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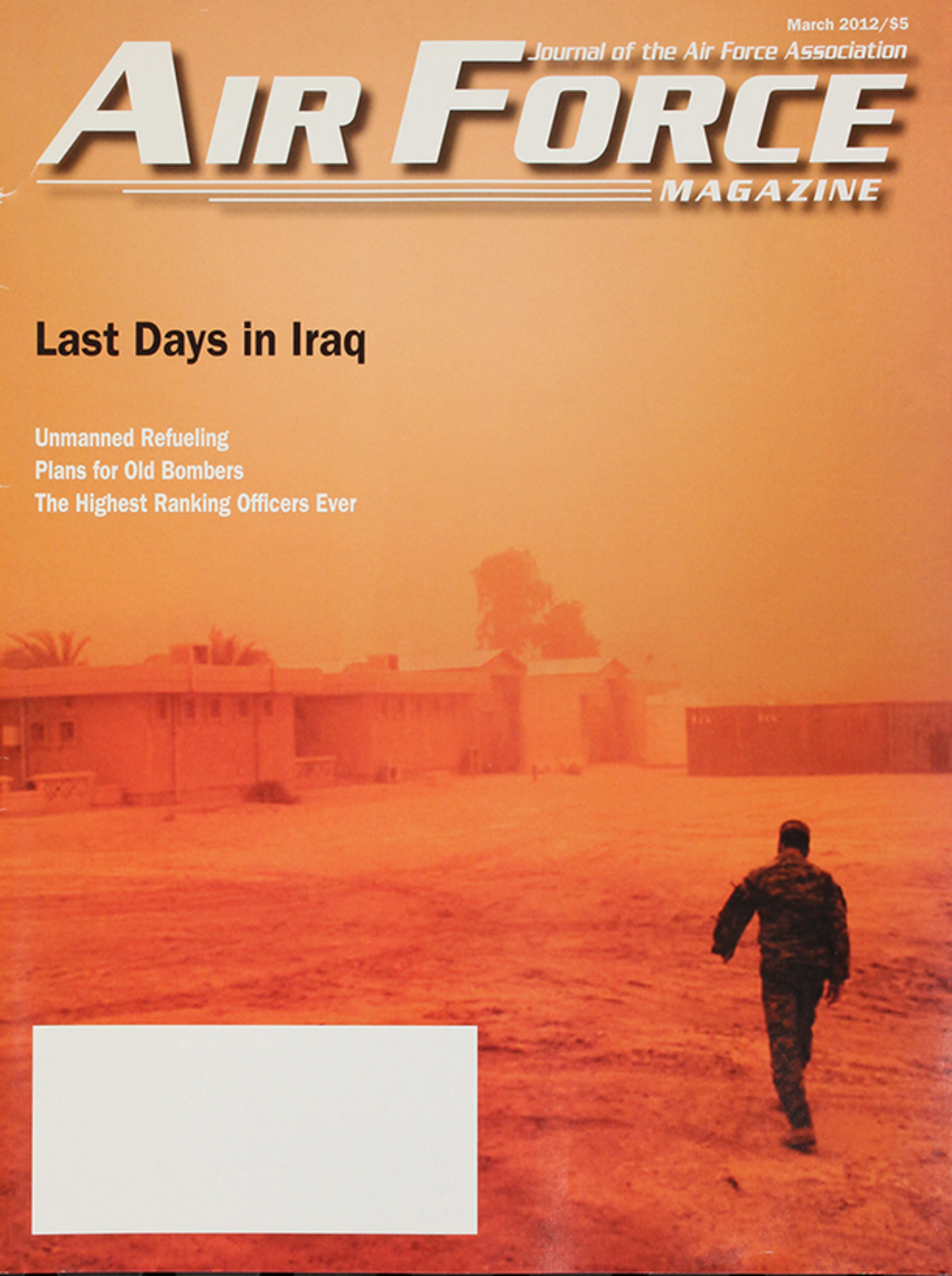

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FEATURES

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DEPARTMENTS

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Editorial

By Adam J. Hebert, Editor in Chief

Bringing Closure

At the end of the Cold War, the Defense Department went through several rounds of base realignments and closures, a process known to all as BRAC. The changes were needed to update DOD's basing structure as the Soviet Union collapsed and the US military shrank.

BRAC works. The first four rounds, in 1988, 1991, 1993, and 1995, brought dramatic changes for the Air Force as a series of large, high-profile bases were shuttered for good. These rounds of closures cost $5.9 billion to carry out, but had already saved the Air Force $12.9 billion by 2004. The early rounds cut USAF's operating costs by $2 billion a year.

About 20 percent of USAF's basing capacity was shut down, but the service actually shrank by some 40 percent from its peak Cold War size. In 1995, the Air Force still had too much property for its airmen and equipment.

For a decade, Congress rebuffed repeated Pentagon requests to approve additional closures. All politics are local, and the prospect of additional closures terrified lawmakers with military bases in their districts. Although efficient and economical in the aggregate, the base closure process was undeniably painful for those local communities that lost their nearby bases.

Finally, in 2005, Congress granted its approval for a new BRAC round, and many anticipated this would be the final go-round for many years. "This round of closures and realignment represents the last opportunity we will have, for a generation, to reset our forces," said Gen. John P. Jumper, Air Force Chief of Staff at the time. Others referred to the 2005 round as the "mother of all BRACs."

But when everything was said and done with BRAC 2005, something shocking happened: USAF closed exactly zero Air Force bases.

Defense Secretary Donald H. Rumsfeld's Pentagon had made military transformation the overriding priority. Cost savings came second, so the Air Force and DOD sought to optimize the efficiency of the military base network in their 2005 proposal. When the BRAC commission edited the list for congressional approval, the commission spared many of the higher profile bases DOD targeted for closure.

At various points in the 2005 process, Air Force or DOD officials proposed shutting down Ellsworth AFB, S.D.; Grand Forks AFB, N.D.; and Cannon AFB, N.M. None ultimately closed. A plan to turn Alaska's Eielson Air Force Base into an aircraftless "enclave" to host training missions was overturned. Pope Air Force Base was absorbed by nearby Fort Bragg, but remained open.

The result was that the only three "major" (DOD's description) USAF installations closed by BRAC 2005 were Gen. Mitchell Airport/Air Reserve Station in Wisconsin; Kulis Air National Guard Base in Alaska; and Onizuka Air Force Station in California. With all due respect to the Mitchell, Kulis, and Onizuka communities, those bases were not of the same magnitude as those shut down in earlier closures.

When everything was said and done, USAF closed exactly zero Air Force bases.

The Pentagon's original 2005 BRAC list predicted Air Force savings of $14.5 billion over 20 years. By the time the BRAC commission finished with its version of the closure list, the expected savings were halved to $7 billion over 20 years.

The upfront costs of that BRAC round proved higher than expected, so now DOD does not expect the 2005 round to break even until 2018. The savings may have been slow to develop, but they are large and perpetual. DOD comptroller Robert F. Hale recently said the 2005 round cost $35 billion upfront, but now that it is done, it will save taxpayers $5 billion annually.

Still, Maj. Gen. Gary W. Heckman, the Air Force's 2005 BRAC director, declared the 2005 round would be worthwhile even "if we save nothing," because of the "combat force enhancements" it ushered in. However, all of this left the Air Force—already saddled with roughly 20 percent too much infrastructure—in roughly the same place.

The service has continued to decline in size, albeit at a much slower pace. Between 2005 and 2011, as the last BRAC's actions were carried out, the active duty Air Force shrank by roughly 21,000 airmen while the force shed about 500 aircraft.

None of this counts the further reductions included in DOD's 2013 budget request, which if approved by Congress would over the next few years shrink the Air Force by an additional 9,900 airmen and 286 aircraft.

Getting Congress to approve DOD's most recent request for new base closure rounds in 2013 and 2015 will not be easy. Lawmakers with bases in their districts frequently take parochial views and attempt to scuttle the entire process or protect their specific bases. They sometimes frame their arguments in national security terms, but just as often the argument is a transparent plea to keep the jobs and money flowing.

It is for this reason that military value is always the top priority when DOD and a BRAC commission nominate which sites to close.

The Air Force had too many bases in 2005. The problem has gotten worse over the past seven years, and the mismatch is only expected to grow. It is clearly time to close bases, so USAF can properly align its infrastructure with its force.

If history serves as any guide, it will take several years of studies, analysis, and pleading before Congress acquiesces to this latest BRAC request. Yes, the Pentagon should look to identify excess overseas facilities first. Yes, DOD should fully understand the national security and financial ramifications of what it is doing. But Congress ultimately needs to set aside its opposition and approve the new BRAC rounds. Without them, the Air Force will continue to be spread around at too many locations, leaving inefficient units and wasting scarce infrastructure dollars.

"There's yet more excess infrastructure," noted Chief of Staff Gen. Norton A. Schwartz in February. "Our expectation is that we would actually close bases in a future base closure round."

When the new BRAC round does come, it has to be different than the last one, which for the Air Force was really BRWC: base realignment without closure. ■

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Letters

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Always Bring Them Home

I read with great interest Richard Halloran's article, "Return to Vietnam" *[January, p. 60].* The work accomplished by the airmen and Navy Seabees to renovate three medical clinics and build a library for a Vietnamese orphanage is admirable, and it helps to further the international image of America's military as one of compassion as well as strength. But I was very disappointed that his list of US military interactions with Vietnam failed to mention the two-plus decades of humanitarian work done by the Hawaii-based Joint POW/MIA Accounting Command and its predecessor organizations.

The worldwide mission to recover, identify, and return our fallen to their families is JPAC's sole task, yet providing medical and other assistance to villagers in some of the most remote parts of the world is also an important element of every operation. The Full Accounting Mission was the key to enabling the US to begin normalizing relations with Vietnam, which we all hope can be repeated soon in North Korea. The Full Accounting Mission fulfills a soldier's promise to never leave a fallen comrade behind on the battlefield, which should provide some level of comfort to a military at war and their families at home—if they only knew the mission existed. A little ink would go far to recognizing the promise that JPAC and its 500 military and Defense Department civilians continue to keep on behalf of others.

Joe Davis,
Alexandria, Va.

While I was pleased to read of the improved US-Vietnam relations and the contributions of our airmen, I wish that SrA. Darren Clemen would have purchased the "souvenir" American dog tags from the Vietnamese vendor. It may have helped to identify the many MIA/KIAs still unaccounted for.

David N. Thatcher
Fullerton, Calif.

They Stay in the Dark

I enjoyed Ms. Grant's recent article, but find that I should correct one error and offer a slightly different perspective on some of her statements *["Black Bomber Blues," January, p. 54].* I was General Scofield's deputy director for quality assurance and, as such, was responsible for the successful fabrication, clearance for flight, and signing the USAF acceptance documentation for the first B-2. I held a similiar position on the B-1B earlier in my career.

The picture [caption] on p. 57 states "Pico Rivera." The actual location is AF Plant 42, Site 4, in Palmdale. The larger sections came in from several locations by air and there was no runway at Pico. Security would have ruled out any operations at Pico, as well as the nearness to the LAX flight paths. Site 4 is an example of the $1 billion to $2 billion of milcon mentioned in the article—it was built and sized for a B-2 production run. Its location also indicates that future plans would have reduced security somewhat because the program could not have maintained true "black" status at that location.

The article states that Mr. Weinberger restarted the B-1B "as a backup." B-1B was restarted because it could supply needed assets in the shortest possible timeframe. It was started from a "warm" base. Key parts and tools were still in existence/storage in nearly 200 sites all around the country. We were able to field that aircraft in barely three years because we had two B-1A testbeds and eight landing gear forgings in storage in Cleveland (forging lead times by themselves are usually greater than three years). My belief is we needed both systems ASAP and based on the reduced B-2 numbers, it turned out to be a wise decision.

Ms. Grant also states: "In theory, so-called black world acquisition streamlines the process and lowers cost." The acquisition process may have been streamlined because General Scofield trusted his people and allowed us to do what we thought needed to be done. However, most black programs never completely "come out" and many of the routine programmatic tasks, such as logistics, configuration, and engineering, are performed by the contractor for the life of the program. Seldom will total numbers ever be seen, and there's probably not a strict accounting between R&D and sustaining-production. The B-2 was a "mil-spec" program. We had a full program office and were doing all the tasks required to field a standard USAF production aircraft, just with fewer people. In other words, there were a lot more things going on with the B-2 a lot earlier in its life cycle than normally seen in most black programs.

The article mentions several technical aspects of the program, but doesn't mention one key one. In manufacturing and QA, we were inventing stuff every day. We were building the first aircraft of composite materials to tolerances tighter than metallics. This was a truly marvelous accomplishment, but it did take time to do. There was a tremenduous amount of information, materials, and equipment transferred to the private sector as a result. I imagine that Boeing is running -787 parts in autoclaves bought for the B-2 and declared surplus.

Finally, we did it in spite of the hurdles in our path. We all share in the unmatched achievement. On that beautiful, clear day, two days before Thanksgiving 1988, when the first B-2 rolled out, we threw down the gauntlet and the Russians couldn't pick it up. In one day, their entire air defense system was 25 years behind and nearly obsolete. Hindsight might be 20-20, but in terms of what was gained, the B-2 should be viewed as a continuing investment, not as a sunk cost.

Maj. James D. Sellers,
USAF (Ret.)
Mansfield, Tex.

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

Off Life Support

Your January 2012 issue of *Air Force* Magazine did a very nice job of highlighting the great work the airmen and civilians of Seymour Johnson Air Force Base do to support and defend our nation *["The Strike Eagle's Nest," p. 46]*. However, I would like to correct one of your pictures and captions p. 48, caption 2). It improperly identifies the function as the "life support shop."

As of October 2007, the prior career fields of aircrew life support, under operations, and survival equipment, under maintenance, began merging into a new career field: aircrew flight equipment, with an AFSC of 1P0X1. In 2008, AFSCs 1T1X1 and 2A7X4 were eliminated and merged under the single AFSC of 1P0X1.

Like other career fields going through functional changes/mergers, it is important for AFE to be identified properly by news media as it builds a new career field culture. We often hear, "It's all the same and still life support." I was on active duty when the merger process started and can confirm it was much more than a "name change," and it's not "just life support."

The name change was much more than that and not an attempt to create an OPR/EPR bullet to get someone promoted! In reality, the merger took the unique skills of *both* career fields and merged them into a *new* career field—now under operations. Our AFE airmen now have nearly double the tasks and skills compared to the previous AFSCs, while dealing with the advantages and challenges of merging work concepts and cultures into new ones. All of this had to be done in the midst of establishing new technical school-technician training requirements, supporting two wars, and taking significant manpower cuts as a result of Program Budget Decision 720.

Although not an official motto, I think the mottoes of the two old career fields combined are appropriate: Aircrew Flight Equipment: "Your life is our business—Last to let you down."

CMSgt. Michael J. Freebury,
USAF (Ret.)
Lebanon, Ill.

That Was Then, This Is Now

I read with interest the article, "Dual Capable," by Michael C. Sirak in the January 2012 issue of *Air Force* Magazine *[p. 32]* partly because he includes information about the still-active B-52s, which are striving to maintain a 74 percent mission capable rate. That seems to be an acceptable availability rate in today's economic climate. However, that rate is sharply lower from what the early B-52 aircraft sought to (and did) achieve: 95 percent. I worked in B-52 logistics from 1959 to 1972, beginning at the B-52 Priority Section, where our mission was to get timely parts support for the most urgently needed components, whose shortages would otherwise ground the airplane—preventing the mission. The difference between then and now is that "then" was the Cold War, and we had all the funding we needed, while "now" the threat is not considered as imminent, and funding is limited. As far as I remember, during the time I worked in that priority section, we did not fall below that 95 percent availability standard. In early March 1961, we actually had 100 percent availability on one notable day—I still have the message from Lieutenant General McKee congratulating our division for that achievement. We used priority airlift, dedicated truck delivery, and even "pilot pickup," when the requiring unit would send their own airplane to physically fly to get the needed part, wherever it might be.

In today's economic and political climate, it is not likely that enough parts and resources will ever again be made available to enable such a support posture. I can appreciate the efforts of today's logisticians, who are probably working just as hard to keep today's airplanes flying, though in a far different climate.

Wayne Haile
Fort Collins, Colo.

Glory Denied

With respect to the article "Encounters in the Tonkin Gulf," on p. 71 of the January

2012 edition, the author reports, "Two aircraft were lost during the strikes, one of them an A-4C Skyhawk flown by Lt. j.g. Everett Alvarez Jr., who was captured and became the first American POW of the Vietnam War."

In reality, George Fryett, US Army, was captured December 1961, as the first POW in Vietnam. He was released in June 1962. In addition, Floyd Thompson, US Army, was captured in March 26, 1964, (months before Lieutenant Alvarez) and was released in March 1973. He was the longest-held POW in Vietnam. Good article overall.

Col. Yvonne Schilz,
USAF (Ret.)
Arlington, Va.

Beyond Understanding

The joint statement of Senators McCain and Graham regarding US relations with Pakistan is on target ("Verbatim: The Fertilizer Factory" January, p. 31). We hear talk of the progress we are making in Pakistan and Afghanistan in our attempt to defeat terrorist organizations such as al Qaeda, the Taliban, and the Haqanni Network. Based on my personal experiences, I question the progress.

I spent 15 months in Peshawar, Pakistan, in the late 1960s, and while there, I was able to visit Kabul, Afghanistan. Mohammad Ayub Khan was Pakistan's President at the time, and many believe he was most responsible for aligning his country with the US in international affairs and securing our military and economic assistance. In his autobiography titled *Friends not Masters,* he outlined his views on foreign policy. He emphasized friendship, not subservience, and he sought high returns for his country. Ever since then, we have been pouring billions of dollars of economic and military assistance into Pakistan. Ayub Khan's desires for high returns have materialized, but at what cost to the United States?

Pakistan has allowed the establishment of safe havens for terrorists. Afghan and Pakistani boys are educated in religious schools (madrassas) in Pakistan, where many develop into militant Islamists taught to hate and fight. Some of the students are ushered into the Taliban where they seek to establish a puritanical Islamic state that will not tolerate forms of Islam different from their own beliefs. They scorn democracy as an offense against Islam.

There are claims that the Taliban was overthrown with the 2001 invasion of Afghanistan. If they were overthrown, they surely were not defeated. They retreated to Pakistani border enclaves where they regrouped. Today, they are again present in too much of Afghanistan, and they enjoy virtual immunity from law and authority in Pakistan's tribal areas. Many of us in America do not understand what drives the Islamic militants. We cannot comprehend the deep-seated hatred of our way of life by the militants and the myriad people they so easily influence. I wait for the day when we bring our brave men and women home from battlefields in far off lands, but I hope we do not mistakenly interpret progress as victory.

Col. Bill Friel,
USAF (Ret.)
Dayton, Ohio

Believe!

I had to chuckle as I read the confession of faith by U. Stephen Antos in the January edition of *Air Force* Magazine's letters to the editor *["On a Clear Day," p. 7].* It could have been any of the letters that crossed my desk back in the days when I was responsible for responding to FOIA requests (demands?) for everything Offutt Air Force Base had on the existence of UFOs. I was in charge of the cats and dogs appended to the 3902nd Air Base Wing. Being one of the few rated officers in the wing, I had the job of responding to sonic boom complaints, jet noise complaints in general, lawyers demanding to speak to aircrews who had flown sorties years in the past—and UFO FOIA requests, among other things. Of course, the real Air Force doesn't now bother itself with collecting data on UFOs, let alone

archiving it on any number of bases. My response to UFO data requests was a piece of boilerplate that the legal office had developed that explained that we had no such data and that they should go bark up some other tree I have long since forgotten the name of.

Like Antos, the UFO FOIA requests were more confessions of faith and an unwavering willingness to believe every crackpot story that has ever been printed in any number of entertainment magazines. There is a term for that kind of faith: blind gullibility. There are some people who are quite willing to believe only what they want to believe. I had an aunt with that tendency; not surprisingly, she claimed to have seen a UFO.

I am a disbeliever. I was a rated navigator from 1961 to 1985; during that time I logged almost 5,000 flying hours over parts of Earth that ranged from the tropical Pacific Ocean to the ice-covered Arctic Ocean—and lots of places in between. I flew in all kinds of weather, both day and night. I have seen lots of phenomena that caused me, on first glance, to ask myself, "What the hell is that?" In every case, after some time making careful observations, I was able to identify the sometimes very strange sights that appear in the sky. I have seen the spectacularly spooky sight of what turned out to be a blood-red moon, in eclipse, peeping over the horizon between Guam and Wake Island; it took several minutes to convince two pilots that the sight out ahead of them really was a rising moon. I am also an amateur astronomer and have been for about 50 years. Nowadays, I do astronomy the way the ancient Babylonians did it, but I have more than passing familiarity with the sky, both day and night.

In half a century of looking at the sky from a wide variety of places with a wide variety of vantage points, I have never seen anything I couldn't ultimately identify. People who believe in UFOs want to believe in UFOs.

Gerald P. Hanner
Papillion, Neb.

Eyes In the Back Of Your Head

Thanks for a great article about B-52 gunners *["The B-52 Gunners," January, p. 64].* I have a special appreciation for gunners, and SSgt. Sam Turner in particular, since I was the aircraft commander of Sam's aircraft (Brown 3, B-52D, 56-0676) on Dec. 18, 1972, when he shot down a MiG-21 over North Vietnam.

Our crew (McCoy E-09) was the No. 1 spare for the launch, but ended up taking off when the last aircraft in the stream aborted on the runway at U Tapao with a fuel leak. It has been almost 40 years since that night when two enemy aircraft came up behind our formation, but I still remember the aircraft shaking when the guns were fired, and Sam's voice (about two octaves higher than normal) when he transmitted over the interphone and said, "I think I hit him!" I quickly looked out the pilot's window and saw the reflection of the explosion under the left wing.

The crew was truly thankful for Sam's timely action. We were also appreciative of his pair of eyes in the back of the aircraft on other missions when he pointed out and tracked surface-to-air missiles launched in our direction.

Turner took care of his crew just like hundreds of other B-52 gunners had done over the years. An unofficial duty of the gunners, especially the more experienced ones, was the "care and feeding" of young crew members. When I was a second lieutenant, someone gave me some great advice: "Find a good NCO and learn everything you can from them." They were absolutely correct. Staff Sergeant Turner is no longer with us, but his accomplishments and those of all the other gunners who took care of their crews will long be remembered. *MiG Killer One,* 56-0676, still proudly serves as a display aircraft at Fairchild AFB, Wash.

Col. Nick Whipple,
USAF (Ret.)
New Port Richey, Fla.

I am writing in regard to Peter Grier's interesting article on the B-52 tail gunners. There are a couple of minor errors that I would not mention had the aircraft not gotten so old that many of the troops—even the old ones—have never seen a B-52, other than the H models now flying. Even then, the gunners are long gone now.

I have been out of the Air Force for 50 years this May. I was in maintenance on them and the B-47 when the BUFF first came out. I then flew as a gunner for several years.

The B-52, through the B model, had the A3A gunnery system. It had two electronic primer 20 mm cannons. It did not have an optical sight. It did have the capability to lock on to two targets at one time. The rest of them, to the G, had one-to-one optics—search and track radars. The G had basically the same system, except it had a closed circuit TV that showed the optics and CRT. The H was in a different world altogether, with a Gatling gun similar to the B-58 Hustler. When I left the military 50 years ago, the gunnery chief gave the mandatory briefing, advising me that I was to say nothing about the B-52 for 12 years. He then chuckled, saying, "Of course, it won't be around then, anyway."

Gary L. Holtman
Columbus, Miss.

Washington Watch

By John A. Tirpak, Executive Editor

Cutting the fleet; Squeezing the lemon; Bye-bye C-27; Spotting the Army's hand ....

2013 AIR FORCE: SMALLER BUT "SUPERB"

The Air Force wants to shed nearly 10,000 airmen and an additional 300 aircraft over the next five years, the bulk of which would go in the next year or two. The drawdown, telegraphed by service leaders for months and announced formally in February, was spurred by the convergence of federal budget cuts, the end of the war in Iraq, the winding down of the war in Afghanistan, and a new defense strategy.

According to a white paper released ahead of the Fiscal 2013 budget, USAF said that after next year—assuming the approval of Congress—it will be "the smallest force since our inception in 1947." However, Air Force Secretary Michael B. Donley said the smaller force will still be "superb" and capable of handling any threat.

Top Air Force leaders said they don't think they'll have to separate anyone involuntarily, and pay cuts are not in the cards, though slower growth in compensation is seen as a must. Leadership also hopes Congress will agree to another two rounds of base closures, because USAF already has too few assets to spread around the bases it has, and it is shrinking further. Since 2001 USAF's aircraft inventory has already come down by more than 500 aircraft, but in the last round of base realignment and closure, no USAF bases were actually closed.

The white paper explained the force structure changes in detail. In the paper, the Air Force said it chose which capabilities to cut as a result of the new strategic guidance "to size our forces for one large-scale combined arms campaign with sufficient combat power to also deny a second adversary, without conducting a large-scale, prolonged stability operation." In other words, if Congress goes along with the requested program, the US military will have enough capability to win one war and frustrate an aggressor in another, but without the capacity to simultaneously sustain an extended counterinsurgency campaign like Iraq or Afghanistan.

"Our decision for the Air Force was that ... the best ... course of action for us is to become smaller in order to protect a high-quality and ready force that will continue to modernize and grow more capable in the future," Donley said at a Pentagon press conference.

Some areas protected from cuts were the bomber force—including a new bomber program—as well as remotely piloted aircraft and cyber capabilities, Donley said, because these address essential USAF missions and those most likely to be needed in the coming decade. Reductions of both aircraft and personnel fell hardest on the fighter and mobility communities, which will lose 123 and 133 aircraft, respectively. The intelligence-surveillance-reconnaissance fleet will be reduced by 30 aircraft.

For the most part, personnel positions to be eliminated will be those directly involved with the aircraft to be retired, Chief of Staff Gen. Norton A. Schwartz explained. The active duty will be cut by 3,900 airmen; the Air National Guard by 5,100; and the Air Force Reserve by 900.

The three elements of the Air Force will work more closely together, Donley said, and the number of associate units among them "will go up from about a hundred to 115. And we expect that number to grow higher" beyond Fiscal 2014, he said.

"Just about every state will be affected" by the changes, Donley added.

In making choices about which aircraft to cut, the Air Force set two guidelines, he said: The aircraft retained should, as much as possible, be multirole platforms capable of doing a number of missions, and whole fleets of a given type should be divested—again, if possible—to eliminate the logistics train that goes with them.

Six squadrons of fighters will be retired, as well as one fighter training squadron, leaving 54 fighter squadrons. The bulk of those retired will be A-10s, mainly because of the multirole emphasis and the fact that the Army and Marine Corps will also shrink substantially. Not as many A-10s are expected to be needed in the future to give ground troops close air support, so 102 Warthogs will head to the boneyard.

There are "still going to be 246 A-10s in the inventory," Schwartz stressed at the Pentagon press conference, adding that F-16s, F-15Es, AC-130s, and even bombers remaining in service can all do some aspect of the CAS mission.

The remaining fighters to be retired come from among the oldest F-16s in the inventory, Schwartz said. However, the Air Force is committed to performing a service-life extension and avionics upgrade on 350 F-16s that will be retained. This is necessary because buys of the F-35 will be slowed in the coming few years, in order to reduce concurrency between the last stages of development and production.

The buy objective of 1,763 F-35s has not changed, Donley said in a speech, sponsored by the Air Force Association, that accompanied release of the white paper, adding—with vehemence—that any change to the ultimate number "is not something we have to consider until the 2020s." He vigorously rejected the notion that the Air Force would buy any more new F-16s to supplement squadron strength until the F-35s begin to roll off the assembly line at a high rate.

THE MOBILITY CHOPPING BLOCK

In airlift, the Air Force wants to go below the minimum T-tail inventory of 300 strategic airlifters imposed by Congress last year. USAF would like to get to a 275-aircraft fleet of 223 C-17s and 52 C-5Ms, the latter of which will have been re-engined and received other modifications. The 27 remaining C-5As would be retired.

Similarly, the Air Force wants to get rid of 65 of its oldest C-130s, leaving a fleet of 318, and forego the full-up Avionics Modernization Program on those Hercs that haven't yet received the upgrade. There are less costly ways to get these aircraft the most essential improvements without doing AMP on them, Schwartz said.

In keeping with the guidelines to eliminate whole types of aircraft, USAF would divest itself of all 38 C-27Js. Their mission—which would have been performed by the Air National Guard—can be performed by C-130s instead. The C-27J represented a "niche" capability no longer needed or afford-

the original transformer.

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USAF photo

Twenty-seven venerable C-5 lifters would retire, leaving a fleet of 52 C-5Ms and 223 C-17s.

able with the wind down of operations in Southwest Asia, Donley asserted, and the C-130 has shown that it can do the job.

Twenty KC-135s will also be retired in Fiscal 2013, according to the white paper.

Long-term cost and performance issues with the remotely piloted Global Hawk Block 30 have led USAF to terminate the program and opt to continue operating the manned U-2 instead, Schwartz said. Although "we like the persistence" offered by the RPA, the Block 30 wasn't going to match the U-2's capability and wouldn't have been cheaper to operate, Donley said.

However, the Air Force will press on with the Block 40 model of Global Hawk, which will have a ground-mapping radar function.

Rounding out the ISR reductions, USAF will retire 11 RC-26 aircraft and "total" one E-8 JSTARS aircraft damaged in an accident and deemed not economically repairable. The MC-12 Liberty will still bed down at Beale AFB, Calif., but the mission will transfer to the Air National Guard.

However, the Air Force will continue to work toward 65 "orbits" of midsize RPAs, such as the MQ-9 Reaper, and will retain the ability to surge to 85 orbits.

In each fleet of aircraft that remains in service, Donley said USAF will work to make them of "common configurations," to increase their mission flexibility and reduce the complexity of training and maintenance. Older C-17s will receive extended-range fuel tanks like those on later models, for example.

WHAT HARD CHOICES LOOK LIKE

Some new programs disappeared from the Fiscal 2013 budget. According to the white paper, "we discontinued or deferred programs that are simply beyond our reach in the current fiscal environment."

These include the Common Vertical Lift Support Program, the Light Mobility Aircraft, and the Light Attack and Armed Reconnaissance aircraft. The helicopter was to replace Vietnam-era UH-1s, while the LMA and LAAR were meant to help partner with nascent air forces in Iraq, Afghanistan, and elsewhere. The Air Force also canceled the new Defense Weather Satellite System, and Donley said a less complex program is eyed for the future.

The flying hour program will be revised to account for greater use of high-fidelity simulators, Donley said.

In his AFA speech, Donley said the Air Force "must not ... hollow" out its force because potential adversaries have learned that it doesn't pay to allow the US "six months to get ready" for a military campaign. The future, he said, is likely to see scenarios more like last year's Libya campaign, which went from notional to operational in a matter of days. There simply won't be time for a big buildup of forces in future conflicts, demanding ready forces, Donley said.

INSATIABLE DEMAND FOR EFFICIENCY

Although the Air Force made an all-out effort to find efficiencies and reduce overhead last year—culminating in a $33 billion reduction over the coming five years—the new budget will contain an additional $3.4 billion of forced productivity, mostly from changes in information technology and how USAF spends its money, Donley said.

Of efficiencies, he told the AFA audience, "there's not much juice left to squeeze from that lemon."

Donley also told reporters the science and technology accounts, as a share of the overall budget, would be left intact, though there might be some shuffling of priorities within them. As part of a DOD edict to hedge against surprises in world events, Donley said USAF is protecting its "seed corn."

However, the Air Force said it is assuming "manageable risks" by only funding its weapon system and facility maintenance accounts at about 80 percent each.

THE ARMY LANDS ON AIRSEA BATTLE

The new AirSea Battle concept, emphasizing air and naval forces to counter the anti-access, area-denial (A2AD) problem with China, Iran, and other potential adversaries has been seemingly superseded by a new Pentagon white paper to include all the services.

The Joint Operational Access Concept, unveiled in January, seeks to deal with the A2AD problem by leveraging "cross-domain synergy."

The paper, introduced by Joint Chiefs Chairman Army Gen. Martin E. Dempsey, said synergy means "complementary, vice merely additive, employment of capabilities in different domains such that each enhances the effectiveness and compensates for the vulnerabilities of the others."

The paper takes pains to recognize how specifically the Army would be involved in combating A2AD. That service has been seemingly left out of AirSea Battle, which has been touted as the template for the most likely operations of the coming decade.

Of particular interest is a "risks" section seemingly offered as a rebuttal of AirSea Battle and the broader JOAC itself. The big risks of adopting the concept are a failure "to achieve the synergy" necessary to make the concept work and the potential failure of the services to develop reliable and well-rehearsed methods to coordinate their actions.

The Army hand was visible in several identified risks.

The joint concept's emphasis "on cross-domain combat power could be misread by resource allocators to suggest significantly less need for organic self-sufficiency," according to the risk section.

Other noted risks suggest the operations proposed would be of "debilitating complexity"; that reliance on deep attack may be "unrealistic"; and that the concept "could be logistically unsupportable" or unsupportable under austere defense budgets.

The JOAC's authors also wonder if the deep attack functions necessary for long-range success from standoff range may be politically hard to justify and whether they might heighten the risk of nuclear war. ■

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Air Force World

By Aaron M. U. Church, Associate Editor

Three Airmen Killed in Afghanistan

Three airmen died when an improvised explosive device struck their vehicle near Shir ghazi in Afghanistan's Helmand province Jan. 5, DOD announced.

The deceased were: TSgt. Matthew S. Schwartz, 34, of Traverse City, Mich.; SrA. Bryan R. Bell, 23, of Erie, Pa.; and A1C Matthew R. Seidler, 24, of Westminster, Md.

Schwartz was from the 90th Civil Engineer Squadron at F. E. Warren AFB, Wyo.

Bell was a member of the 2nd CES at Barksdale AFB, La.

Seidler's home unit was the 21st CES at Peterson AFB, Colo.

First Female USAF Four-Star

President Obama nominated Lt. Gen. Janet C. Wolfenbarger to become a four-star general as head of Air Force Materiel Command at Wright-Patterson AFB, Ohio, the Pentagon announced Feb. 6.

If the Senate approves her nomination, she will become the Air Force's first female four-star. She will replace Gen. Donald J. Hoffman, who has led AFMC since November 2008.

Wolfenbarger currently serves as the military deputy in the Air Force Secretariat's acquisition office at the Pentagon, where she began work last September.

No stranger to AFMC, she served as vice commander from December 2009 to September 2011 and had overseen the B-2 System Program Office and C-17 Systems Group and served in several roles in the F-22 program.

A 1980 graduate of the Air Force Academy, Wolfenbarger began her career as a technical analyst with the Air Armament Center at Eglin AFB, Fla.

Hoffman, Van Buren To Retire

Gen. Donald J. Hoffman, commander of Air Force Materiel Command, announced he will retire after 38 years of service.

Before taking charge of AFMC in November 2008, Hoffman served as military deputy in the Secretariat's acquisition office and as Air Combat Command requirements director.

Since graduating from the Air Force Academy in 1974, Hoffman has commanded two fighter wings; been assistant chief of staff for operations for Allied Air Forces Northwestern Europe, NATO; and logged more than 3,400 flight hours in various aircraft types.

David M. Van Buren, the Air Force's acquisition executive since April 2009, also announced his imminent retirement in February, effective the end of March. At press time, the President had not yet named a nominee to replace Van Buren.

The President has nominated Lt. Gen. Janet C. Wolfenbarger for a fourth star, with assignment as AMC head.

Over and Out in Afghanistan

US and NATO forces in Afghanistan will transition from combat operations to a purely training and advisory role beginning in 2013, said Defense Secretary Leon E. Panetta.

Troops will remain in Afghanistan through 2014 as planned, Panetta said Feb. 1, briefing the press aboard a military flight en route to a NATO ministerial meeting in Brussels.

"Hopefully by mid- to the latter part of 2013, we'll be able to make a transition from a combat role to a training, advise, and assist role," he said. However, this "doesn't mean we're not going to be combat-ready," noted Panetta, rather that NATO forces won't be in "the formal combat role that we are [in] now."

F-35 Commuted Sentence

The F-35B's two-year "probation" has been lifted by Defense Secretary Leon E. Panetta after only one year because of improvements in the pace of testing and developing the short takeoff and vertical landing fighter variant intended for the Marine Corps.

"As of today, I am lifting the STOVL probation," Panetta said in a town hall-style meeting at NAS Patuxent River, Md., in January, congratulating developers for achieving "real progress" in correcting the F-35B's deficiencies.

In January 2011, then-Defense Secretary Robert M. Gates placed the F-35B on probation, frustrated with the aircraft's cost, schedule, design, and engine issues. He promised to cancel the STOVL version if the joint industry-government team didn't resolve its problems within two years.

USAF photo by A1C Holly Cook

"We now believe that because of your work the STOVL variant is demonstrating the kind of performance and maturity that is in line with the other two variants of the [F-35]," Panetta said.

No Nuke Cuts Until 2014

Nuclear bomber and ICBM cuts to meet Air Force obligations under the New START agreement with Russia will begin in Fiscal 2014—not before, said USAF Chief of Staff Gen. Norton A. Schwartz.

"There are still decisions pending on how to go about reaching those New START central targets," Schwartz told the press in a Pentagon briefing Jan. 27. "I would expect that that would unfold in the [Fiscal 2014] program."

Under the terms of the treaty, the United States must reduce its strategic nuclear arsenal to no more than 1,550 deployed warheads and 800 total launchers (i.e., long-range ballistic missiles and bombers) by February 2018.

A total of 700 of the launchers may be in deployed status at any given time.

Schwartz reiterated the Air Force's consistent message that maintaining the triad of nuclear-capable bombers, ICBMs, and submarine-launched ballistic missiles will become increasingly important as the strategic force diminishes in size.

"The diversity, the variety, the attributes associated with each leg of the triad actually reinforce each other to a greater degree," said Schwartz.

02.10.2012

A USAF C-130J Super Hercules from the 37th Airlift Squadron performs a mass airdrop as part of a commemoration recognizing the 37th's February 1942 activation date. More than 300 paratroopers from the Army's 173rd Airborne Brigade Combat Team parachuted into the fields around Alzey, Germany.

Jammin' GPS

There's no way to operate a proposed commercial wireless broadband network alongside DOD's Global Positioning System without significant interference, a joint governmental committee has ruled.

Civilian telecommunications company LightSquared's plan "would cause harmful interference to many [Global Positioning System] receivers," and "there appear to be no practical solutions or mitigations" to allow the systems to operate side by side, asserted Deputy Defense Secretary Ashton B. Carter and Deputy Secretary of Transportation John D. Porcari. They are the co-chairmen of the National Space-based Positioning, Navigation, and Timing Executive Committee.

The unanimous conclusion was reached after "substantial federal resources" were expended in analyzing the company's original plan and subsequent modifications, Carter stated in a letter to the Commerce Department's communications chief Jan. 13.

Analysis by the FAA added further clout to the findings. The agency noted that LightSquared's proposals "are not compatible with several GPS-dependent aircraft safety-of-flight systems," according to the committee co-chairs.

Senior USAF space officials warned early on that the LightSquared network would likely cause significant jamming of and interference to GPS signals.

Despite this specific case, Carter and Porcari said, "the Excom agencies continue to strongly support" the President's aim to make spectrum available for civilian broadband use.

Carter and Porcari proposed drafting "new GPS spectrum-interference standards that will help inform future proposals for nonspace, commercial uses in the bands adjacent to the GPS signals."

Tanker Realism

The KC-46A tanker test program "is not executable" as outlined by the Air Force, warned J. Michael Gilmore, the Pentagon's director of operational test and evaluation.

Citing deficiencies in the KC-46 Test and Evaluation Master Plan in his office's Fiscal 2011 annual report, Gilmore highlighted that the proposed monthly flight hours per aircraft "exceed the historical averages" of previous large military aircraft programs.

He further emphasized that operational testing could require twice as long as the four months allotted.

Gilmore challenged the service to "provide a TEMP that contains a realistic schedule using historical military flight-test parameters."

An Air Force spokeswoman said the service respectfully "does not agree" with DOT&E's assessment, asserting the KC-46 test plan "is comparable to other commercial-derivative test programs, such as the KC-10, and in line with [Federal Aviation Administration] testing efficiencies."

Since the Air Force selected Boeing as the winner of the KC-X tanker competition in February 2011, this is the first time the KC-46 has come under the scrutiny of DOT&E's annual review.

Industry in Peril, Group Warns

The next decade's flat defense budget "will stifle the ability of the defense industry to deliver innovation and urgent wartime capabilities," warned analysts with the Defense Industrial Base Task Force.

Possible reductions approaching the $1 trillion sequestration level outlined in the 2011 Budget Control Act "would severely damage the defense industrial base as a commercially viable enterprise, as a reliable and responsive provider of urgent wartime needs, and as a national strategic asset that is indispensable to the defense of the United States," according to a report released Jan. 6.

Based on a survey of several dozen companies, "this report paints an alarming

Hey, What's That Over There?: *A C-130J from California's Air National Guard deploys decoy flares during training off the Ventura County coast. The flares are designed to "confuse" heat-seeking homing devices by offering burning hot metal targets that will distract missiles from the aircraft's engine heat.*

USAF photo by MSgt. Dave Bullner

Operation Enduring Freedom

Casualties

By Feb. 17, a total of 1,884 Americans had died in Operation Enduring Freedom. The total includes 1,881 troops and three Department of Defense civilians. Of these deaths, 1,492 were killed in action with the enemy while 392 died in noncombat incidents.

There have been 15,343 troops wounded in action during OEF.

Cover Me

F-16s and A-10s flew close air support covering the Dec. 30 rescue of an Army AH-64 Apache attack helicopter crew that crashed in northern Afghanistan.

A second Apache relayed his wingman's distress call to an E-3 AWACS via a KC-135 tanker orbiting nearby. The E-3 broke off to assist in coordinating the recovery, calling in tactical support on the downed aircrew's position.

"We knew the guys on the ground were going to need armed overwatch, so we called in the F-16s," said Maj. Paul Lankes, AWACS mission crew boss during the mission.

Low on fuel, the Vipers rendezvoused with the KC-135, then resumed guarding the aircrew from overhead until relieved on station by a pair of A-10s that remained until a rescue convoy arrived to extract the two-man Apache crew.

"That kind of orchestration is what we do," said Capt. Joel Doss, AWACS electronic combat officer.

Lone Gunman

The Air Force has concluded that the Afghan Air Force officer who shot to death eight USAF air advisors and a US contractor in Kabul last April acted alone.

The investigators "did not determine a conclusive motive," but Col. Ahmed Gul's attack "appeared to be premeditated," according to an Air Force news release discussing Air Force Office of Special Investigations findings on the April 27, 2011, incident.

The release divulged that multiple witness statements "indicated Gul may have had personal issues that were possibly compounded by alleged financial problems." Available evidence did not support early press rumors that Gul had argued with US service members earlier on the day of the shooting.

Gul died of wounds inflicted during the incident.

Rescuing the Rescuers

Braving minus 15-degree Fahrenheit temperatures and hazardous mountainous terrain, US and Afghan airmen rescued 31 Afghans from an avalanche in northern Afghanistan.

They also helped the crew of an Afghan Mi-17 helicopter that had crashed attempting to save the survivors. The joint US-Afghan team set out in two additional Afghan Mi-17s for an area near the city of Fayzabad.

The helicopters climbed 9,000 feet to the rescue site, which was tucked into the difficult-to-traverse Hindu Kush mountain range.

"The landing zone was much smaller than we anticipated. Not too many teams could've pulled this off," noted Lt. Col. John Conmy, 438th Air Expeditionary Advisory Squadron commander and an Mi-17 pilot who participated in the Jan. 24 rescue.

"The crews of all the aircraft worked together as a team to make this [rescue] happen," said Afghan Air Force Maj. Farid Samin.

"The 45th Space Wing is proud to work this important Air Force launch of WGS-4 with Space and Missile Systems Center, United Launch Alliance, and Boeing," said the wing vice commander, Col. Rory D. Welch, who was also the launch director.

WGS-4 transmitted its first on-orbit signals indicating that it "is healthy and ready to begin orbital maneuvers and operational testing," reported Boeing.

WGS-4 joins three WGS Block 1 satellites already operating on orbit. It is the first spacecraft in the series in the Block 2 configuration incorporating ultrahigh bandwidth and data rates to support airborne intelligence-surveillance-reconnaissance assets.

A Worldwide Global Satellite

In mid-January, the United States sealed a long-term Wideband Global Satellite communications partnership with Canada, Denmark, Luxembourg, the Netherlands, and New Zealand.

The arrangement secured the funds to purchase the ninth WGS military communications bird, WGS-9, which the Air Force ordered the following day, Jan. 18.

The five partner nations agreed to contribute a combined $620 million toward WGS-9's $1 billion price tag. The ninth satellite is slated to launch sometime around 2018.

"International participation in WGS is a win-win," said Craig R. Cooning, Boeing space program vice president. "The partners bring additional funding to expand the constellation and make it more resilient, and for a relatively modest investment ... receive immediate access to worldwide services," he added.

B-1 Tests Bomb "Lite"

A B-1 Lancer successfully dropped a BLU-129 low-collateral-damage bomb, proving the aircraft's compatibility with the weapon, in tests over the Utah Test and Training Range.

The BLU-129 is a 500-pound guided munition featuring a composite warhead in place of more typical metal versions. It is designed to destroy targets while causing minimal collateral damage.

"The goal of this test was to verify if a B-1's software would be compatible with the weapon," said Maj. Thomas Bryant of the 337th Test and Evaluation Squadron, at Dyess AFB, Tex., which conducted the trial Jan. 27.

Bookending Combat Shadow

Two MC-130P Combat Shadows from the 9th Special Operations Squadron closed the unit's start-to-finish support of Iraq operations, returning to Eglin AFB, Fla., on Jan 6.

"Since February 2003, our people and assets have steadily deployed in support of Operations Iraqi Freedom and New Dawn," said Col. James C. Slife, commander of the squadron's parent unit, the 1st Special Operations Wing, at Hurlburt Field. Fla.

The 9th SOS alone flew some 8,221 sorties, accumulating more than 12,000 flight hours in the Iraq theater, according to wing officials.

Ski-borne Salvation

A ski-equipped LC-130 departed the snowpack at McMurdo Station, Antarctica, battling bad weather to evacuate seven critically injured fishermen to Christchurch, New Zealand.

The sailors were part of a crew pulled from the deck of a burning Korean fishing vessel in the Ross Sea off Antarctica, Jan. 11. A US research vessel took them to McMurdo.

The badly burned fishermen were scheduled for further evacuation by an Air

Senior Staff Changes

RETIREMENTS: Lt. Gen. Daniel J. **Darnell,** Lt. Gen. Jeffrey A. **Remington,** Maj. Gen. Harold L. **Mitchell.**

CHANGES: Maj. Gen. Mark A. **Barrett,** from DCS, Strat. Plans & Policy, NATO, Allied Command Transformation, Norfolk, Va., to C/S, EUCOM, Stuttgart, Germany ... Brig. Gen. Casey D. **Blake,** from Dep. Cmdr., Jt. Theater Support Contracting Command, CENTCOM, Kabul, Afghanistan, to Vice Cmdr., Army & Air Force Exchange Service, Dallas ... Maj. Gen. Michael R. **Boera,** from Dir., Rqmts., ACC, JB Langley-Eustis, Va., to Dir., Prgms., DCS, Strat. Plans & Prgms., USAF, Pentagon ... Maj. Gen. (sel.) Steven L. **Kwast,** from Dep. Dir., Politico-Mil. Affairs, Europe, Jt. Staff, Pentagon, to Dir., Rqmts., ACC, JB Langley-Eustis, Va. ... Brig. Gen. James K. **McLaughlin,** from Dep. Dir., Global Ops., STRATCOM, Offutt AFB, Neb., to Dir., Space & Cyber Ops., DCS, Ops., Plans, & Rqmts., USAF, Washington, D.C. ... Brig. Gen. Robert D. **Thomas,** from Cmdr., 15th Expeditionary Mobility Task Force, AMC, Travis AFB, Calif., to Cmdr., Jeanne M. Holm Center for Officer Accessions & Citizen Dev., AU, AETC, Maxwell AFB, Ala. ... Brig. Gen. David D. **Thompson,** from Dir., Air, Space, & Cyberspace Ops., AFSPC, Peterson AFB, Colo., to Dep. Dir., Global Ops., STRATCOM, Offutt AFB, Neb. ... Brig. Gen. Roger H. **Watkins,** from Cmdr., Jeanne M. Holm Center for Officer Accessions & Citizen Dev., AU, AETC, Maxwell AFB, Ala., to Cmdr., 379th AEW, ACC, Southwest Asia ... Maj. Gen. Jack **Weinstein,** from Dir., Prgms., DCS, Strat. Plans & Prgms., USAF, Pentagon, to Dir., Air, Space, & Cyberspace Ops., AFSPC, Peterson AFB, Colo.

SENIOR EXECUTIVE SERVICE RETIREMENTS: Joe G. **Lineberger,** James W. **Salter Jr.**

SES CHANGES: Audrey Y. **Davis,** to Principal Dep. Dir., Defense Finance & Accounting Service, Arlington, Va. ... Richard Philip **Deavel,** to Dir., AF Review Boards Agency, OSAF, Manpower & Reserve Affairs, Washington, D.C. ... Sharon K. **Puschmann,** to Asst. Auditor General, Field Offices Directorate, OSAF, Pentagon ... Gordon O. **Tanner,** to Principal Dep. General Counsel, Office of the AF General Counsel, Pentagon. ▪

Force C-17 from Christchurch. However, due to fog and persistent poor weather, officials delayed and ultimately scrubbed the C-17 mission, Australia's *Sydney Morning Herald* reported.

Instead, the New York Air National Guard LC-130 crew—members of the 109th Airlift Wing who were already at McMurdo—elected to make the roughly eight-hour haul to Christchurch. They touched down with the injured men late in the evening Jan. 13.

The Gift of Airspace

New Mexico has granted 11,000 acres of state land to USAF to allow Air Force Special Operations Command more space for live-fire ranges and desert and urban warfare training on the Melrose Air Force Range, adjacent to Cannon Air Force Base.

"Ranges and airspace are the lifeblood of our ability to train and be ready to fight those conflicts the nation asks of us," said Terry A. Yonkers, the Air Force's assistant secretary for installations, environment, and logistics.

"It's an honor for me to be here today to accept this very gracious gift," he added, accepting the land transfer on behalf of the Air Force from New Mexico Gov. Susana Martinez (R), in Sante Fe, Jan. 18.

Valued at approximately $3.2 million, the gift is the result of a June 2008 memorandum of understanding between the Air Force and New Mexico.

Engine Seizure

A dual engine failure caused the crash of an A-10C on a functional check flight, following its overhaul last September, according to an Air Combat Command inquest.

ACC's accident investigators determined the pilot, assigned to Moody AFB, Ga., inadvertently stalled the aircraft at 34,000 feet, causing the engines to seize at high altitude. The mishap took place Sept. 26, 2011.

Unable to recover the aircraft, the pilot located a controlled bailout area and safely ejected from the crippled aircraft. He sustained no serious injuries, but the Warthog was destroyed.

The A-10's stall warning system malfunctioned earlier in the flight, at 15,000 feet, but without any evidence of further problems, the pilot elected to continue the check flight. Both the pilot's inexperience and lack of adequate training were cited as factors—though not the cause—of the accident.

The A-10 was valued at about $14.7 million. The cost of cleaning up the crash site, roughly 20 miles northwest of Moody, is estimated at an additional $150,000.

First In, Still on Watch

The 727th Expeditionary Air Control Squadron—the first air control unit on station in Operation Iraqi Freedom in 2003 and the last one out late last year—now monitors air traffic in the Persian Gulf.

Deployed from the 606th ACS at Spangdahlem AB, Germany, the airmen now work with E-3 AWACS and Army air defense controllers to guide and deconflict military aircraft movement through the Gulf.

The 727th began its new tasking Dec. 30.

Nine Rocket Deal

United Launch Alliance received a $1.5 billion Air Force contract for nine Evolved Expendable Launch Vehicles to support upcoming national security space missions.

Five of the rockets will be of the Atlas V type, for the launch of the Air Force's Defense Meteorological Satellite Program-19 weather satellite, the Navy's Mobile User Objective System-3 communications sat-

USAF photo by A1C Caitlin O'Neil-McKeown

Fast and Furious: *TSgt. Stephen Nelson drives an all-terrain vehicle up the loading ramp and into a C-130J during a contingency response group exercise at Ramstein AB, Germany. The aim of the exercise was to practice an air-land insertion into a landing zone and assess the area for a follow-on mission.*

ellite, and three National Reconnaissance Office payloads.

The remaining four will be Delta IV boosters for the launch of DMSP-20, two Global Positioning System Block IIF satellites, and a mission designated Air Force Space Command-4, according to the Defense Department.

Raptor Center Open

The Ogden Air Logistics Center's new F-22 heavy maintenance facility is now open for business at Hill AFB, Utah.

The 96,000-square-foot building accommodates seven F-22s at a time, in addition to a specialized shop dedicated to the Raptor's unique composite structures, reported Utah's *Standard-Examiner.*

"This facility greatly expands our capability," said Ogden commander Maj. Gen. Andrew E. Busch.

The new addition is the second phase of a $45 million project establishing Raptor depot maintenance at Hill.

Work on the first phase, a 70,000-square-foot facility, was completed in mid-2010. In addition to the work at Hill, F-22 prime contractor Lockheed Martin performs Raptor overhaul work at its facility in Palmdale, Calif.

Rep. Robert Bishop (R) cut the ribbon, opening the new facility Jan. 12.

GPS III Satellites Ordered

The Air Force awarded Lockheed Martin a $238 million contract for production of Global Positioning System III satellites No. 3 and 4.

"The acquisition of the next two GPS III satellites at one time will allow the Lockheed Martin-led team to maximize efficiencies in satellite manufacturing," stated the company in a January news release.

With the first GPS III satellite scheduled for launch in 2014, the new satellites will begin transmitting more accurate and jam-resistant signals than the GPS satellites currently on orbit, according to the company.

USAF awarded the contract for satellites one and two in May 2008. Air Force Space Command boss Gen. William L. Shelton highlighted GPS III as a "model" of project cost and schedule discipline.

Minuteman Terminals Get a Boost

Minuteman ICBM launch control center strategic satellite communications terminals will be modernized under a $9.4 million contract awarded to Raytheon.

A critical component of strategic command and control, the terminals handle the emergency action messages that authorize nuclear weapon launch.

The modernized systems will be able to communicate with the new Advanced Extremely High Frequency satellites, according to John Gould, program manager for the Minuteman Minimum Essential Emergency Communications Network Program Upgrade.

Raytheon will modify the 46 existing terminals linking operational Minuteman facilities and test sites.

Initial fielding of the terminals is scheduled for 2013, with completion of the entire terminal upgrade expected by the spring of 2015.

Photo by Gerl Kromhout

Shadowland: ***Capt. Jeremy Anderson pilots an MC-130P in formation with another Combat Shadow over Scotland on a training mission. The MC-130P is a specialized tanker aircraft capable of clandestine intrusions into hostile territory to refuel or insert special operations forces.***

Okinawa Shuffle

Pacific Air Forces wants to keep Kadena AB, Japan, separate from a Marine Corps air station, said PACAF commander Gen. Gary L. North.

"I'm very comfortable with the lay down that we have at Kadena right now," said North, when asked about relocating Marines from Futenma to nearby Kadena, reported Japan's Kyodo News agency.

Led by Senate Armed Services Committee Chairman Sen. Carl Levin (D-Mich.), a group of senators recommended last year that the Defense Department consider moving Marine Corps assets to Kadena, relocating a portion of the USAF assets on the base to Guam.

However, the US agreed to a deal with Japan in 2006 to construct a new Marine Corps air facility adjoining the existing USMC base at Camp Schwab, also on the island.

The Senators contended that moving Marine Corps aircraft to Kadena could be significantly cheaper than the cost of constructing a new air station at Camp Schwab.

North remains convinced that the original plan is a "very solid proposal, adding that the United States and Japan should "continue to do the work that they have agreed upon."

Tanker Brotherhood

The French air base that hosted Air Force KC-135s from RAF Mildenhall, Britain, last year during operations over Libya recently sent a French KC-135 tanker on a reciprocal visit. Deployed as the 351st Expeditionary Air Refueling Squadron, airmen of Mildenhall's 100th Air Refueling Wing operated alongside French KC-135FR tankers at Istres during the NATO-led Operation Unified Protector.

"In the long term, the goal is for us to be ready for any future conflicts and for us to operate together even more seamlessly than we have in the past," said Lt. Col. Robert Ricks, 100th ARW

Photo by Jim Dunn

Wait, Who's That?: ***An F-15C, wearing one of the new "Splinter" paint schemes, heads out on a Red Flag mission at Nellis AFB, Nev. The design mimics Russian fighters such as the Su-35 and T-50 PAK FA and is meant to provide an even more realistic threat to the Blue Forces during the training exercise.***

staff director and former 351st EARS commander.

"Hopefully we can keep this relationship going," he added. French personnel toured Mildenhall operations and "flew" the unit's new KC-135 Block 40 simulator during the visit Jan. 4-5.

Pullout in Style

Army civil engineers completed final construction of the strategic airlift apron, freight loading dock, and new passenger terminal at Shindand Air Base in western Afghanistan.

The $18 million expansion project "will play an important role as the coalition begins to move equipment and personnel out of theater," said Col. John Hokaj, Shindand commander.

The 67,000 square yards of apron and taxiways, completed in January, allows USAF to keep the runway in operation as it loads and unloads large strategic-lift aircraft, added Hokaj.

Before construction of the passenger terminal, Shindand officials processed transient personnel in a makeshift tent.

The civil engineers turned the apron over to the Air Force Jan. 11.

Fairchild Vies for First KC-46 Unit

Washington State officials are pressing to host the Air Force's first operational KC-46A tanker unit at Fairchild Air Force Base, near Spokane, following Boeing's recently announced shift of KC-46A work to its facility in Everett, north of Seattle.

"The first place for the first planes off the assembly line is only a short flight away," said Sen. Patty Murray (D).

Fairchild recently completed a $43.6 million runway renovation and upgrades to its landing approach system and currently hosts KC-135 operations, making it an ideal site for the new tankers, said Murray and Sen. Maria E. Cantwell (D) at the kickoff of the "Fairchild First" campaign, reported Spokane's *Spokesman-Review.*

As the KC-46 begins rolling off the assembly line around 2017, gradually replacing the KC-135, "the end of one mission is the beginning of the next," said Murray, meeting with local leaders Jan. 9. "The assets this region provides are the best."

Aerostat Accident Explained

A tethered aerostat radar system was destroyed in a thunderstorm at Lajas, Puerto Rico, last August, because airmen on the ground delayed their response, Air Combat Command accident investigators concluded.

Caught in gusting winds, the tethered aerostat radar system dragged its securing winch truck into an embankment—partly due to the ground crew's additional failure to properly chock the vehicle.

Grounded against the embankment, the blimp's tether was drawn taut against a safety cable. The resulting kinetic friction severed the blimp's mooring, allowing it to rise above 7,000 feet, where it ruptured, according to the Dec. 15 accident report.

The rig caused no injury on the ground, but the total loss of equipment is estimated at $8.1 million, excluding cleanup.

Last Wright-Patt Galaxy

The last C-5A Galaxy assigned to Wright-Patterson AFB, Ohio, with Air Force Reserve Command's 445th Airlift Wing, has been retired to the "Boneyard" at Davis-Monthan AFB, Ariz.

"I'm glad it has found its final resting place," said Lt. Col. Philip A. Pierce Jr., 89th Airlift Squadron, the pilot for the Jan. 31 mission.

Tail #70-0457 was the last of the wing's 10 C-5s to depart, making room for nine C-17s that the 445th will now operate.

The wing flew its final formal C-5 mission, a training sortie, in September and hosted the farewell ceremony for its C-5s in October.

The Air Force is now proposing the retirement of the last 27 C-5As in the fleet, describing them as excess to USAF needs. They would leave between Fiscal 2013 and Fiscal 2017.

Laughlin T-38s Moved to Randolph

Twenty T-38C trainers from Laughlin AFB, Tex., arrived at nearby Randolph Air Force Base, completing USAF's consolidation of Introduction to Fighter Fundamentals training.

Laughlin's 434th Fighter Training Squadron relinquished the aircraft to Randolph's 435th FTS, which now gains 11 active duty instructor pilots and more than 30 support positions. The 435th FTS will train 80 additional students annually, according to service officials.

The Air Force announced the end of IFF training at Laughlin and Vance AFB, Okla., last May, leaving IFF training to Randolph, Columbus AFB, Miss., and Sheppard AFB, Tex.

The final T-38C arrived at Randolph—a part of Joint Base San Antonio—on Jan. 18.

Nine Lives Critical Care

The first all-Air Force Critical Care Air Transport and Aeromedical Evacuation team is now operating with HC-130P King aircraft assigned to the 76th Expeditionary Rescue Squadron in Helmand province, Afghanistan. The team completed its first mission earlier this year, according to squadron officials.

Lt. Col. Peter Dominicis, 76th Expeditionary Rescue Squadron commander, explained that his unit first flew with only Air Force pararescue teams, but "as we flew more, we started seeing patients that were more critical and needed more attention," requiring CCAT's specialized skills.

For instance, on Jan. 18, CCAT medical personnel joined with AE personnel on a 76th EQRS HC-130P, evacuating a marine with burns over 80 percent of his body to treatment at Kandahar.

"I don't think he would've survived if it hadn't been for the [CCAT and AE teams]," Dominicis said. The CCAT members complement their AE counterparts by attending to those wounded who are in an unstable condition. ■

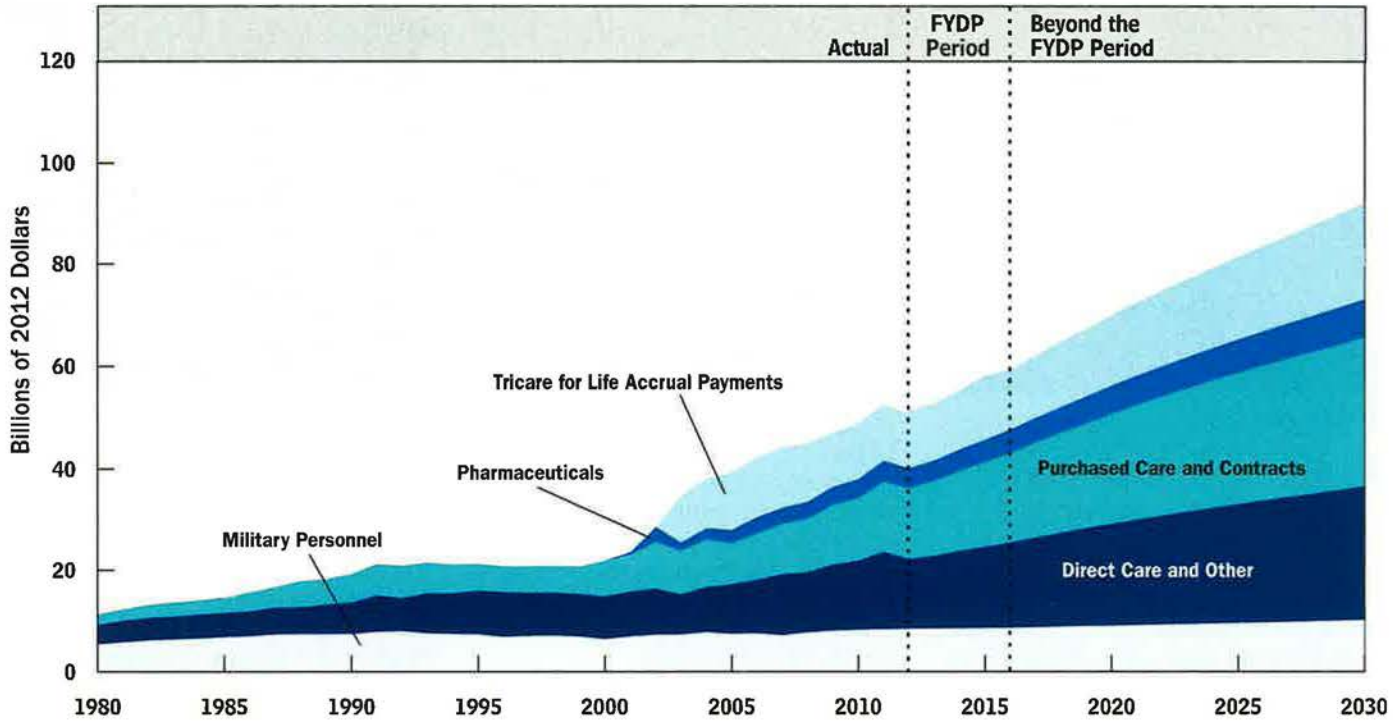
chartpage@afa.org

The Military's Medical Problem

As the Obama Administration grapples with DOD's budget, a prime target will be health care spending. The Pentagon's medical costs boomed over the past decade, rising to $51 billion today. Military health care costs now account for some nine percent of DOD's budget. And, according to the Congressional Budget Office, spending will only grow, absent political reforms.

More than nine million people are eligible for subsidized care. As the chart shows, CBO projects that spending could hit $59 billion by 2016 and as much as $92 billion by 2030. The worry, at a time of flat or declining DOD budgets, is that health outlays will crowd out spending on weapons, readiness, and other vital aspects of national defense.

Surging Cost of Military Health Care System



Funding for overseas wars is included for 2011 and earlier but not later. Before 2001, costs of pharmaceuticals were found in "Purchased Care and Contracts" and "Direct Care and Other." FYDP period = 2012-2016, in which DOD plans are specified. The extension = 2017-2030, in which CBO has projected costs.

Source: "The Long-Term Implications of the 2012 Future Years Defense Program," Congressional Budget Office, Washington, D.C., June 2011. Adapted from Fig. 2-2, p. 17.

The final airmen to leave Iraq found the end of the mission as memorable as the first days of Desert Storm, nearly 21 years earlier.

The Last Days

In mid-January 1991, Capt. Anthony J. Rock, an F-15C pilot assigned to the 1st Fighter Wing at Langley AFB, Va., led a flight of Eagles during the initial air campaign of Operation Desert Storm. The strike package was charged with ensuring air superiority during an attack on Talil Air Base near Nasiriyah in southern Iraq.

Capt. Russell J. Handy, a fellow Eagle pilot assigned to the same wing at Langley, took off on another sortie that day. His mission was to protect the strike package and provide a close escort for EF-111s and F-4G Weasels as they flew toward their objective 100 miles west of Baghdad.

This particular aircraft package also included Capt. David L. Goldfein, an F-16 pilot out of Shaw AFB, S.C. As Handy broke left toward Al Asad, Goldfein headed off in the opposite direction with his eyes on yet another target.

The first night of that complicated air campaign eventually involved more than 600 aircraft and took months to map out. The intent was to dismantle Saddam Hussein's military, stop his forces from seizing Saudi Arabia, and free the Kuwaiti people.

Long, Tough Road

Operation Desert Storm's air war lasted just 43 days, but the US effort would continue for another two decades—first through 12 years of enforcing the no-fly zones over northern and southern Iraq, and culminating last December after nearly nine years of combat during Operations Iraqi Freedom and New Dawn.

Goldfein, now a lieutenant general, is commander of US Air Forces Central in Southwest Asia. Major General Handy was the senior Air Force officer in Iraq from August 2010 until the last troops left in December. Major General Rock also spent 2011 in Iraq, leading the advisory and training mission during USAF's final year in the country.

Not one of the three Air Force leaders ever imagined they would be working together to close out the US military mission in Iraq more than 20 years after that first air campaign. "Our first mission was to destroy the Iraqi military. Our mission 20 years later is to build the Iraqi military," said Handy, as he stood on the ramp of a C-17, minutes after it landed at Talil's Camp Adder for the last airlift flight out of Iraq.

Handy's story is not unique. More than 170,000 Americans served in Iraq at the height of operations; most served multiple tours. The operations defined a generation of airmen and left a lasting impression on countless Air Force careers.

The cumulative numbers are staggering. Since 1991, the US and coalition

in Iraq

By Amy McCullough, Senior Editor

USAF photo by MSgt. Cecilio Ricardo

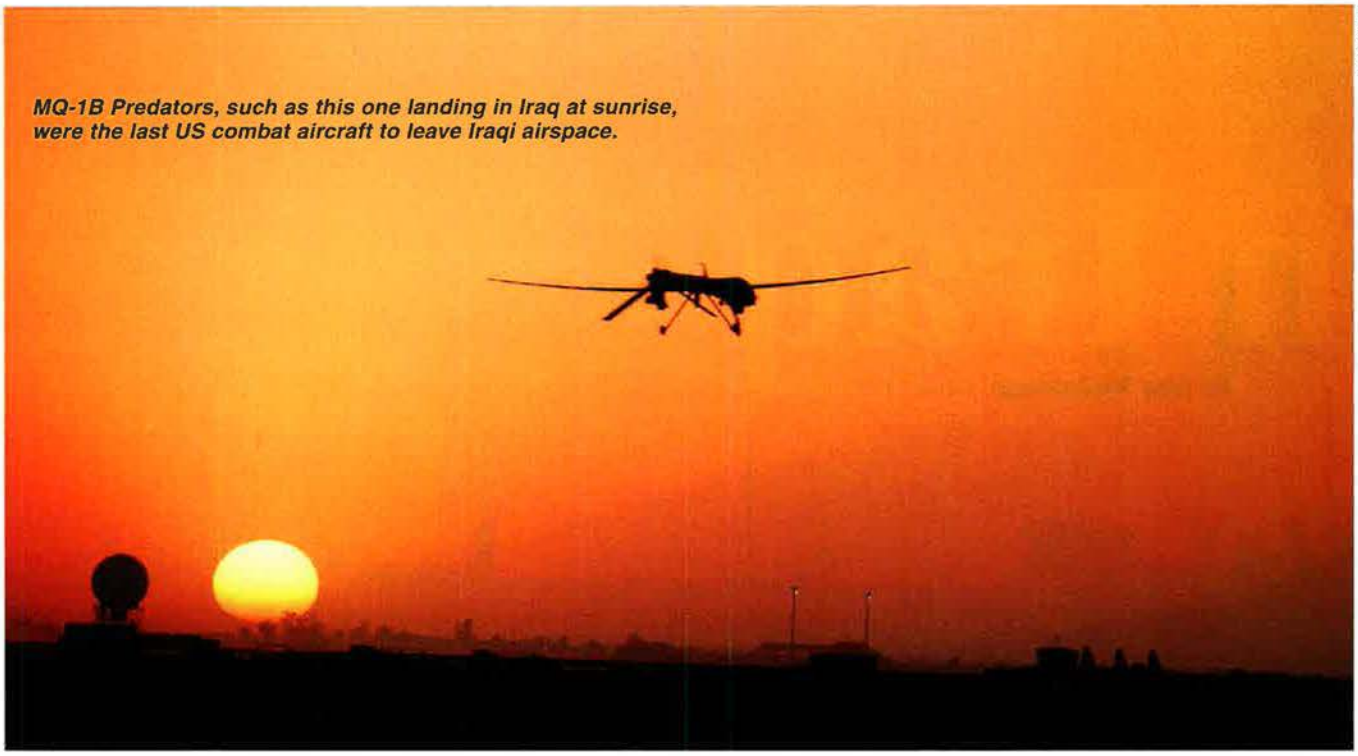
allies flew more than 500,000 sorties and generated 7,635 air tasking orders in the area of operations. Just since the fall of Baghdad in 2003, remotely piloted aircraft flew more than 415,000 hours of persistent intelligence, surveillance, and reconnaissance missions in the AOR and analysts processed over 50,000 of those images. Mobility crews moved more than two million tons of cargo and four-and-a-half million passengers, while security forces accumulated more than 183,000 hours of guard duty, said Goldfein.

"For over 20 years, Iraq has been a defining part of our professional and personal lives," said Army Gen. Martin E. Dempsey, Chairman of the Joint Chiefs of Staff, during the end-of-mission ceremony Dec. 15.

Speaking within a heavily fortified compound at the former Sather Air Base in Baghdad, Dempsey told the assembled airmen, soldiers, sailors, and

USAF photo by MSgt. Cecilio Ricardo

Top: A convoy of trucks carrying the last remaining US military forces in Iraq crosses the border into Kuwait. Here: SSgt. Gerardo Munoz guards the C-17 that was slated to airlift the last USAF airmen out of Ali AB, Iraq, on Dec. 18.



DOD photo

MQ-1B Predators, such as this one landing in Iraq at sunrise, were the last US combat aircraft to leave Iraqi airspace.

marines—who would be, collectively, the last American combat forces out of Iraq—"The road we have traveled was long, and it was tough."

The outcome, Defense Secretary Leon E. Panetta said at the ceremony, "was never certain, especially during the war's darkest days."

"To be sure, the cost was high" in "the blood and treasure of the United States and also of the Iraqi people," he continued. Nearly 4,500 American servicemen and some 319 coalition personnel died, and more than 32,000 were injured or maimed. More than 100,000 Iraqis died in the invasion and subsequent sectarian violence that ravaged the nation. Pentagon leaders flew to Sather—named for SSgt. Scott D. Sather, the first airman to lose his life in Operation Iraqi Freedom, in April 2003—not only to end the mission in Iraq, but also to remember the thousands of lives lost.

"Those lives have not been lost in vain," Panetta insisted. "They gave birth to an independent, free, and sovereign Iraq. And because of the sacrifices made, these years of war have now yielded to a new era of opportunity."

Smoke and fire no longer dominate the skies above Baghdad, and the morning rush hour now clogs the highways instead of military convoys. In December, service members deployed to the international zone were able to walk the rooftops of the former Ba'ath Party headquarters, for one last look at the Iraqi capital's skyline, without worrying about snipers or rocket-propelled grenades.

Panetta and the other senior leaders participating in the departure ceremony encouraged the troops to keep their heads high as they left Iraq, knowing they were leaving behind a country that is free of Saddam's brutal regime, able to govern and secure itself, and that could be a US ally for many years to come—a prospect even more important in light of the "Arab Spring" uprisings of 2011.

"The Iraqi Army and police have been rebuilt and they are capable of responding to threats; violence levels are down; al Qaeda has been weakened; ... and economic growth is expanding as well," said Panetta.

"This progress has been sustained even as we have withdrawn nearly 150,000 US combat forces from this country. ... We salute the fact that Iraq is now fully responsible for directing its own path to future security and future prosperity."

Yet its future remains uncertain.

The last US troops rolled across the border into Kuwait just after dawn on Dec. 18. Days later a series of coordinated car bombs exploded across Baghdad, killing at least 70 people and injuring hundreds more. Less than a week later, a suicide bomber set off another car bomb near the Iraqi Interior Ministry, killing seven people and wounding 32 others.

USAF photo

Maj. Gen. Anthony Rock (l) and CMSgt. Gerald Delebreau, command chief for the 321st AEW, present a flight attendant with a challenge coin. The attendant was working the chartered Delta flight that brought troops back to the US from Kuwait after the war ended in December.

Arguing About Everything

Though not completely unexpected, the bombings have left many to question whether a resurgence of sectarian violence will unravel the progress made over the last nine years.

Panetta warned frankly of the potential danger.

"Let me be clear: Iraq will be tested in the days ahead—by terrorism, by those who would seek to divide, by economic and social issues, by the demands of democracy itself," he said. "The United States will be there to stand with the Iraqi people as they navigate those challenges to build a stronger and more prosperous nation."

A small contingent of uniformed American personnel will remain in Iraq under the new mission of providing security assistance. Some 157 of them will serve there under the newly established Office of Security Cooperation-Iraq, a subordinate of the US Embassy headquartered in Baghdad. Its primary mission is to continue building Iraq's military capacity by offering basic operator training and modern equipment through the Foreign Military Sales program, explained a spokesman.

It's a tall order for an organization used to operating with a much larger footprint. In early 2011, nearly 50,000 US troops and thousands of Defense Department contractors provided security, outreach, and training to the Iraqis. Now, the significantly smaller OSC-I team carries the burden of laying the foundation for the new US-Iraqi strategic security partnership.

"That is especially challenging," said Air Force Lt. Col. Mark Pearson, who is overseeing F-16 sales to Iraq within OSC-I.

"Theirs is a negotiating culture ... based fundamentally upon distrust. ... You argue about everything, and that's not the way FMS works."

Pearson said it is "taking us a long time—it's taking me a long time—to establish the relationships to the point where they will believe what we are saying."

Active FMS cases with Iraq currently total some $8 billion, and that doesn't include the long-awaited F-16 sale, said US Ambassador James F. Jeffrey during a roundtable discussion in Baghdad in November.

The US had already agreed in September 2011 to supply Iraq with 18 Lockheed Martin-built F-16 Block 52 aircraft. In December, the Pentagon notified Congress of a proposed sale of 18 more of the fighters, which would bring the total Iraqi F-16 fleet to 36. Including associated support gear and

Timeline Illustration by Zaur Eylanbekov

USAF photo by MSgt. Cecilio Ricardo

L-r: Lt. Gen. David Goldfein, Maj. Gen. Russell Handy, Maj. Gen. Anthony Rock, Col. Claude Tudor, and Col. Ralph Romine stand at attention at the inactivation ceremony in Southwest Asia just hours after the last US military forces left Iraq.

services, the initial deal is worth $4.2 billion; the follow-on has a value of $2.3 billion.

However, the Iraqi Air Force still has a "long evolution" before it sees a fully operational squadron of F-16s, said Handy.

Lt. Gen. Anwar Hamad Amin, commander of the Iraqi Air Force, said he expects to see an F-16 operational squadron by 2016. However, he reported being pleased with the progress of 10 Iraqi officers training in the US to fly the fighter. The first of them was expected to make his first F-16 flight in January.

The F-16 project "was like [a] dream for me as [an Iraqi Air Force commander]," Anwar said during a news briefing shortly before the US exodus.

Speaking alongside Handy, Anwar pledged that the F-16s would be used "only for the security of Iraq, not to target our neighbor countries."

Keeping Faith

The news conference was staged in front of a hangar where Iraq's growing fixed wing capabilities were displayed.

The Iraqi Air Force operates three C-130Es, 15 T-6 trainer aircraft, a number of Cessna 172s for both training and ISR missions, and some Cessna Caravan 208s. The latter are also used for pilot training, though three are armed with Hellfire missiles for operational combat use.

This year, Iraq is slated to receive the first of six new-build C-130Js, said Lt. Col. Corey Wormack, USAF deputy within OSC-I.

"They are ... very capable, modern aircraft," said Handy. "Because we operate those same systems, by definition, that strengthens our partnership."

The Iraqi Army generally operates rotary wing assets and has 96 helicopters. It's expected to field 135 airframes by the end of 2012, said Col. Scott Alpeter, Army aviation chief for OSC-I.

Although discussions continue in Washington about Iraq's ability to defend its own airspace now that the United States has left, Handy said he has faith in Iraq's air capabilities.

"I'm very confident in not only the Iraqi Air Force's capability to operate these aircraft, but also in our willingness to continue in a long-term partnership role with the Iraqi Air Force," he said. "As you know, when the Iraqi government purchases an aircraft through [FMS], they are not just purchasing an aircraft, ... they are purchasing a capability to operate that aircraft for the long term."

Members of the 447th Expeditionary Security Forces Squadron at Sather continued to provide around-the-clock training to the Iraqis in the final days. They taught basic skills required to secure an air base and suggested ways to make best use of limited manpower so the Iraqis could fill capability gaps after the Americans left.

DOD photo by TSgt. Michael R. Holzworth

A C-17 carrying soldiers from the 25th Infantry Division headquarters flies the US flag and the state flag of Hawaii as it taxis down the runway at JB Pearl Harbor-Hickam, Hawaii. The 25th was the last division headquarters to leave Iraq.

The fledgling Iraqi security forces, which operate just one truck and one small Humvee, now control wide swaths of areas they weren't allowed to enter not so long ago. The average member of the ISF is just 17 years old.

Iraqi troops, though, are well aware of the shortcomings and many worried about what their future would entail.

"We depended on US soldiers a long time; now there is empty space and we have to take control," said an Iraqi private. He spoke through a translator and asked that his name not be used for security reasons.

"We don't know how it's going to go," he said. "We would rather [the US troops] stay."

Handy said individuals will have to determine for themselves if it was all worth it.

"Sacrifice is a very, very personal thing," he said a few days before the last troops left Iraq.

"For me to stand up here and say a sacrifice was worth it would be putting words in the mouths of a family who may have lost a loved one." This was something he was not willing to do, though he said Americans should rest assured that the monumental cost of war also brought significant improvements in the lives of the Iraqi people.

Surreal

"I would say there are tremendous things you can put in the 'win' category for our time here in Iraq. The sacrifice was huge but the opportunities are great because of that."

Many troops were still grappling with that question, though, as they waited at an air base in Southwest Asia for their chartered flight back to the United States.

Some doubted the US really was going to leave, even as they lounged on their luggage outside the passenger terminal waiting to make their way through customs. The US rarely leaves countries where it has fought long and hard, as its continuing but invited presence in Germany, Japan, and South Korea attests.

Those reflecting on the momentous mission generally summed it up in just one word: "surreal." They were honored to have played a role in history and happy to be leaving a sovereign and democratic Iraq behind, but many also said they knew there was more work that could have been done had the US military stayed longer.

"Six months ago, I didn't think we would be here," waiting to leave Iraq for good," said CMSgt. Ward A. Hanning, who served as the Air Force's senior enlisted advisor in Iraq since January 2011 and racked up more than 23,000 miles over the area since the beginning days of the first Gulf War. "I really thought there would be some type of political agreement" that would keep US forces in-country longer.

Such a deal was in negotiation, but ultimately faltered on the Iraqi government's refusal to grant US troops immunity from prosecution.

On the evening of Dec. 17, Handy, Rock, and Hanning boarded a C-17 in Kuwait headed back to Talil to pick up the last airmen and soldiers to be airlifted out of Iraq. When the ramp opened up in Iraq, Rock stared out with a mixture of excitement and disbelief.

"This was my first target on my first day" in Desert Storm, said Rock of Talil's Camp Adder, as he gazed out at the flight line. "You can't make this stuff up."

Minutes later they were strolling in to the passenger terminal with pockets full of challenge coins and huge smiles on their faces.

"Anyone call for a taxi?" shouted Rock.

"Let's get the hell out of here," joked Hanning.

After all 65 airmen and 55 soldiers claimed their seats for the last flight out of Iraq on the last night of Operation New Dawn, the team of Iraqi air traffic controllers, who were trained by US airmen under Rock's command, radioed, "Farewell, friends." ■

Movin' On Out

BAGHDAD—The pullout from Iraq was a massive undertaking.

Defense Secretary Leon E. Panetta, in Iraq for the end-of-mission ceremony, told troops in December that the US drawdown there was "one of the most complex logistical undertakings in US military history."

In roughly one year, 50,000 troops were withdrawn "seamlessly," he said. Moreover, "dozens of bases closed or [were] handed over" and "millions of pieces of equipment ... had to be transferred, all while maintaining security for our forces and the security of the Iraqi people."

For most of those involved in the redeployment of forces back to the US and other destinations, free time simply didn't exist.

Young, tech-savvy airmen learned how to operate without computers, printers, and telephones, as their equipment was packed up and shipped to the Defense Reutilization and Marketing Office to determine whether the gear would be refurbished and reused, sold, or destroyed.

"We have pared everything down to the minimal size we need to lead the logistical push. Everyone is working long days, six to seven days a week," said Col. Michael Gaal, vice commander of Sather Air Base's 321st Air Expeditionary Wing. "There are literally going to be guys who are working to secure the airfield right up until the moment they run to the plane and take off."

Col. Claude Tudor, commander of the 368th Expeditionary Air Support Operations Group, said the planning process was "very detailed, [methodical], and systematic." Countless contingencies were taken into consideration; each included multiple alternative solutions to ensure that President Obama's tight timeline for withdrawal was met, Tudor said.

Vehicles not left in place or airlifted out drove south toward Kuwait. Improvised explosive devices remained a concern, though the number of attacks was down substantially. During the height of operations, US and coalition forces encountered 60 to 70 IEDs daily. By early 2011, however, it was considered a bad day if troops came across two or three, officials said.

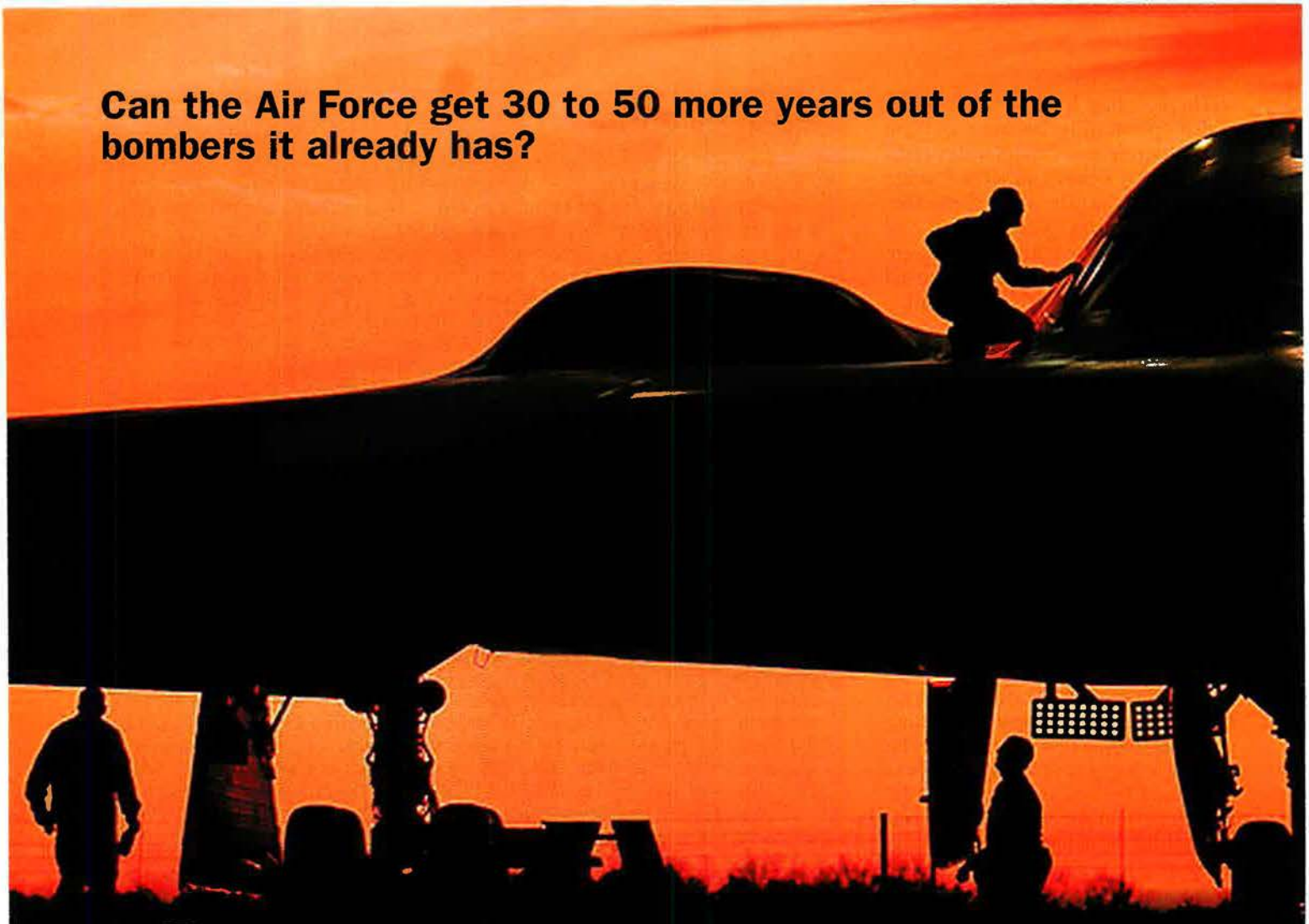
To mitigate risks during the final convoy, combat controllers flew overhead to provide a multilayered command and control architecture, said Tudor.

"As we started to posture out of Iraq, we've lost some ... communicational capabilities. We had to find different ways and means to make sure that we can talk through some of these gaps, so we created bridges using flying [combat controllers] and some other stuff," he said.

Col. Rodney Petithomme, 332nd Expeditionary Operations Group commander, and Lt. Col. Jason Plourde, commander of the 79th Expeditionary Fighter Squadron, flew F-16s for the last manned combat mission over Iraq, Dec. 18, providing yet another layer of protection for the convoy below.

MQ-1B Predators, launched and recovered by airmen assigned to the 46th Expeditionary Reconnaissance Squadron and flown by pilots at Creech AFB, Nev., were actually the last combat aircraft to leave Iraqi airspace.

Can the Air Force get 30 to 50 more years out of the bombers it already has?



Old Bombers,

Long-range strike is one of the core missions of the Air Force, but USAF's inventory of bombers is, by any measure, old. A new bomber program is on the books, but the aircraft won't arrive for another 15 years or so, and even when it does, it could take decades to build a fleet of the necessary size. Can the legacy B-52s, B-1Bs, and B-2s physically last and continue to be credible weapons until the new bomber takes over?

The answer, Air Force and industry officials insist, is yes—and with time to spare.

In fact, the B-52H (dating to 1962) and B-1B (built in the mid-1980s) are planned to stay in service through 2040, and the B-2 (built in the 1990s) is slated to serve through 2058. Although predicting viability decades into the future is inherently risky, the actual service lives of all these aircraft could potentially exceed even those dates.

However, the business of putting iron on target well behind enemy lines is getting tougher by the day. To remain credible, the bomber fleet will have to continue to evolve, said Lt. Gen. Christopher D. Miller, deputy chief of staff for strategic plans and programs.

The bomber flight plan, Miller said, has three elements to it. "One is keeping the airplanes structurally and otherwise safe and effective to fly," he said, followed by "keeping them tactically relevant with equipment upgrades ... and weapons," and finally, integrating the bombers into the overall concept of operations in a way that makes sense.

The bombers will have to be "complementary" to each other and to the rest of the combat air forces, Miller said, warning against considering any platform in isolation from the rest. The bombers will enable other combat systems and in turn be enabled by them, he said.

"For the toughest threat environments," Miller said, the fleet will increasingly rely on standoff weapons—missiles that the bombers can launch from outside the reach of an adversary's defense systems.

"That's not new," he said. "There's always that balance of the cost of a standoff weapon and the advantages of being able to get the platform in closer proximity to the target." However, he said the Air Force has "shown a commitment over time" to choosing the right mix of weapons for its various platforms and

Maintainers swarm over a B-2 bomber. Keeping the nation's premier penetrating bombers combat ready is a constant challenge.

ANG/DOD photo

New Again

By John A. Tirpak, Executive Editor

giving combat commanders the effects they require. "That will not change," he said.

The bombers have undergone numerous changes over the years to make them relevant to their evolving missions, Miller said, and that approach will continue "for the foreseeable future."

"We've taken the B-1, for example, from a nuclear-only airplane to something that's carrying Sniper pods, dropping [Joint Direct Attack Munitions] over Afghanistan."

Similarly, the Air Force has taken the B-52 from "a high-level-only airplane all the way through the Vietnam era of conventional bombs to a pod-equipped, [close air support]-capable plane that has been structurally updated through its lifetime," he said. All the aircraft have received modifications to make them compatible with updated international air traffic and navigation norms.

Structurally, the Air Force has closely monitored the health of its bombers and has done fleet viability analyses to gauge their potential longevity.

"That rolls in the durability testing, the component testing, the engineering projections, and it's pretty exhaustive." The process—which tracks the individual bombers and their idiosyncrasies by tail number—"gives us a recurring snapshot of how ... these platforms [are] doing."

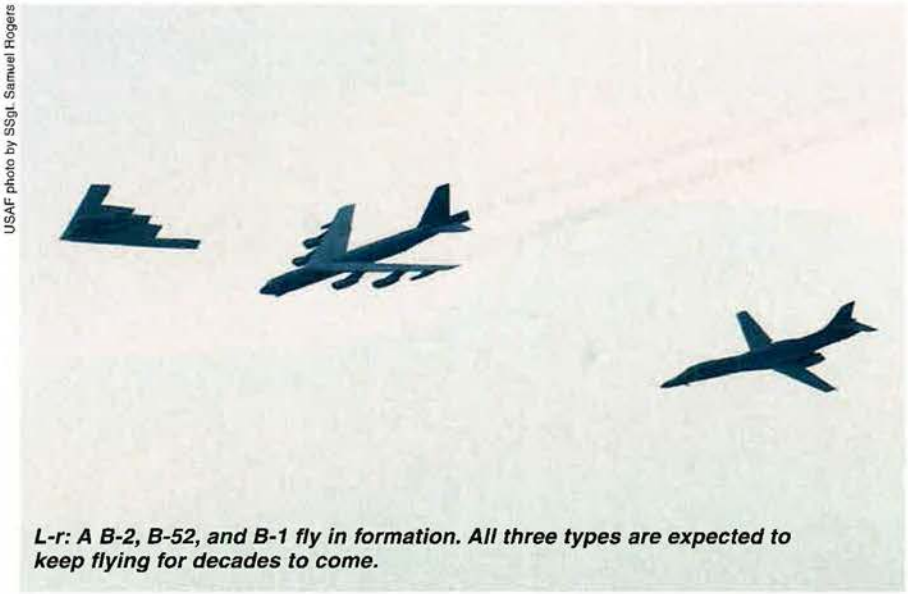
Based on the engineering forecasts, the toughness of the bombers' original construction—all were built to function in the vicinity of nuclear blasts and shock waves—and their actual usage, Miller said, "Nothing I have seen says our bomber fleet is going to have any issues" reaching its planned retirement dates.

The three bombers are very different machines with diverging missions, however, and each will get a tailor-made program of changes and improvements to maximize its contribution to the combat air forces.

B-2 Spirit: The Penetrator

The first B-2 was delivered for flight test in 1988 and reached initial operational capability in 1997. Fifteen years later, the stealth bomber continues to be the "tip of the spear" in major military operations, noted Dave Mazur, Northrop Grumman's B-2 program chief.

It was the B-2 that made the opening attacks in the recent Libya campaign and before that, in Afghanistan and the Balkans. Air Force leaders say it will



USAF photo by SSgt. Samuel Rogers

L-r: A B-2, B-52, and B-1 fly in formation. All three types are expected to keep flying for decades to come.

continue to be the nation's premiere bomber for years to come.

There are only 20 B-2s in service. A total of 21 were built, but one was lost in a 2008 crash, and another was severely damaged in a 2010 engine fire that will keep it sidelined for up to two more years. Besides that, there are usually three B-2s undergoing programmed depot maintenance (PDM) at Northrop Grumman's Palmdale, Calif., facilities.

Each B-2 is inducted for programmed depot maintenance every seven years. One of the B-2s is always engaged in test activities at Edwards AFB, Calif., so the number available for duty at any given time is only 14 or so airplanes. This constitutes a limited and precious capability.

The B-2 was not built like previous bombers. A large percentage of its weight is composites, and that's a good thing in terms of the type's longevity, Mazur said.

"The biggest downfall ... of an airplane is corrosion," Mazur said in December. During the B-2's programmed depot maintenance (PDM) teardowns, maintainers just haven't found a lot of corrosion, meaning the aircraft could have a long-extended service life. Besides that, the B-2 doesn't maneuver violently and has a benign flight profile, so it won't have to endure heavy dynamic loads that tend to induce stress fatigue.

Unlike previous bombers, which have a certain amount of play in their structures, the B-2 "is very rigid" to preserve its stealth and withstand the strains of flying in the vicinity of nuclear blasts, Mazur said. Collectively, these attributes give Northrop Grumman "very high confidence" the B-2 will easily reach its intended retirement date of 2058.

Over the past decade, the B-2 has been refined with a number of upgrades, many of them having to do with improving the resiliency and maintainability of its special stealth coatings and surface treatments. Thanks to a redesign, for example, fasteners near the leading edge of the airplane no longer need time-intensive and tricky puttying and taping; the shape and depth of the screw holes now make that unnecessary.

Likewise, changing out certain line replaceable units (LRUs) takes far less time now. It used to require breaking into the stealth shell, then replacing surface treatments in a process that took 72 hours to apply and cure. That's been whittled down to less than an hour by the installation of stealthy panels and better surface treatments, Mazur reported.

Other improvements include Link 16 data transfer, UHF satellite communications, and additional weapons. Although the changes go beyond what was termed the Block 30 or all-up configuration of the B-2, Mazur noted, they don't yet collectively add up to a nomenclature change to Block 40, although he's sure that will eventually happen as further improvements are made.

The Air Force has a classified "capabilities flight plan" for the B-2 that tries to organize capability upgrades so they can be installed during PDM.

The Air Force recently declared the Massive Ordnance Penetrator—a conventional weapon with the explosive yield of a small atomic bomb—operational on the B-2, which can carry two MOPs. The B-2-massive penetrator combination will be USAF's principal means of threatening hardened, deeply buried targets in denied airspace for years to come.

A radar upgrade on the B-2 is nearly complete, but some other improvements, such as a new antenna for Extremely High Frequency communications, have been tabled as the Air Force sorts out funding. A contract for replacement of the aft deck, which had been subject to cracking, was recently awarded to Northrop Grumman.

One promising near-term upgrade will be to wire the B-2 to be able to carry a variety of different kinds of weapons on internal rotary launchers, which will diversify the kinds of targets it can hit on a single mission and give combat planners dramatically greater flexibility, Mazur said.

USAF photo by MSgt. Cohen A. Young

A B-52 takes on fuel over the Pacific Ocean. Over the years the Air Force has replaced fuel bladders, hatches, windows, and other parts on the venerable aircraft.

A B-1 touches down in Southwest Asia after performing a close air support mission in Iraq.

USAF photo

Keeping the B-2's mission capable rates at acceptable levels is a challenge chiefly because of parts, Mazur said. The LRUs "are 20 years old," and anything of that vintage "is obviously going to start failing more often." The answer is to design new, digital systems that will not only address maintenance concerns but add more capability, he said.

Parts shortages for the defensive management system are the most common reason the Air Force has to keep a B-2 on the ground, Mazur said. After installing EHF communications, modernizing the DMS is the top priority for keeping the B-2 credible, he said. The DMS upgrade is under contract and in progress.

Paul K. Meyer, head of Northrop Grumman's Advanced Programs and Technology division, said there are many classified improvements that will allow the B-2 to penetrate enemy air defenses well into the future. Even as the bomber ages and enemy defenses improve, the B-2 may become a "Day 3" or "Day 10" weapon, but it remains "the best combat-proven weapon system" among the big bombers, he said.

B-1B Lancer: The Workhorse

The B-1B is regarded by its pilots as a "fighter on steroids," having supersonic speed and high agility, in addition to a payload exceeding that of the B-2 or B-52. Operating from a forward location in the Middle East, B-1Bs have orbited over Afghanistan, delivering precision guided munitions at record speed when ground forces request support. With a large payload and the ability to loiter for extended periods, the B-1B has seen heavy service in Southwest Asia.

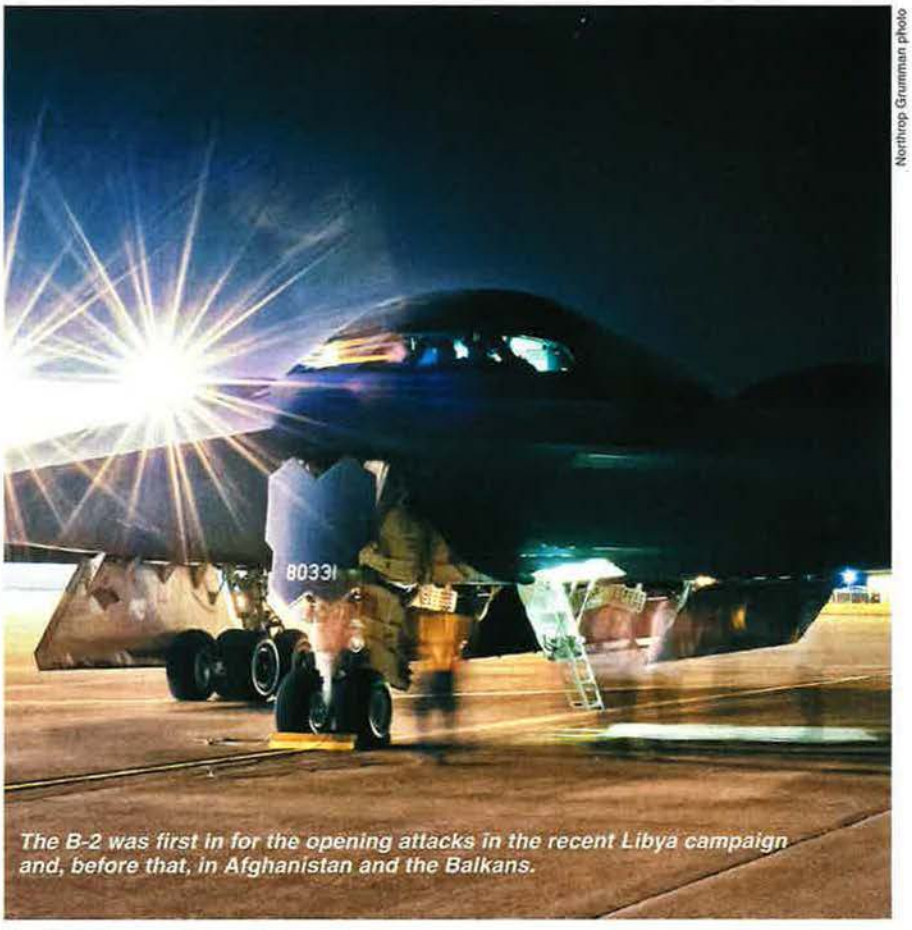
Although structural tests were done early in the B-1B program, a new static fatigue test will get under way shortly, said Boeing B-1 program manager Rick Greenwell. A B-1B taken from the Davis-Monthan AFB, Ariz., "Boneyard" will be broken up into a fuselage and wings and subjected to a torture test simulating more years of hard use. The wing will be inducted for the test in 2012 and finish in 2017, while the fuselage begins the test in 2014 and finishes in 2020.

"We think it can last out through 2050," or 10 years longer than the Air Force will require, Greenwell said.

The B-1B fleet has undergone some recent work to help it last. After problems with the dorsal longeron—the spine of the aircraft—Boeing is replacing the part and has done the work on 54 of the 66 aircraft in inventory. This one change alone will buy many years of service, Greenwell said. Another upgrade will reinforce the wing lower skins.

Operationally, "we are finishing up a tremendous amount of modifications" to make the B-1B more combat capable, he said. These include an updated inertial navigation system, now through development and entering production.

A radar improvement program will decrease the amount of maintenance needed on the aircraft, although the B-1 community is angling to replace the radar with a new active electronically



Northrop Grumman photo

The B-2 was first in for the opening attacks in the recent Libya campaign and, before that, in Afghanistan and the Balkans.

USAF photo by A1C Micaiah Anthony

SSgt. Joshua Partin, with the 2nd Maintenance Squadron Fabrication Flight, walks the massive wing of a B-52 in its hangar at Barksdale AFB, La.

scanned array (AESA) radar, which would drastically reduce maintenance and multiply the B-1B's radar functions. That modification could start in 2014 and finish before the end of this decade.

Other improvements include data links and cockpit upgrades that will replace an awkward tangle of ad-hoc laptops and wires with a more operator-friendly, streamlined internal system.

"Sustainment is an issue," Greenwell said, since the B-1's 1980s-vintage parts are running out and replacements are hard to get. The Air Force's air logistics centers "do a good job" of anticipating parts issues and making sure they are available when aircraft enter programmed depot maintenance.

To enhance its combat capabilities for the future, USAF is pursuing what Greenwell called "16-carry" launchers in the internal bays that will increase the loadout to as many as three times existing limits for individual weapons, using the 500-pound JDAM and the Small Diameter Bomb.

B-52: The Survivor

The B-52's mission has evolved many times since the type first flew in the 1950s, Miller said. It has gone from a high-altitude strategic bomber to an on-the-deck penetrator to a conventional bomb truck, a standoff cruise missile platform, and most recently, to a close air support aircraft. The fleet averages about 17,800 hours of service, but can go to 28,600 hours at least. The new goal is to get the B-52 to last until 2040—something prime contractor Boeing thinks may actually be a conservative figure.

"We don't have to do anything until 2040" by way of a service life upgrade to keep the B-52 safe to fly, Boeing B-52 manager Scot Oathout said. The wings received a major structural upgrade to accommodate cruise missiles in the late 1970s, and that "wing beef-up" won't have to be revisited until 2040.

The B-52 was "overdesigned," Oathout said, meaning its structure can stand far more than specified loads. The current fleet, all B-52Hs, sat alert for many years with much flying, and since then, they have operated at high altitude in a fairly "benign" flight profile without a lot of violent maneuvering, putting little stress on them.

Air Force Materiel Command tracks all the bombers by tail number, he said, so each aircraft gets virtually tailor-made service when it goes in for PDM.

Parts are an issue, Oathout admitted. While some can be taken from mothballed B-52s at Davis-Monthan, the preferred method is to temporarily use a Boneyard part but make a new one from scratch. The Air Force buys such parts in sufficient batches "to ensure a source of supply" for a number of years, Oathout said.

Over the years, he said, the Air Force has replaced fuel bladders, hatches, windows, and most recently, the B-52's radomes. Boeing does analyses of components and systems and recommends to the Air Force when it will become more economical to replace systems than to try to keep supporting them.

The Air Force has often considered replacing the B-52's Pratt & Whitney TF33 engines. The most recent estimate pegged the cost of replacing them at $50 million per aircraft for USAF's 74 B-52Hs. But they continue to serve without excessive problems. Oathout said P&W has done numerous evaluations on the type and has concluded "you could support these engines for many years."

In an austerity budget, spending billions to re-engine the B-52 is not likely. A key near-term improvement for the B-52 is the 1760 bus, which will allow the BUFF to carry all the most modern munitions—the Joint Direct Attack Munition, Joint Air-to-Surface Standoff Missile, and JASSM-ER (Extended Range)—on an internal rotary launcher. The move will yield better fuel economy from reduced drag, flexibility of mixed payloads, and less maintenance.

In fact, Oathout reported, USAF has designated 40 common strategic rotary launchers as "excess" to nuclear requirements and will dedicate them to strictly conventional missions.

The first increment on the CSRL software and integration plan will adapt the software for various Global Positioning System weapons such as JDAM and JASSM; "Increment 2 eventually gets to a mixed load," Oathout said, that would enhance the flexibility of the B-52 to carry a variety of weapons on each mission.

Another critical ongoing improvement is the Combat Network Communications Technology, or CONECT, upgrade, to give the aircraft a digital backbone and enhanced communications. It will put improved processors at each crew member's station, provide color displays, and finally eliminate a jerry-rigged tangle of wires and laptops that has been cluttering the B-52's cockpit for years. The B-52 has also been fitted with the Sniper targeting pod, giving it another imaging and targeting sensor at a low cost, Oathout said.

On the horizon is a potential new AESA radar, to vastly improve the B-52's search and ground-mapping capability while giving it additional electronic warfare capability and reducing its electromagnetic signature. The radar would need to come along by the end of this decade to replace the 30-year-old model that is rapidly becoming "unsupportable," Oathout reported. An analysis of alternatives is under way, scrutinizing in-production radars that could provide an off-the-shelf solution. ■

Verbatim

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By Robert S. Dudney

Knocked Off Balance

"The Air Force's definition of 'balanced' cuts tilts heavily against the nation's most experienced and cost-effective flying units. Despite claims last week that reductions to Air Force aircraft and personnel would be 'balanced' across the active component, the National Guard, and the Reserves, the Air National Guard is apparently taking the bulk of the cuts. This not only squanders the opportunity to ... retain combat capability at a time when reductions must be made, it reduces the Air Force's ability to quickly respond to unforeseen contingencies in the future."***—Statement of retired Maj. Gen. Gus L. Hargett Jr., president of the National Guard Association of the US, Feb. 3.***

Fighter Malpractice ...

"Putting the F-35 into production years before the first test flight was acquisition malpractice. It should not have been done. ... So we're finding problems with all three of the variants. ... I think there's been a tendency to start too early in some cases, and the F-35 is probably an extreme example of that."***—Frank Kendall, acting undersecretary of defense for acquisition, technology, and logistics, remarks at Center for Strategic and International Studies, Feb. 6.***

... And a Get-Well Plan

"As part of a management decision on the F-35 program, we have determined that we are not ready to ramp up to full rate production. So we've depressed the rate of procurement for a few years while we work through the concurrency issues still present in that program. But we remain fully committed to the F-35, as the deputy has outlined—all three variants."***—Secretary of the Air Force Michael B. Donley, remarks during a Pentagon press briefing, Feb. 3.***

Reality, Not Rhetoric

"The capabilities afforded by the Air Force require investment. Major recapitalization was deferred for the past 20 years, yielding a fleet that averages a quarter of a century in age. ... While other branches within the Department of Defense experienced significant growth in the post-9/11 environment, the Air Force's share of the budget declined below 20 percent—a record low. Key modernization efforts were canceled [and] often derided as "Cold War" relics, and major portions of the fleet were filled with aircraft optimized for the permissive environments of Afghanistan and Iraq. In truth, this approach emphasized short-term operational demands over long-term global realities. ... The credible projection of effective power requires more than rhetoric. Capabilities and capacity matter."***—Letter to Senate Armed Services Committee leaders from 14 retired military and civilian Air Force leaders, Jan. 26.***

Iran, Sooner or Later

"If sanctions don't achieve the desired goal of stopping [Iran's] military nuclear program, there will be a need to consider taking action. ... A nuclear Iran will be more complicated to deal with, more dangerous and more costly in blood than if it were stopped today. In other words, he who says, ... 'later,' may find that 'later' is too late."***—Israeli Defense Minister Ehud Barak, remarks at the Herzliya Conference, quoted in*** **The Jerusalem Post,** ***Feb. 3.***

In the Driver's Seat

"Washington and Jerusalem are at last operating from a common timetable—Iran is within a year of getting to the point when it will be able to assemble a bomb essentially at will. And speaking of timetables, Jerusalem knows that Mr. Obama will be hard-pressed to oppose an Israeli strike ... before election day. ... That means that from here until November the US traffic light has gone from red to yellow. And Israelis aren't exactly famous for stopping at yellow lights."***—Foreign affairs columnist Bret Stephens, op-ed in the*** **Wall Street Journal,** ***Feb. 7.***

Panetta's Razor

"I don't have any hard evidence, so I can't say it for a fact. There's nothing that proves the case. But as I said, my personal view is that somebody, somewhere probably had that knowledge."***—Secretary of Defense Leon E. Panetta, on whether Pakistani officials knew of Osama bin Laden's hideout in Abbottabad, CBS News program "60 Minutes," Jan. 29.***

Let's Get Small

"The best choice [and] course of action for us is to become smaller in order to project a high-quality and ready force that will continue to modernize."***—Secretary of the Air Force Michael B. Donley, remarks during a Pentagon news conference, Feb. 3.***

Big Talk From Brother Al

"From now onward, we will support and help any nations, any groups, fighting against the Zionist regime across the world, and we are not afraid of declaring this. The Zionist regime is a true cancer tumor on this region that should be cut off. And it definitely will be cut off."***—Ayatollah Ali Khamenei, Iran's top leader, "prayer lecture" at Tehran University, quoted in*** **Washington Post,** ***Feb. 4.***

Darkness at Noon

"The pattern in the US is not to do anything until there's a disaster. The way we're going to find out if someone has the capability [to launch a devastating cyber attack] is we'll wake up one day and the lights won't work."***—James A. Lewis, technology expert at Center for Strategic and International Studies, quoted by Bloomberg.com, Jan. 31.***

No MAD, or No MAS?

"We will get a missile defense agreement for cooperation with Russia. ... I believe missile defense is the metaphor for the opportunity of getting things right [in US-Russia relations]. It has been an irritant ... for over 30 years. ... Almost everything else that you work with on European security has been settled—settled, decided, and worked on by others together for decades. The only thing that's new, where you can bring the Russians in, is missile defense. ... This is the place where we can actually begin [to] put aside the Cold War and 'mutually assured destruction' and move toward 'mutually assured stability.'"***—Ellen O. Tauscher, undersecretary of state for arms control, remarks to the Defense Writers Group, Jan. 12.***

The Wahhabi Bomb?

"If we ... fail to convince Israel to give up its nuclear arsenal and also fail to convince Iran not to acquire a nuclear arsenal, then it is incumbent on us Gulf states to study all the available options, including the acquisition of weapons of mass destruction."***—Saudi Prince Turki Faisal, former intelligence chief, quoted in*** **The Times** ***of London, Jan. 23.***

Technical advances have the Air Force on the verge of refueling operations with no human present.

Midair refueling is about to change—and it has nothing to do with the new KC-46 tanker program. This change is something elemental.

Since aerial refueling became routine in the late 1940s, USAF pilots have learned the fine skills of flying their aircraft to contact with a tanker—one of the most sensitive in-flight maneuvers. Normally, it takes eyes-on from the pilot in the cockpit, the boom operator on board the tanker, or both.

But over the last decade, advances in precision navigation and automated technology have opened up a new realm: automated refueling, where sensor feedback routines control the contact between receiver aircraft and tanker aircraft without control inputs from pilots.

Flight tests beginning in the mid-2000s have pioneered methods for automation routines. And more is coming. Summer 2012 may see tests of one unmanned aircraft refueling another.

"In-flight refueling has proven invaluable to manned military aviation, and there's no reason to expect that the same wouldn't be true for unmanned systems, especially as the demand for unmanned air vehicles has grown in recent years," said Jim McCormick, the Defense Advanced Research Projects Agency program manager for KQ-X, a program testing Global Hawk remotely piloted aircraft as unmanned tankers and receivers.

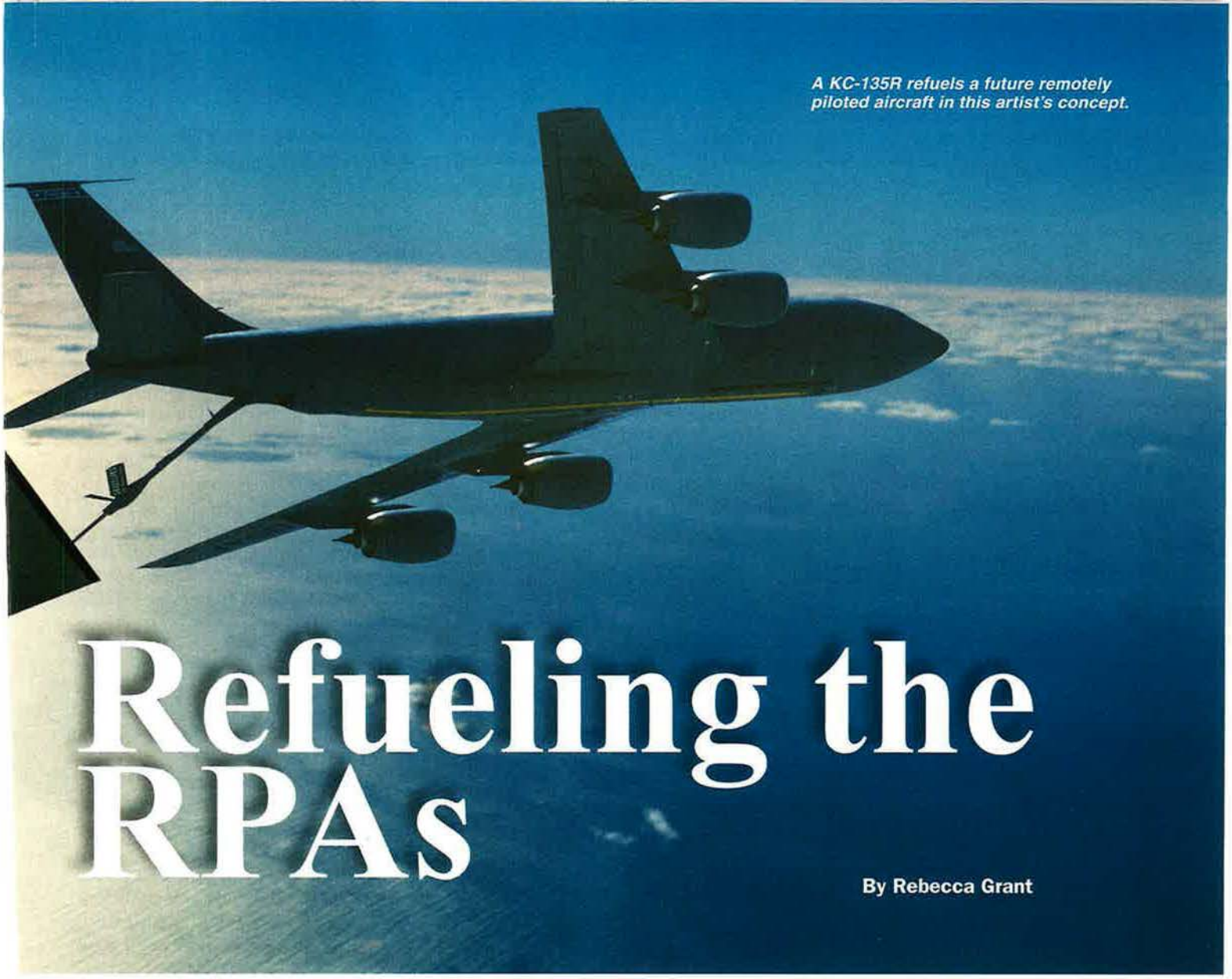
Of course, there are distinct techniques for aerial refueling. Three major approaches have all chalked up successes. The first approach driven by NASA and DARPA matured the concept of optical tracking for automating the probe and drogue "Navy-style" refueling. The Air Force Research Laboratory has spurred extensive industry work in refueling remotely piloted aircraft from USAF tanker booms. On top of this, DARPA now has a new program under way to demonstrate that one unmanned Global Hawk can act as a tanker to refuel another Global Hawk at high altitude.

Automated air refueling required technology to advance beyond basic RPA control. In the late 1990s, several developments pointed toward the possibility of autonomous aerial refueling. First was the widespread use of Predators in the Balkans and other locations. Next, the Global Positioning System satellite constellation reached full operational ca-

Artist's concept by Erik Simonsen

Pilot Dick Ewers and flight test engineer Leslie Molzahn keep their hands off the controls as NASA F/A-18 #845 pulls up to the refueling drogue during an autonomous refueling demonstration flight in 2007.

NASA photo by Lori Losey



A KC-135R refuels a future remotely piloted aircraft in this artist's concept.

Refueling the RPAs

By Rebecca Grant

pability in 1995. GPS provided a means for more reliable flight and autonomous positioning.

Soon the idea of refueling unmanned vehicles took root. "Making UAVs air refuelable would double or triple the loiter time, allowing a single UAV to perform the missions of two or three unrefuelable UAVs," concluded Maj. Jeffrey L. Stephenson in a 1998 master's degree thesis for the School of Advanced Airpower Studies aptly titled "The Aerial Refueling Receiver That Does Not Complain."

Stephenson sketched out the benefits and challenges of automated refueling for remotely piloted aircraft such as Predators. One big unsolved problem was how to handle the fine control required for joining hose and receptacle. Remote piloting and automatic waypoint flying were adequate for getting unmanned aircraft from point A to point B. To refuel, though, they'd need to move in close to the tanker and react with finely shaded control to changes such as wake flow turbulence.

However, aerial refueling for RPAs on intelligence-surveillance-reconnaissance missions was not a pressing priority because those unmanned aircraft already boasted long endurance.

The real impetus toward automated air refueling came from research in the early 2000s on a Joint Unmanned Combat Air System program, dubbed J-UCAS. This program ultimately did not proceed, and part of it was spun off to create the Navy UCAS demonstrator now flying as the Northrop Grumman X-47B.

However, the seed was planted. How would a stealthy but heavy, and possibly armed, long-range RPA get maximum endurance? Midair refueling was the answer. But it could not rely only on ground controller inputs because of the time lag over the satellite link. Unmanned aircraft refueling had to be automated.

Most unmanned aircraft operations are remote, where pilots and sensor operators fly aircraft by transmitting commands over radio or satellite communications links. Aircraft—manned and unmanned—also have automated controls and subroutines that assist human control or, as with autopilot, take over in prescribed situations.

True autonomy is a different beast. It stems from command routines based on sensor inputs exclusive of human intervention. Automation is "hands-off" work done machine-to-machine. The Automation Federation defines it as "the creation and application of technology to monitor and control the production and delivery of products and services." That's easier said than done, especially with objects such as aircraft, which move in a dynamic environment of wind and weather.

Achieving autonomy crosses many functional domains and "involves a very broad range of technologies, including

robotics and expert systems, telemetry and communications, electro-optics, cybersecurity, process measurement and control, sensors, wireless applications, systems integration, test measurement, and many, many more," according to the Automation Federation.

Advances in many of these disciplines made automated air refueling possible.

DARPA and NASA began the Autonomous Airborne Refueling Demonstration by gathering data on how the tanker probe and receiver acted in the stream of air.

Contact was key.

"Autonomous in-flight refueling using a probe-and-drogue system is basically a docking situation that probably requires centimeter-level accuracy in the relative position of the refueling probe (from the receiving aircraft) with respect to the drogue (from the tanker) during the end game," explained a team of aerospace engineers from Texas A&M and Virginia Tech in a 2007 paper. In making the contact, pilots had "to ensure that the tip of the probe contacts only the inner sleeve of the receptacle and not the more lightly constructed and easily damaged shroud," the team added.

Now, it would be up to an automation routine to do the same. The first breakthrough came in 2006 when a NASA F/A-18 engaged with a contract Omega Air Refueling Services tanker while relying on an autonomous system. However, these flights still required pilot consent at points in the maneuver.

The process relied on a combination of technologies. Inertial navigation assisted by GPS guided the receiver aircraft toward the refueling airplane. Once in close, the mating of the receiver's probe with the refueling basket proceeded via optical tracking, which used a system of cameras and emitters to make the minute corrections necessary to achieve lock. Basically, it took the place of what pilots have been doing for decades.

"Skilled pilots can actually save some tricky, last-second movement the basket has a habit of making," commented NASA test pilot Dick Ewers. But, he added, they often "set themselves up for a basket strike, ripping off the basket from the hose or sometimes breaking the probe or parts of the airplane."

Intriguingly, the automated systems handled the process differently. Pilots learned not to try to follow every move of the bouncing basket in order to catch it. But the optical tracker did just that, gradually falling into rhythm with the basket so that movements were synchronized.

By 2007, the Autonomous Airborne Refueling Demonstration was logging full success. DARPA announced that the system had demonstrated the ability to "join the tanker from up to [2.3] miles behind, 1,000 feet below, and 30 degrees off heading." Specifically, that meant an unmanned aircraft could fly first to a designated waypoint using GPS and then switch to a fully autonomous refueling mode.

The Air Force also wanted to develop something different, namely, an automated system suitable for its boom-equipped tankers. The main advantage of a boom is greatly increased fuel flow rates of up to 1,200 gallons per minute. It's important when fighters are waiting turns to refuel or large aircraft such as bombers, AWACS, JSTARS, or even other tankers need fuel. While some Air Force tankers carry both probe and drogue and boom systems, refueling from the boom has long been the norm for USAF pilots.

Automating the boom operation was a different challenge, especially since the boom was regarded as not nearly so forgiving as the basket.

Two potential approaches were tried in models and found wanting. The first was to use GPS to edge an unmanned receiver into position. This seemed to

USAF photo by Bobbi Zapka

USAF photo

A Calspan Learjet, configured to fly like an RPA, maneuvers into refueling position under a KC-135R in these photos of automated aerial refueling demonstration test flights. By 2007, the system was considered fully successful.

A Global Hawk refuels another RQ-4 in this NASA artist's concept. DARPA believes Global Hawk is the obvious choice of test aircraft for the Autonomous High-Altitude Long-Endurance Refueling program. NASA envisions that the tanker will fly behind the receiving aircraft.

NASA illustration

work for formation flying. However, it did not fully cope with "distortions due to wake effects from the tanker," found the Texas A&M team.

Another discarded approach was pattern recognition. It didn't work in low lighting conditions and threatened to take up too much on-board computing power.

Method three was picked. This was a technique broadly based on optical recognition, with the help of algorithms to improve prediction. The guinea pig was a specially modified Learjet flown out of Niagara Falls, N.Y., by Calspan Corp. as part of an overall contract led by Boeing's Phantom Works.

"The goal is to be able to fly something without a pilot in it within 40 feet of a manned vehicle," an AFRL official said of the program in an interview.

Flight tests in 2007 showed major progress. Although the Learjet had an automated air refueling system, pilots handled takeoff then turned the jet over to the system to demonstrate a refueling rendezvous. The automated system guided the Learjet into position behind a KC-135 tanker. There it ran through seven air refueling positions including contact, precontact, left and right inboard observation, left and right outboard observation, and the all-important break away. The Learjet held contact position for 20 minutes and was guided by the autonomous system for a total of one hour and 40 minutes of flight time.

"These tests show that we are making great advancements in system integrity, continuity, and availability through improved relative navigation algorithms, control laws, and hardware," Boeing program manager David Riley commented in December 2007.

In 2009, Boeing again won the Air Force Research Laboratory's contract, this time worth $49 million for a full test program. Reports at the time hinted that part of the reason for AFRL's interest was to explore automated refueling of an optionally manned new long-range strike bomber. The technology required a boom system depending directly on advances in optical tracking. The key was to steer the boom using an image placed on the receiver RPA.

Then in 2010, Northrop Grumman demonstrated its capability for positioning aircraft. "The success of this flight test is especially notable because it demonstrates the ability of an embedded GPS/INS to host relative navigation processing," said Alex Fax, director of positioning, navigation, and timing solutions at Northrop Grumman's Navigation Systems Division.

A series of tests carried out by the 190th Air Refueling Wing in late 2010 and early 2011 marked a new era. A Learjet test aircraft once again played the role of unmanned aircraft. Pilots flew the airplane to altitude then turned it over to the automated system, which moved the airplane into position for the tanker boom operator.

Demonstration of the fine skills for station-keeping opens the possibility for all aircraft, manned and unmanned, to refuel under autonomous control. Equipment installed in the test aircraft enabled eight straight days of unmanned air refueling tests. Test officials said the system blurred the distinction between traditionally piloted and autonomous aircraft, comparing it to a safety feature. "The pilot can let go, and it relieves fatigue. Planes can be manned or unmanned—it's optional," said Lt. Col. Lee Grunberger, who was one of the test coordinators.

Success with manned aircraft tankers refueling autonomously operated receivers was not the end. The next hurdle was the unmanned tanker.

Global Hawks were the natural candidate for the KQ-X program. The high-altitude surveillance airplanes had been flying in combat all during the 2000s with proven reliability. Their internal fuel capacity, of about 17,300 pounds, made the Global Hawk a suitable "tanker" that could carry aloft enough fuel for both its own missions and potential offload.

According to DARPA, the program is addressing the challenges of unmanned systems, sensing, and aerodynamics to a much greater degree than AARD. "Tackling these complexities in a fully unmanned refueling scenario, with the real-world Global Hawk system, should increase our confidence that unmanned systems can be autono-

NASA photo by Tony Landis

The F/A-18 research aircraft follows a pickup carrying an airborne tanker drogue image down a runway in early AARD testing. An RPA's approach to the boom is broadly based on optical recognition, aided by algorithms to improve prediction accuracy.

mously refueled in a safe, flexible, and affordable manner," said McCormick, the program manager.

As early as 1998, Stephenson had cited the range, fuel payload, and high-altitude operating characteristics and deemed it ideal for top priority in the unmanned aerial refueling mission. The problem at the time was how to compensate for as much as a 3.5-second delay in a satellite control link during rendezvous.

DARPA took up the challenge with its new KQ-X program in 2010—and followed a pragmatic approach. "We're using proven Global Hawk aircraft and ground stations, algorithms developed under AARD, and off-the-shelf refueling hardware," McCormick explained. The DARPA program takes full advantage of the work carried out over the previous decade and will use it to reduce risk. "We're mostly avoiding new technology, so we can focus on the challenges of integration and unmanned operation," he noted.

The Autonomous High-Altitude Long-Endurance Refueling program set out to demonstrate "repeatable probability of success with limited flight performance aircraft under high-altitude conditions, redundant safe separation, and unmanned flight operations," stated DARPA officials.

"We think this is important because a next generation HALE platform designed to refuel may be much more affordable, capable, and effective," McCormick said.

Two older Global Hawks operated by NASA were designated for the program. Step 1 was risk reduction. Northrop Grumman's Proteus test aircraft flew within 40 feet of the NASA Global Hawk while at 45,000 feet.

"When you add autonomous flight of both aircraft into the mix, ... you gain a capability that has mission applications far beyond just aerial refueling," said Geoffrey Sommer, KQ-X program manager for Northrop Grumman.

The concept for double unmanned refueling was a bit different from the routine scenario of receiver trailing tanker. In this case, plans called for the tanker Global Hawk to fly behind the receiver Global Hawk. "We want the aircraft with the smarts and the maneuvering capabilities in the rear," Northrop Grumman official Mark Gamache explained to news site Xconomy San Diego at the outset of the program.

According to McCormick, 2012 is a make-or-break year. "We plan to complete, this summer, a convincing demonstration that includes repeated transfer of fuel," he said. "In the process, we will learn better how this type of aircraft operates in close formation and gain valuable experience with complex unmanned operations."

Unmanned Fleet?

In preparing a 2011 study of autonomy, the Defense Science Board observed, "Dramatic progress in supporting technologies suggests that unprecedented, perhaps unimagined, degrees of autonomy can be introduced into current and future military systems." The Pentagon urged the DSB to identify opportunities for "more aggressive application of autonomy."

Still, several questions remain before USAF finds itself conducting hands-off refueling on a regular basis. First is whether to add autonomous refueling capability to current platforms. For example, converting legacy RPAs to take on fuel in flight depends on the aerodynamics and durability of each system. At a minimum, each must be able to handle a single point refueling receptacle.

Then there are the flying characteristics to consider. Early model Predators were designed for a limited envelope, not including extreme turbulence, weather, and high-altitude operations. On the other hand, the Global Hawk's inherent flying characteristics are far better suited to midair refueling.

Tactics are another consideration. Planning tanker orbits, especially for high-intensity air campaigns, is an art in itself. Day-to-day tactics and training will have to sort out the most efficient systems for rendezvous, for example. Stephenson advocated "en route rendezvous [allowing] both the UAV and tanker to enter the air refueling track on a straight-line course." In this case, "the tanker will not have to orbit and waste valuable time waiting to hook up with the UAV," he pointed out. More experiments—and a dose of experience—will be needed to clarify these points, but the progress is promising.

Refueling will be essential for unmanned deep reach aircraft on strike or ISR missions. For example, the Navy's UCAS-D stealth demonstrator logged successful flights by two test air vehicles in 2011. Although it is just a demonstrator, UCAS-D's estimated range of 1,726 to 2,417 miles would be greatly expanded by aerial refueling. The ability to top off with fuel from a "recovery" tanker could become important in operations around the carrier—or even over land bases. The same would hold true for unmanned strike aircraft. Refueling is essential for moving from the relatively light ISR payloads to toting munitions out to deep strike ranges.

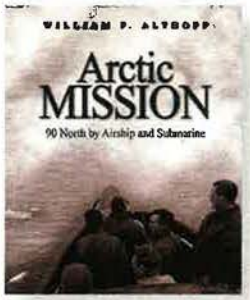
The technology of visual recognition for close-in guidance may also pay off in other applications going well beyond air refueling, such as complex RPA formations.

Given these advances, there seems little doubt that the Defense Science Board's predictions about new opportunities in autonomy are being proved right when it comes to automated aerial refueling. ■

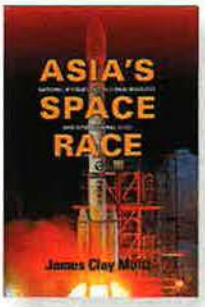
Rebecca Grant is president of IRIS Independent Research. Her most recent article for Air Force *Magazine was "Black Bomber Blues" in the January issue.*

Books

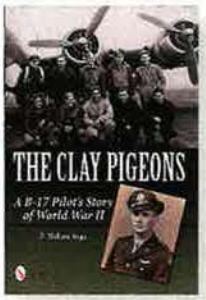
Compiled by Chequita Wood, Media Research Editor



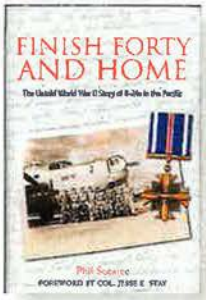
Arctic Mission: 90 North by Airship and Submarine. William F. Althoff. Naval Institute Press, Annapolis, MD (800-233-8764). 264 pages. $39.95.



Asia's Space Race: National Motivations, Regional Rivalries, and International Risks. James Clay Moltz. Columbia University Press, New York (800-343-4499). 274 pages. $35.00.

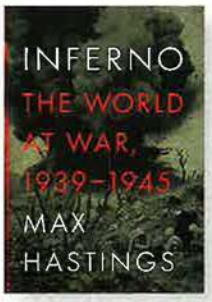


The Clay Pigeons: A B-17 Pilot's Story of World War II. E. Helene Sage. Schiffer Publishing, Atglen, PA (610-593-1777). 158 pages. $35.00.

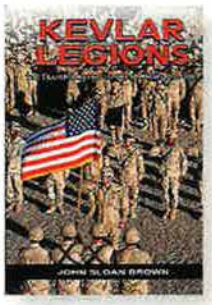


Finish Forty and Home: The Untold World War II Story of B-24s in the Pacific. Phil Scearce. University of North Texas Press, Denton, TX (800-826-8911). 373 pages. $29.95.

First South Pole Landing: The Pilots' Story. Jan Churchill. Order from: www.janchurchill.com, Jan Churchill, PO Box 32, New Castle, DE 19720 (302-325-2718). 82 pages. $24.95.

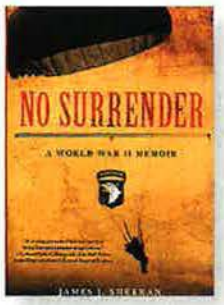


Inferno: The World at War, 1939-1945. Max Hastings. Knopf, New York (800-733-3000). 729 pages. $35.00.



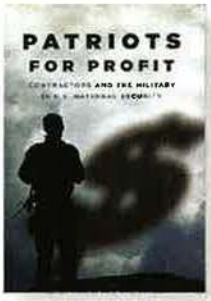
Kevlar Legions: The Transformation of the US Army, 1989-2005. John Sloan Brown. GPO, Supt. of Documents, Washington, DC (866-512-1800). 539 pages. $50.00.

McNamara, Clifford, and the Burdens of Vietnam, 1965-1969. Edward J. Drea. GPO, Supt. of Documents, Washington, DC (866-512-1800). 694 pages. $68.00.

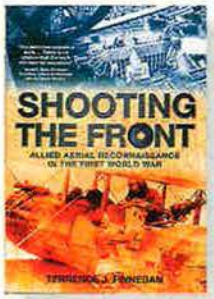


No Surrender: A World War II Memoir. James J. Sheeran. Berkley Caliber, New York (800-631-8571). 311 pages. $16.00.

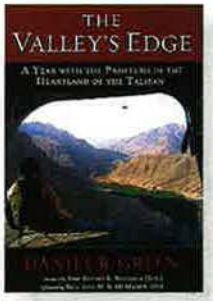
On Heroic Wings: Stories of the Distinguished Flying Cross. Barry A. Lanman and Laura M. Wendling. DFC Book Fund, Seattle (866-332-6332). 325 pages. $39.95.



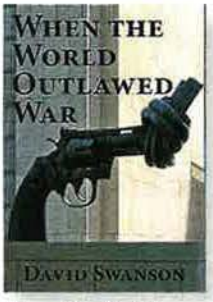
Patriots for Profit: Contractors and the Military in US National Security. Thomas C. Bruneau. Stanford Security Studies, Stanford, CA (800-621-2736). 270 pages. $24.95.



Shooting the Front: Allied Aerial Reconnaissance in the First World War. Terrence J. Finnegan. Independent Publishers Group, Chicago (800-888-4741). 408 pages. $44.95.



The Valley's Edge: A Year With the Pashtuns in the Heartland of the Taliban. Daniel R. Green. Potomac Books, Herndon, VA (800-775-2518). 246 pages. $29.95.



When the World Outlawed War. David Swanson. Order from: David Swanson, www.davidswanson.org/outlawry. 172 pages. $15.00.

Women for Victory: American Servicewomen in World War II—History and Uniforms Series. Katy Endruschat Goebel. Schiffer Publishing, Atglen, PA (610-593-1777). 360 pages. $89.99.

Fighters Over

The Korean War saw the end of the propeller-driven fighter era overlap with the early days of the jet age.

Korea

Photos via Warren E. Thompson
Text by June Lee

Robert Hook photo

During the Korean War, F-86Fs fly south of the 38th parallel, back to Osan AB, South Korea. Their drop tanks are still attached, meaning they had not run into aerial opposition.

On June 25, 1950, North Korean forces swept past the 38th parallel and invaded South Korea. While North Korea had the backing of China and the Soviet Union, South Korea had the assistance of the United States and the United Nations. Spanning a little more than three years, the Korean War ended in an armistice. The war ushered in an era of new swept-wing jets while phasing out propeller-driven fighters from World War II. ***I1I*** *Crewmen change a tire—chewed up by rough airstrips—on an F-51 Mustang at Chinhae Air Base. When it came to finding good landing strips, it didn't help that Korea is a largely mountainous country.* ***I2I*** *A Mustang with the 67th Fighter-Bomber Squadron flies over North Korea in 1951, ready to drop napalm.* ***I3I*** *Capt. Daniel James Jr. of the 12th Fighter-Bomber Squadron at Taegu Air Base poses in front of his Mustang. "Chappie" James flew more than 100 combat missions in Korea. He went on to serve in Vietnam and in 1975 became the first black four-star general in the US military.*

1 Tom Shockley photo

2 Ed Mason photo

3 Ed Nebinger photo

I1I *Airmen inspect Lt. Ed Jones'* Red Raider, *from the 36th FBS, after it was struck by anti-aircraft fire. Note the holes in the rear fuselage.* ***I2I*** *Pilot 1st Lt. Mario Prevosti poses with his aircraft's "Flying Tiger"-style nose art and a young South Korean at Chinhae Air Base in 1951.* ***I3I*** *The Mustangs of the 39th Fighter-Interceptor Squadron had blue and white spinners, giving them the nickname "The Blinker Nose Squadron." Note the unpainted napalm tanks.* ***I4I*** *Capt. Cecil Foster taxis back to the 16th Fighter-Interceptor Squadron parking area after shooting down his fifth MiG. Foster racked up nine aerial victories in the Korean War.*

|1| *Lt. Emmett Taylor (r) of the 45th Tactical Reconnaissance Squadron receives congratulations for completing his 100th mission in June 1951. Taylor flew Mustangs throughout his tour.* *|2|* *Lt. Col. Bruce Hinton (l), 336th FIS commander, discusses tactics for an upcoming mission from Suwon. He scored the first MiG-15 kill for the F-86 on Dec. 17, 1950.* *|3|* *Under the Bout One project, USAF provided used F-51 Mustangs and instructor pilots to South Korea's Air Force, which had no combat ready aircraft. This F-51 was at Taegu Air Base in July 1950. The fuselage is painted with South Korea's Air Force emblem.* *|4|* *F-86 Sabre pilots wait out alert duty with a card game at Kimpo Air Base.* *|5|* *Mustangs prepare for a low-level napalm drop against Chinese troops along a mountain ridge.*

1 Ernest Jones photo


2 John Henderson photo

3 Duane Bideman photo


5


4

I1I Lt. Col. George Ruddell (l) and Maj. Clyde Wade (r) congratulate Capt. Joseph McConnell Jr. on a successful mission. He would become the war's highest-scoring ace, with 16 MiG kills. All three pilots were with the 39th FIS. I2I Pilots of the 40th FIS at Pohang Air Base enjoy some downtime before their next mission. I3I Time for a quick snooze in the cockpit while the crew chief does the same below. I4I Lt. Jim Isbell stands in front of his RF-51 Mustang before taking off for a mission. Isbell was assigned to the 45th TRS, nicknamed the "Polka Dots."

|1| *Maintainers change the engine of an F-86A Sabre at Kimpo in late spring 1951. The F-86 became an iconic aircraft of the Korean War as it went up against the new Soviet MiG-15s. The MiGs had a better climb and turn rate and higher ceiling, but the skills of US pilots prevailed.* *|2|* *This F-86 was destroyed by Polikarpov Po-2s at Suwon Air Base. The Po-2, often flown as the infamous "Bed Check Charlie," would come in below radar and attack air bases late at night with small bombs. These attacks were more annoying than harmful, yet some caused serious damage.* *|3|* *Lt. Bruno Giordano of the 334th FIS at Kimpo sits in the cockpit of an F-86. Behind him are sandbag revetments, which helped protect aircraft from shell fragments.* *|4|* *The rear fuselage of Lt. Col. Glenn Eagleston's F-86A after a MiG caught up with him over MiG Alley. Eagleston—who had been one of the top aces of World War II—managed to land safely at Suwon, but the aircraft was a total loss.*


1


2 Leo Fournier photo

3


John Henderson photo 4

I1I Pilots of the 36th FBS pose in front of the F-86F Rosalie *at Suwon in 1953. I2I F-86s hidden under camouflage netting. Sabres based at Kimpo and Suwon made those sites a hot target. I3I Crew chief Sgt. George Banasky (r) smiles for the camera with a fellow airman in front of an F-86. The tail colors of this aircraft represent the 18th Fighter-Bomber Wing. I4I Ruddell, commanding officer of the 39th FIS, is seated in his F-86* MiG Mad Mavis. *He would have seven more red stars painted on his F-86 before the armistice in July 1953. The armistice stopped the fighting, but the Korean War technically never ended, and USAF airmen and fighters remain in South Korea to this day.* ■

Hap Arnold is the Air Force's only five-star general, but just the 10th highest ranked US military officer ever.

The Highest Ranking

By Peter Grier

Gen. of the Air Force Henry H. "Hap" Arnold is the highest-ranking officer in US Air Force history. But he didn't don a USAF uniform until late in life, well after retirement.

How can both those statements be true?

The answer sheds light on the United States' fascinating list of all-time top military leaders—those who reached the highest rungs, how they got there, and how they stand compared to compatriots and heroes who came before.

As every airman is taught today, Arnold was a giant, a pioneer of American airpower. Among the first US military pilots taught by the Wright brothers, he helped organize the young American air arm in World War I. In World War II, he built and led the nation's armada of 80,000 warplanes to victory, despite his own debilitating heart trouble.

His accomplishments were recognized in 1944 when he was elevated to five-star status. At the time, US air units were part of the Army, so his official title was General of the Army. That was the rank he held when he retired due to poor health in 1946.

One year later the United States Air Force was born. Two years later, in 1949, President Truman signed a bill commissioning the retired Arnold a five-star General of the Air Force, an honor many in Washington felt Hap richly deserved. Truman's desk calendar notes he personally presented Arnold with his new commission during a brief noontime meeting on June 2, 1949.

Arnold died in Sonoma, Calif., on Jan. 15, 1950. Following a somber ceremony held amidst sleeting winter weather, the career-long Army man was buried in Arlington Cemetery as a full member of the new Air Force he had done so much to bring to life.

Today Arnold remains the only officer in American history to reach five-star status in two services. But this does not make him the highest-ranking officer in the US military pantheon, of course. He was not the top US general of World War II. He was not even the highest-ranking officer promoted to

star rank did not seem commensurate with what he had accomplished. After all, Washington did more than defeat the British in battle. Along the way he established the framework for how American soldiers should organize themselves, how they should behave, and how they should relate to civilian leaders. Almost every big decision he made set a precedent. He was the father of the US military as well as the US itself.

"Washington's stewardship as the Army's senior officer was unique and, by its nature, could not have been duplicated by his successors," writes Army historian William Gardner Bell in *Army Generals and Chiefs of Staff, 1775-2005.*

Fitting and Proper

Furthermore, the needs of wars on a huge scale in the 20th century had produced four- and five-star US generals. Technically, they outranked the three-star Washington. By the time the nation's bicentennial rolled around, federal lawmakers decided it was only fair to recognize the great Virginian's preeminence. Accordingly, on Sept. 28, 1976, Congress passed a joint resolution calling for Washington to be posthumously promoted to the grade of General of the Armies of the United States, with that grade to have precedence over other Army grades,

Left: General George Washington's attack on the Hessians at Trenton, Dec. 25, 1776, as depicted by artist Emanuel Leutze.

five-star status in December 1944, when Congress approved the grade.

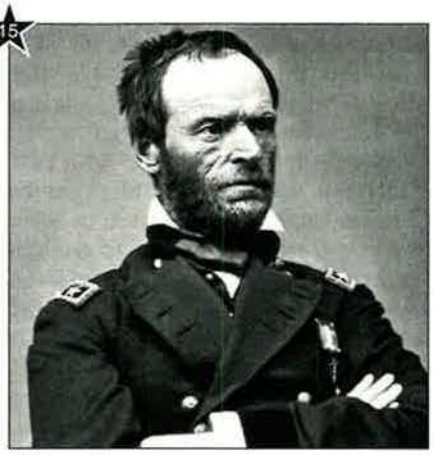
What does the all-time US military hierarchy look like? Who heads the list, and how did they get there?

Perhaps the best way to answer these questions is to start at the pinnacle of leadership, where the situation is clear. George Washington is the highest-ranking US officer. If somehow the nation's wartime heroes were gathered together in one force, from Ulysses S. Grant to Gen. David H. Petraeus, they would all be under the command of the father of our country.

This is so because Congress and the President directed it. When Washington died, he was a lieutenant general. But as the centuries passed, this three-

Highest Ranked Military Officers

1. Gen. of the Armies George Washington
2. Gen. of the Armies John J. Pershing
3. Adm. of the Navy George Dewey
4. Fleet Adm. William D. Leahy
5. Gen. of the Army George C. Marshall
6. Fleet Adm. Ernest J. King
7. Gen. of the Army Douglas MacArthur
8. Fleet Adm. Chester W. Nimitz
9. Gen. of the Army Dwight D. Eisenhower
10. Gen. of the Air Force Henry H. "Hap" Arnold
11. Fleet Adm. William F. "Bull" Halsey Jr.
12. Gen. of the Army Omar N. Bradley
13. Fleet Adm. David G. Farragut
14. Gen. of the Army Ulysses S. Grant
15. Gen. of the Army William T. Sherman



William Sherman

Ulysses Grant

David Farragut

past or present. It is clear from the resolution's wording that lawmakers meant Washington to be the senior US military officer of all time. "It is considered fitting and proper that no officer of the United States Army should outrank Lt. Gen. George Washington on the Army list," stated the legislation.

President Gerald Ford was happy to sign an Executive Order that carried out Congress' wishes. Washington's appointment was given an effective date of July 4, 1976.

The grade of General of the Armies, as opposed to that of General of the Army, is meant to convey leadership over all branches of the US military. It has been associated with only two men in US history: George Washington and John J. Pershing.

Of the two, only Pershing held the title in his lifetime. Thus "Black Jack" might be listed second in the hierarchy of US military leaders. Congress first voted to create the General of the Armies rank in 1799, but the aging George Washington was not immediately raised to this new level and he died that year. In 1800, with Washington gone and the prospect of a war with France dissipating, Congress specifically authorized President John Adams to suspend promotions to this exalted plane.

Enter Pershing. Born in 1860, he was an officer of the old school. A star at West Point, he served in the Indian Wars, the Spanish-American War, and the US struggle against insurrection in the Philippines. He performed admirably as an observer in the Russo-Japanese War—service that helped convince President Theodore Roosevelt to personally nominate him for brigadier general over 909 higher-ranking officers.

What Insignia?

Despite personal tragedy—his wife and three daughters died in a fire at the Presidio of San Francisco in 1915—Pershing rose to command the American Expeditionary Forces in World War I, the first large-scale deployment of US troops in Europe. Starting from almost nothing he organized training and logistics for an army of two million men. He insisted Americans would fight as a separate force—a move that helped establish the US as a world power and increased President Woodrow Wilson's leverage in the postwar Paris peace conference.

On Sept. 3, 1919, Congress honored Pershing's wartime service by reviving the grade of General of the Armies and bestowing it upon him. He retired with that rank on Sept. 13, 1924.

After this promotion, Pershing continued to wear the four stars he and the Army's other top generals of the time had adopted as their insignia, according to the Army Center of Military History. At the time, service regulations held that full generals should wear four stars, but made no mention of the insignia a General of the Armies should display.

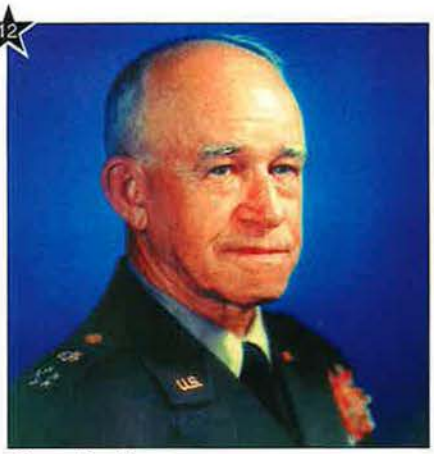
Later, at the height of World War II, in December 1944, Army regulations were changed to prescribe that officers holding the rank of General of the Army (singular) should wear five stars on their shoulder. This did not affect Pershing's place in the service or in history.

"Although General Pershing continued to wear only four [stars], he remained preeminent among all Army personnel, by virtue of congressional action and Army regulations governing

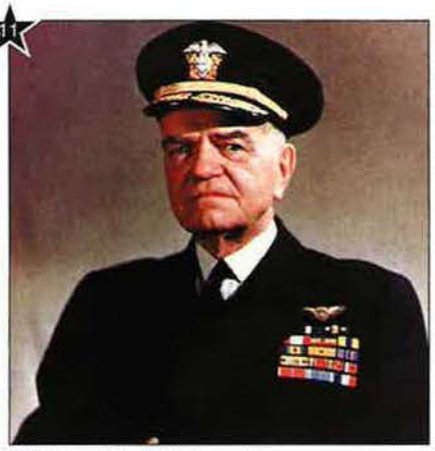
Dwight Eisenhower

Chester Nimitz

Douglas MacArthur



Omar Bradley



William "Bull" Halsey Jr.

Henry "Hap" Arnold

rank and precedence, until his death on July 15, 1948," states an Army Center of Military History monograph on five-star leaders.

The next step down on the US military ladder is Admiral of the Navy, a rank that by seniority and precedence is superior to that of a five-star Fleet Admiral. Only one man has held it in American history—George Dewey. He is thus arguably the third-ranking US officer of all time.

Dewey, like Washington and Pershing, acceded to his high place in the military firmament after his toughest battles were won. A Vermonter and Naval Academy graduate, he served as an up-and-coming officer in the Civil War. By 1898 he was a commodore and commander of the US Asiatic Squadron. At the onset of the Spanish-American War, he was ordered to proceed from China to the Philippines to commence actions against the Spanish fleet. On the morning of May 1, 1898, he reached the entrance to Manila Bay, then sent his ships into battle shortly after first light, uttering to the commander of his flagship USS *Olympia,* Capt. Charles V. Gridley, the famous line, "You may fire when you are ready, Gridley."

The Battle of Manila Bay ended in a great US victory, with Spain's ships and shore installations destroyed and minimal loss to US forces. It put the world on notice a new sea power was rising and, not coincidentally, made Dewey a national hero. Congress quickly voted him the thanks of the US and bumped him up to rear admiral. Then, in 1899, lawmakers voted to create the rank of Admiral of the Navy, to be held by only one person. "Whenever such office shall be vacated by death or otherwise the office shall cease to exist," said the enacting legislation.

Arch-General

Another congressional act raised Dewey to this pedestal on March 24, 1903, with his commissioning date set retroactively to March 2, 1899. According to a Naval History and Heritage Command biography, he held the rank of Admiral of the Navy until his death in Washington, D.C., on Jan. 16, 1917.

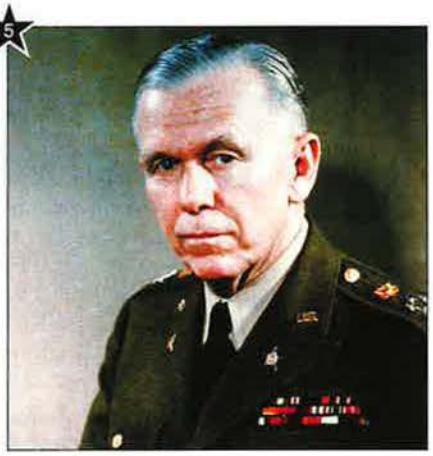
The US military and lawmakers have traditionally awarded five stars only to admirals and generals who are top-shelf leaders in great wars. Following Washington, Pershing, and Dewey, whose final ranks were essentially accolades, the next level in the hierarchy consists of famous officers who steered the nation to victory in World War II.

George C. Marshall was preeminent among these men (though not the most senior). A graduate of Virginia Military Institute, Marshall was a second lieutenant in World War I's AEF and an aide to Pershing. He helped devise the crucial and victorious Meuse-Argonne Offensive. He rose through the ranks in the interwar period, a time when promotions were hard to come by for most.

A brigadier in 1936, he was named Army Chief of Staff by President Franklin Roosevelt in 1939. Marshall was sworn in to the post and raised to general on Sept. 1, the day German forces marched into Poland and World War II began.

After Pearl Harbor, Marshall became nothing less than the principal architect of the American contribution to the Allied cause and eventual victory. Like his mentor Pershing, he demanded competence to the extent that some

Ernest King



George Marshall

William Leahy

George Dewey

John Pershing

George Washington

found him cold. He once appointed an old colleague to a high post, only to hear the man had delayed acceptance because his furniture was not packed for the necessary move. Marshall called him to see if this was true and was told it was—the man's wife was out of town; there was nothing to be done. Marshall withdrew the job and placed his friend on the "retired" list the next day.

The Army Chief himself was satisfied with the four stars on his shoulder. But from the beginning of the war the Navy pushed Congress for a higher-ranking slot, with some in that service arguing that they needed such a level to place them on better footing with allies, particularly the British, who had fleet admirals and field marshals of such status.

In 1942, Chief of Naval Operations Adm. Ernest J. King wrote Marshall a memo urging that Marshall accede to the creation of a level above admiral and general. King's suggestions for the names of these new ranks were "arch-admiral" and "arch-general." In a Nov. 30, 1942, memo, Marshall replied that he did not think the move wise.

"In the first place, it would involve the immediate implication that we were proposing something for our own personal advancement. Also, I believe that neither our legislators nor the American people would react at all favorably to the creation of what to them would be exalted military rank," Marshall wrote his Navy counterpart.

Pressure from President Roosevelt, a former assistant secretary of the Navy, and Secretary of War Henry L. Stimson eventually forced Marshall to accept the inflation of ranks. Marshall and his fellow Army four-stars got an additional star and title General of the Army. The Navy received the five-star rank Fleet Admiral.

Under the promotion deal, FDR's Chief of Staff Adm. William D. Leahy, who served as the de-facto first US Joint Chiefs Chairman, emerged as the most senior officer. Leahy was promoted to Fleet Admiral effective Dec. 15, 1944—and thus today ranks fourth on the all-time US military list. Marshall was next, with a promotion date of Dec. 16. He was followed by King, promotion date Dec. 17; Gen. Douglas MacArthur, Dec. 18; Adm. Chester W. Nimitz, Dec. 19; Gen. Dwight D. Eisenhower, Dec. 20; and lastly Arnold, who received the first of his eventual two five-star posts on Dec. 21, 1944.

Marshal Marshall

The story around Washington in later years was that Marshall had opposed the move to five stars because he did not want to be referred to as "Marshal Marshall." He denied this in postwar interviews with his eventual biographer, Forrest C. Pogue. "I didn't think I needed that rank and I didn't want to be beholden to Congress for any rank or anything of that kind," Marshall told Pogue. "That was twisted around and somebody said I didn't like the term marshal because it was the same as my name. I know Mr. Churchill twitted me about this in a rather scathing tone. I don't recall that I ever made the expression. But my reason for not wanting it was, I thought it was much better that I personally shouldn't be beholden to anything for Congress except for fair treatment—which they gave me."

In December 1945, Adm. William F. Halsey Jr. earned elevation to the status of Fleet Admiral. In 1950, during the Korean War, Army Gen. Omar N. Bradley received a fifth star. Since that time four stars has remained the highest level of US military achievement. After Korea there was some sentiment in Congress to establish a six-star rank for MacArthur, but that faded as surely as MacArthur's own political ambitions. Similarly, after the 1991 Persian Gulf War, there was some discussion of promoting Army Generals H. Norman Schwarzkopf and Colin L. Powell to five-star rank, but this sentiment soon faded.

As to the great US military leaders of the Civil War, today they rank below the five stars, but at the top of the four-star hierarchy. First among these is Adm. David G. Farragut, the Navy hero credited with saying, "Damn the torpedos, full speed ahead!" as he entered Mobile Bay in 1864. A grateful Congress promoted Farragut to full admiral after the war, on July 25, 1866. He was the first Navy officer to hold that rank. Farragut outranked his Army compatriots due to length of service; he was appointed a midshipman in 1810—when he was nine years old.

On July 25, 1866, Congress also made Lt. Gen. Ulysses S. Grant a full General of the Army, putting him in charge of all Army forces. He was succeeded in this post by Lt. Gen. William T. Sherman, promoted to General of the Army on March 4, 1869. According to the Army Center of Military History, regulations at the time specified that an officer so designated wear a four-star insignia.

With the beginning of the Civil War's sesquicentennial last year, the relative ranks of Farragut, Grant, and Sherman are once again likely to generate discussion. ■

Peter Grier, a Washington, D.C., editor for the Christian Science Monitor, *is a longtime defense correspondent and a contributor to* Air Force *Magazine. His most recent article, "Big Plans for the Air Force Museum," appeared in February.*

DOD Senior Leadership

KEY:

ASD Assistant Secretary of Defense
ATSD Assistant to the Secretary of Defense
DASD Deputy Assistant Secretary of Defense
DUSD Deputy Undersecretary of Defense
PDUSD Principal Deputy Undersecretary of Defense
USD Undersecretary of Defense

Compiled by June Lee, Editorial Associate

(As of Feb. 16, 2012)

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(Reports to PACOM)
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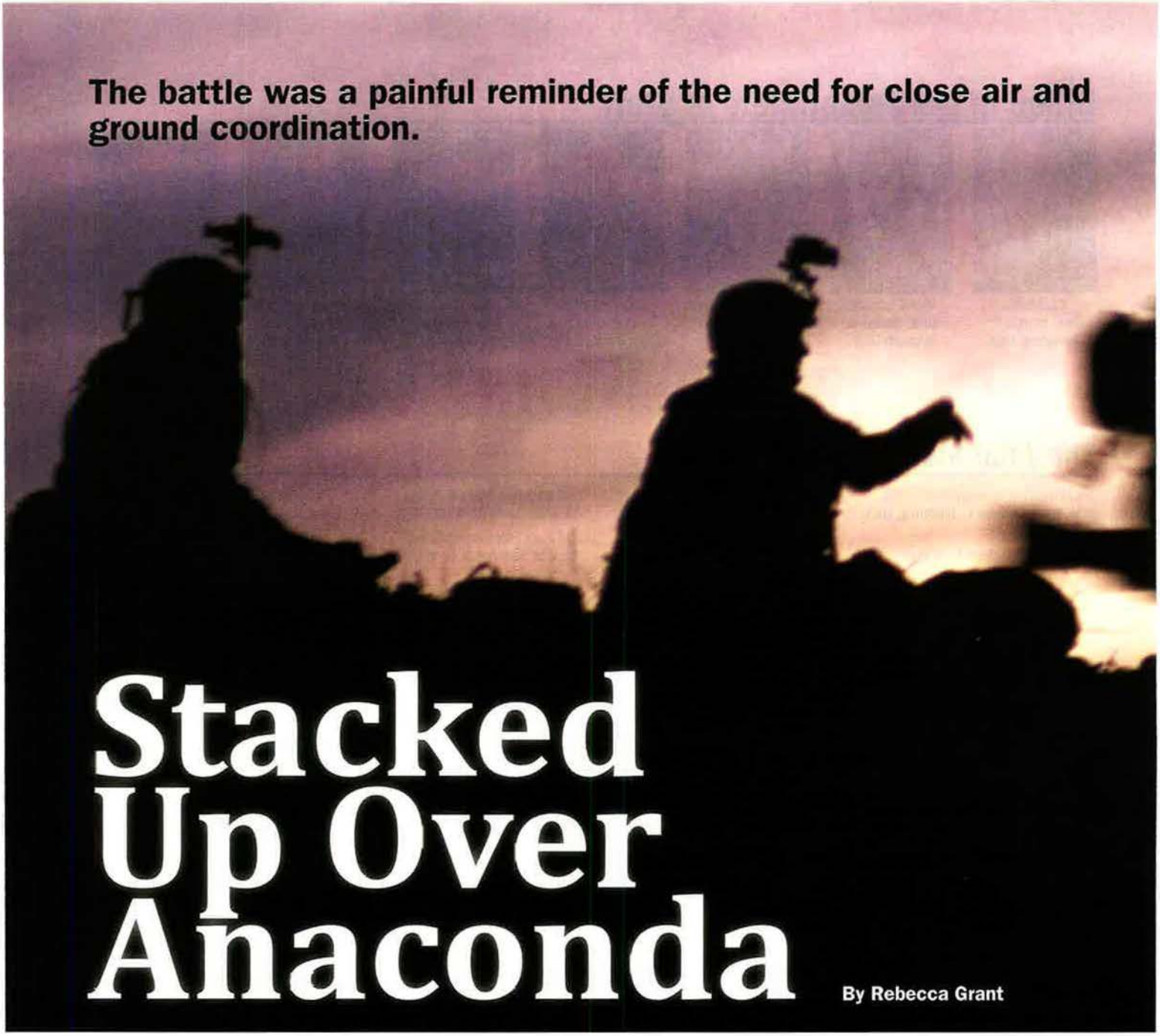
The battle was a painful reminder of the need for close air and ground coordination.



Stacked Up Over Anaconda

By Rebecca Grant

A battle that took place from March 2-16, 2002, in the high mountains of eastern Afghanistan, gave regular American forces their first taste of Operation Enduring Freedom's sustained combat. This particular mission, Operation Anaconda, proved much deadlier and more difficult than its planners had expected.

Anaconda had been designed as an Afghan-led, US-supported operation to encircle, trap, and destroy a growing Taliban force. It would push retreating fighters into a blocking element so that they, too, could be stopped and defeated, to prevent large numbers of the enemy from melting away such as had happened the previous year at Tora Bora.

The operation was conceived weeks after the battle of Tora Bora in December 2001 saw Osama bin Laden and al Qaeda forces slip away from a mountain redoubt.

Now, the "enemy had massed for the second time," wrote Air Force Gen. Richard B. Myers, who was Chairman of the Joint Chiefs of Staff in 2002, in his 2009 book, *Eyes on the Horizon.* It seemed like a golden opportunity to continue pursuit of al Qaeda leaders and fighters as the new provisional government in Afghanistan consolidated.

Special operations forces started planning. The mission was to involve the largest group of conventional ground forces of the war, so in February the SOF troops handed tactical control of Anaconda off to the regular Army, under the name Combined Joint Task Force Mountain.

Flaws in the plan perhaps began with the handoff. Up until March 2002, Operation Enduring Freedom was a model of a new kind of war. Roaming airpower supported small teams of SOF operators, Afghan allies, and CIA specialists, and there was no formal land component in place until late November 2001.

For airpower, it was easy to manage because teams were dotted all over Afghanistan. Even at Tora Bora, there had been no more than several dozen US personnel on the ground. Anaconda was designed as a different type of operation. The assault was shaped to Army doctrine as the first major ground operation of the war.

Soldiers from the Army's 10th Mountain Division dig into fighting positions after a day of responding to enemy fire during Operation Anaconda. Below, a soldier from the 101st Airborne Division scans the mountainous Afghan countryside for targets.

USA photos by Spc. David Marck Jr.

The enemy had "started to get together in a place where they could have enough mass to be effective," said Myers in a March 4, 2002, briefing. "We've been following that, allowing it to develop until we thought it was the proper time to strike."

Of course, there were multiple problems.

Intelligence slipped up. The Afghan portion of the attack collapsed. And soldiers got a shock from the level of resistance mounted by al Qaeda forces.

But the real black mark of Anaconda was the failure of Army planners to bring the joint air component into the planning process until the last minute. Operation Anaconda remains one of the central battles of the Afghanistan war

USA photo by Spc. Andres J. Rodriguez

Soldiers on March 14, 2002, watch a Chinook helicopter drop Canadian troops in the mountains where al Qaeda and Taliban forces were holed up in caves.

because it exposed a recurrent flaw in US military operations: poor coordination between air and land forces.

The operation was "a bit of a surprise," said retired Air Force Gen. T. Michael Moseley, who during Anaconda been the three-star air commander for US Central Command, in a 2011 interview.

Moseley did not find out a large operation was brewing until several days later. He was at a meeting elsewhere in the CENTCOM theater when Maj. Gen. John D. W. Corley called him from the combined air operations center. "I think you need to come back. There is something going on," Corley told Moseley.

Organizing airpower had not been a major problem in Afghanistan before. SOF typically blocked out areas of operation as small restricted zones. In contrast, a regular Army force would rely on formatting most of the battle area for airspace control. The 10th Mountain Division, like other divisions, trained with air liaison officers to organize air control measures.

Yet planners breezed past these typical procedures in the haste to get on with Anaconda.

The speed with which air support could arrive was greatly affected by where the Army set the fire support coordination line or FSCL. (FSCLs are the bomb lines used to demarcate areas along the front.) Beyond the FSCL, strike sorties could seek out enemy targets.

50 Percent Intelligence

Inside the FSCL, every close air support sortie required the highest level of control. That ensured troop safety, but also slowed down the flow of air support. Plans called for treating the entire Anaconda area of operations as "short of the FSCL, requiring positive terminal direct control and approval for strike residing with the CFLCC-Fwd Commander," found an Air Force after-action report. Routine procedures were setting up a clog in close air support.

Air mobility planners were also in the dark about Anaconda. Brig. Gen. Winfield Scott III was the CAOC's director of mobility forces. He could not "remember the AMD [Air Mobility Division] ever seeing the plan" for Anaconda until the system spat out an airlift requirement.

But the Army had to move between 700 and 1,000 personnel from Kandahar to Bagram for the operation. At the beginning of 2002, Bagram was a barren base with pockmarked Soviet-era concrete. Fuel was scarce, with barely enough on hand to support C-130s and Army helicopter aviation.

"We gathered up every available flying resource that we could in that part of the world," said Corley. Aircraft dragooned into the operational support included some of the C-17s being used for a vice presidential trip to the region and Marine Corps KC-130s. Army helicopters were so short of fuel that another ground fuel bladder was delivered to Bagram, and two C-17s did nothing but service it.

"We had a tanker overhead. The C-17 would spiral up, plug in, get the gas, spiral back down, and offload gas," Scott recalled.

Despite all this, the planners may have gotten away with the rough start were it not for a major underestimation of al Qaeda's strength and determination.

Intelligence did not know the number of al Qaeda and insurgents in the mountains. "Before we went in there, we heard everything from 200 to several thousand," remarked Myers at the time.

The low estimate was 168 and the high estimate, from CENTCOM, was more than 1,000 enemy personnel.

The lower estimate was used for planning and appeared in the CONOPS for the operation.

In essence, CJTF Mountain was planning for a largely unopposed operation, in which they would hold a seven-to-one manpower advantage. The situation was very different; in fact, the numbers would prove about equal.

Hundreds of enemy fighters manned dug-in positions on the high ground—above where Army helicopters would land to insert soldiers. And the fighters were prepared, with hardened defensive positions, sniper rifles, rocket-propelled grenades and mortars, and even crew-served machine guns.

"We only probably had about 50 percent of the intelligence right—locations and more importantly, the enemy's intent, which was to stand and fight,"said the commander of the operation, Army Maj. Gen. Franklin L. "Buster" Hagenbeck, a year after the battle.

On the morning of March 2, 2002, helicopters lifted the soldiers of CJTF Mountain into the Shah-i-Kot Valley. Task force elements landed at seven blocking points to intercept enemy fighters. They immediately took fire from the slopes above.

US participants experienced scads of confusion and fought through withering al Qaeda gunfire from fighters encamped in the hillsides above, while supporting air strikes felt as if they took forever to arrive.

"What happened is ... that terrain broke us up, we were fighting in squads and platoons, so you could literally be 200 yards away from a fellow platoon but you're separated by a ridge line," Hagenbeck said.

On the ground, the Army reacted quickly. Helicopters extracted some of the assault force from southern positions and consolidated around other soldiers. But mounting these operations under the barrage of fire led to numerous calls for close air support—far more than the two simultaneous events pledged.

The Army forces had gone in very light, without their own artillery or other heavy firepower. They would be

dependent on unplanned CAS when the situation deteriorated. Their main source of indirect fire support was from Apache helicopters and the air component's fighters and bombers.

Now they would be counting on airpower. The coalition air component delivered 177 precision bombs and strafing attacks in the first 24 hours alone. There were more than 30 forward air controllers in the area, and because of the tight space, coordinators had to take extreme care to ensure bombs did not hit friendly forces—or other aircraft in the congested, multilayered airspace.

"Enemy continues to hold the high ground," noted the Army situation report for the evening of March 2. The next day, CJTF Mountain kicked the fight into high gear and committed the theater reserve.

Moseley ordered fighters from Kuwait to beef up air support.

"We were flying missions out of Kuwait to bail these guys out," he later said. The first two A-10s flew a five-hour commute and arrived over the battle area at sunset. Their pilots heard "two or three different ground FACs screaming for emergency CAS," according to the Air Force report.

Soldiers on the ground "were apparently under fire with heavy machine gun and mortars. ... You could see tracer fire and pockets of fire all over the place," said one pilot. The two A-10s released Mk 82 bombs set for airburst to hit enemy troops at a mortar position.

After that attack, "the ground FAC said that all the fire they were taking ceased and that it looked like we whacked these guys out in the open. There wasn't much movement out there anymore."

In the air, it was a melee. Pulling up from one pass, an A-10 came within 300 yards of an orbiting gunship. Later, the A-10s were surprised when Navy F/A-18s, launching from carriers 600 miles south, dropped weapons underneath them.

The traffic convinced the A-10 pilots they were going to have to take a more proactive role in their other mission, forward air control, because they could not shuttle the hundreds of miles to Kuwait and still provide the CAS needed.

Moseley reached the Chief of Pakistan's Air Force on his cell phone. "I want to park some A-10s at Jacobabad," Moseley told him.

"Just tell me, are they already in the air?" asked Air Chief Marshal Mushaf Ali Mir. Moseley admitted they were.

Pakistan agreed to the emergency hosting.

Delivering more air strikes was essential, but concentrating them into an area the size of the District of Columbia was extremely challenging. The battle area was about 64 square miles and held as many as 1,400 Americans on the ground. Into that box poured an average of 253 bombs per day.

Photo via globalsecurity.org

Smart bombs dropped by a B-52 explode on a ridgeline during Anaconda.

Takur Gar

A small USAF team linked with Hagenbeck's headquarters and worked around the clock to provide a channel between the CAOC, airborne aircraft, and ground controllers.

But the worst was yet to come. Seven of Anaconda's eight fatalities occurred on a snowy ridgeline named Takur Gar. A Special Forces team had pulled out of the ridge during hot fighting on Day 1.

Two helicopters carrying a SEAL team attempted to reinsert back at Takur Gar early on the morning of March 4. It was important to seize the area, because the ridgeline offered a commanding view of the entire area. But above the ridge, three feet of freshly fallen snow hid hardened al Qaeda bunkers and fighting positions.

Enemy fire hit one helicopter, and as it lifted off, Petty Officer 1st Class Neil C. Roberts fell out and was killed fighting on the ground. The second SEAL helicopter returned to rescue Roberts, while an Army Ranger quick reaction force launched two helicopters from Bagram.

One of the Ranger helicopters was shot down by an RPG, instantly killing four soldiers.

Soldiers, SEALs, and airmen set up defensive positions about 150 feet from the snow-covered al Qaeda positions. The disabled Chinook was their shelter, but it made for a fat target. The troops attacked uphill, in the snow, but could not reach al Qaeda firing positions.

Close air support was the only option for their survival. Combat controller SSgt. Gabriel P. Brown was on the ground with the stranded team. "My job was to concentrate on bringing in the bombs to knock out the enemy, and I knew I needed to do it fast," Brown later said.

SrA. Jason D. Cunningham, a pararescueman with the 38th Rescue Squadron at Moody AFB, Ga., had been on the first quick reaction helicopter. For hours he treated casualties inside the downed helicopter while taking continuous fire from al Qaeda. For their safety, Cunningham moved the casualties outside the helicopter, putting himself in the line of fire numerous times. Cunningham was fatally wounded and died on the ridge seven hours later. He was posthumously awarded the Air Force Cross for his courage under fire.

Deep into the fight Brown directed two F-15Es to his location. "We have enemy troops 75 meters away. ... I need guns only," he told them. Maj. Chris Short led the first-ever close air support combat strafing from an F-15E. On his third pass, Short's gun delivered 100 rounds into the enemy position. "You could smell the burning pine off the trees and see snow kicking off the ground," Brown said.

All told, Brown controlled about 30 strikes on the Takur Gar ridge that day. The survivors held off al Qaeda for 14 hours until night fell, when helicopters finally extracted the team.

USAF photo by SrA. James Harper

An F-15E takes off. A USAF pilot during Anaconda performed the first-ever Strike Eagle close air support strafing attack, in response to a combat controller request for "guns only."

The fighting continued, and deconfliction became ever more critical as the number of aircraft increased in the congested airspace above the battle.

In another twist, Afghanistan's provisional government had reopened civil air routes mere days before the operation. Civil air traffic was flying above the battlespace, with bombers several thousand feet below and fighters streaking past at still lower altitudes.

Remotely operated MQ-1 Predators were in the mix, too. "Initially, the Predators were flying about the same altitude that we were so sometimes you'd have fairly close passes," said Navy Lt. Cmdr. Todd Marzano, who flew several missions during Anaconda.

"That confusion and chaos could have been avoided," said Moseley.

The good news was that bombs available soon outnumbered targets, and airpower pulled off a series of critical successes.

On a typical day, there were three or four troops-in-contact situations requiring immediate close air support. One afternoon, a single B-1 delivered 19 precision bombs on 10 different targets over two hours.

In another case, an al Qaeda mortar team fired on 10th Mountain Division soldiers for two days until it was finally destroyed by an F-16 strike and the besieged unit's follow-on mortar attack.

On the ground the final task to complete Anaconda was to take Objective Ginger, the area surrounding Takur Gar. Objective Ginger had turned into the last holdout for al Qaeda insurgents.

The assault began with planned air strikes, which were now proceeding much more smoothly. In one strike March 8, Navy pilots tanked, checked in, and "they gave us a target immediately and then we released on that target, tanked and went home," said Marzano.

Still, the airspace was tight. As Navy Lt. Eric Taylor set up one run to release Mk 82s on March 10, he saw "the B-52s, contrails coming in overhead the same target area getting ready to release," he said. He knew the CAOC timed each strike, but "you knew he was coming and you knew he was going to release something on that run, so it made you a little uneasy coming through there."

Lessons Learned and Forgotten

A total of 667 weapons were released on March 9 and 10. By the morning of March 10, Objective Ginger was in coalition hands. Friendly Afghan forces captured the rest of the Shah-i-Kot Valley on the morning of March 12, by which time allied aircraft had delivered more than 2,500 bombs.

Operation Anaconda ended March 16.

Tactical excellence, both on the ground and in the air, ultimately turned Anaconda into a success, but it had been a nasty shock. Those involved hustled to draw its lessons, especially as planning was under way for a new fight in Iraq.

Anaconda stood out as a reminder that regardless of technological excellence, successful combat hinges on commanders' decisions.

"If CENTCOM had insisted that Hagenbeck build a truly joint operations plan that tightly welded the ground, air, and special operations elements, and if the command in Afghanistan had had the ability to execute a more thorough reconnaissance, our special forces and conventional troops might not have been surprised by the large, determined, and well-armed enemy," Myers concluded.

Could it happen again? The 14-day battle has been the subject of several major reports from USAF, RAND, National Defense University, Air University, and others.

Hagenbeck publicly criticized the Air Force's CAS speed and performance in *Field Artillery*, an Army publication. The Air Force initially had limited assets available for what was essentially a surprise operation, and there was a need for extreme caution as dozens of air controllers called in strikes in a small area. Nonetheless, Hagenbeck lamented the small number of aircraft that could attack at any given time and what he deemed their slow response.

Journalist Sean D. Naylor wrote a detailed book about Anaconda titled *Not a Good Day To Die*. War college papers and journal articles covered aspects of Anaconda. As recently as 2009, *Esquire* magazine published a lurid first person memoir from three soldiers who fought in Operation Anaconda.

Reminiscences of other coordination failures—such as Kasserine Pass in World War II—suggest sometimes US forces must painfully relearn the skill of air and land component cooperation.

Current joint doctrine has not permanently sewn up all the seams that plagued Anaconda.

USAF Maj. David J. Lyle studied Anaconda for a 2009 Army Command and General Staff College thesis. He found a lingering tendency to put joint task force planning first and work the components—such as air support—later.

"There is currently no doctrine available to estimate the additional bill in close air support or intelligence support if an Army unit has reduced organic capability for either self- or enemy-imposed reasons," Lyle noted. Air and ground component commanders still need better ways of evaluating risks, especially "when logistics, geography, politics, or time limit the ground component's ability to deploy with its full complement of organic assets," he wrote.

Sound joint doctrine also can't guarantee senior Army commanders will know or respect airpower.

After Anaconda, top Air Force and Army officers met to clear the air, work through the problems, and ensure air-ground coordination would be better for Operation Iraqi Freedom. The two components have integrated much better since, but Anaconda serves as a reminder that proper planning requires proactive integration. ■

Rebecca Grant is president of IRIS Independent Research. Her most recent article for Air Force *Magazine was "Black Bomber Blues" in the January issue.*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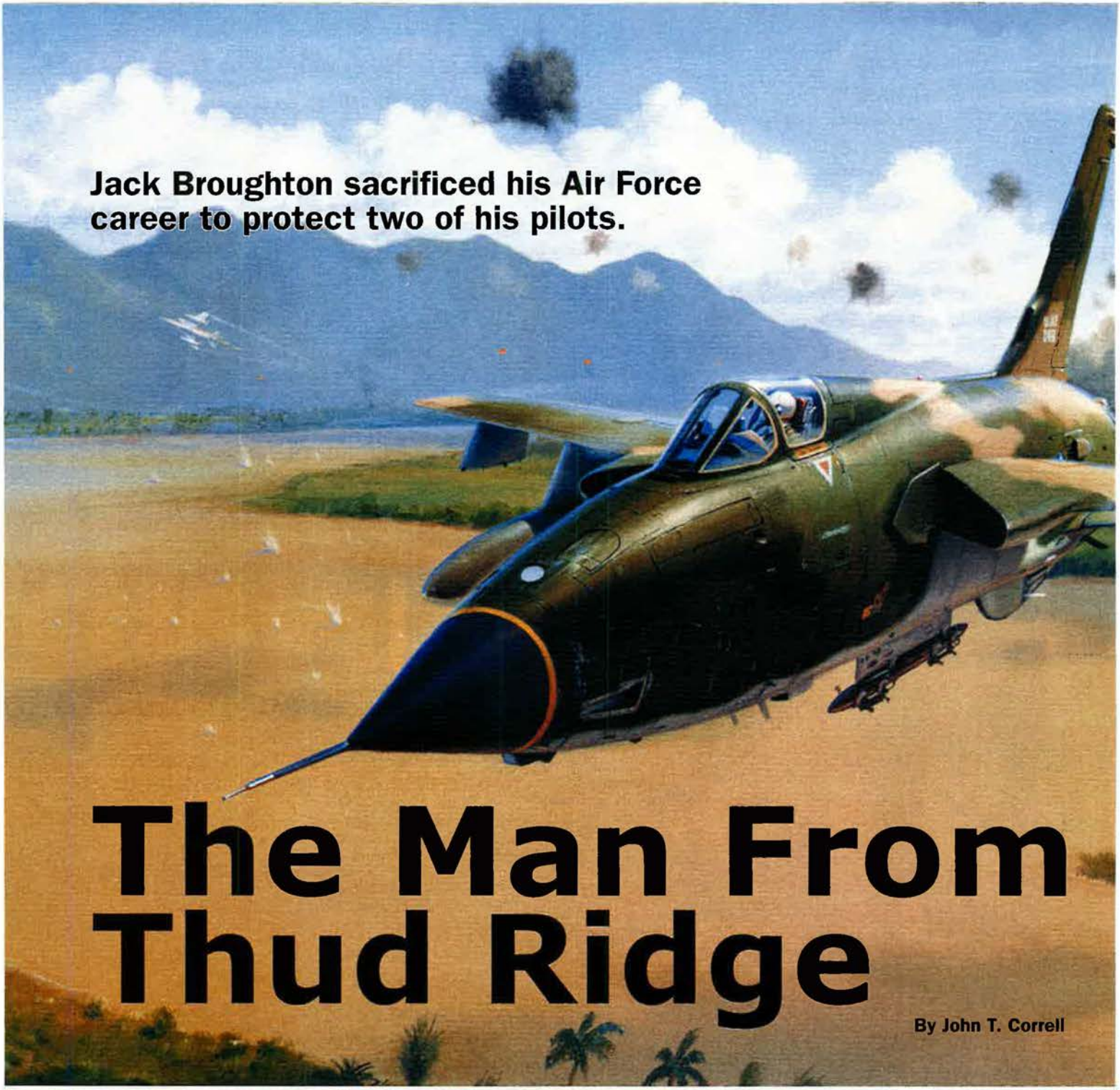


Jack Broughton sacrificed his Air Force career to protect two of his pilots.

The Man From Thud Ridge

By John T. Correll

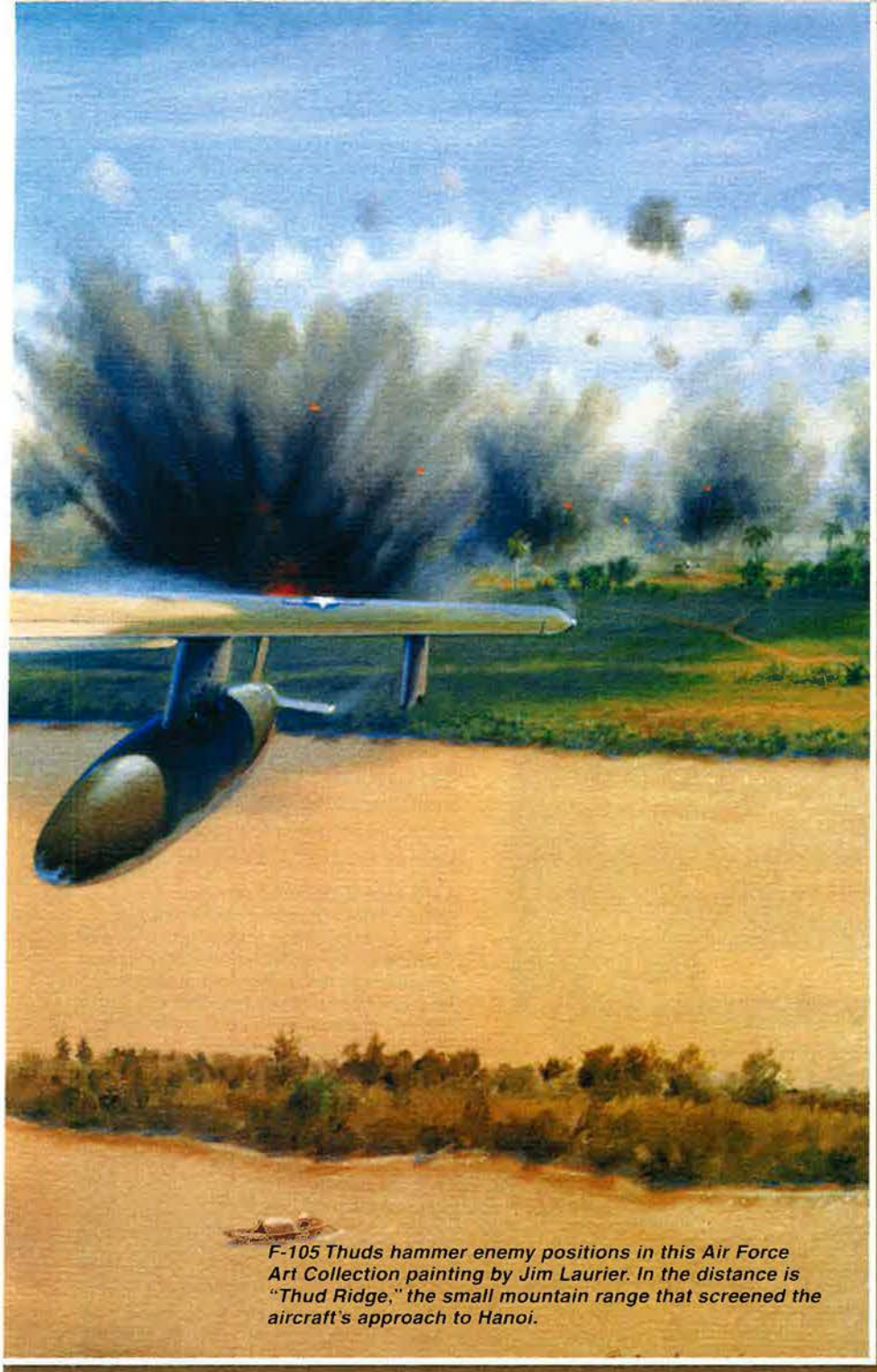
When Air Force Col. Jacksel M. Broughton arrived for duty at Takhli Air Base in Thailand in September 1966, Rolling Thunder—the air war against North Vietnam—was entering its hottest phase.

Broughton, 41, looked like a sure bet to go far: a West Point graduate, 114 combat missions in Korea, commander of the USAF Thunderbirds aerial demonstration team, commander of an air defense interceptor squadron, combat ready in every fighter from the P-47 to the F-106, and promoted to colonel in June 1964 with only 19 years of commissioned service.

At Takhli, he was vice commander of the 355th Tactical Fighter Wing, one of the two Thud wings in Thailand engaged in Route Pack Six, the part of North Vietnam where the air defenses were thickest and most lethal. Broughton often led a combined strike force of F-105s from his own wing and from the 388th TFW at Korat AB, Thailand.

In June 1967, Broughton was nine months into his combat tour and had flown 102 combat missions. He had already earned the Air Force Cross—second only to the Medal of Honor in the hierarchy of awards—two Silver Stars, and two Distinguished Flying Crosses.

Almost 50 years later, Broughton is well known for his combat memoir, *Thud Ridge*, which has been in print continuously since publication in 1969, with about half a million copies sold. The title refers to a string of small mountains that screened the F-105's approach to Hanoi. Sen. John McCain (R-Ariz.), who flew missions in Route



Painting by Jim Laurier

F-105 Thuds hammer enemy positions in this Air Force Art Collection painting by Jim Laurier. In the distance is "Thud Ridge," the small mountain range that screened the aircraft's approach to Hanoi.

Pack Six as a Navy pilot before he was shot down and captured, calls *Thud Ridge* the "single best day-to-day account of combat flying in Vietnam."

The book ends on a cryptic note, recounting an action of which Lt. Gen. William W. Momyer, commander of 7th Air Force, said, "The only thing that he [Broughton] did not do to accomplish his mission was to kill himself in the effort; and but for his superior airmanship and guts he would have done that. I recommend Colonel Broughton be awarded the Air Force Cross."

However, as Broughton said in *Thud Ridge*, "It didn't work out that way. Two of my majors were accused of strafing a Russian ship near Haiphong as they fought for their lives. I fought for them with all of my might and instead of my getting a second Air Force Cross, all three of us received a general court-martial. That is quite a story in itself and one of these days I may tell that story, too."

It would be another 20 years, though, before the full story was disclosed.

The Vietnam War was managed in detail from Washington, with combat effectiveness undercut by limited objectives, gradual escalation, and measured responses. In particular, President Lyndon B. Johnson and his Secretary of Defense, Robert S. McNamara, were distrustful and fearful of airpower. Johnson agonized over the questionable proposition that aggressive use of airpower might draw China or the Soviet Union into the war. To guard against any such provocation, airmen were saddled with an elaborate list of rules of engagement.

Make No Mistake

"The ROE consisted of a one-inch-thick stack of legal-length paper, hung vertically in a manila folder," Broughton said. "The clasp at the top allowed for the constant changes that could be recommended by anyone up the chain of command who made more than 40 cents an hour. We were required to sign off that we had read and understood all of them before we were allowed to head north for the first time. Recertification was a periodic requirement."

The rules came in two categories: geographical areas that could not be struck and conditions under which enemy forces could not be attacked.

"Alongside Thud Ridge—a north-south mountain range lying between our bases in Thailand and Hanoi—was the MiG fighter base at Phuc Yen," Broughton said. "We would fly inbound en route to Hanoi, and I would have, say, five flights of fighters—four aircraft to each flight. And as I would approach Phuc Yen I would watch the MiGs come out and taxi to the end of the runway and run their engines up and get ready for takeoff. Now, I could have dumped my nose right then and got four MiGs on the ground on almost every mission up there. But I couldn't touch them. ... So I would go past the airfield and the MiGs would roll for takeoff and be on the tail of my last flight and in position to shoot down whomever they wanted to."

In previous wars, rules of engagement were routinely ignored. In Korea, for example, US pilots were forbidden to cross into Soviet or Chinese territory, even in hot pursuit of enemy aircraft, but most of them did it anyway. Border crossers were punished lightly, if at all.

In Vietnam, the ROE were strictly enforced with little allowance for mistakes.

On June 2, 1967, Jack Broughton ran afoul of the rules of engagement, with disastrous consequences for his Air Force career. The wing commander was away on a trip and Broughton was

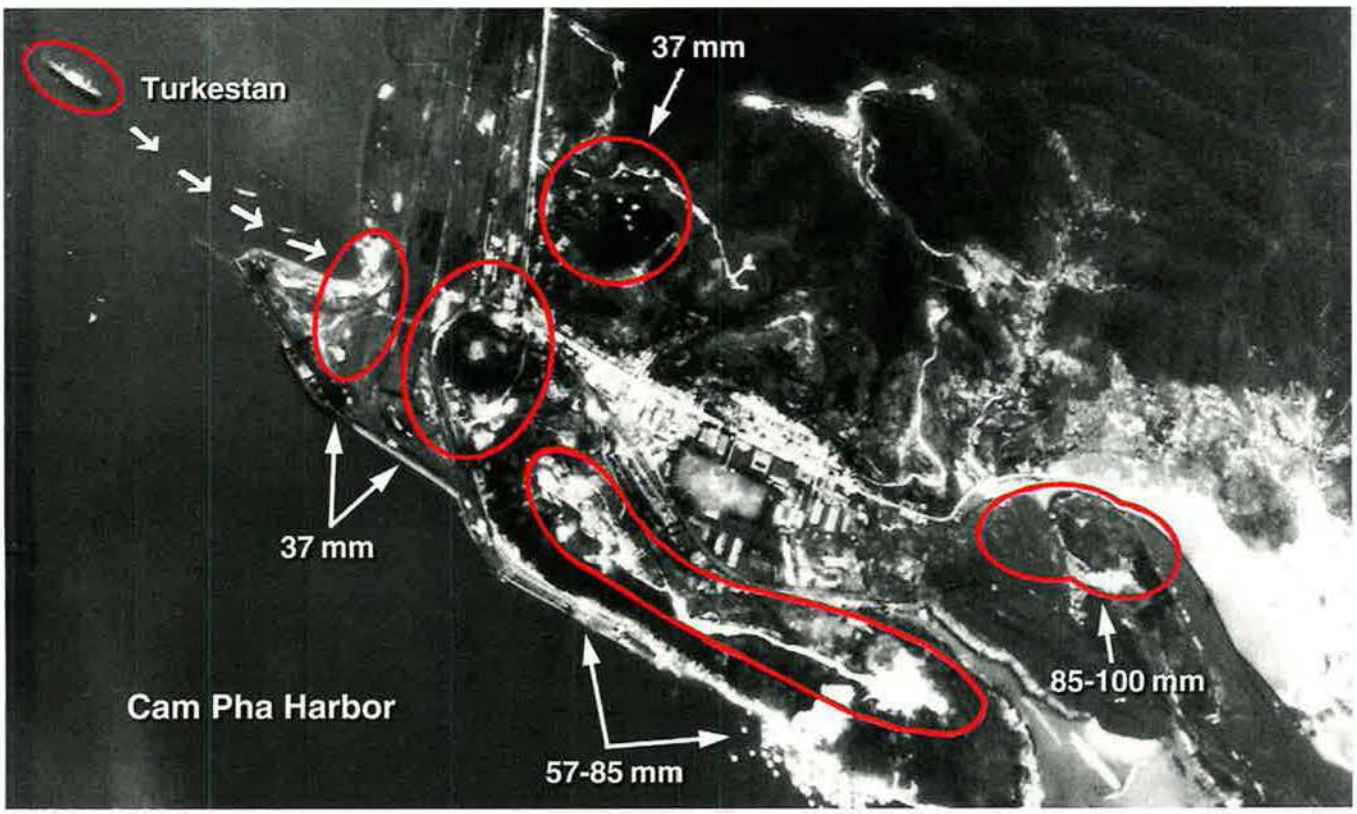
Photos via Jack Broughton

the acting commander. He had flown a mission that day. After landing, he attended to some paperwork and went to the officers club to eat, still in his flight suit. During dinner, he was called outside by two of his pilots, Maj. Frederick G. Tolman and Maj. Alonzo L. Ferguson, who had just landed and were greatly worried.

Others in their chain of command—their squadron commander and the deputy for operations—were new. Broughton was known as a stand-up boss. The bond was special because on a previous mission, Tolman had "wiped out a large gun emplacement that was in the process of shooting me out of the sky," Broughton said.

On June 2, they had flown as Weep Three and Four, with Tolman as flight leader and Ferguson as wingman. Tolman told Broughton he may have hit a ship at Cam Pha harbor while suppressing fire from anti-aircraft guns. Cam Pha was North Vietnam's auxiliary port and like Haiphong, 40 miles to the south, off limits under the ROE. Guns—some of them in the protected area, some just outside the restricted lines—routinely

Left: Jack Broughton removes his gloves after a mission over Hanoi in 1967. Below: A reconnaissance photo of Cam Pha harbor. Anti-aircraft fire—from the sites circled in red—prompted return fire from two pilots under Broughton's command. Their encounter there changed Broughton's Air Force career.



shot at F-105s both inbound to targets and outbound. They fired at Tolman and Ferguson on their way to their target that day and Tolman, noting the exact location, planned to "hit them a lick" later.

On their return, they swept down on Cam Pha in a high-speed strafing run, Tolman in the lead. Fire from the ground was heavy and accurate. As Tolman hosed the gun emplacements with his cannon, he suddenly saw a ship in the center of the activity in the harbor. The F-105s climbed for altitude and headed south. The entire encounter with the ship took place in about five seconds.

The ship would be central in the gun camera images but the field of focus was too narrow for the film to show the ground fire coming up from all sides. For reasons of weather, Tolman and Ferguson diverted to refuel at Ubon, where they were taken to a mandatory intelligence debriefing. Shaken, Tolman denied firing his cannon. That was a false official statement on the record and there was no way to call it back. Ferguson was also implicated by not objecting.

Broughton saw instantly that the gun camera film was the only evidence the ship had been fired upon. "I could either follow the established procedures and they would be court-martialed for firing on an unauthorized target and making false official statements, or I could do something about it," he said.

He made a quick decision. "Over the years, I have had hundreds of suggestions as to how I could have reacted differently, but none of the advice givers [were] there," he said.

He called the sergeant running the film crew and told him to bring the film to him. There, outside the club, he had the sergeant open the containers, pull out the film, and expose it in the headlights of the truck.

"I could have let that film go through its normal channels and thrown Ted and Lonnie to the wolves," he said. "I would have been clean, but I would have surrendered any possibility of further action on my part."

Or, "I could have pleaded their case up through the maze of supervision. 'Perhaps we struck a ship—it was all a mistake.' I knew that would not work. I had been through several investigations where our people had been dealt with severely for minor infractions of Washington's restrictions."

At 2 a.m., Gen. John D. Ryan, commander in chief of Pacific Air Forces, called with an instruction to "check and see if there is any possibility that Kingfish Four could have bombed a ship in the Haiphong area this afternoon and call me back immediately." Broughton reported, "There is no possibility that Kingfish Four could have bombed a ship."

He did not volunteer any further information.

Photo via Jack Broughton

Broughton (r) briefs President John Kennedy on air defense issues in 1963, while the head of Air Defense Command, Gen. Robert Lee, listens. Broughton was then commander of the 5th Fighter-Interceptor Squadron.

Ryan Presses the Search

The next day, the Soviets complained their merchant vessel, *Turkestan,* had been bombed in the roadstead at Cam Pha and said they had recovered an unexploded 20 mm shell from the damage on the ship. "The 105 does not eject fired shell casings," Broughton said. "It spits everything that passes through the firing cycle into a big can in the nose of the aircraft and stores the brass there until the can is unloaded on the ground." The shell in evidence was probably taken from the wreckage of an F-105 somewhere in North Vietnam.

The Pentagon denied a US attack on the ship. "The incident was quieting down and becoming yesterday's crisis," said Phil G. Goulding, chief spokesman for the Department of Defense. "The press, swept up in other news events and particularly the Middle East War, did not pursue it."

The issue remained alive "because General Ryan wouldn't let the *Turkestan* go away," Broughton said. "He spent the next two weeks crisscrossing the Pacific with a C-135 full of PACAF detectives, personally searching for an answer."

Ryan confronted Broughton at Takhli June 17, this time asking his question more broadly. Broughton told him that the two-ship element he was looking for was Weep Three and Four and that he, Broughton, had destroyed the film.

Broughton was relieved of duty immediately and by Ryan's specific order put into a holding pattern as special assistant to the combat support group commander. Ryan denied the request of the wing commander that Broughton be made special assistant to him instead. Ryan insisted that it be the combat support group commander, several years junior to Broughton and formerly his subordinate.

The Pentagon conceded US warplanes may have struck the Soviet freighter with cannon fire aimed at anti-aircraft guns protecting the port. A few days later, on June 29, two Navy fighters attacked the Soviet ship *Mikhail Frunze* in Haiphong harbor. The Defense Department announced that damage to the vessel was "inadvertent," and that was the end of that. The Navy showed no interest in prosecuting its pilots for violating the ROE.

The Air Force, however, decided to throw the book at Broughton and the two majors. The court-martial authority in their case was the 355th TFW, but the charges and specifications were

Photo via Jack Broughton

Broughton gets a snappy sendoff from his crew chief as he heads out for a mission over Hanoi.

drawn up by a legal advisor from 13th Air Force and given to the wing commander to sign. There were two counts of conspiracy under Article 81 of the Uniform Code of Military Justice and two lesser counts for destroying government property and the catchall general punitive article.

The specific accusations were destruction of seven rolls of government film and "willfully, with intent to deceive" concealing a "material fact" by exposing the undeveloped film. The potential penalty was dismissal from service with loss of pay and allowances, including retirement benefits, and 12 years or more in prison.

The pretrial investigation, required by UCMJ Article 32 before a general court-martial, recommended summary nonjudicial punishment with reprimands and fines imposed.

This was overruled by higher headquarters, citing "breach of moral code" and directing a court-martial.

The venue for the court-martial was Clark Air Base in the Philippines, headquarters of 13th Air Force. By the strange organizational setup in Southeast Asia, the wings in Thailand were under the operational control of 7th Air Force in Saigon but reported to 13th Air Force for everything else.

Seventh Air Force, the combat headquarters, had no part in the trial. However, among those ready to support Broughton without regard to possible consequences was Maj. Gen. Gordon M. Graham, vice commander of 7th Air Force, who said Broughton's past accomplishments, courage, and leadership should "transcend any isolated errors in judgment made under the stress of combat."

Few people other than those directly involved knew the time and place of the trial. Some material introduced in evidence was classified top secret. "That meant portions of the trial would have to be closed sessions, and it meant that air policemen had to guard the doors of the auditorium," Broughton said.

The defendants immediately upset the apple cart with preemptory challenges that removed the designated president of the court-martial and two others and left Col. Charles E. Yeager, one of the best known fighter pilots in the world, as president of the court.

"When it came down to finding a colonel who was senior to Jack to head his court-martial board, every bird colonel in Southeast Asia ducked for cover," Yeager said. "It was a damned mess and no bird colonel, hoping to be promoted to general some day, wanted to be involved. Everybody from the Joint Chiefs down wanted to nail Broughton and his pilots and make them examples. Nobody wanted to displease the Chief of Staff, but nobody wanted to nail Jack, either, because most of us sympathized."

Col. Robin Olds, commander of the F-4 wing at Ubon, challenged himself off the court on the grounds of prior knowledge. He later said that Ryan, who "was conducting the investigation himself," had discussed the case with him.

With the gun camera film gone, there was no evidence against Tolman and Ferguson and they were promptly acquitted of all charges. The court threw out the conspiracy charges against Broughton but convicted him of the lesser charges, with "intent to deceive" removed from the specifications. He was fined $100 a month for six months and admonished, probably not what PACAF had in mind. Nevertheless, "it was a kiss of death because the only way for a senior officer to survive a scandal of that magnitude was to have all charges against him dismissed," Yeager said. "He would never again have a command."

Also serving on the court was Col. Harry C. Aderholt, commander of the 56th Air Commando Wing at Nakhon Phanom AB, Thailand, noted for his combat orientation and standing up for his aircrews. Returning to the base after the trial, he told his pilots, "I've just come from the most disgusting episode of my life. I have seen a great injustice done. If you go out and hit the wrong target and mess up badly and come back here, don't you tell anybody."

On Oct. 15, the *Miami Herald* told a curious story in a Copley News Service dispatch filed from Hong Kong. It quoted an unnamed witness whose "report is accepted as genuine in diplomatic circles here." The witness said he had visited *Turkestan* and seen the holes in the upper and lower bridge. The entry of the bullets had been horizontal rather than at an angle and the holes varied in size from 15 mm to 40 mm.

The indication was that it was the North Vietnamese gunners, trying to hit the low-flying airplanes, who raked the ship.

Following the court-martial, Broughton was assigned to the Weapon System

Broughton readies for a mission in Maxine McCaffrey's famous painting. The artist was deeply impressed by Broughton and the respect he garnered from his fellow pilots.

Evaluation Group in Washington, D.C. It was an undemanding job and he had time on his hands. He used it to work on the book that would become *Thud Ridge* and on his appeal.

The court-martial was set aside in July 1968 by the Air Force Board for Correction of Military Records, which said the felony conviction was disproportionate, especially when Broughton's shortcomings were measured against his outstanding service in combat. The offense was more in keeping with nonjudicial punishment under UCMJ Article 15, as the Article 32 investigation had recommended. The board dismissed the court-martial findings in favor of an Article 15, with forfeiture of $300 for two months and admonishment.

An officer assigned to observe the proceedings told Broughton that one of the reviewers had said (although it was not made part of the record) the court-martial was the "grossest miscarriage of military justice he had ever seen."

Upon getting the news of the board's finding, Broughton applied for retirement forthwith and left the Air Force on Aug. 31. "I found it interesting that in the entire history of the United States flying forces, only one other officer had ever had a general court-martial set aside and voided. His name was Billy Mitchell," Broughton said.

Thud Ridge was published in 1969, with an introduction by Hanson W. Baldwin, a longtime military editor of the *New York Times*. There have been six US editions so far, and it has been translated into several foreign languages. Broughton's second book, *Going Downtown: The War Against Hanoi and Washington,* came out in 1988, with a foreword by Tom Wolfe. It was Broughton at his fiery best and, for the first time, told the story of the *Turkestan* incident and the court-martial.

Reversal and Rehabilitation

"Few people in the Air Force knew much about the *Turkestan* issue, other than a sort of wispy knowledge that Broughton had been court-martialed," said Richard P. Hallion, former historian of the Air Force. "By intention or chance, there had been no press coverage of the trial. Even though people were reading *Thud Ridge,* much of the Air Force regarded Broughton as having a cloud over his head, or worse. There were pockets of support for Broughton, but it was not until later—well after publication of the court-martial story in *Going Downtown*—that he was 'rehabilitated,' so to speak, in popular Air Force opinion."

Among those who believed in Broughton all along was Maxine McCaffrey, best known of the artists who documented the Vietnam War. During the time Broughton was fighting to get his court-martial negated, her painting of him hung in the Pentagon E Ring, outside the office of Gen. Bruce K. Holloway, the vice chief of staff and an old fighter ace.

In her notes to accompany the painting, McCaffrey said, "At the several squadrons at all three bases I heard much about Col. Jack Broughton from the pilots themselves. It seems they had a rare kind of respect for this man who wouldn't send his men where he didn't fly himself. ... Broughton fought for them to live. They admired him, respected him, feared him, and loved him."

In 1997, the Chief of Staff, Gen. Ronald R. Fogleman, established a professional reading program for Air Force members. There were 34 books, of which 13—*Thud Ridge* among them—were designated as the "basic list." The Air Force ordered 10,000 copies and gave one to every junior officer upon promotion to captain. In 2009, Broughton was one of the noted airmen honored at the Air Command and Staff College's Gathering of Eagles.

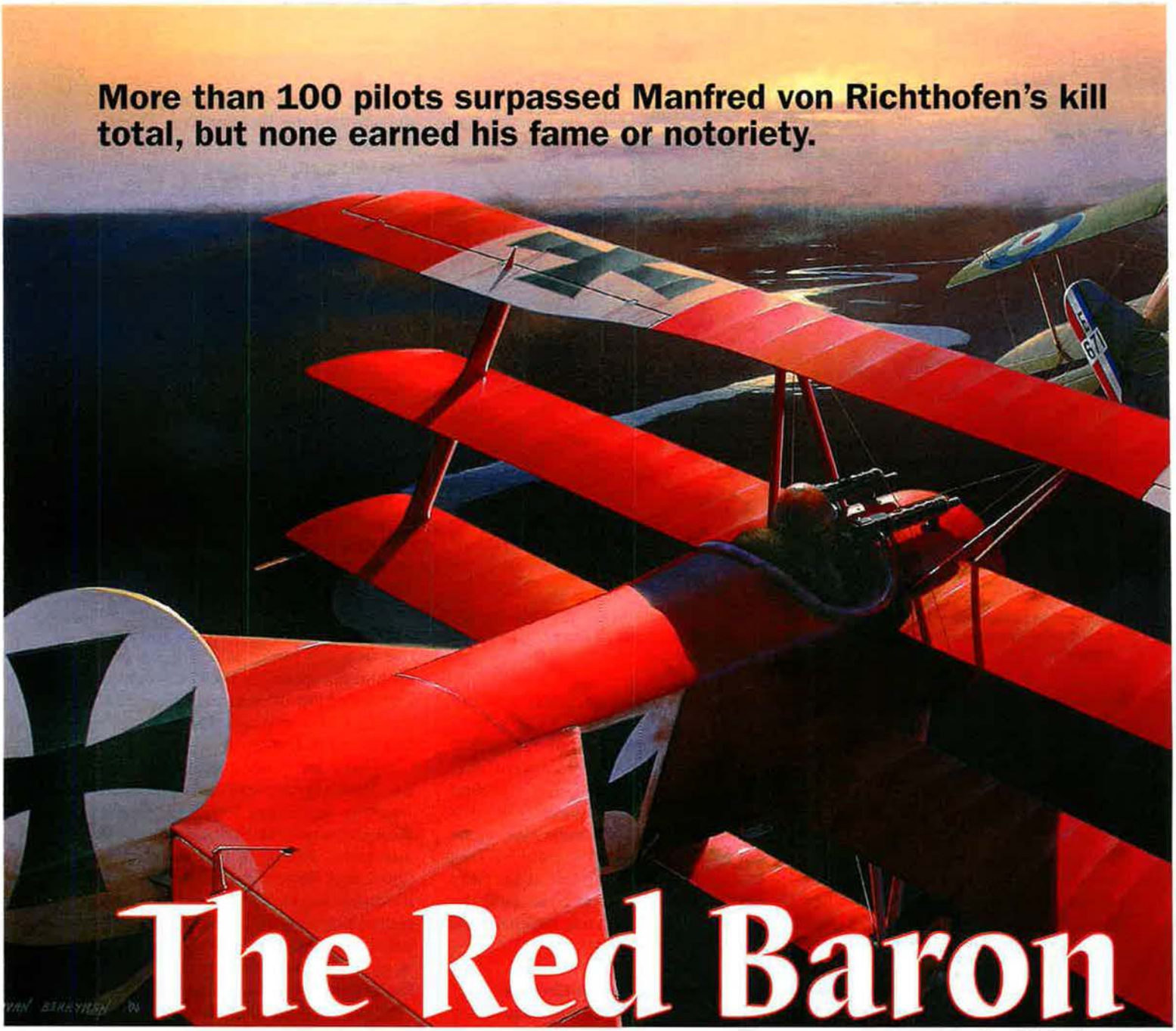
"There have been hundreds and hundreds of letters and calls of support over the years, and I still get them," Broughton said. He continues to speak and write. His most recent book, in 2007, was *Rupert Red Two,* covering his career before Vietnam and his post-retirement activities. Rupert Red Two was his call sign as a P-47 wingman in Germany on his first operational assignment in 1946.

"Jack Broughton was the finest combat leader at Takhli during my time there," said Leo K. Thorsness, leader of the wing's Wild Weasel SAM hunters, a POW for six years, and recipient of the Medal of Honor. "He was a leader who led with brains and guts. All pilots have some good traits; Jack had them all. But one of his greatest strengths—supporting his pilots—was his downfall.

"Combining Jack Broughton's leadership talent in getting the most out of his men, never asking his pilots to fly a mission he would not fly, and leading the toughest missions into Route Pack Six made Jack Broughton a combat legend," said Thorsness. "I am proud to have served with him." ■

John T. Correll was editor in chief of Air Force *Magazine for 18 years and is now a contributor. His most recent articles, "Nine Feet Tall" and "The Scourge of the Zeppelins," appeared in the February issue.*

More than 100 pilots surpassed Manfred von Richthofen's kill total, but none earned his fame or notoriety.



The Red Baron

By Dik A. Daso

In the history of aerial warfare, there is no name more recognizable than Manfred Albrecht Freiherr von Richthofen—the Red Baron. Credited with 80 victories (there were certainly more, unofficial ones), Richthofen's rise to the pinnacle of the aerial elite began in the cavalry and survives today in an era witnessing the slow demise of the century-old ethos and profession of the fighter pilot.

Why is the Red Baron still lionized after nearly 100 years? There are some 1,800 World War I aces, all belligerent countries counted. Why don't the ever-colorful Eddie Rickenbacker, Canadian William A. Bishop, Frenchman Rene P. Fonck, Germany's Ernst Udet, or English ace Edward C. Mannock hold such mystique?

During World War II, more than 100 pilots had exceeded Richthofen's 80 victories. Germany alone ended the war with more than 5,000 ace pilots. Yet, the leading aerial ace of all time, Erich A. Hartmann (352 in World War II), remains relatively unknown. Can it be as simple as the fact that the Red Baron was the first "Ace of Aces"? Are there lessons from Richthofen's experiences that might be relevant today?

In his youth, Richthofen enjoyed hunting and became a skilled marksman. At the turn of the 20th century, game hunting was a popular pastime, particularly among the affluent. He had a keen eye and became particularly accurate with a rifle. Much has been made of this skill, but Richthofen was certainly not unique in this regard.

George C. Marshall and Henry H. "Hap" Arnold, American Army officers, future five-star generals, and Richthofen contemporaries, were both avid hunters. Arnold was also accomplished at shooting skeet, but never became an ace pilot. In 1909, former President Theodore Roosevelt single-handedly provided the Smithsonian Institution with a collection of thousands of African mammals. Philosophically, the crux of this fascination with hunting revolves around developing the determination and will to intentionally take the life of another living thing—the killer instinct.

Richthofen, of course, killed dozens of airmen during the course of the war—sometimes at such a close range their blood spattered his aircraft. Marshall and Arnold went on to command Allied forces during World War II and routinely

picture for the future of the aerospace and defense industry," said Aerospace Industries Association President Marion Blakey.

The task force comprised AIA, the National Defense Industrial Association, and Professional Services Council.

Tougher Scrutiny for EELV Program

Congress is requiring the Pentagon to keep a close eye on the Air Force's proposed block-buy plan for space boosters to ensure the service's promised cost savings are realized.

The Government Accountability Office warned last fall the Evolved Expendable Launch Vehicle block-buy strategy could actually lock in higher prices under the current plans, negating its value.

Language in the Fiscal 2012 defense authorization bill now requires DOD to report—along with the Fiscal 2013 budget request—how the Air Force is incorporating GAO's cost-saving recommendations.

Congress also mandated that the EELV program revert from a sustainment program to an acquisition program. This means the Air Force will be under more stringent reporting requirements for EELV cost, schedule, and performance.

RPA Pipeline Pilots Fly RQ-4

The 1st Reconnaissance Squadron at Beale AFB, Calif., welcomed the first two RQ-4 Global Hawk operators specifically trained as remotely piloted aircraft pilots under the service's new 18X specialty code.

"It's a privilege to be the first in this platform at this capacity ... and pave the way for the rest of the pipeline students," said one of the pilots, a second lieutenant.

The two immediately began flying operational missions in support of combatant commanders worldwide, according to Beale officials.

"With these pilots not coming from traditional training and not being experienced aviators, this is untested territory," said the unit's commander during the Jan. 13 wing-pinning ceremony.

No Relief for DMSP

Congress terminated the Defense Weather Satellite System in the newly enacted 2012 defense appropriations bill, compelling the Air Force to devise a new strategy for future space-based weather monitoring.

DWSS, which was intended to succeed the current Defense Meteorological Satellite Program (DMSP) spacecraft on orbit, was born out of yet another canceled program, the tri-agency NPOESS constellation of satellites.

Lawmakers warned last year that scrapping the program, refining requirements, and holding a new competition might be preferable to continuing with DWSS, which suffered protracted cost and schedule problems.

Lawmakers stripped all but $43 million of the service's $445 million request for DWSS development, stipulating the Air Force use the remaining money to cover termination penalties.

Congress then designated $125 million in separate funding for "weather satellite follow-on activities." Though an Air Force Space Command spokesman said AFSPC is "still determining the appropriate future path given these reductions," it will extend the operating life of the current DMSP spacecraft.

The Air Force halted work on the DWSS in January, preparing instead to launch the two remaining legacy satellites—DMSP-19 and DMSP-20—while a new system is devised.

Air Force officials stress that DMSP is able to continue providing the US military with "high-quality and timely weather data" into the 2020s.

However, "based on the performance of these two airmen, I have high hopes for the future of the program and the 18X pilots," he said.

The new classification 18X is for RPA pilots who are newly commissioned officers or those transitioning from nonrated career fields.

STOVL Trainers for Eglin

The first two production-model F-35B fighters destined to train Marine Corps pilots and maintainers arrived at the Lightning II schoolhouse at Eglin AFB, Fla., in January. They were flown directly from the production line at Lockheed Martin's plant in Fort Worth, Tex.

Aircraft BF-6 and BF-8 touched down separately at Eglin, joining the 33rd Fighter Wing, which oversees joint-service F-35 training.

The two fighters added to Eglin's growing complement of F-35s, which already numbers six Air Force F-35As.

The schoolhouse's first regular F-35 pilot training course was originally scheduled to begin in January, but as of midmonth, the Air Force was not yet sure when courses would begin. For the time being, the F-35s at Eglin will be flown by test-qualified pilots in familiarization missions around the region, Air Force Chief of Staff Gen. Norton A. Schwartz said at a Feb. 3 Pentagon press conference.

P&W Gets F-35 Engine Contract

Pratt & Whitney received a contract worth at least $1.1 billion to power 30 F-35 low rate initial production strike fighters. The contract covers the F135 engines for LRIP Lot 5.

"We anticipate contract negotiations with the F-35 Joint Program Office that will reflect the great progress being made on F135 affordability," said Bennett Croswell, president of Pratt's Military Engines business unit.

Under the contract, the company will supply engines for 21 Air Force F-35As, three Marine Corps F-35Bs, and six Navy F-35Cs, beginning in late 2012.

The contract includes spare parts, management and engineering services, sustainment, and field support, as well as the power plants themselves.

Pratt & Whitney received $138 million for long-lead engine materials for the aircraft last year, and Lockheed Martin cinched the $4 billion Lot 5 LRIP deal just last December.

10K for F-15E

An F-15E operating from Bagram Airfield, Afghanistan, topped 10,000 accumulated flight hours, becoming the first F-15 of any model to reach the mark, according to Bagram officials.

Assigned to the 335th Fighter Squadron at Seymour Johnson AFB, N.C., the Strike Eagle has been flying for more

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Stability Conversation

It's a good time to talk and a bad time to negotiate with Russia on the next round of bilateral nuclear reductions following the New START agreement, said Ellen O. Tauscher, then undersecretary of state for arms control and international security.

Instead, the United States and Russia are laying the foundation for future negotiations the Obama Administration is keen to pursue, through a series of "strategic stability talks" over the next six to eight months.

"We would like to get back to talks on what we call deployed and nondeployed and strategic and nonstrategic [assets]. But I think we are sanguine about that fact that they are not ready to do it," Tauscher said speaking in Washington, D.C., Jan. 12. (In February, Tauscher became the State Department's special envoy for missile defense.)

In the meantime, the Administration hopes to foster "a much more mutually assured and stable relationship," she said.

With Russia preoccupied with presidential elections this month, the Administration facing its own election cycle in November, and NATO still conducting its defense and deterrence posture review, Tauscher said further nuclear reduction talks will have to wait.

Instead, the two nations have identified a "baker's dozen" of topics to discuss, including conventional weapons in Europe, cyber issues, missile defense, and piracy, maintaining open lines of communications for when opportunity does arise.

than 21 years, including combat sorties as far back as Operation Desert Storm.

"It has taken more than 21 years of qualified maintenance technicians performing more than one million hours of inspections and repairs in all types of environments ... to ensure aircraft #89-0487 was available," said CMSgt. John Parrott, superintendent of Bagram's 335th Expeditionary Aircraft Maintenance Unit.

He also credited all the other airmen, such as weapons loaders, involved in keeping the aircraft operating.

A crew from Seymour Johnson flew the aircraft to the historic milestone on a sortie over Afghanistan, Jan. 13.

Turkish F-35 Deal Moves Ahead

Turkey's defense procurement ministry expects to formalize a purchase deal for F-35 strike fighters after clearing a key government hurdle early this year, reported Turkey's *Hurriyet Daily News.*

Purchase negotiations with Turkey have resumed after stalling last March —allegedly over US refusal to share sensitive software coding.

"Lockheed Martin is pleased that the [Turkish] Defense Industry Executive Committee has authorized the procurement of the F-35," company F-35 program spokesman Michael Rein said Jan. 6.

"Turkey is an essential partner in F-35 production, development, and sustainment activities, and we remain ready to support its future fighter aircraft requirements," he added.

One of the nine F-35 development partners, Turkey plans to purchase some 100 F-35s, with delivery expected to begin in 2015.

WGS-4 Comsat On Orbit

WGS-4, the fourth Wideband Global Satellite communications spacecraft, blasted into orbit aboard a United Launch Alliance Delta IV rocket from Cape Canaveral AFS, Fla., Jan. 19.

Here's Mud in Yer Eye: ***SrA. Danielle Sturdivant slithers through the "electric eel" obstacle during a Tough Mudder challenge in Mesa, Ariz. The yellow wires are electrified. Tough Mudder hosts endurance events that feature 20 to 30 obstacles designed by British special forces to test all around strength, stamina, mental grit, and camaraderie.***

USAF photo by A1C David Owsianka

Painting by Ivan Berryman courtesy of Cranston Fine Arts

Above: This painting by Ivan Berryman depicts Richthofen flying his iconic Fokker Dr.I triplane.

made decisions ultimately resulting in thousands of casualties on both sides of the battle lines. The ability to kill calmly and with purpose carried over to military experiences around the globe. Being an excellent shot was simply an added benefit in Richthofen's case.

The Red Baron's military career began in the cavalry. The thunderous charge and the flashy uniforms often enticed young men into service as horsemen. Tales of Teutonic knights impervious to enemy attacks fashioned the ethos of German nobility. Composers, such as Richard Wagner, wrote operas and symphonies honoring these heroic characters.

Born into social status and influenced by high culture, Richthofen had been exposed to traditional aspects of nobility and personal glory at an early age. Acclaim in the skies could not yet be imagined, as aerial weaponry was then only in its infancy, but he envisioned a triumphant celebration at his hereditary home after cavalry victories in combat. Trench warfare completely derailed any such thoughts and he remained unfulfilled while on cavalry duty on both fronts during the first year of the Great War. In May 1915, Richthofen took his longing for glory with him when he transferred to the Fliegertruppe (the German air service).

Close-in Work

Oswald Boelcke, one of Germany's early fighter pilots, became Richthofen's flying tutor. This master of the air and Max Immelmann became the first two airmen admitted to the Order Pour le Mérite, an honor sought by every Prussian soldier and reserved for fighter pilots with a history of confirmed victories.

Strangely, neither Boelcke nor Richthofen cared much for flying. They placed more importance on audacity in the face of the enemy than on piloting ability (looping and aerobatics). Both men believed that ultimately the purpose of military fighters was to attack and destroy other aircraft and kill enemy airmen.

Richthofen even went as far as to forbid aerobatics of any kind during his months in command. He believed that a pilot need not "be an aerobatic artist or trick shooter" but did require courage enough to "fly right up to the opponent."

In modern fighter pilot terms, he meant it was essential to "get close to your work." In the days of the early aerial machine gun, closer was definitely better for killing a target maneuvering in three dimensions. Richthofen understood that the object of combat flying was killing the enemy, and attacks in a stabilized "two-dimensional" environment were usually more successful, particularly when unobserved by the victim. Preservation of one's own forces and equipment became far more important than practicing loops and barrel rolls. Richthofen's airplane became his steed—the machine gun, his rapier.

Richthofen's early learning experiences were not out of the ordinary. During World War I, for example, Marshall's mentor was Gen. John J. Pershing, commander of the American Expeditionary Forces in Europe. During the years after the war, Arnold's mentor was none other than Brig. Gen. Billy Mitchell. Clearly, the mentor's abilities and characteristics can have a dramatic impact on a student's future performance. Richthofen joined the Pour le Mérite order one year after his teacher, Boelcke, had received its "Blue Max."

There is certain irony that Boelcke's death came in a midair collision between his aircraft and his wingman's, both taking evasive action to miss an enemy D.H.2—chased by a young Richthofen. Such an end had denied Boelcke what Richthofen characterized as a "beautiful death."

Richthofen would only write that the loss of his mentor "affected all of us very deeply."

Photo via National Archives

Like many fighter pilots of his day, the Red Baron was an ambitious, glory-seeking egomaniac.

Photo via National Air and Space Museum, Smithsonian Institution (SI 76-13317)

The Red Baron took trophies from every kill.

Yet, witnessing aerial accidents was not a unique occurrence in those days. A young Lt. Jimmy Doolittle saw a fatal collision between two training aircraft just before taking off on his first military training flight, and then helped to pull survivors from the wreckage. He continued the mission and took off. Doolittle later escaped death himself after decapitating a student pilot during a midair collision in the traffic pattern.

Events such as these hardened most pilots to the realities of early aerial combat.

Richthofen took command of Royal Prussian Jagdstaffel 11 (Jasta 11) in January 1917 and arrived at his new base in the newest fighter available, the Albatros D.III. Immediately, he ordered his standard camouflage paint scheme changed to a solid, bright blood red over the entire Albatros.

This was the same month he received the Pour le Mérite after his 16th victory. These hard-fought wins had taken five difficult months. By April 21, 1918, he would add 64 more.

Richthofen had the rest of his unit's airplanes also painted red, and each individual pilot added distinguishing colors or markings so they could be identified by the color during aerial combat.

It took little time for British and French pilots to report that they had been attacked by—and barely escaped from—a group of airplanes that resembled a "flying circus," with the leader's aircraft completely red. Richthofen scored the vast majority of his victories in his red Albatros, although his red Fokker Dr.I triplane may be more iconic.

Modern characterizations frequently highlight those few kills that he scored near the end of his career in that colorful three-winged aircraft. While the translation was different in each country, soon everyone knew that engaging the blood red Albatros meant a tangle with the Red Baron. This was precisely the effect he had been hoping for.

Guts for the Glory

By laying down the gauntlet, Richthofen made certain there would be other aerial "knights" to challenge Jasta 11—the pilots and the commander. This approach might today be interpreted as taking nose art to an unhealthy extreme, but to the Red Baron, it established an attitude of invincibility that he continued to instill in his airmen by both word and deed.

Yet, beyond his obvious courage and daring, there remains a less examined side, perhaps the side that made Richthofen so deadly in the air and also resulted in his demise: He was an ambitious egomaniac, a "Kreuzschmerzen" (slang for one diligently pursuing the Iron Cross), and he was not alone.

French pilots freely admitted medals brought the glory they sought in combat. Canadian ace Bishop flew and fought relentlessly until he had earned the Victoria Cross, his country's highest award for valor. Again, nothing in Richthofen's persona was particularly unique. In fact, glory quests were rewarded not only with medals but also with fame and notoriety.

It was common practice after an aerial victory to land near the vanquished and retrieve a piece of the enemy's airplane. While this act may sound a bit crazy, German fighter airplanes primarily had a defensive role and seldom crossed over Allied lines any farther than would allow them to glide back to friendly territory in an emergency.

Richthofen, however, often went far beyond the simple proof required for an aerial credit. Typically, he or the ground soldier verifying the kill, cut from his victim's airplane a swath of cloth that included the serial number, and then Richthofen affixed the cloth to the wall in his trophy room. In at least one case, lacking any physical proof from a destroyed airplane, he had a rather graphic photograph taken of the dead pilot as proof of the kill, reproduced it, then sent a copy home to his mother.

The quest for military honors was initially fueled by the requirement to reach eight victories—a number typically needed to earn the Pour le Merite. By the time Richthofen gained acceptance to the order with 16 kills, he was the first to successfully meet its increasingly demanding aerial victory numbers.

In addition to shootdown trophies during these early days, he ordered a small cup, from a silversmith in Berlin, engraved with the aircraft type and the shootdown date, following each of his first 60 victories. Only a nationwide silver shortage stopped that tradition.

Bravado was common among all fighter pilots. Some might argue it was actually necessary in aerial combat in those days. Both French and British pilots personalized their airplanes, usually to ensure recognition by their own units in the air. British authorities, however, frowned on markings that overshadowed the cohesiveness of the fighting unit, and although individualism during aerial action was encouraged, individualism demonstrated in appearances was "in poor taste."

The Red Baron narrowly escaped death on July 6, 1917, when a British F.E.2 observer's bullet struck him in the head, splintering a section of his skull. He was forced to land and was immediately hospitalized to heal the wound. Richthofen had just taken command of Jagdgeschwader 1, a fighter wing consisting of four Jastas. This unit, dispersed along the front lines and all painted in colorful schemes, became known as Richthofen's Flying Circus.

But it was also during these months that the British regained their technical advantage in the skies over Germany. Advanced Sopwith fighters (Triplanes and Camels), along with Bristol two-seaters, soon dominated Richthofen's Fokker aircraft. In a letter to a close friend written during his recuperation he said, "You would not believe how low morale is among fighter pilots presently at the front because of their sorry machines. No one wants to be a fighter pilot anymore."

Wounded and facing mounting odds, he continued to command and to fight, refusing medical grounding. He returned to combat—shooting down two enemy airplanes in August—before taking another hiatus through the fall of 1917. He then flew two successful combat sorties but subsequently endured another dry spell until March 1918.

It seemed that the head wound had more long-lasting effects than initially thought by his doctors.

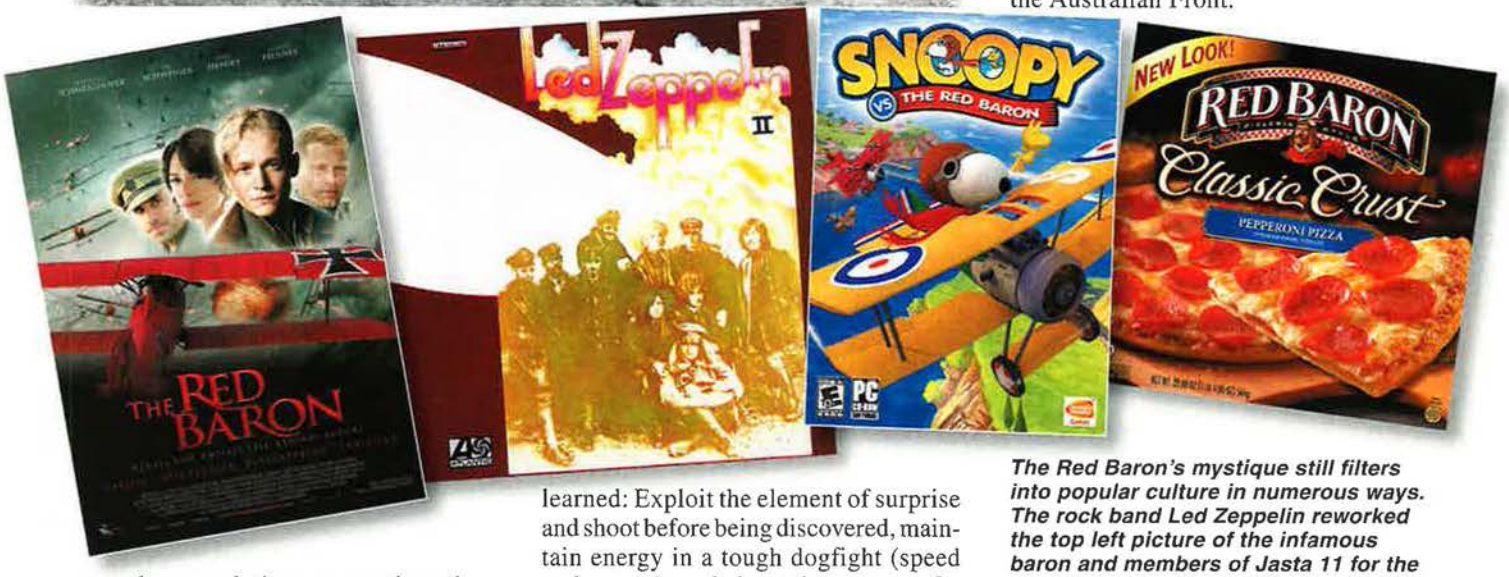
Recuperation from his open head wound was painful and required several surgical

German Bundesarchiv

Left: Richthofen (in the cockpit of an Albatros D.III) pictured with members of Jasta 11.

Approaching 10:30 a.m. on April 21, 1918, the Red Baron and two wingmen took to the skies, responding to incoming British aircraft. Less than an hour later Richthofen, deep in Allied territory, died in his airplane. His life was most probably ended by a lucky shot from the ground.

For whatever reason, Richthofen had violated his second general principle and followed a seemingly hapless British pilot, flying a Sopwith Camel, who was attempting to escape to friendlier skies. Flying very low, the dueling twosome etched their way through the Somme River valley until the baron's Fokker triplane, closing for the kill, appeared to suddenly spin into the ground behind the Australian Front.



The Red Baron's mystique still filters into popular culture in numerous ways. The rock band Led Zeppelin reworked the top left picture of the infamous baron and members of Jasta 11 for the cover of their second album—with their own and other music figures' heads superimposed on the bodies.

He was 11 days shy of his 26th birthday.

Through the decades that followed, the legend of the Red Baron became larger than life, heroic in epic proportions. His funeral rivaled those given to heads of state and was perhaps more ceremonial.

Since his death, the Great War's leading fighter ace has represented the embodiment of the chivalrous "Knight of the Air," not only for Germany but for fighter pilots everywhere. Even in recent generations, the name "Red Baron" has repeatedly popped up in popular songs, cartoons, and elsewhere, ensuring that his legend continues. ■

procedures and time, more time than Richthofen was willing to sacrifice away from his unit. During the period he spent at home, he did take the opportunity to deal with the realities of the war.

All indications are that, mentally, he had matured a tremendous amount. He completed an aerial tactics manual and also reread his diary-autobiography written during the early months of the war. As a seasoned combat veteran and a witness to mounting losses, he saw the poor morale—the result of looming defeat—among the fliers. He found his early writing flamboyant and self-important—not representative of the man he had become during the war.

On April 19, 1918, a copy of Richthofen's Air Combat Operations Manual was delivered to the Supreme Headquarters for dissemination to other units. The detailed document summarized combat flight experience into a practical aerial tactics manual. Among the lessons learned: Exploit the element of surprise and shoot before being discovered, maintain energy in a tough dogfight (speed and power), and shoot the gunner of a two-seat aircraft first.

Richthofen also described two "General Principles" that were "never" to be violated.

First, never "overshoot" your adversary—that is, fly past a slower opponent who might then shoot at you.

Maturation

And second, "never obstinately stay with an opponent whom through bad shooting [by the attacking pilot] or skillful turning [by the defender] one has been unable to shoot down." He noted that when the battle lasts until it is far on the other side of the enemy lines, "one is alone and faced by a greater number of opponents."

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The airmen charged with delivering nuclear weapons were often kept in the dark about the revolutionary weapons.

Early Atomic Air

By Phillip S. Meilinger

Photo from the collection of Harold Agnew

Theoretically, it had been known for decades that splitting the atom would release enormous power—far greater than any explosive ever invented. In the 1930s the theories of nuclear fission began to take definite shape as scientists in Germany, the US, and elsewhere began experiments that revealed the secrets of the atom.

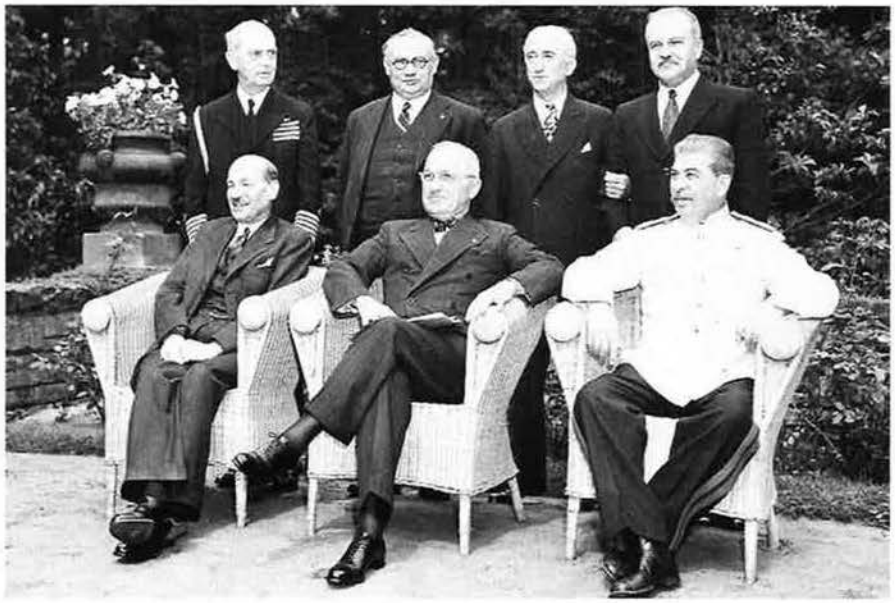
In early 1939 it was apparent war was coming in Europe. It was also obvious to a group of scientists in America, some of whom had recently fled Germany, that the Nazis were working toward an atomic bomb. This was a frightening possibility, so these individuals, led by Albert Einstein, wrote to President Franklin D. Roosevelt, warning him of the peril represented by German research. The US needed to beat the Nazis to the atomic bomb, and it would take immediate action and vast funds to do so.

In October 1939, one month after war erupted in Europe, FDR directed the Army to study the matter.

Top: 509th Composite Group aircraft on Tinian, before its bombing mission to Hiroshima. **Enola Gay** ***is in the foreground. Above:*** **Enola Gay** ***crewmembers (l-r) Maj. Theodore Van Kirk, Col. Paul Tibbets Jr., and Maj. Thomas Ferebee. Despite their successful mission over Hiroshima, Tibbets' crew was bypassed for the tests at Bikini Atoll.***

For the next six years the Army managed the Manhattan Project to build an atomic bomb. This was the most secretive weapon-development program of the war. The entire project was enormous, requiring not only covert laboratories, "heavy water" plants, and vast amounts of silver to produce the required electrical coils, but also mining operations to obtain the necessary uranium.

On Dec. 2, 1942, a team of scientists led by Nobel Prize winner Enrico Fermi huddled in a secret lab beneath the stands of the abandoned football stadium at the University of Chicago and produced the world's first self-sustaining nuclear reaction. A year later scientists at Los Alamos, N.M., under the leadership of J. Robert Oppenheimer, began building a weapon from Fermi's achievement. On July 16, 1945, an atomic device was detonated at Trinity Site in the New Mexico desert. The blast was seen as far away as Albuquerque and El Paso and entailed the now familiar ball of fire and mushroom cloud. One observer described the blast as "unprecedented, magnificent, beautiful, stupendous, and terrifying."



Seated at the Potsdam Conference (l-r): British Prime Minister Clement Attlee, US President Harry Truman, and Soviet Premier Joseph Stalin. Truman learned of the successful Trinity test while at this conference.

Ending the War

President Harry Truman was in Potsdam, discussing the postwar settlement of Germany with Joseph Stalin and British Prime Minister Clement Attlee, when he was told of the Trinity blast. According to Truman, there was never any question in his mind that he would use the atomic bomb against Japan. The issues now dealt with delivery and the appropriate target.

Because of its size and weight, the bomb could only be carried in a B-29; even so, the bombers had to be specially modified and the crews specially trained to handle the new weapon. In the summer of 1944, Gen. Henry H. "Hap" Arnold chose Lt. Col. Paul W. Tibbets Jr., a superb pilot with a distinguished combat record, to head the unit that would deliver the bomb. The 509th Composite Group was activated on Dec. 17, 1944, and after training in the US, Tibbets moved his unit to the island of Tinian in the Marianas. After undergoing normal theater orientation, the 509th flew a number of combat missions against Japan, utilizing large conventional bombs, termed "pumpkins," that resembled the atomic bombs in size, shape, and weight.

The target question involved several factors. President Truman and his advisors decided to hit an actual military target, rather than attempt a demonstration, such as exploding a bomb off the coast of Tokyo. There were too few bombs available to waste on empty space. It was also feared that since the actual bomb had not yet been tested—Trinity was a huge, static device detonated under laboratory conditions—the psychological and propaganda harm of announcing a demonstration only to have the bomb fail to explode was too great a risk.

This concern was not trivial; even the head of the Joint Chiefs of Staff, Fleet Adm. William D. Leahy (who considered himself an ordnance expert), predicted failure.

In addition, military planners and scientists wanted an untouched target so they could more easily determine the effects of the atomic blast. Secretary of War Henry L. Stimson then crossed Kyoto off the target list because of its historical and cultural significance. The name then coming out on top was Hiroshima—Japan's eighth largest city, a large seaport, headquarters of the Second Army, and a major war industry center.

In late July, President Truman warned the Japanese they must surrender or face terrible consequences. They ignored him. On Aug. 2, Tibbets received orders to drop the bomb. The *Enola Gay* took off from Tinian at 2:30 a.m., Aug. 6, 1945. The flight en route was uneventful, and at 8:15 a.m. the bomb exploded above Hiroshima at an altitude of 1,890 feet to maximize the blast effect.

The bomb, termed "Little Boy," had a uranium core and detonated with the equivalent force of 20,000 tons of TNT—equal to thousands of B-29s carrying conventional bombs. Tibbets described the blast as a "giant purple mushroom" that quickly rose to a height of 45,000 feet—three miles higher than the aircraft's own altitude—and even from several miles away appeared to be "boiling upward like something terribly alive." It gave the unsettling appearance of a phenomenon about to engulf the airplane. In the city below, it destroyed virtually everything within a one-mile radius of the blast.

A second bomb, a more advanced plutonium design nicknamed "Fat Man," was dropped on Nagasaki on Aug. 9. Japan surrendered five days later.

Debate still rages over whether the atomic bombs were necessary to force Japanese surrender, but it was not a serious question at the time. Truman had no regrets over his decision—the invasion of Japan scheduled for November could have cost millions of lives, on both sides. He was not willing to pay that price. Japanese leaders interviewed after the war agreed the bombs had been the final straw that had broken their will. The enormous power of the atomic bombs had as much psychological effect as it did physical. Essentially, everyone believed atomic weapons had fundamentally altered the conduct of war. There would have to be new strategies, new weapons, new organizations, and new doctrines.

When the war ended the Army Air Forces shrank dramatically in size, as did the entire military establishment. The AAF, which had consisted of 243 groups in March 1945, quickly dropped by two-thirds—it would eventually bottom out at 48 groups—and many of those were no longer combat-ready. The 509th was

Lt. Gen. Henry "Hap" Arnold (r) with Col. Jacob Smart in China. Arnold picked Tibbets to head the 509th Composite Group.

one of the few groups still in good shape, and it formed the core of the "atomic air force."

Besides demobilization and budget cutbacks, the AAF faced the problem of secrecy. The Manhattan Engineer District run by Maj. Gen. Leslie R. Groves was a very close-hold organization. For the airmen, this was a major concern. Their institutional future seemed dependent on atomic weapons, but they had virtually no insight into the bomb's development or production. It made them a bit paranoid.

The Bikini Atomic Tests

On Aug. 25, 1945, Sen. Brien O. McMahon, chairman of the Senate's Special Committee on Atomic Energy, suggested taking captured Japanese and German ships out to sea and bombing them with atomic weapons to prove "just how effective the atomic bomb is." The Joint Chiefs agreed, and in January 1946, Acting Secretary of War Kenneth C. Royall and Navy Secretary James V. Forrestal sent a memo to the President emphasizing such tests were necessary "to determine, among other things, the consequences of this powerful aerial weapon with respect to the size, composition, and employment of the armed forces and should particularly facilitate an analysis of future naval design and tactics."

Truman approved tests to be carried out at Bikini Atoll in the Pacific; their code name was Crossroads.

The Army and Navy would jointly conduct these atomic tests because the main targets were to be surplus American ships and captured enemy vessels. The plan called for one air burst over the ships themselves—to be dropped by a B-29 from the 509th—and two underwater detonations arranged by the Navy. (During the event, only one underwater detonation took place because the first was so successful.)

Vice Adm. William H. P. Blandy was the overall commander for Crossroads, with Maj. Gen. William E. Kepner, from the AAF, as his deputy, and Brig. Gen. Roger M. Ramey leading the AAF contingent of 2,200 people.

The first test, termed Able, was scheduled for July 1. The 509th had been practicing in New Mexico for several months, dropping "pumpkin" dummy bombs in the desert. Accuracy remained a concern. The horrible aerodynamic shape of the 10-foot-long, five-foot-diameter, and 10,000-pound Fat Man bombs had been troublesome since Nagasaki, but little had been done to correct it. Nonetheless, the crews felt confident as they prepared for the trip out to the Marshall Islands.

Crews from the 509th dropped 27 practice bombs on the target to refine their skills. Even so, it appeared trouble was brewing when Kepner received a memo stating, "The scoring system, which worked so well in the States, seems to be giving trouble at Bikini. Of the seven releases, it was possible to measure the accuracy of only four, and those were estimated."

According to the practice scores obtained, Tibbets' crew was the best. Nonetheless, he was bypassed as mission pilot because of what he later claimed was internal Air Force politics.

On the day of the drop, Tibbets and two of his bombardiers noted the winds and computed when and where to drop the bomb. Their calculations were far different from those of the assigned drop crew. Tibbets offered suggestions to the chosen crew but they ignored him: One of Tibbets' bombardiers, Maj. Thomas Ferebee, predicted the bomb would fall 1,600 feet short and to the left of the target.

On the morning of July 1, 1946, a B-29 arrived over USS *Nevada*—painted bright red so as to be visible from 30,000 feet—and dropped its bomb. The device was to explode 550 feet over the top of the battleship and sink it immediately. It detonated at 518 feet, but it missed its target by nearly half a mile, and to the left—as Ferebee had predicted. Despite months of practice and two dry runs immediately before the actual drop, the bomb still missed its target, in perfect weather, by more than five football fields.

The Navy was much amused. *Nevada* was still afloat—although five other ships were sunk and others were heavily damaged. As an aircraft approached the barely scorched *Nevada,* one sailor mused: "Well, it looks to me like the atom bomb is just about like the Army Air Force [sic]—highly overrated."

What Had Gone Wrong?

People pointed fingers at the aircrew, airplane, bombsight, and the bomb itself. Maj. Gen. Curtis E. LeMay, the deputy chief of the air staff for research and development, ordered tests of the aircraft and bombsight immediately thereafter, but they showed no malfunction. Crew error was also ruled out, although as noted, some believed that was the culprit. The Strategic Air Command official history blamed unpredictable winds.

One report of the incident concluded lamely that "some unusual force affected the bomb, causing it to veer off in an unpredictable and erratic manner, giving a point of impact somewhere left and short of the theoretical one." One theory was that a bomb fin was damaged on leaving the aircraft and this caused the weapon to veer off course.

The AAF blamed the poor aerodynamics of Fat Man and used this as an argument for greater transparency in the atomic weapons program. If the AAF were to be responsible for dropping the bombs in war, then it should have greater insight into their construction. Divided authority over development and delivery was a recipe for disaster.

In the aftermath, the AAF continued to hammer away at Groves in an attempt to gain more access to the atomic program. By late 1946 an agreement was reached: Groves would train more bomb commanders—air officers who would assemble the bombs—as well as weaponeers to actually monitor the weapon in flight. This was a major step forward. At the same time, despite the embarrassment of the errant bomb, the test gave the services and policy-makers an opportunity to witness the power of the new weapon. Many found this sobering.

One naval officer at Bikini commented that the Navy was much chastened by the tests. It had expected to sail the target fleet back to San Francisco to demonstrate the

The second of two Crossroads nuclear tests at Bikini Atoll in the Pacific in July 1946. Due to severe radioactive contamination, the Navy had to sink the fleet of ships used as targets in the two tests.

negligible effects atomic weapons had against it, but the radioactivity on the ships was so severe that the Navy abandoned the plan and sank the fleet—the contamination could not be removed despite countless attempts to do so.

This was, as the naval observer noted, "a momentous decision, a momentous admission." The official committee tasked to examine the results of Crossroads painted the significance of the atomic bomb in stark terms: "If used in numbers, atomic bombs not only can nullify any nation's military efforts, but can demolish its social and economic structure and prevent their re-establishment for long periods of time." The report went on to state there was no defense against the bomb; therefore the US could only stockpile enough weapons so it could overwhelm any potential enemy.

Atomic weapon development, which took all but the most senior diplomats and military officers by surprise, is recognized as a defining moment in history. The detonation of a single bomb carried by one aircraft that destroyed a large portion of a major city while killing tens of thousands of people had a profound psychological effect on everyone.

Cities and people had been destroyed before—the Romans leveled Carthage in antiquity and 50,000 Roman soldiers had been slaughtered in one afternoon at the Battle of Cannae—but the impact of such destruction occurring nearly instantaneously by such a relatively small device shook the foundations of military theory.

Gen. Carl A. Spaatz, the Commanding General of the AAF, noted this belief when he wrote in April 1946: "Strategic bombing is thus the first war instrument of history capable of stopping the heart mechanism of a great industrialized enemy. It paralyzes his military power at the core."

Airmen believed this, and because initial atomic bombs were so large and cumbersome, only large aircraft could deliver them. Specially modified B-29s, then the largest aircraft in the world, were the sole carriers of the bomb, and they belonged to the AAF. This gave airmen a sense of both euphoria and paranoia. Although they owned the aircraft, they did not own the bombs. The Manhattan Engineer District controlled all aspects of atomic bomb development, construction, and assembly. In January 1947 the district was disbanded and its functions absorbed by the Atomic Energy Commission (AEC).

The cloak of secrecy draped over the program by Groves and then the AEC was so total that airmen were kept almost completely in the dark. Indeed, not just airmen were in this state: When the AEC briefed President Truman in April 1947, they told him the atomic stockpile was "very small." Worse, no bombs were actually assembled and few personnel were trained to do so. Truman, who had been President for two years by then and should have known better, was nonetheless visibly shocked. At that time, there were only 13 unassembled atomic bombs in the entire US arsenal.

In hindsight, it is apparent there was a great deal of institutional jealousy and gamesmanship being played by the atomic gatekeepers. The bomb's assembly and arming, as well as the modifications carried out on the B-29s used for delivery, were not as complex as pretended. Moreover, secrecy was hardly airtight—the Soviets infiltrated the Manhattan Project early in the war and spies passed on invaluable secrets to Moscow.

As early as 1942 Groves knew the Russians were attempting to infiltrate the Manhattan Project, but did little to stop them. In fact, one historian labeled the MED's attempts at counterespionage as "amateurish." The heavy mantle of secrecy was successful largely in keeping information from the airmen charged with delivering the bomb, not from the Soviets.

Airmen would fight against this bureaucratic barricade for years. Not until the Korean War broke out, and there were fears of major conflict with the Soviet Union and China, did custody of atomic weapons finally transfer to the military—when atomic weapons were deployed to Guam just in case.

By the end of the decade, as a result of a decree by President Dwight Eisenhower, more than 90 percent of the nuclear stockpile had been transferred to the military. There it would remain. ■

Phillip S. Meilinger is a retired Air Force pilot with 30 years of service and a doctorate in military history from the University of Michigan. He is the author of eight books and more than 80 articles on military affairs. His latest book is Into the Sun: Novels of the US Air Force. *His most recent article for* Air Force *Magazine, "How Bombers Defeated Japan," appeared in December 2011.*

Keeper File

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Les Aspin Was Dead Right

In early 1991, Washington was agonizing about possible war with Iraq. Some hawkish members of Congress—notably Sen. Sam Nunn (D-Ga.)—were opposed. On Jan. 8, Rep. Les Aspin (D-Wis.) stepped forward with an unexpected message. He said he was bullish about US airpower's ability to knock out Saddam Hussein's forces in a swift, phased campaign. The war would be short and casualties relatively few. His remarks probably had some influence. Four days later, Congress narrowly approved armed action. Five days after that, President George H. W. Bush launched Operation Desert Storm. It lasted 43 days and, but for the final 100 hours, was entirely an air campaign. Said Secretary of Defense Richard Cheney: "The decisive character of our victory in the Gulf War is attributable in large measure to the extraordinary effectiveness of airpower." Aspin had been proved right.

"The Military Option"

Rep. Les Aspin, democrat of Wisconsin
Chairman, House Armed Services Committee
White Paper on Persian Gulf Crisis
Jan. 8, 1991
Washington, D.C.

Find the full text on the *Air Force* Magazine's website www.airforce-magazine.com "Keeper File"

This White Paper summarizes what I have drawn from ... hearings and other sources on the military option. It is my report and not that of the House Committee on Armed Services. ...

The coalition's airpower provides the clearest and most one-sided advantage enjoyed by the anti-Iraq forces. Coalition forces will have an almost three-to-one edge in numbers of combat aircraft and an overwhelming edge qualitatively. ... Coalition forces should be able to establish air superiority relatively easily over Kuwait and over Iraq, as well. ... Control of the air in a part of the world where there is little to no concealment available for deployed forces will permit coalition air forces to range over both Iraq and the battlefield and attack strategic and tactical targets at will. ...

My review of the testimony presented to the committee, as well as private conversations with former and active defense officials, convinces me that we will fight a phased campaign in the Persian Gulf. The war is likely to begin with an air campaign against strategic and military targets in Iraq and then proceed to a sustained air campaign against Iraqi military forces in or near Kuwait. The final phase of the campaign would involve the commitment of ground forces. ...

The first task in a strategic air campaign against Iraq would be to establish air superiority. Iraqi aircraft, airfield, and air defense assets, particularly surface-to-air missiles, would be top priority targets at the outset. Iraq's ballistic missiles would also be targeted from the outset in an effort to preempt any Iraqi attacks against Israel, Saudi Arabia, and other Arab countries. The air campaign would then focus on Iraq's chemical, biological, and nuclear capabilities—stockpiles, delivery vehicles, production facilities, and so on. Iraqi military command and control complexes would be high priority targets as well. ...

None of the military experts appearing before the committee questioned our ability to execute successfully the strategic air phase of a military campaign against Iraq.

During [the tactical air campaign] phase of the war, airpower would be used against Iraqi military forces in the Kuwait theater of operations: operational and tactical reserves in their assembly areas, supply depots, field command headquarters, and first echelon forces deployed in their defensive positions along the border and coast in Kuwait. The objective would be to interdict the highway and rail lines of communication north of Basra, destroy the logistics facilities in southern Iraq, reduce and disrupt Iraqi reserves in the rear areas, and reduce the forward defenses of the Iraqi Army.

The limited road and rail network, the large natural lake of the Hawr Al Hammar, and the marshy conditions of the lower Tigris-Euphrates delta constrict available lines of communication from Iraq to its forces in southern Iraq and Kuwait to a relatively narrow area around Basra. A successful interdiction campaign concentrated on that area would effectively cut off Iraqi forces. ...

Iraqi forces in their prepared positions in the desert will be readily identifiable to observation from the air and vulnerable to air strikes. ...

There is little doubt that a tactical air campaign against Iraqi forces would inflict heavy losses on Iraq's logistics infrastructure and to its reserves. Iraq's ability to sustain forces deployed in southern Iraq and Kuwait would be weakened and the capability of its operational and tactical reserves reduced. How much damage would be inflicted upon the first echelon forces ... is uncertain. ...

The objective [during a final ground phase] of a coalition ground force campaign against Iraqi forces would be their defeat and forcible ejection from Kuwait. ... The success of the ground phase of an air-land campaign would depend upon the efficacy of airpower. General Dougherty told the committee that the "only way to avoid numerous casualties at the outset of conflict in this area is to exploit initially the special strength of our external mobile air forces—Air Force, Army, Navy, and Marines." ....

I am convinced that if we must go to war, we will fight a phased campaign, one that begins with an air campaign against strategic and military targets in Iraq, then proceeds to a sustained air campaign against Iraqi military forces in or near Kuwait, and ends with the commitment of ground troops. ...

While I believe the possibility of achieving a "bloodless victory" is small, the prospects for a rapid victory with light to moderate American casualties, perhaps three to five thousand including 500 to a thousand or so fatalities, are high. I judge the risk of a bloody campaign, with casualties in the 10,000 to 20,000 range including several thousand fatalities, to be small. ...

On a vote to authorize the President to use force to liberate Kuwait, the right vote is "yes." ■

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AFA National Report

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By Frances McKenney, Assistant Managing Editor

San Antonio Success

Air Education and Training Command's sixth January symposium—co-hosted by the **Alamo Chapter** in San Antonio—attracted yet another record crowd.

Held at the Henry B. Gonzalez Convention Center, the seminar brought in 3,996 attendees. They came to hear updates on topics ranging from recruiting to ROTC. In fact, commented AETC Commander Gen. Edward A. Rice Jr., attendees could essentially learn about the entire AETC enterprise through the symposium.

In the course of two days, the event offered three keynote presentations, some 150 exhibitors at the technology exposition, and 70 breakout information sessions.

Undersecretary of the Air Force Erin C. Conaton; Gen. Raymond E. Johns Jr., head of Air Mobility Command; and retired Army Maj. Gen. Josue Robles Jr., president and CEO of USAA, were the keynote speakers.

Symposium attendees watched a prescreening of a new George Lucas movie, "Red Tails," about the first African American US military pilots, maintainers, and their support personnel, collectively known as the Tuskegee Airmen. Eight of these World War II veterans were on hand. So was actor Nate Parker, who portrays a pilot in the movie.

John J. Politi, former Air Force Association board chairman and Alamo Chapter's symposium lead, said Parker had attended other screenings for "Red Tails" but told the symposium's 2,300 movie-goers that this one was the most meaningful.

The Alamo Chapter has responsibility for many activities that make the symposium tick: organizing the tech expo; arranging for the convention venue and hotel; funding transportation to shuttle people from local hotels to the black-tie banquet; and hosting two receptions, plus an AFA executive dinner that brings together AETC leaders and symposium sponsors.

An AETC public affairs news release noted that future symposia will be held every other year, beginning in 2014, as a cost saving measure.

Wounded Airman Support

At the Air Force's invitation, AFA recently launched a program to help wounded airmen who have returned to US medical facilities from the war zone. The airmen often don't have personal items with them because they move quickly from hospital to hospital.

AFA Board Chairman Sandy Schlitt (left) and Alamo Chapter President Randy Coggins look over an information brochure at the AETC Symposium's tech expo in San Antonio. The next symposium is in 2014.

More photos at http://www.airforce-magazine.com, in "AFA National Report"

Three AFA chapters have already begun implementing this Wounded Airmen program: the **Nation's Capital Chapter** and the **Donald W. Steele Sr. Memorial Chapter,** working together in the Washington, D.C., area, and the **Alamo Chapter** in San Antonio. AFA selected these chapters to pilot the initiative because of their proximity to Walter Reed National Military Medical Center in Bethesda, Md., and San Antonio Military Medical Center in Texas.

Steele Chapter President F. Gavin MacAloon reported that Chapter VP Kevin Lewis and Nation's Capital Chapter Senior VP Harvey Dahljelm paid an initial visit to three airmen. They began an assessment of needs—working with the Air Force recovery and care coordinator—and delivered gift baskets and money for incidental expenses.

From San Antonio, Alamo Chapter President William R. Coggins e-mailed: "I had a good visit today with one of our wounded airmen, SrA. Orion Orellana ("Oreo") at SAMMC. Oreo is a JTAC [joint terminal attack controller]. His vehicle was hit by an RPG in Afghanistan on Nov. 16, and he suffered a lot of damage to his entire left side: lost fingers on his left hand and left leg crushed by the impact." Orellana was on his third deployment, having served before in Afghanistan and Iraq. He had also moved through at least three medical facilities within a month.

In talking to him, Coggins learned that the combat controller wanted headphones so he could listen to music and watch movies. The chapter collected some $75 that day, and chapter member SMSgt. Linda Scott, who is the group's 59th Medical Wing representative, took a set of ear buds and a pair of headphones to Orellana the next day.

"He was choked up and very humbled that [we] went through all that trouble for him," Scott wrote.

So That We Won't Overlook a Vet

With help from **Hangar One Chapter** President Dominick J. Mullaney and New

Jersey State President Howard Leach, AFA in the Garden State donated funds to identify grave sites of all veterans buried at a cemetery in Neptune, N.J.

Alexander Scott, a senior at Marine Academy of Science and Technology in Sandy Hook, got the idea for this Eagle Scout project because his Boy Scout troop had been decorating vets' graves at Hamilton Cemetery every Memorial Day. It occurred to him that they might be overlooking some of them.

He began his research last summer and by fall was looking at individual grave markers in the cemetery. There, one day in October, he happened to meet a professional genealogist, Cindy Kiefer. Scott had by this time identified the graves of about 300 veterans. Kiefer helped him find another 100. The oldest dated to the War of 1812.

Scott used the funds he collected from AFA and other donors to pay for a sign erected at the cemetery. He had the veterans' names engraved on aluminum sheets, mounted the lists on bead board, and covered the whole sign with a small roof. He placed a PVC flag holder into the ground near some graves that are not readily identifiable as the resting place of a veteran. His scout troop will thus be able to find the site and decorate it with a small flag this Memorial Day.

Scott became an Eagle Scout in January.

AFSPC and CPs

The Air Force Ball, sponsored by the **Lance P. Sijan Chapter** at a resort in Colorado in January, highlighted Air Force Space Command's 30th anniversary—and a dynamo who headed the chapter's Community Partner program.

The chapter calls the Air Force Ball the "No. 1 formal military event in town," and this time, the black-tie-and-mess-dress event at the five-star Broadmoor kicked off a year of AFSPC activities that will take note of the command's establishment in January 1982.

So it was fitting that the ball's special guests included retired CMSgt. Charles P. Zimkas Jr. He was AFSPC's first command chief and is now an AFA national director emeritus. Other AFSPC VIPs: Gen. William L. Shelton, the commander, and Lt. Gen. Michael J. Basla, vice commander.

AFSPC Outstanding Airmen and spouses of deployed airmen from the command, NORAD-US Northern Command, and the Air Force Academy each were introduced to the audience. It was a high point in the evening, said Hank Scarangella, the chapter's secretary.

In another memorable moment, AFA Chairman of the Board S. Sanford

Schlitt presented Sijan Chapter's Debbie Estrem with a Chairman's Citation, recognition as she wrapped up eight years as the chapter and state Community Partner VP.

In 2003, Estrem—who always carried AFA membership applications in her handbag—took on a CP program consisting of four members. Within five years, she increased the number to 150. She signed up so many businesses that the chapter had to appoint two assistants to help her. The chapter newsletter editor said the list of CPs sometimes took up two pages.

By the time Estrem handed over the reins to a new CP VP last November, the chapter had won eight consecutive national-level Community Partner Membership Gold Awards. They are given when CPs represent at least six percent of overall chapter membership.

That's one Gold Award for each year Estrem led the chapter's program.

STEM Street After-School Club

The **Leigh Wade Chapter** in Virginia presented $3,000 in December to support an after-school program that encourages kids to explore science, technology, engineering, and math concepts.

Cindy M. K. Jones, a physical education teacher at Clover Hill Elementary School in Midlothian, Va., received the AFA matching grant from James C. White, chapter VP for aerospace education. Also on hand to donate the funds: Chapter President Gary D. Metzinger, Secretary Cordell Hopper, and Treasurer Ferris J. Hackleman.

Jones, who was AFA's Virginia State Teacher of the Year 2009-2010, caught the attention of the chapter again because of her STEM Street Club. The program uses robots assembled from plastic building blocks, straw rockets, parachutes weighted with pennies, and other hands-on devices, to get the Clover Hill students interested in science.

The program involves other teachers and the students' families, as well: The program held a train-the-trainer three-day workshop for the adults last summer, and when the STEM Street Club began its first session in October, each child brought along a parent or grandparent.

The STEM Club's inaugural session was for kindergarteners to fifth-graders; its winter session, now under way, targets fourth- and fifth-graders. The winter club meets for a month, once a week, for 90 minutes.

Major sponsors of this program come from the roster of Leigh Wade Chapter Community Partners, Metzinger said.

Flying the Flag in Alabama

In Huntsville, Ala., county officials dedicated a Veterans Memorial this past Veterans Day. Eight flags fly from the granite monument, to honor the US, Alabama, POWs-MIAs, and each military branch.

Getting the Air Force flag in that lineup took "herculean effort" from the **Tennessee Valley Chapter,** according to Russell V. Lewey, aerospace education VP. He explained that the memorial's foundation required $15,000 to sponsor a service flag. The funds were to cover construction as well as maintenance.

A local company paid for the Marine Corps flag, for example, but until the Tennessee Valley Chapter stepped forward, the Air Force flag had no sponsor. This town "is predominantly Army-focused," Lewey pointed out.

So the chapter set to work. "In our first year, we raised over $6,000 and are well on our way for next year's collection," he said. The chapter has five years to complete the project.

Lewey said a plaque at the base of the flagpole acknowledges the chapter's sponsorship, and "airmen from all across the valley ... will be able to reflect upon the Air Force's heritage and its future as a result of the presence of the Air Force flag."

USAF Anniversary in Wyoming

The commander of Air Force Global Strike Command addressed the Air Force anniversary banquet, hosted by the **Cheyenne Cowboy Chapter** in Cheyenne, Wyo., in October.

Lt. Gen. James M. Kowalski spoke about how local citizens have worked

with the military. "This is a community that has consistently and historically supported Fort D. A. Russell, F. E. Warren, 20th Air Force, the 90th Missile Wing, and Global Strike Command," Kowalski said. "There is a long and invaluable relationship that endures here."

Chapter President Irene G. Johnigan similarly praised Air Force personnel at F. E. Warren Air Force Base. "It is truly an honor for us to honor our young people in blue," she told the audience of 345 guests.

Among the blue-suiters in the spotlight were Capt. Daniel R. Moore and 1st Lt. Stephen McVay, from the 90th Missile Wing, who accepted the AFA national-level Gen. Thomas S. Power Award as best missile crew.

AFA National Director Rick Hartle and Rocky Mountain Region President Gayle White presented awards that evening. The Cheyenne Chapter received four of them. In addition, Medal of Merit awards went to chapter members Carol A. Holland, Leslie D. Swidecki, and Mary Thompson.

Hartle and White presented AFA Pitsenbarger Awards to SrA. Paul E. Link and SrA. Daniel D. Rivera, both from the 90th Medical Operations Squadron at F. E. Warren.

AFA Pitsenbarger grants of $400 go to selected top enlisted personnel who graduate from the Community College of the Air Force and plan to continue on to a bachelor's degree.

$12,000 Worth of Hot Dogs

They worked from 8 a.m. to 6 p.m. They sold hot dogs, bratwurst, nachos, and cold drinks. They grossed $12,000. Call it a good weekend's work by the **San Jacinto Chapter** in Texas.

Together with AFROTC cadets from the University of Houston, chapter members earned the funds by manning a concession stand at Ellington Field's Wings Over Houston air show.

The 27th annual event attracted the crowds through the F-22's first appearance at this venue, a "Tora! Tora! Tora!" re-enactment of the World War II attack on Pearl Harbor, and aircraft such as the B-52, AC-47 "Spooky" gunship, and vintage B-29 Superfortress.

The AFA-AFROTC concession stand sat in a strategic location: on the flight line and near an entrance gate, the first food booth the visitors came across.

Homer S. Black, chapter secretary, organized the concession. He had help from Treasurer Larry M. Bradshaw and chapter members Lt. Col. Aldru T. Aaron, who is the AFROTC detachment commander, and Lt. Col. Shaunte Y. Cooper, executive officer of the 147th Reconnaissance Wing.

Chapter members who pitched in behind the counter at the air show included Chapter President Donald E. Keltner.

Black gives credit to the dozen cadets who manned the grills both days, helping turn out the booth's best-seller: hot dogs 'n beer. The chapter received 10 percent of the gross and gave the cadets 60 percent, for their role in this fund-raiser. ■

USAF photo by Matt Bildin

At the Cheyenne Cowboy Chapter's USAF banquet, AFA National Director Rick Hartle (l) and Rocky Mountain Region President Gayle White (r) present AFA Pitsenbarger Awards to SrA. Daniel Rivera and SrA. Paul Link.

Reunions

reunions@afa.org

55th & 58th Weather Recon Sq. June 13-15 in Branson, MO. **Contact:** Conrad Layton, (918-446-6945) (conradlay@aol.com).

84th ATS/MAS Sq. May 18-19 at the Hampton Inn in Vacaville, CA. **Contact:** John Burnett, 3013 Red Maple Ct., Vacaville, CA 95687 (jnburnet@cwnet.com).

91st Strategic Recon Wg Assn. Aug. 22-27 at the Grand International Hotel in Minot, ND. **Contact:** Jim Bard, 3424 Nottingham Rd., Westminster, MD 21157 (410-549-1094) (jimbardjr@comcast.net).

351st BG Assn. June 14-17 at the Holiday Inn Cincinnati Airport in Erlanger, KY. **Contact:** Deborah Eason, 3722 Sussex Dr., Milledgeville, GA 31061 (478-453-7388) (dbme@windstream.net).

446th BG. May 3-6 in Washington, DC. **Contact:** Beverly Tucker, 2210 Englewood Ave., Durham, NC 27705 (919-280-1249) (b.t@mindspring.com).

Berlin Airlift Veterans Assn (1948-49). Sept. 26-29 in Ogden, UT. **Contact:** J.W. Studak, 3204 Benbrook Dr., Austin, TX 78757 (512-452-0903).

First Flight Det., Nha Trang AB, South Vietnam. June 4-7 at the Embassy Suites, Colorado Springs, CO. **Contact:** Wayne Haring (719-598-2692) (wayneema@msn.com).

Forward Air Controllers Assn. Oct. 17-21 in Tucson, AZ. **Contact:** Tom McGrain (480-460-1969) (nail28@cox.net).

JCAFB NavigatorTng Class 63-01. May 17-20 in Washington, DC. **Contact:** Ken McNair (425-226-5501) (ken-mcnair@msn.com).

SAC Airborne Cmd Control Assn. Aug. 22-26 in Washington, DC. **Contact:** (804-740-2290) (wcurtis135@aol.com).

UPT 52-C. May 7-11 at the Menger Hotel in San Antonio. **Contact:** Jim Griffith (830-598-5403) (rjgwjg@verizon.net). ■

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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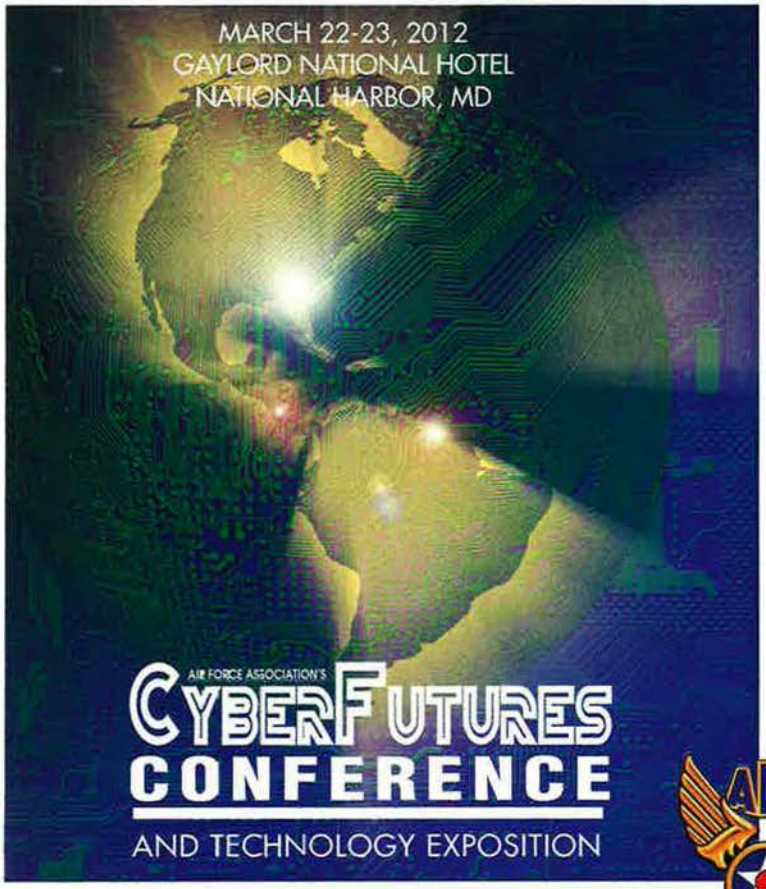

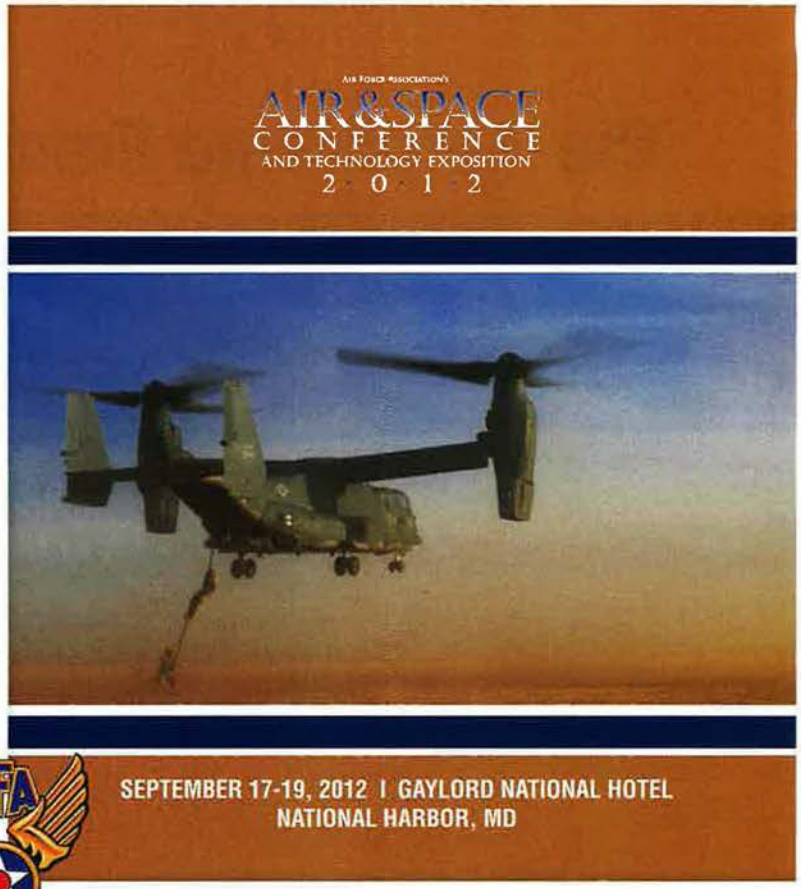

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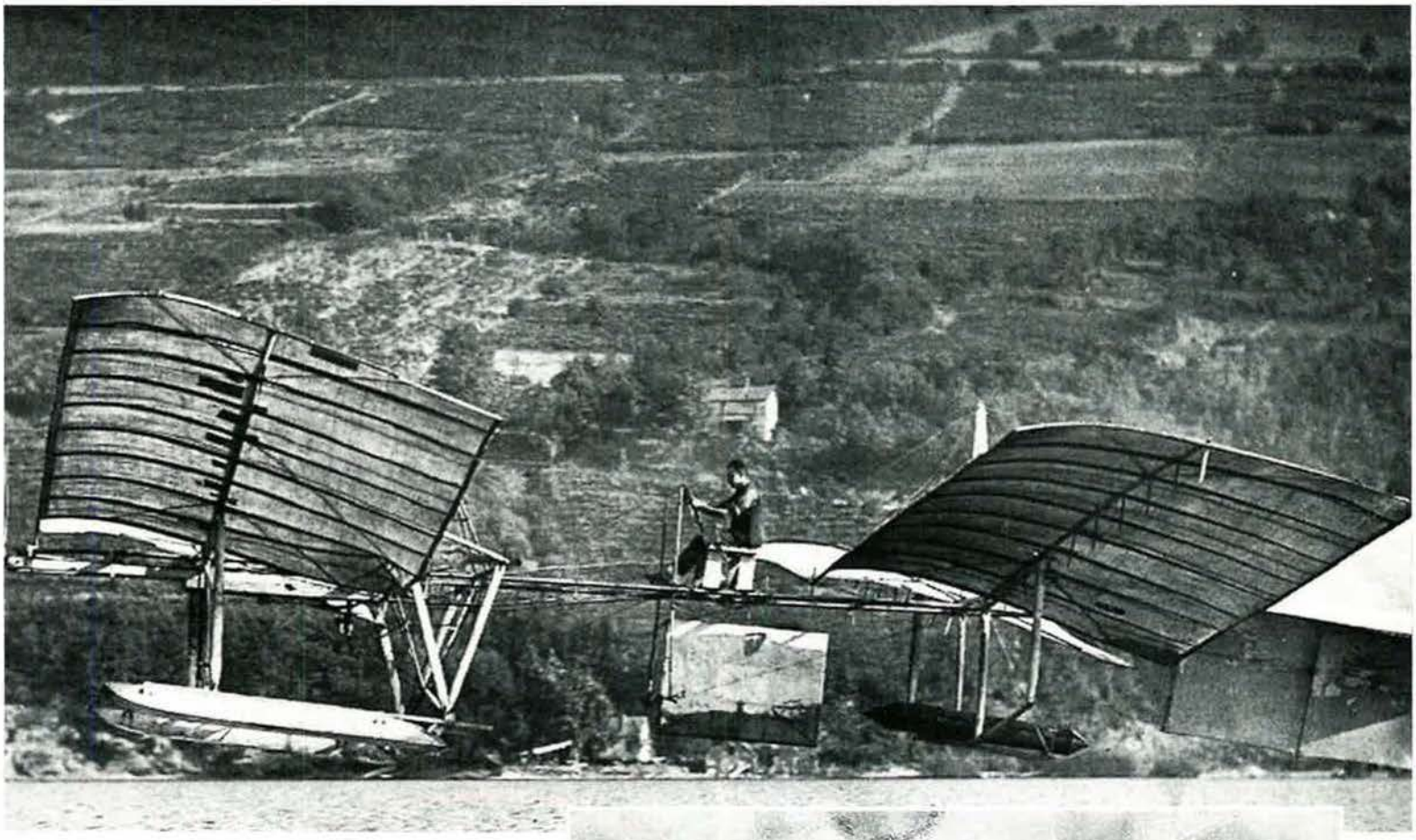

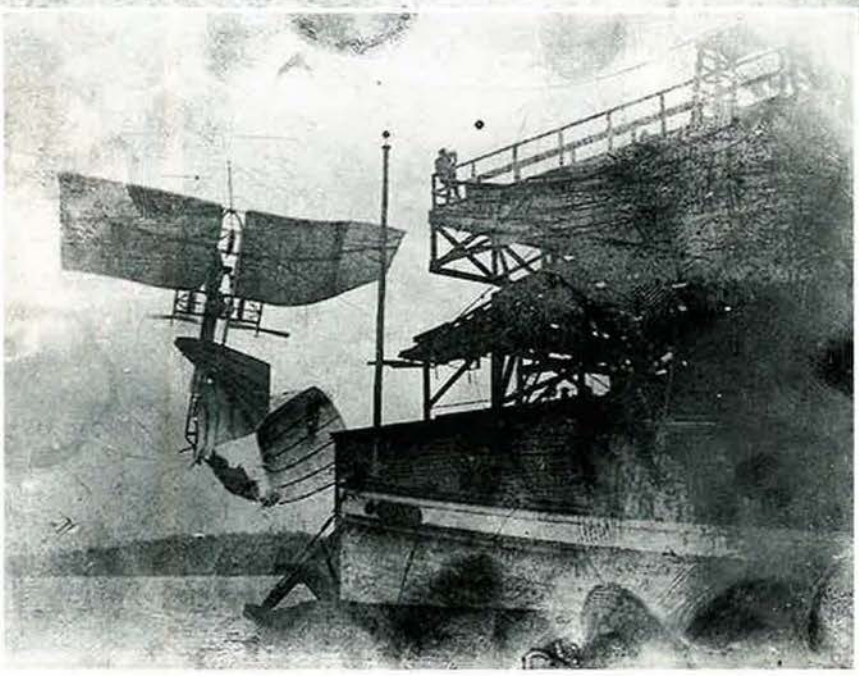

Samuel Langley, a Secretary of the Smithsonian Institution, was a luckless pioneer in manned aviation. On Dec. 8, 1903, his manned "Aerodrome" failed for the second time, breaking up (inset) and crashing into the Potomac River. Nine days later, the Wright brothers' "Flyer" took wing at Kitty Hawk, N.C. Langley died in 1906. In time, though, his Aerodrome would fly—sort of. Glenn Curtiss, a Wright rival, sought to undercut their patent by showing the Aerodrome could have flown. In 1914, he took the craft to New York where it made a few short hops (above, piloted by Curtiss employee William Doherty). The Smithsonian then displayed it as the first manned, powered, heavier-than-air craft capable of flight. Orville Wright was outraged (Wilbur had died in 1912) and severed all contact with the museum. He sent the original Flyer to Britain for exhibition in the Science Museum. In 1942, the Smithsonian admitted that Curtiss had greatly modified the Aerodrome, even giving it a new engine for his flights. The museum recanted its claims for "Langley's Folly" and declared the Wright Flyer to have been the first capable of flight, after all.

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Airpower Classics

Artwork by Zaur Eylanbekov

Hs 129

The Hs 129 attack airplane was an air weapon that "might have been." If the prewar Luftwaffe bureaucracy had not been so shortsighted, Germany could have fielded a fully developed Hs 129 ground-attack aircraft that would have been as useful to them as the Sturmovik was to Russia. Instead, delays, changes, and ultimately inadequate resources caused the Henschel-designed aircraft to be too late and too few in number to be decisive.

The Hs 129 was an all-metal, low-wing, twin-engine attack airplane. It followed in the footsteps of the first "Stuka," the highly regarded Henschel Hs 123 biplane. While disliked by the Luftwaffe's test pilots, this so-called Panzerknacker (meaning "tank cracker") was beloved by the pilots who flew it. The aircraft, however, was dogged by misfortune. Sabotage by Henschel's foreign workers led to problems. Moreover, delays in the Hs 129's development put it into combat just as the Germans were losing air superiority. Because the aircraft was vulnerable to fighter attack, its loss rate almost equaled its rate of production.

The Hs 129 featured heavy armor protection of the pilot, fuel tanks, and engines. For instance, the tiny windscreen had 75 mm-thick armored glass. As a result, it was successful in attacks on Allied armor against heavy defenses. Eventually, field fixes to its temperamental engines and other gear raised the mission-ready level to about 70 percent. In one of the war's many ironies, Hs 129s supplied by Germany to its Romanian ally were used against German forces when Romania switched sides in 1944.

—Walter J. Boyne

This aircraft: German Hs 129B-2—*Red F*—as it looked in 1945 when assigned to 14 Panzerjager/ Schlachtgeschwader 9 in Hungary.

Hs 129 was a rugged anti-tank platform.

In Brief

Designed, built by Henschel ★ first flight spring 1939 ★ crew of one ★ two Argus AS 410 piston engines ★ number built 868 ★ **Specific to Hs 129B-2:** armament two 7.9 mm machine guns, two 20 mm cannon or four 7.9 mm machine guns and one 30 mm cannon ★ two Gnome Rhone radial engines ★ load two 50 kg bombs ★ max speed 253 mph ★ cruise speed 196 mph ★ max range 428 mi ★ weight (loaded) 11,574 lb ★ span 46 ft 7 in ★ length 32 ft ★ height 10 ft 8 in.

Famous Fliers

Notables: Arno Ehrhardt, Ernst Kupfer, Bruno Meyer. **Test pilots:** Albert Gatzemeier, Hans Wilhelm Kaempf, Siegfried Schuricht.

Interesting Facts

Featured extremely small cockpit (some instruments mounted on engine cowling ★ tested with 20-foot-long 75 mm cannon, each round weighing 26 pounds ★ fitted with downward-firing rocket mortars ★ used Revi gunsight mounted outside cockpit ★ equipped with engines that rotated in opposite directions, eliminating torque effects ★ used with some success in Tunisia ★ succeeded as anti-tank aircraft in Battle of Kursk ★ considered "defenseless" against enemy fighters ★ flown by air arms of Hungary and Romania.

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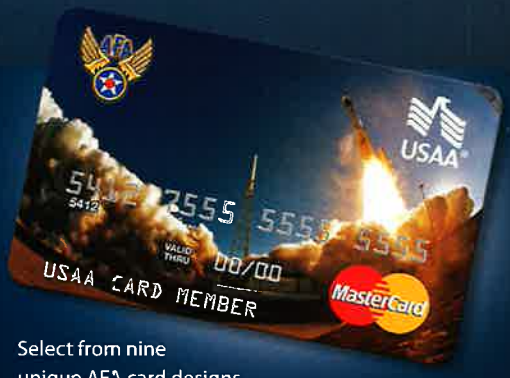

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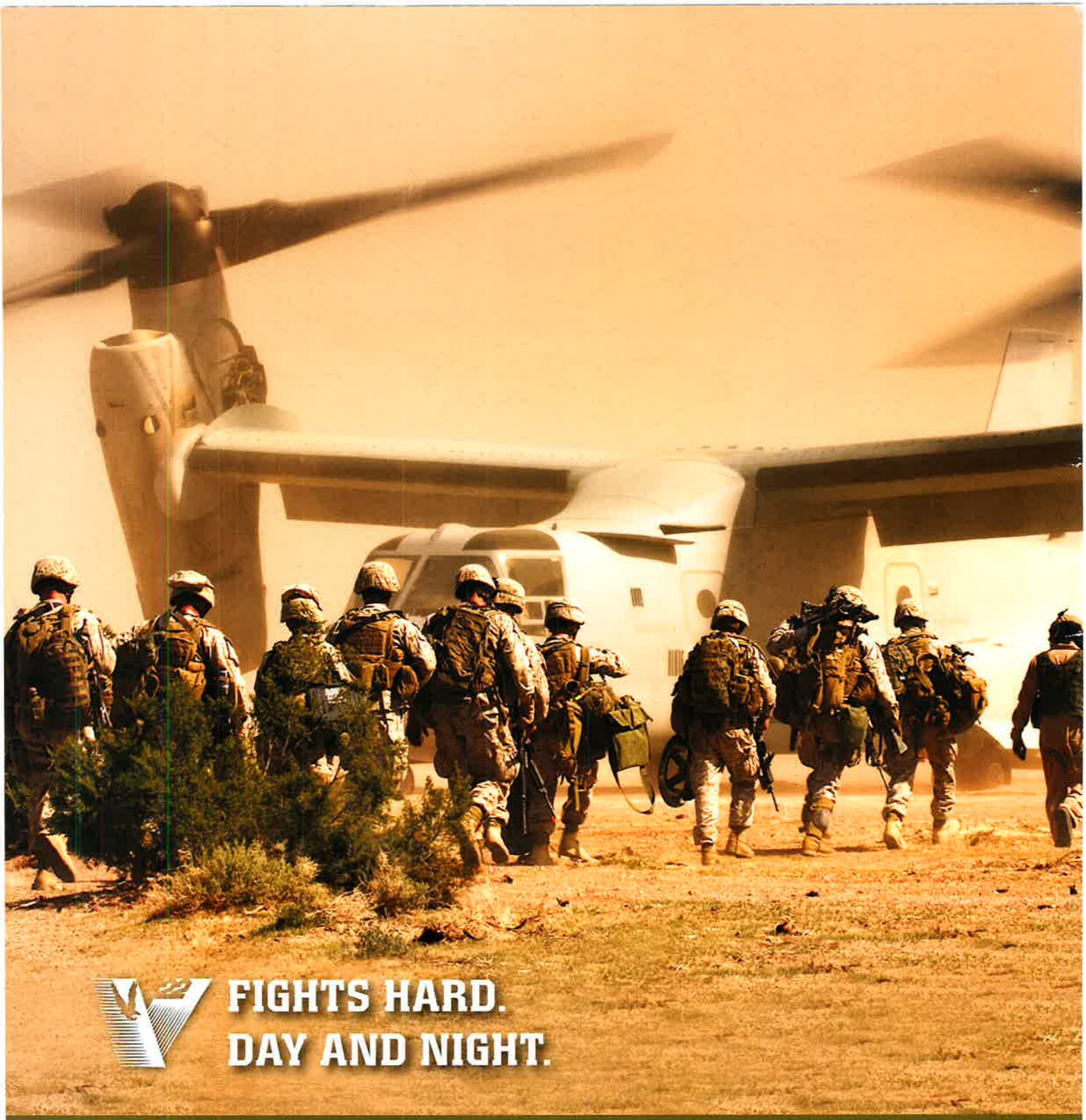

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