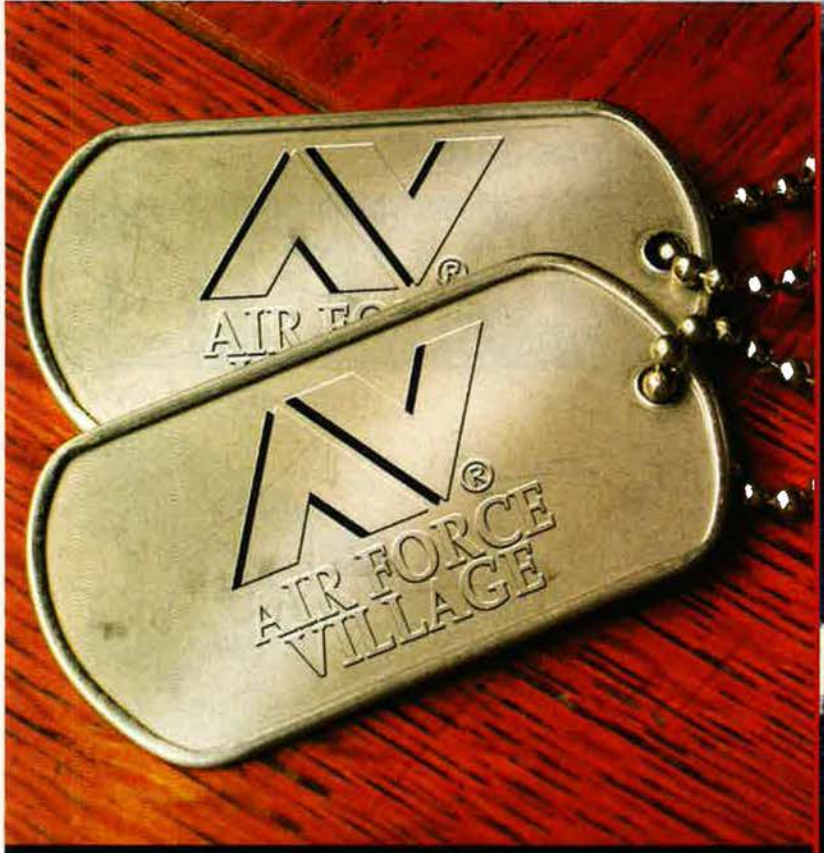
Pearson, the Air Force's only pilot with a space "kill" rose to the rank of major general before retiring as commander of the Air Force Flight Test Center in 2005.

In September 2007, some airmen put together a tribute to Pearson's historic flight. SSgt. Aaron Hartley, a crew chief at Homestead ARB, Fla., observed that an F-15 then assigned to the 125th Fighter Wing at Homestead was in fact the aircraft used in the satellite shootdown. Hartley helped arrange a flight to honor the achievement.

The pilot of the remembrance flight was Pearson's son, Capt. Todd Pearson, an active duty F-15 pilot based at Mountain Home AFB, Idaho.

It's hard to remember today, but for years in the mid-'80s, the flying tomato can's fate was a matter of great controversy in Washington. In the end, the program simply faded away, leaving as its legacy one successful shot and a great nickname. ■

Peter Grier, a Washington editor for the Christian Science Monitor, *is a longtime defense correspondent and a contributing editor to* Air Force *Magazine. His most recent article, "In Search of the Perfect Uniform," appeared in the January issue.*



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EQUAL HOUSING OPPORTUNITY

Aviation cadet programs have produced thousands of flying officers, and always when desperately needed.

They Wanted Wings

By Walter J. Boyne

The Air Force's predecessor organizations—the Army Air Service, Army Air Corps, and Army Air Forces—ran aviation cadet programs over a period of some 48 years, from their inception during 1917 until their final termination in 1965. These programs varied greatly in size and scope. They came and went.

Still, all of the cadet programs had this much in common: They all were set up and launched when time was short, facilities limited, and combat imminent. Each of the programs produced the pilots, navigators, bombardiers, and other personnel to meet the country's needs, and did so in huge numbers, sometimes almost as if by magic.

The Air Force Academy, Reserve Officer Training Corps, and Officer Training School—all leading to or requiring a college degree—are now well-established as the paths to a military commission. Yet it is worth recalling the times when aviation cadets gave the nation huge numbers of officers, often straight out of high school.

Although aerial warfare had developed rapidly in Europe during the Great War of 1914-18, inherent conservatism and tight budgets of the US Army kept the American air component to a minimum during the early years of that conflagration. Not until America's entry into the war in April 1917 did President Woodrow Wilson sign into law what was then the largest Congressional appropriation in history—$640 million for aeronautics. This began a huge production effort and the creation of the training programs the vast new "flying corps" would require.

In these years, Benjamin D. Foulois, a future Chief of the Air Corps, was the Air Service's first military pilot (an airship pilot). He went to Canada to examine the flying training systems in place there. These, especially the School of Military Aeronautics (SMA) at the University of Toronto, were used as models for the Air Service to follow.

Maj. Howard Bingham was tasked to create a similar American system, and by July 1917, eight universities had similar programs. Bingham even adopted the Canadian term "flying cadets" for the pilot candidates, who had to be under 25 years of age, have two years of college, and be "athletic, honest, and reliable."

USAF photo

Cadets at Kelly Field, Tex., in 1918. Between April 1917 and November 1918, US and European aviation cadet schools graduated more than 10,000 students.

Ten Hours Then Solo

Almost 40,000 applied for the program, with 22,500 passing the very tough physical examination that became an enduring characteristic of the aviation cadet programs.

American schools of military aeronautics grew to 20 weeks' duration. Emphasis was on military training, aerodynamics, aircraft rigging and maintenance, engines, gunnery operation, and theory of combat tactics.

A simultaneous effort created 24 more flying schools. The flying cadets received 40 to 50 hours in aircraft such as the Curtiss JN-4 or Standard J-1.

Those who survived the training (the accident rate was high) and passed their pilot qualification tests received commissions as second lieutenants and were rated as either a reserve military aviator or junior military aviator.

With their new wings, the pilots then received a month of specialized training to qualify for pursuit, bombardment, or observation work. Most sought assignment to pursuit squadrons.

The growth of the Army Air Service from April 1917 to November 1918 was amazing. Although promises to "darken the skies with aircraft" were not fulfilled, the Air Service, American Expeditionary Force, fought for seven months at the front, mustering 740 US-built and squadrons of foreign aircraft. Cadet schools in the US and Europe graduated more than 10,000 students.

The 1918 armistice began a series of reductions in funding, personnel, and aircraft. The Air Service bottomed out from 1923 to 1926 with 880 officers and 8,000 enlisted. The numbers would improve only marginally until just before World War II.

A small aviation cadet program was required to offset the loss of reserve officers. A new era began on June 20, 1930 when Randolph Field, Tex., opened, consolidating several training efforts.

Standards for the flying cadets were extraordinarily rigorous from the entrance

USAF photo

A group of cadets gather around an AT-6 Texan during a training session. Texans are among the most famous of World War II-era training aircraft.

exams to the flight line. An estimated 90 percent of applicants failed the physical or the entrance exams.

Flight instruction was often conducted in a rigorous, almost brutal manner, with the average student expected to solo in 10 hours. The cadet was continuously monitored by instructors for any failure in technique or discipline. (The time-to-solo gradually increased as training aircraft grew more complex.)

Washouts were frequent, either for a perceived lack of flying ability or a failure to meet military standards. Students of the time were actually counseled not to be ashamed about washing out—the standards were considered so high, only the most gifted could meet them.

During the interwar years, funds were so limited that graduating classes were tiny. Between 1919 and 1926, some 1,494 flying cadets entered primary flying school, but only 415 graduated.

Even in the 1930s, a newly graduated second lieutenant pilot would often be immediately placed in the reserves without ever seeing active duty.

The interwar years also saw changes in equipment from World War I surplus Jennys, S.E.5as, and de Havilland DH-4s to specialized trainers.

It is difficult to overstate the importance of the flying cadet program to the Air Force. The aviation cadet program produced leaders such as generals Jimmy Doolittle, George C. Kenney, Curtis E. LeMay, Thomas S. Power, and Elwood R. Quesada. Ten of the service's top aces of World War II were former cadets. And 28 of 38 USAAF Medals of Honor were awarded to aviation cadets.

"Stanine"

With wars raging around the world, the United States finally ordered a buildup with bewildering speed. The forecasted size of the Air Corps rose to an unprecedented 24 groups in July 1939. This called for annual pilot training classes of 1,200—six times the previous annual rate.

In March 1941, the goal grew to 84 groups, 30,000 pilots per year, and 100 training bases.

Graduating 30,000 pilots required 60,000 candidates and 300,000 applicants. The numbers were clearly beyond the capacity of the Air Corps to handle

In June 1941, the Army Aviation Cadet Act created the grade of "aviation cadet" instead of "flying cadet." When the uncannily accurate Air War Plans Division Plan No. 1 was accepted in August 1941, the annual pilot requirement was estimated to be 85,236—with complementary requirements for navigators, bombardiers, gunners, radio operators, mechanics, and other skills necessary for a wartime air force.

It was immediately apparent that aviation cadet qualifications had to be lowered to get sufficient numbers into training. In the years to come, these qualifications would be adjusted according to the perceived need of the service. Among the first restrictions to go was the requirement for two years of college.

Three general classes of aviation cadets were sought. They were "aviation cadet (pilot and bombardier), aviation cadet (navigator, nonpilot, flying), and aviation cadet (ground duty, as meteorologist and engineer.)"

The size of the programs grew to staggering numbers. When war began in December 1941, there were 16,733 cadets in flying training. One year later, there were 89,973, peaking at 109,000 two years later.

Aviation cadet examining boards around the country gave candidates a three-part classification test in addition to the physical exam. These were intended to determine whether the candidate would be best suited as pilot, navigator, or bombardier. The new test measured judgment, mathematical skills, mechanical ability, comprehension, and leadership qualities. Another section measured reflexes, hand-eye coordination, the ability to perform under pressure, and visual acuity. An interview with a psychologist formed the third part.

Scores on the three tests were aggregated on a nine-point scale—the famous "stanine" (for "standard nine") score. Most of the volunteers wanted to be pilots, and many were dissatisfied if assigned as a navigator or bombardier.

The Air Corps Chief, Maj. Gen. Henry H. "Hap" Arnold foresaw the extent of the new pilot requirements and solicited aid from established civilian flying schools.

The initial group of nine primary flight training schools increased to 56 by 1943.

Contractors were paid per student. The Air Corps supplied the aircraft, flying equipment, and a cadre of supervisory officers. Contractors were then frequently inspected. They had to supply "adequate" facilities, but the degree of "adequacy" was often challenged by cadets who were alternately freezing or sweating in the barracks.

A typical school with a 300-student class size had 278 civilian personnel, with 128 flying instructors. They were supported by a 56-man military component, with a major commanding. Similar arrangements were made on a smaller scale to train technical personnel. In time, Air Corps schools were provided for nonpilot rated officers.

Arnold also developed the College Training Program to help qualify potential aircrew members. From March 1943 to June 1944, the program examined aircrew candidates—those who passed were

USAF photo

Lt. Gen. Russell Davis, who retired in 2002, is believed to have been the last aviation cadet to serve on active duty.

enrolled at one of 153 colleges affiliated with the program.

Almost 100,000 men entered aviation cadets through the CTP.

In the short term, World War II's aviation cadet program helped produce the sheer volume of officers needed for the war. Along with the almost 200,000 pilots, the aviation cadet program graduated about 100,000 navigators, bombardiers, and observers. Another 2,576 graduated as enlisted pilots.

With America's massive postwar demobilization, aviation cadet training was closed down from shortly after the end of the war until December 1946, when it was opened on a very limited basis to unmarried enlisted men with at least two years of service remaining. In 1947, aviation cadet training was opened to civilians with at least two years of college.

The new United States Air Force had an annual pilot quota of 3,000, requiring 4,800 candidates

The requirement for navigators, bombardiers, and radar observers was recognized by the establishment of the Aircraft Observer Bombardment program, which was opened to aviation cadets in 1949, with the same standards as for pilots.

In June 1950, North Korea invaded South Korea, the US came to South Korea's aid, and this meant another massive explosion of pilot training. Air Training Command needed 10,000 candidates to produce 7,200 pilots per year, based on an expected 29 percent attrition rate.

Unfortunately, recruitment was low and the attrition rate was more than 50 percent. ATC expanded, but the only solution was to repeat World War II's aviation cadet success. Nine contract pilot flying schools were opened between 1950 and 1953.

A Change in Focus

During those three years, entry conditions were eased and the stanine test score requirement was lowered. Airmen who had served for 18 months no longer needed two years of college, although civilian applicants did. The minimum age for applicants was lowered to 19.

In 1952, a "revitalized" program was introduced with the hope of reducing the washout rate below its then current 34 percent level. Preflight training at Lackland AFB, Tex., was lengthened to 12 weeks, permitting flying training bases to concentrate on flight activities. Wings and commissions were awarded after 12 months, but an additional four months of specialized training followed.

Collectively, the requirement for 7,200 pilot graduates was almost met in 1953.

When the Korean War drew to its grudging halt with the 1953 armistice, the Cold War persisted. The Air Force became a permanent force in being, not just a cadre waiting for the next emergency.

USAF decided to stabilize pilot training at 4,800 per year and to improve training quality. The Air Force sought higher quality students by increasing the entrance requirements once again.

Then came a permanent change in focus spurred by the shocking launch of the Soviet satellite Sputnik on Oct. 4, 1957. At that time, only 31 percent of the officers in Strategic Air Command and Tactical Air Command possessed college degrees. USAF began an immediate effort to recruit scientists and engineers for officer training schools, and after 1961, 95 percent of Air Force officers were to have degrees.

Gradually, graduates from the academy, ROTC, and OTS supplanted the aviation cadets. The last cadet pilot training class was in 1961, the last navigator class in 1965.

The final pilot aviation cadet was William F. Wesson, who graduated Oct. 25, 1961. Wesson had entered flight training in December 1959, but broke his back and hip in an ejection. He fought a medical dismissal, and in June 1961, resumed training as the sole aviation cadet at Webb AFB, Tex.

It was a lonely time for the only member of the specially designated Class 62-B, but Wesson persevered and won his wings and commission. Sadly, he died in a civil aircraft accident a few years later.

On March 3, 1965, the very last aviation cadet to graduate was navigator Steven V. Harper. Foulois, who had helped start the program so many years before, presented Harper with his wings.

Lt. Gen. Russell C. Davis is thought to be the final aviation cadet who was on active duty. He retired in 2002 as chief of the National Guard Bureau.

No matter the time period, from World War I to the 1960s, all of the aviation cadet programs had some essential characteristics in common.

First, and certainly most important, they attracted people who wanted to serve their country, fly, and who were hungry for an upward career path.

Second, the aviation cadet programs were usually done in concert with a sector of the civilian flying population.

Third, they created an environment that most participants enjoyed, despite the danger, discomfort, and hard work implicit in the program.

Former aviation cadets have often called for a return of the system, but the decline in total pilot requirements makes a return of an aviation cadet program unfeasible for the foreseeable future. Memories, however, are being cultivated at the still-growing Aviation Cadet Museum in Eureka Springs, Ark. ■

Walter J. Boyne, a former aviation cadet, is a retired Air Force colonel and author. He has written more than 600 articles about aviation topics and 40 books, the most recent of which is Supersonic Thunder. *His most recent article for* Air Force *Magazine, "Forceful 'Argument,'" appeared in the December 2008 issue.*

Verbatim

By John T. Correll, Contributing Editor

Population Gap

"Today, in any given minute in the United States, 40 babies are born. In China, it's 160. In India, it's 280. When you look at the population of 18-to-35 [year-old] males, there's an explosion in southern Asia, in the Middle East, in Africa, in South America."—***Marine Corps Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff,*** **Pacific Stars and Stripes,** ***Nov 22.***

Full of [it]

"And to those who have argued [that] deterrence is a fading phenomenon, something from the Cold War that is no longer applicable, they are full of [it]."—***Gen. Norton A. Schwartz, Air Force Chief of Staff,*** **Los Angeles Times,** ***Nov. 26.***

Lethal Solution

"The equation is simple: We kill them, or we lose. Fighting fanatics is a zero-sum game. And let's stop saying, 'We can't kill our way out of this problem.' Faced with faith-drunk killers, there's no other way out. History doesn't reveal a single exception."—***Ralph Peters, retired Army officer turned author and columnist,*** **New York Post,** ***Nov. 13.***

Nuclear Japan

"It would be [a] good [idea] to have the issue of whether Japan should have nuclear weapons discussed. I think that such a debate alone would enhance Japan's deterrence against nuclear attacks."—***Gen. Toshio Tamogami, a month after his ouster as chief of the Japanese Air Self-Defense Force for declaring that Japan was not an aggressor in World War II, Xinhua News Agency, Dec. 1.***

Alternative in Ground War

"We are considering a major infusion of more US troops and dollars into Afghanistan in an effort to thwart a rising Taliban insurgency. An alternative policy would focus much more than we are doing now on training, equipping, and supporting indigenous forces to fight insurgencies in their own region in their own ways, rather than for US forces to do most of the direct fighting. ... The direct fighting against insurgents would be done by indigenous forces, not US ground forces, unless necessary."—***Retired Gen. John A. Wickham Jr., Army Chief of Staff from 1983 to 1987,*** **Arizona Daily Star,** ***Nov. 9.***

WMD Attack by 2013

"Unless the world community acts decisively and with great urgency, it is more likely than not that a weapon of mass destruction will be used in a terrorist attack somewhere in the world by the end of 2013."—***Report of Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism,*** **New York Times,** ***Dec. 1.***

Bush's Biggest Regret

"The biggest regret of all the Presidency has to have been the intelligence failure in Iraq. A lot of people put their reputations on the line and said the weapons of mass destruction [were] a reason to remove Saddam Hussein. It wasn't just people in my Administration; a lot of members in Congress, prior to my arrival in Washington, D.C., during the debate on Iraq, a lot of leaders of nations around the world were all looking at the same intelligence. And, you know, that's not a do-over, but I wish the intelligence had been different, I guess."—***President George W. Bush, ABC News, Dec. 1.***

Missing Advocates

"Apart from the Special Forces community and some dissident colonels, however, for decades there has been no strong, deeply rooted constituency inside the Pentagon or elsewhere for institutionalizing the capabilities necessary to wage asymmetric or irregular conflict—and to quickly meet the ever-changing needs of forces engaged in these conflicts."—***Secretary of Defense Robert M. Gates,*** **Foreign Affairs,** ***January.***

Unified Korea

"We see a unified Korea as likely by 2025 and assess the peninsula will probably be denuclearized, either via ongoing diplomacy or as a necessary condition for international acceptance and cooperation with a needy new Korea."—***National Intelligence Council report,*** **Washington Times,** ***Nov. 19.***

Whoops

"The rim of the great Asian continent is already home to five nuclear powers: China, India, Pakistan, North Korea, and Russia."—***US Joint Forces Command report, Nov. 25. The Pentagon subsequently said inclusion of North Korea was a mistake.***

Shifted Focus

"Iraq is now a rear-guard action on the part of al Qaeda. They've changed their strategic focus not to Afghanistan but to Pakistan, because Pakistan is the closest place where you have the nexus of terrorism and nuclear weapons."—***Gen. James T. Conway, Commandant of the Marine Corps,*** **Wall Street Journal,** ***Nov. 26.***

Rumsfeld Calls for Patience

"The singular trait of the American way of war is the remarkable ability of our military to advance, absorb setbacks, adapt, and ultimately triumph based upon the unique circumstances of a given campaign. Thus it has been throughout our history. And thus it will be in Iraq and Afghanistan, if we have the patience and wisdom to learn from our successes, and if our leaders have the wherewithal to persevere even when it is not popular to do so."—***Former Secretary of Defense Donald H. Rumsfeld,*** **New York Times** ***commentary, Nov. 23.***

Internal Combustion

"I've already seen how things get worse as the result of an oil price collapse. It's dangerous—but people who have not governed a nuclear-armed country don't quite understand that."—***Yegor Gaidar, who was acting prime minister of Russia in 1992, on social unrest generated by the most recent crash of Russian oil industry,*** **Wall Street Journal,** ***Dec. 19.***

PR and Propaganda

"Without clearly defined strategic communications responsibilities, DOD may appear to merge inappropriately the public affairs and information operations functions."—***Pentagon inspector general on contracted-out Defense Department "strategic communications" program with blurred lines between public relations and propaganda,*** **Washington Post,** ***Dec. 12.***

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AFA National Report

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By Frances McKenney, Assistant Managing Editor

Speaking to Space Command

Air Force Association Chairman of the Board Joseph E. Sutter spoke at a commander's conference for Air Force Space Command in November.

Gen. C. Robert Kehler, head of AFSPC, had invited him to the meeting, held south of Los Angeles, at Ft. MacArthur, and dovetailing with the AFA Global Warfare Symposium. Among the 100 people at the AFSPC conference were command chiefs, staff, and civic leaders.

Sutter told the audience that AFA has expanded its communications efforts to better inform decision-makers and the public about airpower's role and the need to recapitalize USAF's aircraft and space systems.

USAF photo by Duncan Woods

AFA Board Chairman Joe Sutter speaks at an Air Force Space Command commander's conference at Ft. MacArthur, Calif., in November.

For a Tuskegee Airman

Through efforts spearheaded by the **Lincoln Chapter** in Nebraska, a new elementary school was officially named in October to honor a Tuskegee Airman.

Paul Adams Elementary School in south Lincoln opened to students (kindergarten through fifth grade) this past August. In October, more than 500 guests attended the formal dedication ceremony for the first elementary school to open in the district since 1995. The guest of honor was retired Lt. Col. Paul Adams.

Born in Greenville, S.C., Adams was among the nation's first African-American military airmen, having trained at Tuskegee Army Air Field in Tuskegee, Ala., for World War II service. Adams became a P-51 fighter pilot in the 332nd Fighter Group. After retiring from the Air Force, he began teaching industrial arts in 1964 at Lincoln High School. He retired in 1982 but continues to mentor students through volunteer programs.

The chapter's involvement in the elementary school began two years ago when nominations were sought for names for three schools to be built. The chapter's aerospace education vice president, Diane R. Bartels, received chapter approval to organize a letter-writing campaign to have a school named for Adams. Chapter VP Lang W. Anderson III and Membership VP Robert A. Athan pitched in by making telephone calls and writing e-mails to support the nomination.

After Adams' name was selected, Bartels, Chapter President Robert A. Tovado, and Chapter Secretary Steven H. Plamann helped plan the dedication ceremony.

A brass quintet from the USAF Heartland of America Band at Offutt Air Force Base provided the music for the program. After the ceremony, Adams spent a half hour signing autographs at a reception. The afternoon culminated with the flyby of a warbird familiar to Adams, a P-51 Mustang.

Don't Throw It Away

The director of an institute that preserves World War II memorabilia and memories spoke to the November meeting of the **Col. H. M. "Bud" West Chapter** in Tallahassee, Fla.

William O. Oldson, a history professor at Florida State University, founded the school's Institute on World War II and the Human Experience. He described its mission to archive artifacts from the time period 1936-49 and to collect oral histories. People have donated letters, diaries, photographs, newsletters from bases and defense plants, service records, drawings, and uniforms. Oldson echoed a statement on the institute's Web site: "Do not let your memorabilia be thrown away because you think no one is interested."

Receiving special recognition at this dinner meeting were cadet leaders Charday Caminero of FSU's Det. 145; Jeremy Chick from Godby High School FL-811; and Perry Thomas from the Civil Air Patrol. In addition, several FSU cadets—including cadet chapter members Christopher Wittman and Mei-Ling Liber—performed a POW-MIA ceremony that evening.

Chapter President Gary Sharpe later explained, "At every opportunity, we collaborate with all cadet programs within our coverage area." He pointed out that the chapter is more than 100 miles from the nearest active duty Air Force base—Tyndall—so it concentrates on supporting nearby junior and senior ROTC units and science, technology, engineering, and mathematics efforts in area schools. The chapter even supports three AFJROTC programs in Bainbridge and Thomasville, Ga., because they are not located near Georgia chapters.

$20,000

The take was $20,000 in round numbers—$19,800, to be exact—when the

San Jacinto Chapter (Tex.) manned a food booth at a Houston air show in October.

The chapter took home 10 percent of that, plus an invitation to return, from the company that organized the concessions at the 24th annual Wings Over Houston air show at Ellington Field.

Selling cold drinks, nachos, and hot dogs was no simple task. Chapter Vice President Richard P. Campbell began lobbying for a food booth eight months ahead of time and did not land the job until September. Rules stipulated no fewer than a dozen people manning the booth at all times during the two-day event, so Campbell rounded up 40 volunteers. Most came from the University of Houston's AFROTC Det. 003—commanded by chapter member Col. Philip A. Bossert Jr.—and the school's Corps of Cadets. Others helping out came from the Air National Guard's 147th Reconnaissance Wing (ANG), whose vice commander, Col. Rodney L. Horn, is chapter president; an Air Force detachment at NASA's Johnson Space Center; and the ranks of NASA contractors.

Among the chapter members working the booth were Tommy Thompson, Samuel Morthland, and William J. Rothschild.

Capt. Travis Nels, treasurer of the Charlemagne Chapter, presents an AFA Pitsenbarger Award to MSgt. John Rickman at a Community College of the Air Force ceremony at Geilenkirchen NATO AB, Germany.

All-State Effort

In preparation for Veteran's Day, the **Red River Valley Chapter** put a varied group of people to work and got all the state's AFA chapters involved.

In early November, Boy Scouts, Girl Scouts, and a group from Youth Activities at Grand Forks AFB N.D., stood outside the base's commissary and exchange, soliciting donations. They had in hand lists of items needed by residents of the state-run North Dakota Veterans Home in Lisbon.

"The response was outstanding," said the chapter's president, SMSgt. Daniel J. Becker. "The scouts received over eight full shopping carts of donations over two days."

Becker then organized more than a dozen volunteers from the base, his chapter, and the **Happy Hooligan Chapter** in Fargo to deliver the donations on Nov. 11. A donation from the **Gen. David C. Jones Chapter** in Minot helped with travel costs, since Lisbon is some 100 miles south of Grand Forks.

The group had lunch with residents of the facility and participated in a Veterans Day ceremony, along with other visiting veterans organizations. Becker was called on to speak to the audience and presented the residents with AFA 2009 calendars, which, he later said, "the veterans absolutely loved." The calendar features Army Air Forces photos from World War II.

More Chapter News

■ Capt. Travis J. Nels, treasurer of the **Charlemagne Chapter** in Germany, presented an AFA Pitsenbarger Award to MSgt. John V. Rickman at the November Community College of the Air Force graduation ceremony at Geilenkirchen NATO Air Base. Pitsenbarger Awards provide $400 scholarships to CCAF graduates who are continuing on to a bachelor's degree. Rickman is a member of the logistics wing, NATO Airborne Early

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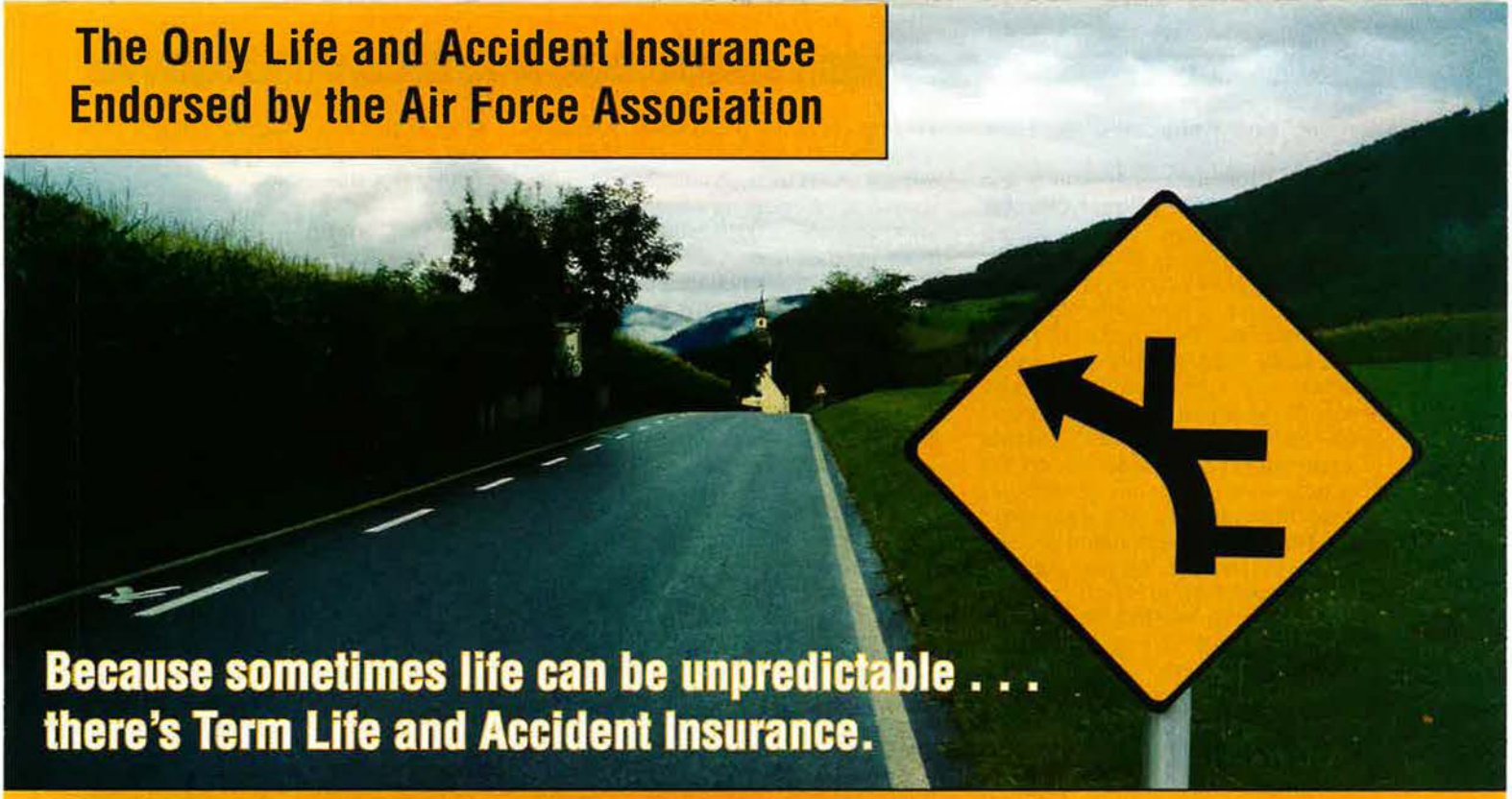

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■ James Kirkstadt, treasurer of the **Lt. Col. B. D. "Buzz" Wagner Chapter (Pa.)**, spearheaded an effort to secure an award for a World War II veteran. Leonard Reighard, who served with the Army Air Corps in the Philippines, was overlooked when Pennsylvania's Cambria County honored Johnstown area veterans in a spring 2008 ceremony. Kirkstadt remedied the situation and presented Reighard with a Certificate of Appreciation and medal during the chapter's anniversary dinner. Another guest of honor at the dinner was retired USAF Col. Boyd Gilbert, nephew of the chapter's namesake. Wagner was the first AAF ace of World War II.

■ In November, the **Richmond Chapter (Va.)** sponsored a lecture called "Mach 1 and Beyond" for AFJROTC cadets at Deep Run High School in Glen Allen, Va. Chapter President David Reisenwitz's hour-long PowerPoint lecture began with an explanation of Ernst Mach, a 19th century Austrian physicist who established the principles of supersonics. Reisenwitz then covered aviation development from the Wright brothers to the SR-71.

■ The 181st Intelligence Wing vice commander, Col. Christopher H. Colbert, was guest speaker for the Veterans Day meeting of the **Southern Indiana Chapter.** The Air National Guardsman, whose unit is located near Terre Haute at Hulman Airport, is a command pilot with more than 3,000 hours in F-16s and F-4s. He described the unit's transition from F-16s to intelligence operations. The 181st was redesignated in July 2008. Chapter President Marcus R. Oliphant reported that 40 guests attended this dinner meeting.

■ The Pearl Harbor Memorial Reception of the **Iron Gate Chapter (N.Y.)** included patriotic songs and a recital of the poem "Rouge Bouquet," written by World War I soldier-poet Joyce Kilmer. Honored guest was retired Maj. Gen. J. Stanley Holtoner, a longtime chapter leader. Holtoner earned his wings at Kelly Field, Tex., in the early 1930s. In 1952, he became commander of the Air Force Flight Test Center at Edwards AFB, Calif. The chapter named him and chapter member George Burns as Jimmy Doolittle Fellows.

William C. Rapp

Retired Brig. Gen. William C. Rapp, an AFA national director emeritus, died Nov. 21. He was a resident of Williamsville, N.Y.

A Korean War veteran, General Rapp served in the Air Force and Air Force Reserve from 1948 to 1990. He was a retired executive of a telephone company.

General Rapp had been an AFA member since 1950, serving as chapter, state, and region president (Northeast Region) and on national committees before his election to the board of directors in 1978. He was also a trustee of what was then the Aerospace Education Foundation. ■

With Tuskegee Airman Lt. Col. Paul Adams, USAF (Ret.), at the dedication of a school named for him are (back row, l-r): Lincoln Chapter's Kelly Schweitzer, Katie Elwer, and Gina Nastase. Front row: Silver Wings members Jackie Reisinger and Karla Rinschen.

More photos at http://www.airforce-magazine.com, in "AFA National Report"

Reunions

reunions@afa.org

509th BW. April 14-18, 2010 in Tucson, AZ. **Contact:** Fred Smith (501-922-5990) (fjlcretta@suddenlink.net).

601st and 615th AC&WS, Germany. April 26-May 1 at the Howard Johnson Inn in St. Augustine, FL. **Contact:** Francis Gosselin, 10645 Cup Dr., San Antonio, FL 33576 (352-588-9295) (fgosselin@tampabay.rr.com).

AF Navigators Observers Assn. Oct. 14-16 at Wright-Patterson AFB, OH. **Contact:** Ron Barrett (816-782-0745) (ronaldpbarrett@yahoo.com).

Jolly Green Assn. May 1-2 at the Ramada Plaza Beach Resort in Fort Walton Beach, FL. **Contact:** Lee Massey, 916 Aloma Faye Ln., Fort Walton Beach, FL 32547 (850-863-3131) (leetmassey@earthlink.net).

WWII bombardiers. May 6-10 in Nashville, TN. **Contact:** Bob Thompson, 280 Sharon Dr., Pittsburgh, PA 15221 (412-351-0483). ■

E-mail unit reunion notices four months ahead of the event to reunions@afa.org, or mail notices to "Unit Reunions," *Air Force* Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information. We reserve the right to condense notices.

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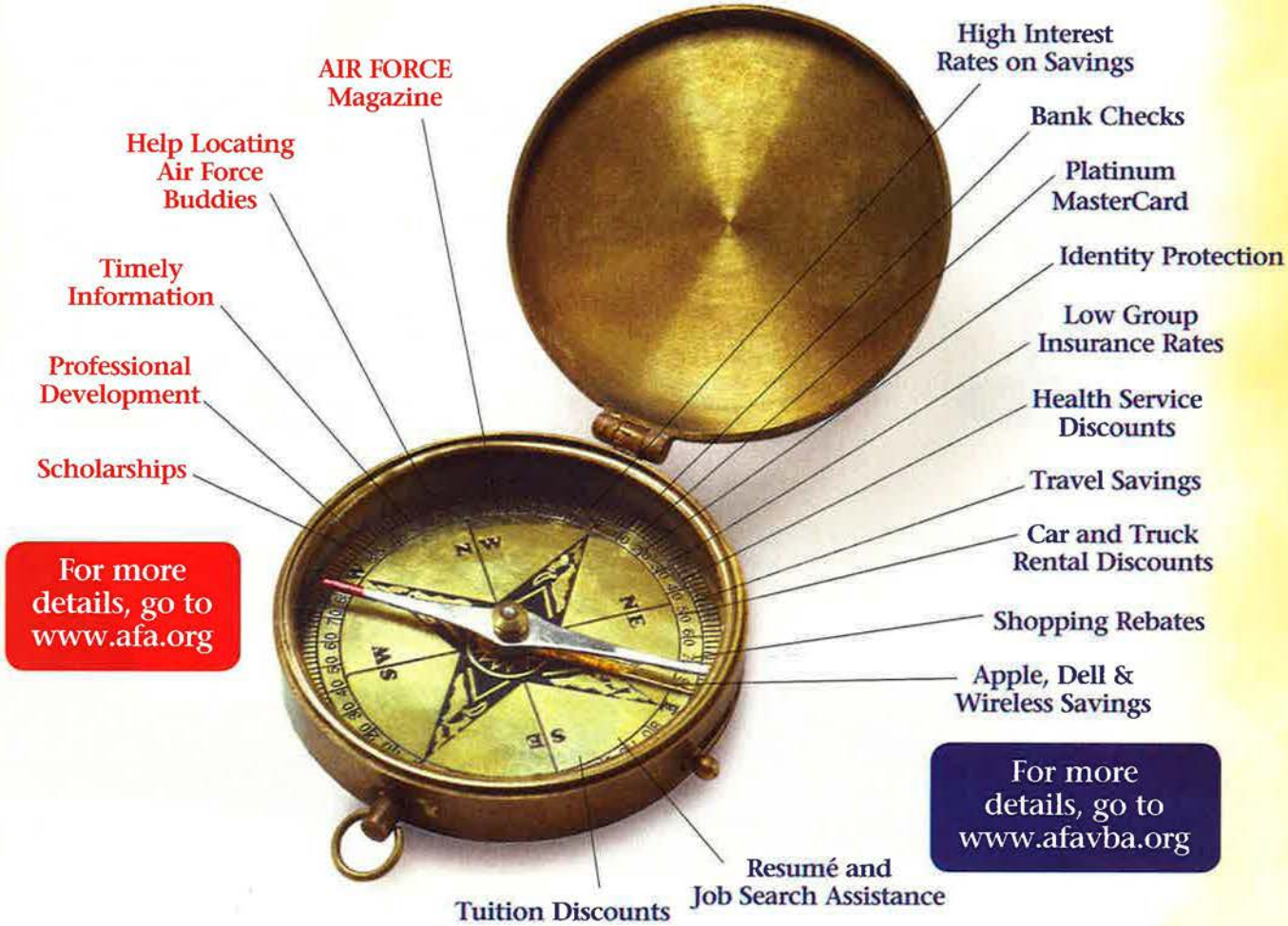

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Airpower Classics

Artwork by Zaur Eylanbekov

He 111

The He 111 was designed in the early 1930s, masquerading as an airliner and in violation of the Versailles Treaty. In the Spanish Civil War of 1936-39, this medium bomber seemed invincible, and so it became the Luftwaffe's World War II workhorse, serving on every front until the war's end. Germany and its allies operated it as a bomber but also for other purposes, including airlift, ground attack, anti-ship operations, saboteur drops, mine-laying, glider tug, and more.

Germany started World War II with some 800 He 111s of varying types, and they performed well against the air forces of Poland and then France. It was notorious for being the preferred instrument of devastation in some of the Reich's most cold-blooded bombings of civilian centers—Warsaw and London among them. By 1940, the He 111 had become highly vulnerable because of its relatively light armor and scanty defensive armament. High attrition in the Battle of Britain forced it into the night-bomber role.

The June 22, 1941 launch of Operation Barbarossa—the German invasion of Russia—gave the He 111's a new lease on life against mediocre opposition. Its greatest offensive successes in Russia were torpedo attacks on Arctic convoys and retaliation raids made against US shuttle bombers. Still, success didn't last long. The 1942 Battle of Stalingrad cost Germany 165—more than half—of its bombers remaining on the Eastern Front. As Soviet fighter forces grew in capability, He 111s were relegated to transport and support.

—Walter J. Boyne

This aircraft: Heinkel 111 bomber—1H+BN—as it looked in spring 1940 when assigned to Kampfgeschwader 26 for operations against Norway.

An He 111 on a mission over London and the Thames River.

In Brief

Designed by Heinkel ★ built by Heinkel, Dornier, Arado, SNCASO, Fabrica de Avione, CASA ★ first flight Feb. 24, 1935 ★ crew of five (pilot, nav/bomb, three gunners) ★ number built 7,300 ★ **Specific to He 111H-16:** two Junkers Jumo 211 engines ★ armament one 20 mm cannon, one 13 mm and four 7.9 mm machine guns ★ max load eight 551-lb bombs and one 2,204-lb bomb ★ max speed 270 mph ★ cruise speed 230 mph ★ max range 1,280 mi ★ weight (loaded) 30,865 lb ★ span 74 ft 2 in ★ length 53 ft 9 in ★ height 13 ft 1 in.

Famous Fliers

Military notables: Hans Baur, Werner Baumbach, Ernst Udet, Theo Blaich, Theodore Rowehl, Ulrich Kessler, Martin Fiebig, Victor von Lossberg, Friedrich Aschenbrenner, Gernot Eicke, Werner Klumper, Ernst Kuhl, Werner Moelders, Fritz Todt. **Others:** Adolf Hitler, Heinrich Himmler, Albert Speer.

Interesting Facts

Designed by brothers Walter and Siegfried Gunter ★ Employed first by Kondor Legion in Spanish Civil War ★ led notorious raids on Guernica, Warsaw, Rotterdam, London, Coventry ★ flew pre-WWII reconnaissance missions over France, Britain, Soviet Union ★ dropped guided missiles and V-1 buzz bombs ★ nicknamed Pedro and Spade ★ appeared in 1969 Guy Hamilton film, "Battle of Britain" ★ more than 60 major variants.

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