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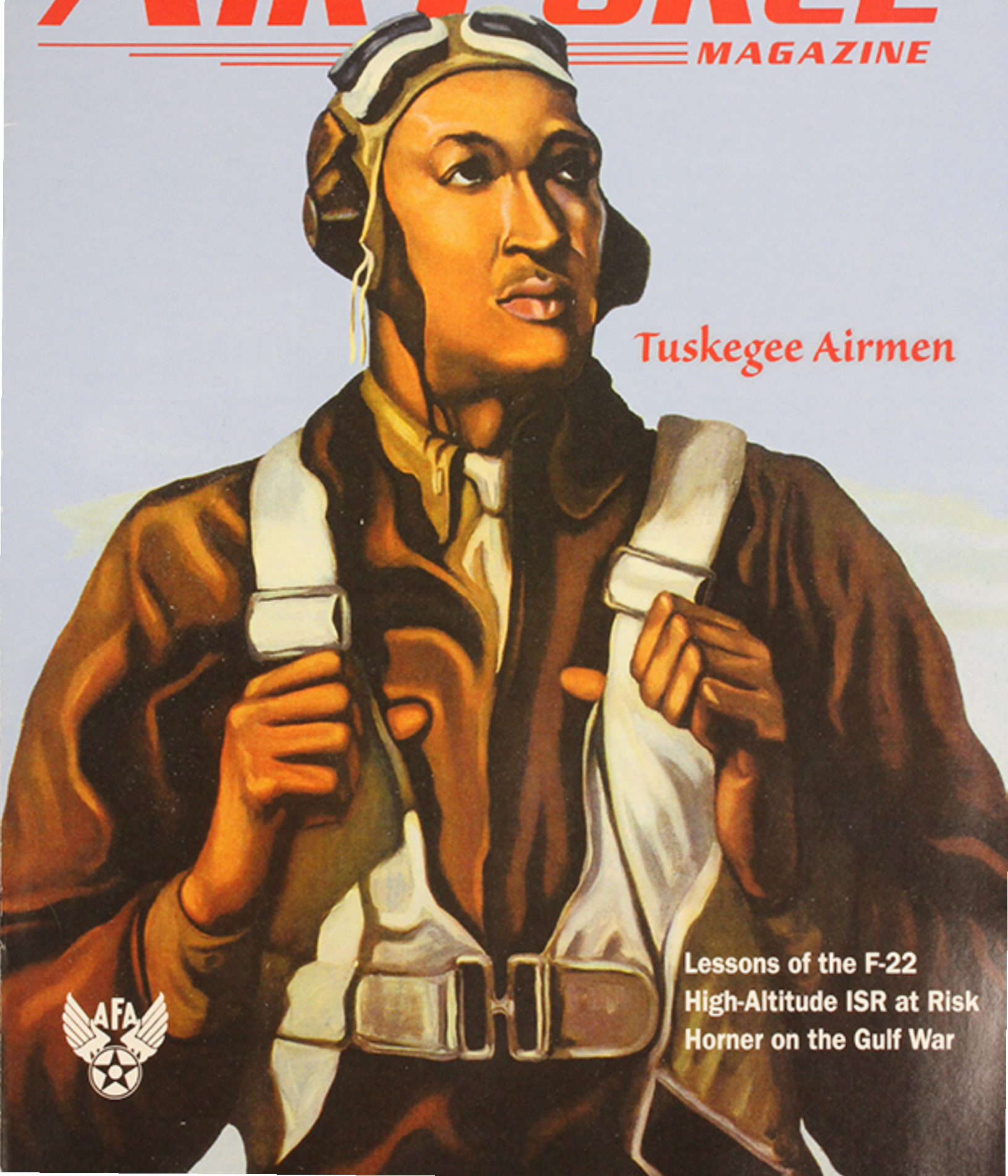
Journal of the Air Force Association

# AIR FORCE

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MAGAZINE



*Tuskegee Airmen*

Lessons of the F-22  
High-Altitude ISR at Risk  
Horner on the Gulf War







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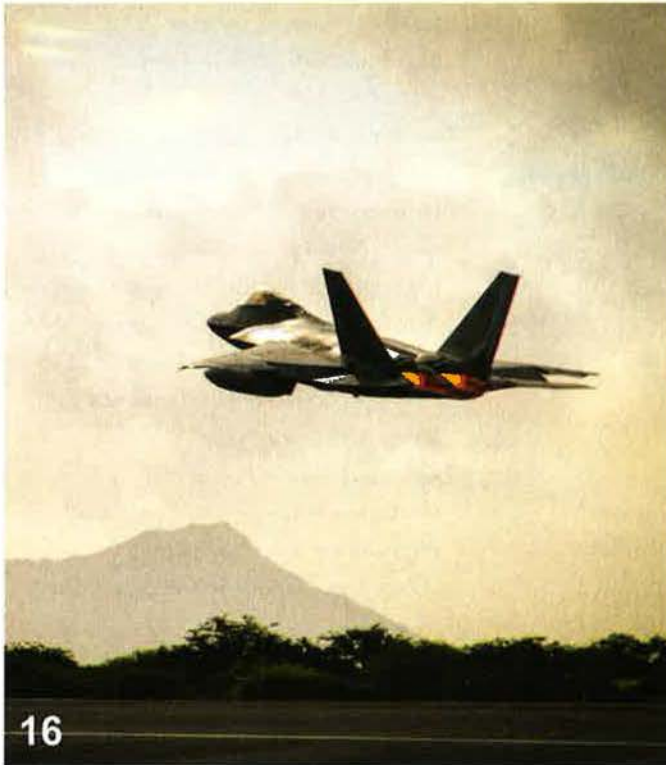
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**About the cover:** A 1943 poster that served as a war bonds ad and a symbol of pride for the Tuskegee Airmen. See "Red Tails," p. 34.





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# Following the Money to Europe

It has now been two years since Russia illegally seized the Crimean Peninsula from Ukraine and began a low-level, destabilizing "hybrid war" in Ukraine's east.

Russia's attack on Ukraine's sovereignty came after Russia had previously battled with and occupied territory belonging to Georgia and allegedly sponsored severe cyber attacks targeting NATO member Estonia.

The message Vladimir Putin sends his neighbors is clear: Toe Russia's line or pay the price.

These Russian attacks and provocations have had many nations in Central and Eastern Europe on edge. In February, as part of the Defense Department's Fiscal 2017 budget request, US leaders announced a quadrupling of funding for the European Reassurance Initiative (ERI), a US program designed to reassure, bolster, and defend the European nations most threatened by Russia.

This is an extraordinary uptick in funding: a more than \$2.5 billion increase in a single year to enhance what was already a high-profile defense and engagement program. ERI includes Operation Atlantic Resolve, a series of US-led measures to expand Allied training exercises, make infrastructure improvements, and create a larger rotational presence in Europe.

"We share a commitment to promoting a Europe that is whole, free, and at peace," read an end-of-2015 US European Command release. Atlantic Resolve is a response to "Russian intervention in Ukraine specifically."

Many of the nations with the most to fear are NATO members, and the Alliance—led as always by the United States—continues to increase its support of their freedom and security. Make no mistake: "We will defend every inch of our NATO territories," Air Force Gen. Philip M. Breedlove, EUCOM commander, said in February, *Stars and Stripes* reported.

This past year saw several notable US deployments and military engagements. To cite just a few of 2015's air-centric operations, there was:

- A six-month A-10 theater security package that saw a dozen Warthogs and 300 airmen from Moody AFB, Ga., operate out of bases in Estonia, Hungary, and Romania.
- A three-week, five C-130 detachment deployed to Powidz AB, Poland, to train with the Poles for skills including night vision goggle operations and fighter intercept training.
- An Oregon Air National Guard deployment of a dozen F-15Cs to Campia Turzii Air Base in Romania to train with allies and "strengthen interoperability."
- A deployment of eight New Jersey ANG F-16s to Graf Ignatievo AB, Bulgaria, for the two-week Thracian Star combined air operation exercise.

And in the highest-profile European deployment of the year, four F-22 Raptors, a C-17 airlifter, and 60 airmen deployed to Spangdahlem AB, Germany, for the F-22's first deployment to Europe. From Germany, the Raptors branched out to fly from bases in Poland and Estonia, "demonstrating

our commitment to NATO Allies and the security of Europe," stated EUCOM.

With these visible airpower commitments as the baseline, DOD is really ramping things up now. "2017 ERI funding strengthens deterrence through measures that provide a quick joint response against any threats made by aggressive actors in the region," budget justification documents explain.

More than a half-billion dollars would be committed to establishing an Army armored brigade combat team in Europe.

Planned air initiatives include new pre-positioned equipment to support forward flight operations. DOD seeks to put aircraft maintenance vehicles, forklifts, crash recovery vehicles and fire trucks, and runway snow removal equipment at numerous forward locations to allow for quick and dispersed flight operations.

It's not just logistics. The plan also calls for "deferring previously planned force reductions" at RAF Lakenheath, UK. The base will keep a full complement of 20 air superiority F-15C fighters "ready for operational patrols and joint exercises" through 2017.

These defense measures send a powerful message to America's allies that the US stands with them against aggression and intimidation. In a reflection of the tension on the continent, Russian, NATO, and US officials repeatedly exchanged blunt words during last month's Munich Security Conference in Germany.

"We have to take these threats from Moscow seriously," said Polish Foreign Minister Witold Waszczykowski. "We have to be wise before the event, not wise after the event."

Criticism angered prominent Russians in Munich. "NATO's policy with regard to Russia has remained unfriendly and opaque," Prime Minister Dmitry Medvedev complained, adding, "One could go as far as to say that we have slid back to a new Cold War. Almost on an everyday basis we are called one of the most terrible threats either to NATO as a whole or to Europe, or to the United States."

But Russia is still illegally occupying Crimea and covertly supporting a separatist war in Eastern Ukraine. These facts were not lost on Breedlove, who said, "Our actions are defensive, and they are proportionate in size and capability."

NATO is bolstering its reassurance efforts because it spent 20 years trying to build a partnership with Russia, a nation that "does not want to be a partner," Breedlove said.

And so, to demonstrate commitment to those threatened by Russia, USAF will vigorously bolster its European capabilities. Airpower is fast, flexible, and highly visible when needed.

One final example: As part of the 2017 budget request, USAF seeks infrastructure improvements at Spangdahlem to support fifth generation fighter operations with hardened aircraft shelters, a low observable/ composite repair facility, and other upgrades to facilitate F-22 (and eventually F-35) deployments to Europe.

As NATO Secretary General Jens Stoltenberg said in Munich, "Deterrence starts with resolve. It's not enough to feel it. You also have to show it." ★

**To deter Russia, the US will dramatically increase its forward presence in Europe.**



# The Warthog Lives On

**S**en. Kelly Ayotte (R-N.H.) won a decisive victory in February when Defense Secretary Ashton B. Carter announced plans to keep the Air Force's fleet of A-10 Warthogs flying until 2022, reversing the military's cost-saving effort to send the ground attack aircraft to the boneyard.

The New Hampshire Republican, whose husband was an A-10 pilot, had led efforts on Capitol Hill to keep the Warthog in the Air Force's inventory despite assertions from defense officials that the cost of maintaining the single-mission airframes was simply too high in an era of constrained budgets.

Ayotte, a vocal member of the Senate Armed Services Committee who has emerged as a leading hawk, wasted no time declaring victory and pivoting to preserve the mission in the future.

"We should now get to work on the development and procurement of an aircraft that can eventually replace the A-10 and provide even better close air support capabilities for our troops," she said in a Feb. 2 statement. "Technology will continue to advance and threats will continue to evolve, but our ground troops will always need effective, lethal, and precise close air support—and as long as I am in the Senate I will fight to ensure they have it."

The key to the statement, however, is how long she will be in the Senate. While she won her much-publicized fight over the A-10, her own battle for re-election is in considerably more doubt.

As the 2016 congressional campaigns begin to heat up, control of the Senate is up for grabs, and Ayotte is one of the most vulnerable senators going into the November elections. She has a formidable challenger in popular Democratic Gov. Maggie Hassan.

In 2010, Ayotte won her seat with a healthy 60 percent margin, but New Hampshire has trended more Democratic in statewide elections in recent years. Indeed, the state's senior senator, Jeanne Shaheen, was one of only a handful of vulnerable Democrats in 2014 to survive that election cycle, which thrust control of the Senate into the hands of Republicans.

Ayotte is considered a rising star in GOP circles, particularly as she has partnered with Senate Armed Services Committee Chairman Sen. John McCain of Arizona and Sen. Lindsey O. Graham of South Carolina to promote hawkish defense policies and higher Pentagon spending levels. However, she is a

moderate and has worked with Democrats on a range of issues, including military sexual assault.

Her election will likely hinge more on domestic issues, like funding for Planned Parenthood, on which she has had to stray from conservatives, than on matters of national security. And in a state that has voted for Democrats in most recent presidential elections, the timing of Ayotte's re-election bid in a presidential year could hurt her chances.

Ayotte isn't the only lawmaker with deep national security interests fighting for her political life in what could be one of the most interesting congressional election cycles in recent memory.

Even McCain, a formidable presence in the Senate who is seeking a sixth term in the chamber, has a fight on his hands. He won re-election in 2010 with 59 percent of the vote, but he has perhaps his fiercest general-election challenger in Democratic Rep. Ann Kirkpatrick, a three-term House member whose district includes Flagstaff and the southern Phoenix suburbs.

For McCain, however, it's not just his re-election that is at stake. He could lose his gavel as well.

If Democrats regain control of the Senate but McCain maintains his own seat, GOP rules would prohibit the Arizona Republican from serving as the powerful panel's ranking Republican, a job he has already held for six years.

Among those Republicans who hope to prevent a Democratic takeover of the upper chamber is Rep. Joe Heck of Nevada, a one-star general in the Army Reserve who is running for the seat left open by retiring Senate Minority Leader Harry Reid (D-Nev.). Heck, a military physician, currently serves as the House Armed Services military personnel subcommittee chair and would likely angle for a Senate Armed Services slot, should he win in November.

But his victory, like many other competitions for Senate seats this year, is far from certain. Democrats have recruited Catherine Cortez Masto, a former state attorney general, to run against Heck, and they are pulling out all the stops to hold onto that seat—a necessary win if they have any hope to regain control of the Senate. ★

*Megan Scully is a reporter for CQ Roll Call.*

*Congress has kept the A-10 flying, but will pro-military lawmakers win re-election?*

USAF photo by T8gt. Jason Robertson



## Sigh

Nice compilation of fighter pictures. Too bad airlift, tanker, bomber, and ISR aircraft, plus key support elements, too numerous to mention, did not participate in the 25 years of war [*"USAF: 25 Years at War," January, p. 20*]. Maybe they were not engaged or perhaps they were just forgotten. The more things change, the more they stay the same.

Col. Larry Hammack,  
USAF (Ret.)  
Moseley, Va.

I read the several letters complaining that the writer's favorite aircraft was omitted from the "USAF: 25 Years of War" issue with disbelief [*"Letters: We Agree, It's Disappointing," February, p. 6*].

I well recall how you begged us readers to submit our photos in September and October as you note. I encouraged a number of my friends to do so. As one who feels highly honored by having one of mine printed, I appreciated the opportunity.

MSgt. Bill Brockman,  
ANG (Ret.)  
Atlanta

Your article "25 Years at War" included extraordinary coverage of airmen and warfighting systems. I would have added

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documentation of some of the critical contributors: B-52's first shots of Desert Storm fired with CALCM plus Ops out of Diego. Fourteen years of B-1 precision CAS. Forty-four-hour B-2 sorties kicking off Enduring Freedom. And then there are the constant enablers making everyone look good: AWACS, Rivet Joint, Joint STARS, and strategic airlift. As history repeats itself, we need to think through and pace ourselves for the next 25 years. Looks like the BUFF will still be around!

Lt. Gen. Thomas J. Keck,  
USAF (Ret.)  
Tucson, Ariz.

## Missed a Decade or So

"AWACS for the 21st Century" (January, p. 68) did a credible job conveying the operational impact of the massive Block 40/45 upgrade. Conversely, in reporting its deployment to the Middle East, the article fell short on the historical perspective of AWACS operating continuously in the AOR by nearly a third. Statements such as "since the aircraft began watching Iraq in the early 1990s"; "the jet has been flying continuously in the Middle East for more than two decades"; and "AWACS and the Air Force have been in the desert ... since the first Gulf War" all miss nearly a decade of the 552nd AWACW's proud history. Comprising thousands of sorties and tens of thousands of flying hours during the period 1980-89, 552nd crews flew these aircraft in executing round-the-clock, 24/7/365 combat weapons control, surveillance, and warning during Operation Elf One. Telling a first generation AWACS "crew dog" that continuous combat operations in the Middle East began in the 1990s, would be akin to telling an RAF airman that World War II began with the attack on Pearl Harbor!

Col. Dan Koslov,  
USAF (Ret.)  
Alexandria, Va.

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Rebecca Susan Lipscomb  
Periodicals Chief  
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Maxwell AFB, Ala.

## General Robinson

Enjoyed the article on Gen. Lori Robinson [*"Wingman: In Command," January, p. 78*]. She was the second person to welcome me to Thumrait Air Base [Oman] when I stepped off the rotator. The first was Col. James Kowalski. What's the chance of being deployed with two individuals, at the same time, who are both promoted to oversee major commands?

CMSgt. Fred W. Spielmann,  
USAF (Ret.)  
Longwood, Fla.

In your article on General Robinson you mentioned her tour as commander of the 17th Training Wing at Goodfel-

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low AFB, Texas, where the 17th has a "mixed bag" of training for operational endeavors, but you failed to mention the maintenance training programs that keep those systems up and running. As a ground radio maintenance instructor,

I spent two tours at Goodfellow, one of which was during Col. (later Gen.) Norma Brown's tour as commander.  
MSgt. David C. Stamps,  
USAF (Ret.)  
Carlsbad, Texas

### Correction

Due to an editing error, the February "Airpower Classics: Predator," p. 84, listed two pilots as having received the Distinguished Flying Cross for flying the Predator RPA. No RPA pilots have received the DFC.—THE EDITORS

## Senior Staff Changes

**NOMINATIONS: To be Major General:** Steven L. **Basham**, Carl A. **Buhler**, James C. **Dawkins Jr.**, Dawn M. **Dunlop**, Albert M. **Elton II**, Michael A. **Fantini**, Cedric D. **George**, Patrick C. **Higby**, Mark K. **Johnson**, Brian T. **Kelly**, Brian M. **Killough**, Scott A. **Kinds-vater**, Donald E. **Kirkland**, Robert D. **LaBrutta**, Russell A. **Mack**, Charles L. **Moore Jr.**, Paul D. **Nelson**, Mary F. **O'Brien**, John T. **Quintas**, Duke Z. **Richardson**, Robert J. **Skin-ner**, Bradley D. **Spacy**, Ferdinand B. **Stoss**, Jeffrey B. **Taliaferro**, Christopher P. **Wegge-man**, Stephen N. **Whiting**, John M. **Wood**. **To be Brigadier General:** Michael A. **Guetein**, Brook J. **Leonard**.

**CHANGES:** Brig. Gen. (sel.) Mark A. **Baird**, from Spec. Asst. to the Cmdr., AFMC, Wright-Patterson AFB, Ohio, to Vice Cmdr., SMC, AFSPC, Los Angeles AFB, Calif. ... Brig. Gen. (sel.) James R. **Cluff**, from Sr. Mil. Asst. to USD for Intel., OSD, Pentagon, to Vice Cmdr., 25th AF, ACC, JBSA-Lackland, Texas ... Brig. Gen. Richard A. **Coe**, from Dep. Commanding General-Air, Combined Jt. Forces Land Component Command-Iraq, to IG, ACC, JB Langley-Eustis, Va. ... Maj. Gen. Dwyer L. **Dennis**, from Dir., Global Reach Prgms., USAF, Pentagon, to PEO, C3I & Networks, AFMC, Hanscom AFB, Mass. ... Maj. Gen. Eric T. **Fick**, from PEO for Fighters & Bombers, AFLCMC, AFMC, Wright-Patterson AFB, Ohio, to Dir., Global Reach Prgms., USAF, Pentagon ... Maj. Gen. (sel.) Scott A. **Howell**, from Dir., Ops., AFSOC, Hurlburt Field, Fla., to Cmdr., Spec. Ops. Jt. Task Force-Afghanistan, US Forces-Afghanistan, CENTCOM, Kabul, Afghanistan ... Brig. Gen. (sel.) Matthew C. **Isler**, from Cmdr., 12th FTW, AETC, JBSA-Randolph, Texas, to Dep. Commanding Gen.-Air, Combined Jt. Forces Land Component Command-Iraq ... Maj. Gen. Verallinn **Jamieson**, from Dir. Intel., ACC, JB Langley-Eustis, Va., to Dep. Cmdr., Jt. Functional Component Command for ISR, STRATCOM, JB Anacostia-Bolling, D.C. ... Brig. Gen. Peter J. **Lam-berth**, from Vice Cmdr., 25th AF, ACC, JBSA-Lackland, Texas, to Dir., Intel., ACC, JB Langley-Eustis, Va. ... Brig. Gen. (sel.) Jeannie M. **Leavitt**, from Principal Mil. Asst. to the SECDEF, OSD, Pentagon, to Cmdr., 57th FW, ACC, Nellis AFB, Nev. ... Brig. Gen. Russell L. **Mack**, from IG, ACC, JB Langley-Eustis, Va., to Dir., Plans, Prgms., & Rqmts., ACC, JB Langley-Eustis, Va. ... Maj. Gen. Robert D. **McMurry Jr.**, from Vice Cmdr., SMC, AFSPC, Los Angeles AFB, Calif., to Cmdr., AFRL, AFMC, Wright-Patterson AFB, Ohio ... Brig. Gen. (sel.) James D. **Peccia III**, from Associate Dir., Budget Ops. & Personnel, Office of the Asst. SECAF, Financial Mgmt. & Comptroller, OSD, Pentagon, to Dir., Budget Ops. & Personnel, Office of the Asst. SECAF, Financial Mgmt. & Comptroller, OSD, Pentagon ... Brig. Gen. Michael J. **Schmidt**, from PEO for ISR & Spec. Ops. Forces, AFLCMC, AFMC, Wright-Pat-terson AFB, Ohio, to PEO for Fighters & Bombers, AFLCMC, AFMC, Wright-Patterson AFB, Ohio ... Brig. Gen. Christopher M. **Short**, from Cmdr., 57th FW, ACC, Nellis AFB, Nev., to Sr. Defense Official, DIA, US Embassy, UK ... Maj. Gen. Jay B. **Silveria**, from Cmdr., US Air Warfare Center, ACC, Nellis AFB, Nev., to Dep. Cmdr., AFCENT, CENTCOM, Southwest Asia ... Brig. Gen. (sel.) Daniel L. **Simpson**, from Cmdr., NSA/Central Security Service Texas, NSA, JBSA-Lackland, Texas, to Dep. Dir., Intel., US Forces-Afghanistan, CENT-COM, Kabul, Afghanistan ... Brig. Gen. Ferdinand B. **Stoss**, from Dir., Strat. Plans, Prgms., & Assessments, AFGSC, Barksdale AFB, La., to Dir., Ops., AFGSC, Barksdale AFB, La. ... Maj. Gen. (sel.) Jeffrey B. **Taliaferro**, from Dir., Plans, Prgms., & Rqmts., ACC, JB Langley-Eustis, Va., to Cmdr., 9th Air & Space Expeditionary Task Force-Afghanistan, CENTCOM, Kabul, Afghanistan ... Maj. Gen. (sel.) Glen D. **VanHerck**, from Dir., Ops., AFGSC, Barksdale AFB, La., to Cmdr., US Air Warfare Center, ACC, Nellis AFB, Nev. ... Brig. Gen. (sel.) John T. **Wilcox II**, from Cmdr., 341st Missile Wg., AFGSC, Malmstrom AFB, Mont., to Dir., Strat. Plans, Prgms., & Assessments, AFGSC, Barksdale AFB, La. ... Lt. Gen. (sel.) Robert S. **Williams**, from Chief, Office of Mil. Cooperation, CENT-COM, US Embassy, Kuwait, to Cmdr., 1st AF (Air Forces Northern), Tyndall AFB, Fla.

**SENIOR EXECUTIVE SERVICE CHANGE:** Henrietta K. **Brisbon**, to Vice Procurement Svcs. Executive, Defense Info. Tech. Contracting Orgn., Ft. Meade, Md.



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## Back to full spectrum; Keeping the A-10; Arsenal plane; Warming up for future fights....

WASHINGTON, D.C., FEB. 4

### EMBRACING "NEXT-WAR-ITIS"

With its Fiscal 2017 budget request, the Pentagon is shedding its posture of focusing almost exclusively on counterinsurgency and the all-out pursuit of terrorists, saying the threats posed by near-peers, such as Russia and China, are now its top priority. While the fight against ISIS and terrorism broadly will still be vigorous—and would get a huge boost in the spending plan now before Congress—the “base budget” request clearly emphasizes investment in modernization, research, and development geared for a future, high-end fight.

The \$582.7 billion budget request marks a full pendulum swing away from the policies of just seven years ago, when then-Defense Secretary Robert M. Gates fired the Air Force’s top leaders partly because of what he viewed as their “next-war-itis”—what Gates considered to be the inexcusable sin of continuing to prepare for high-end major-nation warfare instead of bending every dollar and asset available to the lower-tech fights in Afghanistan and Iraq.

The switch back to “full spectrum” readiness signals an acceptance on the part of national security leaders that the strategy of the Obama Administration—that there can’t be a new Cold War if the US won’t play along—hasn’t worked, and that during America’s long preoccupation with Middle East brush wars, its major competitors have gained ground technologically, and now pose a much bigger problem.

Defense Secretary Ashton B. Carter, providing an early February “preview” of the defense budget, said the new spending plan takes “the long view” of challenges, which amount to “a return to ‘great power’ ... competition.”

The budget proposal focuses on “the fights that might come 10, 20, or 30 years down the road.” The US must confront “a new strategic era,” Carter asserted.

“We’re taking a strong and balanced approach to deter Russian aggression,” he said in Washington, D.C., calling Russia the top existential threat to the US. “We haven’t had to worry about this for 25 years,” Carter noted, and “while I wish it were otherwise, now we do.”

The world has “not stood still” while the US fought in Afghanistan and Iraq, Carter said, and the security environment is “dramatically different than the one we’ve been engaged in” since the first Gulf War in 1991.

China, Carter said, continues its explosive military spending and growth, and this fact will require the US to continue its “rebalance, so-called, to maintain stability” in the Pacific region.

Carter called out North Korea as the third-highest security challenge facing the US. American forces will have to remain ready to “fight tonight” on the Korean Peninsula because of Pyongyang’s unstable and threatening behavior.

Iran is the fourth on the list of security challenges, Carter said. The nuclear weapons deal struck with Iran is a good one, he said, because it “doesn’t limit us in the Defense Department in any way,” but the US military will “still have to

counter Iran’s malign influence against our friends and allies in the region, especially Israel.”

The fight against terrorism, and ISIS in particular, is the fifth-ranking challenge, Carter said. ISIS “must and will be defeated now” because it is “metastasizing in Afghanistan, Africa, and elsewhere.” The anti-terrorism fight will likely continue for years, he said, and will get increasingly tough. This is because “destructive power of greater and greater magnitude” is falling into the hands of “smaller and more aberrant groups.”

While DOD “must and will address all five of those challenges,” doing so will demand “new thinking” and a recognition that the realm of potential combat has expanded beyond air, land, and sea, to “cyber, space, and electronic warfare.”

### CARRY A BIGGER STICK

Deterrence is the key for security in all of the nation-state scenarios, Carter asserted. “We must have—and [be seen] to have—the ability to impose unacceptable costs on an advanced aggressor that will either dissuade them from taking provocative action or make them deeply regret it if they do.”

“The US military will fight very differently” than it has in the last 15 years, and will be readied to cope with “a high-end enemy,” Carter said. Russia and China will be the pacing and “most stressing competitors.” They are pursuing capabilities “that seek to achieve their objectives rapidly; before, they hope, we can respond.” Although the US doesn’t want a conflict with either country, “we also cannot blind ourselves to the actions they appear to choose to pursue.”

To defeat ISIS, Carter said DOD is proposing to double its spending on Operation Inherent Resolve to \$7.5 billion in 2017. He suggested that \$1.8 billion of that will go to replenish depleted war stocks. “We’ve recently been hitting [ISIS] with so many GPS-guided smart bombs and laser-guided rockets that we’re starting to run low on the ones that we use against terrorists the most,” he said, specifying that the money would buy about 45,000 more munitions.

The Pentagon will back away from its proposed retirement of the A-10 Warthog until 2022, Carter acknowledged, saying broadly that more fourth generation aircraft will be retained than planned. The A-10 would be replaced by F-35s “on a squadron-by-squadron basis, so we’ll always have enough aircraft for today’s conflicts.” However, it was revealed separately that the Air Force would buy five fewer F-35s in Fiscal 2017 than previously planned, to cover other modernization expenses.

The budget plans for a quadrupling of funds allocated to the European Reassurance Initiative, Carter said, from \$800 million in FY16 to \$3.4 billion in FY17. The money will fund additional force rotations from the US to Europe, more international exercises and training, more pre-positioned equipment, and “infrastructure improvements to support all this.”

The goal, to be achieved by the end of 2017, is to create “a highly capable combined arms ground force that can respond



across the theater, if necessary," with Russia clearly the driving threat behind this development.

As adversaries have grown more adept with precision, stealth, and in the cyber and space domains, it will be necessary to invest heavily in future leap-ahead capabilities, Carter said. For three decades, the US enjoyed technological dominance in these areas, but no more.

He noted that the Pentagon's Strategic Capabilities Office, which Carter created in 2012 to rapidly field new technologies, will get an unspecified boost in 2017 funding, as part of an overall \$71.4 billion Pentagon research and development program. But rather than try to introduce vast fleets of all-new gear, the emphasis will be to "build on what we have" and increase the capabilities of extant systems, "keeping current capabilities viable for as long as possible."

Carter said a top priority of the SCO will be to adapt the micro-technologies found in smartphones—cameras, sensors, micromechanical systems—and put them on weapons, such as the Small Diameter Bomb, to allow advanced targeting "through commercial components."

Another initiative will be in swarming autonomous vehicles, such as "micro-drones that are really fast, really resistant," that can be "kicked out the back of a fighter jet moving at Mach 0.9" or "thrown into the air by a soldier in the middle of the Iraqi desert." These small vehicles would also be produced through additive manufacturing, or 3-D printing.

Carter said the long-term research done on railguns will soon produce longer-range, higher-speed artillery shells that can also be used for point defense. Fired out of existing gun barrels on Army artillery or Navy ships, the weapons will be capable of "defeating incoming missile raids at a much lower cost per round and thereby imposing higher costs on an attacker."

## THE FLYING AIR FORCE MAGAZINE

Finally, Carter said the Pentagon will adapt "one of our oldest aircraft"—he didn't immediately identify which one—and turn it into an "arsenal plane," which will function as "a very large airborne magazine, networked to fifth generation aircraft that act as forward sensor and targeting nodes."

A major shortcoming of the F-22 and F-35, the Air Force's two stealth fighters, is that their internal weapons carriage is limited. The arsenal plane concept would seem to address this shortcoming by allowing the stealth fighters to designate targets for long-range weapons carried by the magazine aircraft well out of enemy air defense range. The project is an example of how the Defense Department will combine "different systems already in our inventory to create whole new capabilities," he said.

Submarines would also get a big increase, to the tune of "more than \$40 billion over the next five years," to equip them to carry more Tomahawk cruise missiles, more than tripling each sub's capacity from 12 to 40 Tomahawks each.

The Navy's F-18 Super Hornet fleet would also be bolstered, to ensure a full supply of carrier-based striking power until the F-35C version of the Joint Strike Fighter is available in larger numbers. As a tradeoff, Carter said, the Navy will reduce its buy of littoral combat ships.

Cyber capabilities would be increased department-wide by \$7 billion in Fiscal 2017 and \$35 billion over five years, Carter noted. The money will go to build better network defenses and cyber "training ranges" on which to exercise them.

Space capabilities would get an increase of \$5 billion. Carter said the US is no longer "waiting to invest until the threats [in space] are fully realized." Space is no longer a "sanctuary" and the increase would fund ways to "identify, attribute, and negate all threatening actions in space." The US depends on space for its military capabilities, and some adversaries "want to take that away from us," Carter said.

Some of the money to pay for these initiatives will come from reductions in Defense Department overhead costs, which Carter said would amount to "\$8 billion over the next five years." He also pledged to propose some revisions to the Goldwater-Nichols defense reforms of 1986 to further streamline the defense organization. A review, he said, had been underway for several months, and Carter promised decisions "in [the] coming weeks."

The US no longer has the luxury of focusing on a single type of threat, Carter asserted. Echoing the old complaint from his predecessor Gates, Carter said DOD sometimes concentrated on "whatever big war people thought was coming over the horizon" to the detriment of the fight at hand. That approach "won't work for the world we live in today," he said.

The US can't choose the fights it wants to engage in and "we have to do both" the big wars and small ones, Carter said. "That's what this budget is designed to do."

## A CHANGE IN CLIMATE

The Defense Department in January started assigning various responsibilities for dealing with climate change. This comes after multiple Pentagon studies over the last 20 years identifying serious strategic challenges emerging from climate change, with the effects already affecting the world security situation.

Pentagon Directive 4715.21, dated Jan. 14, said that all mission planning and execution will henceforth include the effects of climate change on the DOD mission; taking those effects into consideration when developing plans and procedures, and "anticipating and managing any risks that develop as a result of climate change to build resilience."

The most recent Pentagon assessment of the risks of climate change, published last July, noted that rising world temperatures are producing tangible effects requiring action by DOD. Among them, the Arctic Ocean is now largely ice-free during the summer months, prompting far more commercial traffic—and Russian naval activity. Given Russia's recent unpredictable and aggressive actions on numerous fronts, this increased military presence in the Arctic in turn requires a greater US Navy response. It also requires the ability to operate in an area formerly often only accessible by submarines.

The report also noted that most coastal Navy ports and some lowland bases near the ocean are increasingly subject to flooding and more destructive storms. This mandates more resilient infrastructure and places for forces under storm threat to safely relocate.

The undersecretary of defense for acquisition, technology, and logistics is to develop a series of "boards, councils, and working groups to integrate climate change considerations" in Pentagon policies and plans, and determine how climate change will drive "life cycle analyses" for various systems and compel the purchase or modification of various systems.

Other defense entities were tasked to assess how they will have to change or gear up to combat the effects of global warming and to assess "challenges and opportunities" arising from it.





## A Cultural Shift in Space

The Air Force is changing its training and creating a “cultural shift” in its space domain to prepare for possible future conflicts that could threaten America’s assets in orbit, Air Force Secretary Deborah Lee James said.

“We are going to start treating space the way we treat everything else in the US military,” James said on Jan. 14 at the Center for Strategic and International Studies in Washington, D.C. “We need to get our heads around the fact that one day there could be a conflict on Earth that, in some way, bleeds into space.”

To prepare, the Air Force is shifting resources and experimenting on how it can train to defend its constellation of satellites, much like the service trains to protect its assets in other domains, James said. She said investments and tests by China and Russia are spurring the change.

## 📸 screenshot

02.08.2016

*An F-35A team parks a Lightning II for the first time at Mountain Home AFB, Idaho. The Air Force version of the strike fighter arrived there for testing by the 31st Test and Evaluation Squadron from Edwards AFB, Calif. In this first test simulating deployment, the F-35A was to carry out suppression of enemy air defenses, close air support, and air interdiction flights.*





Winston A. Beauchamp, deputy undersecretary of the Air Force for space, said on Jan. 29 the transition is a work in progress.

"The need for improved mission assurance is not new, but the realization that we're not currently postured to provide assured access to critical space capabilities—that's one that's only a couple of years old," Beauchamp said at an Air Force Association Mitchell Institute for Aerospace Studies space breakfast on Capitol Hill.

"We have put together an architecture that accomplishes [the] mission very efficiently, but it will not have the capability to protect itself and be resilient in the face of [a] threat," he added.

#### **DOD's New Maternity, Paternity Policy**

Defense Secretary Ashton B. Carter on Jan. 28 announced a new standardized maternity leave for new mothers as part of



USAF photo by A1C Connor J. Marth



his "Force of the Future" initiative, saying the policy will put the Defense Department in the "top tier of institutions nationwide."

Under the new policy, new mothers will receive 12 weeks, doubling what was previously standard, though it is just two-thirds of what the Navy had approved and what Air Force Secretary Deborah Lee James said she wanted to implement.

The move is "imperative for attracting and retaining talent," Carter said. The Department of the Navy previously set its maternity leave at 18 weeks for female sailors and marines. In December, James said she wanted the Air Force to follow in the Navy's footsteps, but the service will now stay at the 12-week standard.

"I applaud Secretary Carter and welcome these announcements as a positive step forward for our airmen and their families," said James in a statement.

DOD is pushing to increase paternity leave from 10 days to 14, Carter said. The military also will extend adoption leave from three weeks for one parent by adding two weeks of leave for the second parent.

### F-35s To Fly at Farnborough

Air Force F-35As will make their debut at the Royal International Air Tattoo and the Farnborough Air Show in July, the service announced. F-35As from Luke AFB, Ariz., will join Marine Corps F-35Bs in both static displays and a heritage flight at the shows.

"The plan for F-35 aircraft to take part in air shows here in the UK this summer is a significant milestone for our RAF and Royal Navy personnel training hard to fly the F-35; for British industry who are contributing an impressive 15 percent of every aircraft; and for the British public who will have their first opportunity to see this remarkable aircraft in action," said British Defense Secretary Michael C. Fallon in the release.

### First KC-46A Fill Up

The KC-46A Pegasus on Jan. 24 conducted its first aerial refueling, transferring fuel through its boom to an F-16C during a test flight from Edwards AFB, Calif., the Air Force announced. The tanker passed 1,600 pounds of fuel to an F-16C as a requirement to connect to a light/fast receiver.

Two weeks later, the KC-46 refueled an F/A-18, using the tanker's hose and drogue system.

## By the Numbers

# 103,419

Flight hours flown by KC-135s supporting US Central Command from Al Udeid AB, Qatar, in 2015. The aircraft, assigned to the 379th Air Expeditionary Wing, set a flying hour record, completing more than 20,000 sorties, and offloaded some 700 million pounds of fuel for Operations Inherent Resolve and Freedom's Sentinel, according to Air Forces Central Command. The wing operates USAF's largest fleet of KC-135s, with more than 60 aircraft.



USAF photo by Greg ... Davis

**Shoveling It:** SrA. Joshua Forren of the 436th Aircraft Maintenance Squadron at Dover AFB, Del., shovels ice from under the wing of a C-5M. In the background are piles of snow, plowed off the runway after a January winter storm dumped 22 inches of the white stuff on the base.

The next boom tests will be with an A-10 as a light/slow receiver and with a C-17 as a heavy receiver. The KC-46A will then test its centerline drogue system and wing aerial refueling pods with an AV-8B Harrier, according to Air Force Materiel Command.

The remaining tests are required before the Air Force makes its Milestone C low-rate Initial production decision. The first production contract is expected shortly after. USAF plans to purchase 170 tankers, with the first 18 KC 46s expected by August 2017.

### A Costly ICBM Mishap

In May 2014, in the midst of a Pentagon review of the nuclear enterprise, the 90th Missile Wing experienced a mishap that resulted in \$1.8 million in damage to an intercontinental ballistic missile, the Air Force announced Jan. 22.

The Minuteman III ICBM, assigned to the 90th MW at F. E. Warren AFB, Wyo., "became nonoperational during a diagnostic test," and the accident happened when maintenance personnel were troubleshooting the problem, according to the press release. No one was injured, and the mishap did not create a public safety hazard, the Air Force said.

An investigation found that the maintenance team chief was properly trained but "mistakenly performed an action not



## The War on Terrorism

### US Central Command Operations: Freedom's Sentinel and Inherent Resolve

As of Feb. 17, a total of 22 Americans had died in Operation Freedom's Sentinel, the mission in Afghanistan, and 14 Americans had died in Operation Inherent Resolve, the mission in Iraq and Syria.

The total includes 34 troops and two Department of Defense civilians.

There have been 86 troops wounded in action during OFS and five troops in OIR.

### In it for the Long Run

Defense Secretary Ashton B. Carter said the US support for the Afghan military will last through 2017 and beyond, saying the country is "in this for the long run."

The Afghan military is still a force in development, Carter said, and will need US support. However, the upcoming fighting season will see a much more capable Afghan military, he said, citing increased use of its long-range artillery and the delivery of A-29 Super Tucano close air support aircraft.

The Afghan forces will be "stronger [while] completely independent of US participation," Carter said. This is necessary to face a resurgent Taliban and a growing threat of ISIS in the country, he added.

Carter said the current rules of engagement are well thought out and "allow us to do what we think needs to be done." However, the US will adjust its plans in the future to better provide support to the Afghan forces, he noted.

### Super Tucanos Land in Afghanistan

The US Air Force on Jan. 15 delivered the first four of 20 A-29 Super Tucanos to Hamid Karzai Airport in Kabul, giving the Afghan Air Force its own fixed wing close air support capability.

US Army Brig. Gen. Wilson A. Shoffner, Operation Resolute Support spokesman, said the aircraft are expected to go into service in April. The US Air Force's

81st Fighter Squadron at Moody AFB, Ga., is expected to train 30 Afghan A-29 pilots over the next three years, according to an Air Forces Central news release. The first class of pilots and maintainers graduated in December.

"This is a fighting aircraft which will destroy the centers of enemies in the country," said Colonel Bahadur, public affairs director of the Afghan Air Force, in the release.

### Bones Leave the AOR

B-1s have taken a break from the fight in the Middle East for the first time since 2001, as aircraft assigned to the 379th Air Expeditionary Wing returned home in January for aircraft modifications.

During the unit's most recent six-month deployment, aircraft and crews, deployed from Ellsworth AFB, S.D., flew 490 sorties and dropped 4,850 bombs. The group dropped 2,224 bombs in one month, more than any other B-1B unit, topping the previous deployed team's mark of 1,068 bombs, said Capt. Abraham Smith, officer in charge of the 379th Expeditionary Aircraft Maintenance Squadron, in a press release.

"Hundreds of thousands of manpower hours have been put into the past six months to keep these aircraft running and it's been a very challenging and an exhausting deployment," Smith said.

The B-1B modification is one of the largest ever. Lt. Col. Michael Williams, who leads the 419th Flight Test Squadron at Edwards AFB, Calif., told *Air Force Magazine* last year the modification is so big it "ought to be called the B-1C." It includes the Vertical Situation Display Upgrade, which adds a digital cockpit; Fully Integrated Data Link to enhance targeting and command and control; and the Central Integrated Test System Upgrade, which gives aircrew real-time aircraft diagnostics and simplifies maintenance and troubleshooting.

Combined with ongoing sustainment efforts, the modification package will extend the bomber's viability beyond 2040.

directed by the technical guidance." He and the two airmen on his team were decertified but returned to duty after being retrained and recertified. Despite the timing of the incident, the Air Force kept the details from Pentagon investigators, according to the Associated Press.

### Aviation Mishaps Increase After Record Safe Year

Fiscal 2014 was the safest ever for Air Force manned aviation, but the total number of Class A aviation mishaps increased in Fiscal 2015, bringing it more in line with historical norms. In Fiscal 2015 there were a total of 35 Class A aviation mishaps (categorized as flight, flight related, aircraft ground operations, and remotely piloted aircraft), and seven aircraft were destroyed, compared to 24 total Class A aviation mishaps and two aircraft destroyed in Fiscal 2014, Air Force Safety Center spokesman Keith Wright told *Air Force Magazine*.

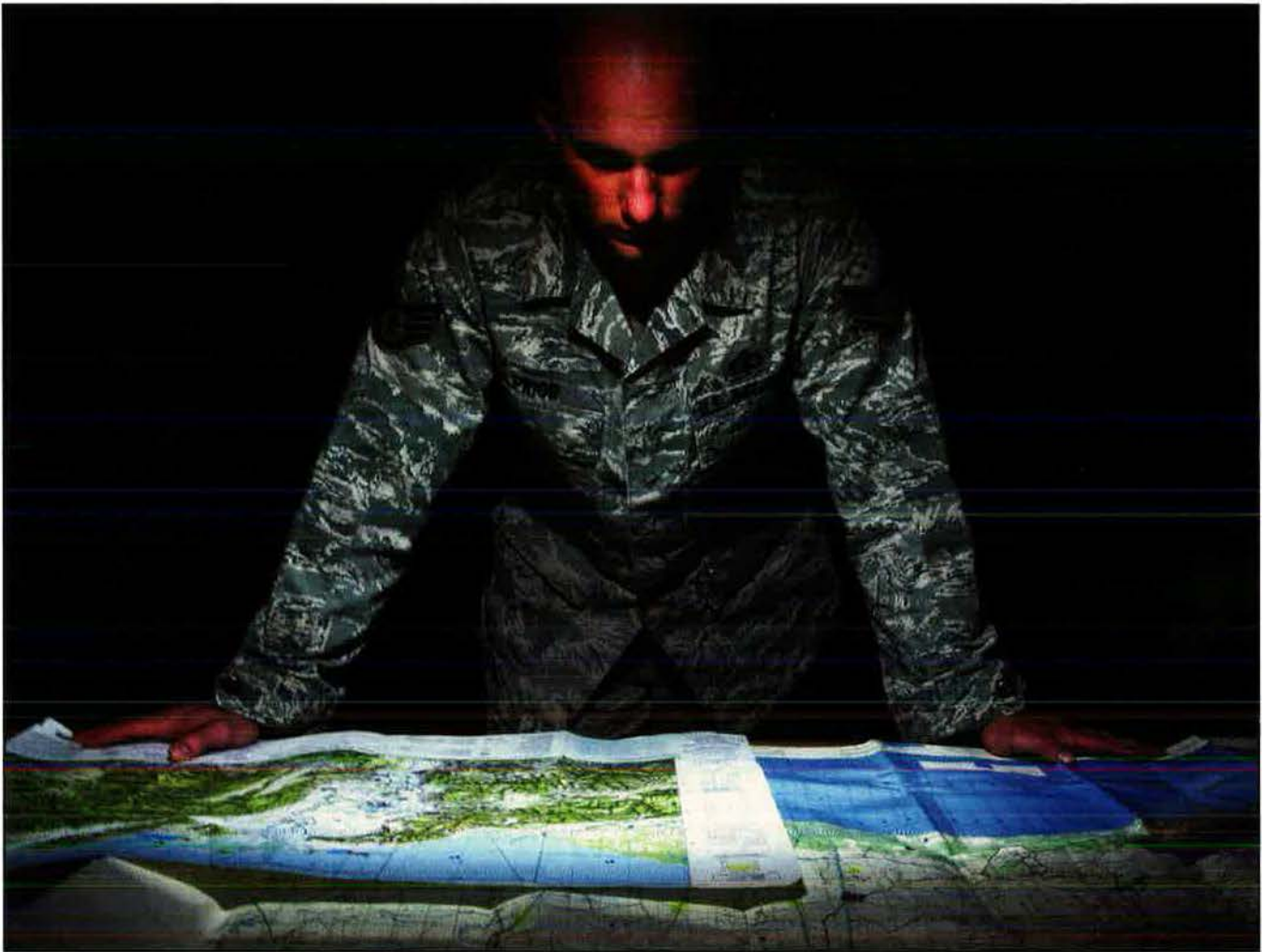
A Class A mishap is any accident in which someone is killed or permanently disabled or there is at least \$2 million in damage. There were 19 Class A aviation flight mishaps—"nearly identical" to the 10-year average of 18.5—and 16 Class A RPA mishaps in Fiscal 2015, compared to just seven aviation flight mishaps and 12 RPA mishaps in Fiscal 2014.

The number of deaths resulting from an aviation mishap decreased, dropping from 10 in Fiscal 2014 to six in Fiscal 2015. However, the number of on-duty ground fatalities increased, rising from one in Fiscal 2014 to four in Fiscal 2015. Off-duty ground fatalities also increased from 42 in Fiscal 2014 to 47 in Fiscal 2015, according to an Air Force news release.

### Pentagon Reviewing Valor Awards for Upgrade

Defense Secretary Ashton B. Carter on Jan. 7 directed the services to review every service cross and Silver Star award





USAF photo illustration by S/A. Danielle Juilla

since Sept. 11, 2001, for a possible upgrade as part of a broad review of the Defense Department's awards process.

The review includes more than 100 service crosses, including seven Air Force Crosses, for a possible upgrade to the Medal of Honor, the military's highest honor. The review process began under the direction of former Defense Secretary Chuck Hagel in 2014.

A senior defense official, speaking with reporters on background on Jan. 6, said no specific case brought about the review and the reviews directed by the Secretary are not related to the Air Force's decision to review recent Air Force Crosses for a Medal of Honor upgrade.

The Air Force is the only service to not have a Medal of Honor recipient since Sept. 11, 2001. Reviews are to be completed by Sept. 30, 2017. In addition, the Pentagon will attempt to improve the timeliness of the awarding of the Medal of Honor through new guidelines. This includes mandating that nominations for valor awards be initiated within 45 days of valorous action, processed through the chain of command so it reaches the Defense Secretary within 12 months, and the award of a service cross, Silver Star, or other valor awards should be made within 12 months of the process beginning, according to a Pentagon announcement.

#### DOD Creates New "Remote" Award Device

The Defense Department is creating new devices for military

**Safely South:** At MacDill AFB, Fla., SSgt. Darrell Prior examines a map of Colombia. A terminal instrument procedures (TERPS) specialist with Air Mobility Command, Prior helps ensure the safe landing of DOD aircraft in Central America, South America, the Caribbean, and Mexico. TERPS airmen evaluate host nation procedures and apply USAF criteria. The specialists work with their foreign nation counterparts and also visit their assigned countries to build partnerships.

awards to further clarify how a service member contributed to the fight, including creating an "R" device for remote operations, the Pentagon announced Jan. 7.

The "R" device will be awarded to a service member who uses "remote technology" to directly impact combat operations, according to a Pentagon announcement. A senior defense official, speaking to reporters on background before the announcement, said the device will be for service members who, through a specific, direct, and hands-on action, immediately influenced a battle.

While currently the device will largely focus on remotely piloted aircraft pilots and sensor operators, officials said the criteria is written to include any future technology that could directly impact a battle remotely.

The Pentagon is also creating a "C" device for awards to recognize members who performed meritoriously in combat. This will be separate from the current "V" device, which is specifically awarded for valor actions in combat. ★



By Robert S. Dudley

**Chatter**

"I will make a prediction, and I hope I'm wrong. If they [Obama Administration officials] don't change their policies toward Syria, ... an attack against this homeland is coming, and it's coming from Syria. It is being planned as I speak."—*Sen. Lindsey O. Graham (R-S.C.), remarks to the press, Feb. 4.*

**The Big Five**

"We have five ... evolving challenges. ... First is in Europe, ... to deter Russian aggression, and we haven't had to worry about this for 25 years. ... Second is in the Asia-Pacific, where China is rising, and where we're continuing ... to maintain the stability in the region that we have underwritten for 70 years. ... Third challenge is North Korea, a hardy perennial, a threat to both us and to our allies. ... Iran is the fourth challenge. ... We still have to counter Iran's malign influence against our friends and allies in the region, especially Israel. And challenge number five is our ongoing fight to defeat terrorism and especially [ISIS]."—*Secretary of Defense Ashton B. Carter, remarks at the Economic Club of Washington, D.C., Feb. 2.*

**How To Lose Lives**

"Unfortunately, there's nothing operationally today that's driving ... modernization. Air forces that fall behind the technology curve will fail. We can't let that happen. As the threat increases, if your capability against it does not become more and more technologically advanced, then you will lose more lives if you're faced with that threat. The enemy is not resting, and we can't afford to. We have to maintain a balance of capability, capacity, and readiness. The price of systems has prohibited us from buying all high-end equipment over time, and quantity does have a quality all of its own."—*Gen. Mark A. Welsh III, USAF Chief of Staff, comments to the press at JB Langley-Eustis, Va., Dec. 16.*

**The Challenge**

"Our job is not necessarily to defend our network. I can hire people to defend our network. We have to figure out how to operate in that [contested military cyber] domain and we have to protect our missions in

our domain. Our entire air superiority structure—the F-22, the F-35—is dependent on cyber."—*USAF Gen. John E. Hyten, commander of Air Force Space Command, remarks to a cyber symposium in Colorado Springs, Colo., Feb. 2.*

**McCain Blasts Off**

"Empty promises, ... stalling tactics, stale arguments, and suspect assertions. ... Little progress has been made in limiting the influence of Russia on space launch. ... Today, Russia holds many of our most precious national security satellites at risk before they ever get off the ground. ... It says an awful lot about the current acquisition system when the default assertion from the Air Force is that it takes longer to develop a rocket engine today than it took to develop the entire Saturn V launch vehicle that took us to the moon in the 1960s."—*Sen. John McCain (R-Ariz.), Senate Armed Services Committee hearing with Secretary of the Air Force Deborah Lee James, Jan. 27.*

**Gates' Critique**

"The level of dialogue on national security issues would embarrass a middle schooler. People are out there making threats and promises that are totally unrealistic, totally unattainable. Either they really believe what they're saying, or they're cynical and opportunistic—and, in a way, you hope it's the latter, because God forbid they actually believe some of the things that they're saying. ... A lot of people in both parties are making huge promises and commitments. In some cases the things they're saying they're going to do are unconstitutional or merely against the law, and others are, from a budgetary standpoint, inconceivable."—*Robert M. Gates, former Secretary of Defense and CIA director, slamming presidential candidates at a Politico event, Jan. 25.*

**Terminator Conundrum**

"Artificial intelligence can help us with a lot of things that make warfighting faster, that make warfighting more predictable, that allow us to mine all of the data that we have about an opponent, to make better operational

decisions. ... I might say to a weapon, 'Go learn the signature; once you've learned the signature, identify the target.' That's about as far as I'm willing to go at this point. ... A human has the responsibility to make the decision to prosecute the target. ... There are ethical implications, there are implications for the laws of war. There are implications that I call 'The Terminator Conundrum.' What happens when that thing can inflict mortal harm and is empowered by artificial intelligence? ... How are we going to know what is in the vehicle's mind, presuming for the moment that we are capable of creating a vehicle with a mind?"—*USAF Gen. Paul J. Selva, vice chairman of the Joint Chiefs of Staff, remarks at Brookings Institution, Jan. 21.*


**Sixteen in a Row**

"The American public believes its military is No. 1, but its commanders and enemies increasingly know differently. ... Losing is no longer unthinkable. Beginning in 2014, former Pentagon force planner David Ochmanek ran wargames examining whether the US and NATO could defend the Baltics against an attempted Russian takeover. He ran 16 wargames with eight different teams of military personnel; the US lost every time. The exercise disproved the assumption that America's supposed technological edge would make up for US forces' being outnumbered in Europe."—*Mackenzie Eaglen, American Enterprise Institute's Marilyn Ware Center for Security Studies, Wall Street Journal editorial, Jan. 31.*

**Cyber and Terror**

"A lot of people find this surprising in our post-9/11 world, but in 2013, 'cyber' bumped 'terrorism' out of the top spot on our list of national threats, and cyber has led our report every year since then. ... Our primary concern is low-to-moderate level cyber intrusions from a variety of sources which will continue and probably expand. They impose increasing costs to our businesses, to US economic competitiveness, and to national security. The cyber threat is here. It's upon us now."—*Retired USAF Lt. Gen. James R. Clapper Jr., Director of National Intelligence, speech, US Naval Academy, Jan. 29.*





**USAF'S BIGGEST PROBLEM  
WITH THE F-22? THERE AREN'T  
ENOUGH TO GO AROUND.**

*Open wide: An F-22 displays its weapons bay for an air show at JB Elmendorf-Richardson, Alaska. In wartime, the Raptor carries AMRAAMs, JDAMs, and SDBs. Specialized munitions could make the limited fleet even more effective.*



By John A. Tirpak, Editorial Director

# CRITICAL INGREDIENT *in* SHORT SUPPLY

**T**EN years after the Air Force declared initial operational capability with the F-22 Raptor, the jet is receiving high marks for its combat performance, proving itself to be everything USAF expected—and more. The biggest challenge for the Raptor community now is how to stretch the limited fleet so USAF can guarantee air superiority until a successor aircraft comes along. That may not happen for another 20 years.

Raptors deployed in Operation Inherent Resolve against ISIS over Iraq and Syria have proved so crucial to the coalition air campaign over the last 17 months that Air Combat Command chief Gen. Herbert J. “Hawk” Carlisle has said US Central Command simply won’t send strike packages into some areas without them. Far beyond merely protecting coalition aircraft from hostile fighters, the F-22s are serving as the quarterbacks of the campaign. As the forward-reaching eyes and ears of the Air Force, the Raptors are directing strikes, shepherding air packages away from danger, destroying high-value ground targets, and vastly enhancing the situational awareness of the whole enterprise.

The F-22 has been a potent show-of-force tool with which to demonstrate US capability and resolve to adversaries. Rapid, unannounced deployments of F-22s have been made to various bases in the Pacific, the Middle East, and Europe when tensions with North Korea, China, Iran, and Russia have escalated. The presence of the fighters has frequently quieted belligerent rhetoric.

Although the F-22 has not yet been called on to demonstrate its prowess in a live dogfight, the jet has built a dominant record of wins in both domestic and international air-to-air exercises and live combat missions.

The fifth generation F-22 “is even better than we thought it was. It does more than we even thought it could do,” Carlisle told reporters last September at AFA’s Air & Space Conference. Indispensable in the fight against ISIS, the Raptors “allow those fourth generation airplanes to be even better than they would be on their own. . . . They make everybody better.”

The Raptor, he said, “is showing itself to be absolutely critical to the success of those air fights.”

In the anti-ISIS campaign, F-22s are quarterbacking the fight “to make sure the right people are in the right place at the right time,” said Maj. Justin Anhalt, ACC’s F-22 requirements officer.

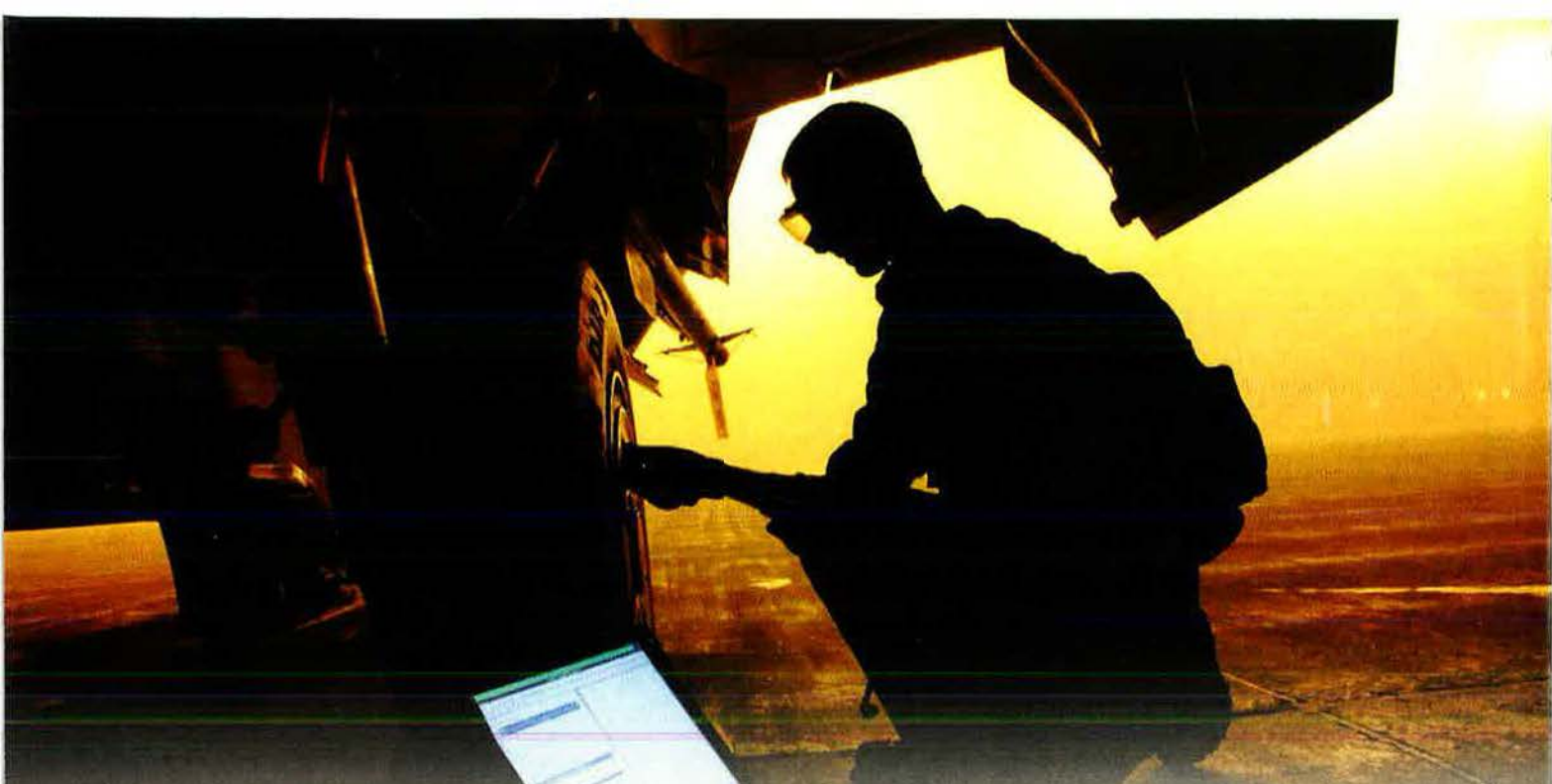
“In this type of environment, we’re keeping everyone . . . safe. We’re keeping [coalition aircraft] away from the Syrian aircraft and the Russian aircraft and . . . we continue to make sure things are de-escalated.”

The F-22’s unique attributes are its stealthiness, high speed, ability to fly at very high altitude, and sensor fusion.

The Raptor’s sensor fusion integrates both the airplane’s own impressive intelligence-collecting capabilities with inputs from AWACS and other sensor aircraft to provide a comprehensive picture of the battlespace.

Anhalt explained that while AWACS is good at marshaling forces and seeing the large-area picture, the F-22, “at the tip of the push downrange, puts you in a great position to be able to see everything that’s going on out there and maneuver the force.” The F-22, deep inside hostile territory, can see behind mountains and other “radar blind spots,” track hostile aircraft with fine-grain detail, and control “the flow of the fight,” Anhalt said. Moreover, the Raptor provides the information it collects to





USAF photo by S/A: Cynthia Spalding

the other aircraft in the package, boosting their situational awareness.

The US-led coalition tries to give Syrian and Russian aircraft operating in the area a wide berth, but a ground threat—in the form of surface-to-air missiles and anti-aircraft artillery—“has not been an issue for where we’ve been operating,” he noted.

Last June, Carlisle spoke of an F-22 mission lasting nearly 12 hours, with multiple aerial refuelings, in which the striking F-22 was “re-rolled” into other pressing tasks to collect sensor information, protect a wayward package, or take charge of aircraft retasked to strike different targets.

#### WRITTEN INTO THE PLAYBOOK

Such missions are a testament to the ability of the Raptor to stay in the fight,

but these incidents are not common, Anhalt said. “They’ve been less and less frequent as time has gone on,” he said.

The Air Force declines to describe the size of the F-22 force deployed and its operating location, but Anhalt explained that the F-22s change out periodically, along with their crews. Several F-22 units have deployed to Operation Inherent Resolve, each arrival overlapping with the departing unit by a week or so in order for the crews to share lessons learned. These lessons are being collected and written into the F-22 playbook, shared with other F-22 pilots at a regular meeting, called Fighter Dominance, in Marietta, Ga., and disseminated to other elements of the combat air forces through conferences such as the annual Weapons/Tactics meeting at Nellis AFB, Nev., in January.

The number of F-22s assigned to OIR has not changed from the original deployment, so USAF accurately assessed the number needed to do the job at the outset, Anhalt said.

One of the expected obstacles to employing the F-22 in large-force operations like OIR was that F-22s, to preserve their stealth, don’t have the same kind of data-sharing equipment as the fourth generation force. This issue has been overcome through voice communications, exhaustive planning, and the air tasking order, Anhalt explained.

“There currently is no common data link between the F-22 and the fourth gen fighters,” he said, but smart lieutenants and captains have “gotten around” that capability gap.

*Above: A1C Robert Miller checks an F-22's tire pressure. Maintainers have turned the F-22s at a rapid pace, helping USAF get the most out of the fleet. At right: A Hawaii ANG Raptor takes off from JB Pearl Harbor-Hickam last September for a CENTCOM combat deployment.*



ANG photo by A1C Robert Cabuco



The fourth and fifth gen pilots have figured out “how to integrate tactics ... without that shared data link” through the use of “contracts” regarding who will do what and when. The pilots are then “able to pass very specific things over traditional UHF [and] VHF radios, to where not only can we execute the mission, but ... at the same level, as if we were sharing information perfectly.”

He explained that once the ATO is developed, units that are geographically separated will email and call each other by phone to script the mission in fine detail.

“Everyone knows what to expect from everyone else. And then within that construct, we have set tactics that are standardized throughout the combat air forces, and [which] we’re also starting to share with our coalition air forces.”

So exhaustive is the planning and well-understood the environment that “there’s very little improvisation. As it turns out, the way we train is the way we fight, and everything that we were training for is working extremely well,” Anhalt said.

It’s not perfect, though, and the F-22 improvement plan, known as “Tactical Mandates,” has a line item to integrate the Link 16 transmit function on the F-22. In fact, this is considered so vital that it has been accelerated a year.

“In 2020, we’re going to start modifying 72 aircraft so they will have Link 16 transmit and open mission systems on it,” Anhalt said, joking, “Never before seen: Air Force actually moves a program to the left and does something faster.”

Even with all the mission leadership duties and a real battlefield with many different nations—having different objectives—in the air all at once, F-22 pilots are not finding themselves taxed.

“Our training ... is orders of magnitude more stressful for the pilot than what we’re calling on them to do in OIR,” Anhalt asserted.

Russian and Syrian pilots are “interested” in the F-22, and may have tried maneuvering close by to see how the jet operates, but “because of our sophisticated avionics and ... stealth and ... supercruise and maneuverability,” there’s “not a time where we allow Syrians or Russians to see us or influence us in any way without us choosing for them to do that,” Anhalt explained. He said there were “some incidents ... early on” in which F-22s had to steer coalition air packages away from the



USAF photo by MSgt. Carlos Claudio

**SSgt. Greg Willis, A1C Darby Ryan, and SSgt. Christopher Stacklin (left to right) inspect an ammunition loading system at JB Langley-Eustis, Va., in 2012.**

Syrian or Russian jets and “we were very close to them and they never realized it.”

Asked about the principal lessons learned about employing the F-22 in combat, Anhalt said, “Before you send an aircraft to war, you always worry, is it going to perform?” So far, “everything is working exactly as we would expect.”

Prior to OIR, he said, F-22 pilots had little experience performing air-to-ground missions, dropping “only a handful” of bombs over a decade. In the last 17 months, however, bomb-dropping missions have become routine. Because of that, “we’ve ... learned a lot about our air-to-ground ordnance and how to better allocate weapons for certain targets” and mission planning. The experience has been “good for the [F-22] community. We’ve wrung out that portion.”

The F-22 is limited to the 500- and 1,000-pound JDAMs and the Small Diameter Bomb in the ground attack regime. Though there have been times the F-22 community has expressed a desire to add other types of munitions to the portfolio, “we realize there’re many other platforms, like fourth gen platforms or bombers, that are carrying these very specific weapons” and “so long as they’re doing it,” the F-22 fleet doesn’t necessarily need to replicate that capability, Anhalt said.

Near-term improvements for the F-22 include the latest air-to-air weapons: the AIM-120D AMRAAM and the AIM-9X Sidewinder. Anhalt said the AIM-9X would deploy with whatever F-22 unit deployed to theater first in early 2016. Longer term, the Air Force is looking

at several candidates to put a helmet-mounted weapon aiming system on the F-22. A new helmet is expected around 2021.

Other near-term improvements include software updates providing ground collision avoidance and “stability” updates that test pilots have “really loved,” Anhalt noted.

## IT JUST WORKS

Carlisle said deployed F-22s are turning in a “75 to 80 percent mission capable rate, which is in line with airplanes we’ve been flying in the inventory for decades.”

The low observables maintainability “is still something we’re working on,” he said, but no F-22 sorties have been scrubbed for maintenance.

Parts are somewhat in short supply, but that’s because the F-22s are flying vastly more hours than expected. “We’ve exceeded those [planned and funded] hours by thousands of hours,” Carlisle said, compelling USAF to find extra funding to make up the shortfall.

Even so, “when supplies are short,” deployed aircraft get precedence and turn in better mission capable rates than jets at home station.

The Rapid Raptor deployment in August to Europe also was “amazingly successful,” he said. “We flew 100 percent of the sorties,” operating from bare-bones bases.

“When American airpower shows up in a place and a time” when it’s not expected, “it’s a pretty big message to assure our allies, friends, and partners”



*F-22s at JB Elmendorf-Richardson, Alaska, prepare for a training mission. Though it has not been in a live dogfight, the F-22 has flown combat missions against ISIS.*

as well as to “potential adversaries,” Carlisle observed.

Battle lessons learned have prompted quick-reaction upgrades which expand the number of ways ground coordinates can be entered into the F-22’s computers from the pilot or offboard sources, like the Army’s Military Grid Reference System, or MGRS. It will enhance F-22 communication and integration with ground units accustomed to MGRS. Raptor pilots will have the new capability in theater this month.

The biggest deficiency in the F-22 fleet, though, has to do with the number of F-22s. There simply aren’t enough of them.

The Air Force’s vetted requirement for the F-22 was 381 aircraft—a number that evolved from a Cold War high of more than 750. Although the 381 number had been verified by numerous studies inside and outside the Pentagon, then-Defense Secretary Robert M. Gates terminated the program at 187 aircraft in 2009.

As a result, the Air Force has had to craft a new strategy to use the F-22 as

a “silver bullet” force, enhancing the fourth generation fleet and parsing jets out to various contingencies in small quantities. Last year’s Rapid Raptor deployment to Eastern Europe, while quick and unexpected, only involved four aircraft. A similar deployment was made to the Persian Gulf region in 2013 in response to Iran’s threatening rhetoric and aircraft movements. The very first such deployment to Kadena AB, Japan, was to send a message to North Korea, and former squadron officials involved with that deployment said it accomplished the mission handily.

“I think we got their attention. ... They shut up pretty quick,” said one former F-22 squadron commander.

### DREAMING

One obvious solution to the shortage of F-22s would be to simply buy more—but that is much easier said than done. The production line at Lockheed Martin’s Marietta facility took years to develop and build; workers had to be cleared,

trained, and certified. While Congress ordered the F-22’s tooling to be stored when the production line was stopped, as a practical matter, it would take years to get the line up and running again. Compounding the problem, the learning curve of workers would have to start over from nearly scratch.

Asked if the Air Force would ever put the F-22 back in production, Carlisle said in September, “I dream about it every night.” It’s a “very tough question,” he said, adding, “I don’t know if we would be able to get that through Congress.”

At the time of the F-22’s termination, a RAND study found it would cost upward of \$19 billion to shut down the F-22 production line, then reconstitute it later and produce 75 new jets. Anhalt said he knows the current-dollar number to restart the F-22 line because “the question gets asked” within government, but he declined to discuss it.

Brig. Gen. Jeffrey B. Taliaferro, ACC’s director of plans, programs, and requirements, said in a January interview that

USAF photo by A1C Matthew Lancaster

*During a 2011 Red Flag at Nellis AFB, Nev., crew chiefs SrA. Idma Ramirez and SrA. Sheila Smith work on an F-22. During deployments, the multirole fighters have had a 75 to 80 percent mission capable rate.*





**An F-22 flies over the Pacific Ocean. After 10 years in service, the Raptor remains USAF's newest operational fighter.**

"we're really challenged in the number of recapitalization programs that the service is taking on, over the next decade or two," and an F-22 restart or an acceleration of its successor, tentatively penciled-in for the 2030 time frame, might be one program too many.

With no new jets likely coming, the Air Force will have to find ways to get more out of the F-22 force that it already has. Anhalt said the maintenance force is doing an excellent job turning the F-22s at a rapid pace, "keeping the jets flying and the people trained." The logistics train is "pretty mature" so "I think there's very little juice to squeeze out of that."

What about taking some of the F-22s used to train pilots and converting them to combat status?

Taliaferro said the schoolhouse doesn't really have any "overcapacity" such that it could give up any Raptors. Also, the jets at Tyndall AFB, Fla., are not maintained to the same configuration as the combat-coded force, "so there'd be a bill to bring that fleet up" to the same combat-ready configuration.

USAF owns "two fleets that are getting farther and farther apart as time goes by," Anhalt explained.

Discussion of whether the training fleet could give up some aircraft will probably have to wait for the Fiscal 2021 spending plan, Anhalt said. That would be the time to develop a "midlife update" on the F-22 fleet, because it will have been operational for 20 years and its technology will be "30 years old" by then.

"We're probably going to have to do a very significant upgrade on the aircraft at that point," he predicted, and that would be the best time to consider "whether we take all those training jets and [bring them to the] common configuration."

There are other initiatives being considered. One way to get more out of the existing fleet would be to squeeze more munitions into the F-22's weapons bay. The jet can carry six AMRAAMs or two JDAM bombs and two AMRAAMs in the main bay and one Sidewinder in each of the "cheek" bays. Smaller munitions with the same capability could boost the effectiveness of each sortie by increasing the number of shots each F-22 could make. Former ACC chief Gen. Gilmory Michael Hostage III said the limited weapon load-out was his only regret about the F-22.

"I think we see having a deep magazine for our combat-coded fleet is important and is a challenge," Taliaferro said. "Over time, shrinking munitions may be a way to influence that challenge," he added, declining to comment further.

## HANGAR QUEEN NO MORE

The F-22 can carry stores externally, but doing so sacrifices its stealth.

Anything that can be done to avoid reducing the F-22 fleet further is being done. A senior USAF official said it is unofficial policy that any F-22 damaged in an accident will be repaired if it's technically possible to do so, but there are few spare components laying around.

USAF has considered reconstituting production of some major F-22 parts, but "what it comes down to, is, we more or less have to lose a wing before we decide we're going to buy a new wing," Anhalt said.

A "hangar queen" former F-22 flight-test article that has been reassigned as a maintenance trainer at Edwards AFB, Calif., will be restored to flying status. This bird will be used for some "very specific" testing the Air Force envisions coming in the future, Anhalt reported. "It is going to be a workhorse in one very specific realm, which I won't get into."

Chief of Staff Gen. Mark A. Welsh III has said on numerous occasions the shortage of F-22s means the Air Force will rely on the F-35 to achieve air superiority in future conflicts much more than originally planned. Even though the F-35 was to be a multirole jet and not a dedicated dogfighter, Anhalt said it will be superior to the F-15 in the air-to-air regime.

"As threats continue to evolve... having stealth is basically your ticket to get into the fight, and if you don't have stealth, you will not be there," he said.

"I sit in the vault with the F-35 requirements guys, and we have discussions every single day about how we're going to be complementary to each other, and how we can attack this problem as we move into the future."

Similar to its communications problems with F-15s, F-16s, and other fourth gen fighters, the Raptor also cannot securely communicate with the F-35. This issue will be answered circa 2020 with the Link 16 solution.

"It just makes sense for us to get Link 16," Anhalt said.

Taliaferro said the F-22 push from here on will be to "keep it relevant," adding, "We know fifth gen is needed to complete the mission." While the F-22's role against ISIS is getting a lot of attention, the Raptor has been deploying overseas to various theaters "for several years now, and even those sorties that don't shoot a missile or drop a bomb—they have an effect."

Carlisle said, "We have to figure out how to make" the Raptor "a long-term, viable part of the fight, just like we have with other low-density, high-demand assets."

As have many other high-demand assets, the F-22 has proved itself in combat without there being enough assets to meet demand. ★



**L**t. Gen. Charles A. Horner was the man in charge of orchestrating the phenomenally successful air war against Iraq during Operation Desert Storm in 1991. He was the first-ever wartime joint force air component commander, a position created in 1986.

That made him the single air commander for the Air Force, Navy, Marine Corps, and coalition air operations, answerable directly to the theater commander, Army Gen. H. Norman Schwarzkopf Jr. This meant Horner oversaw 100,876 coalition air sorties from Jan. 17 to Feb. 28, 1991.

In a December 2015 interview, he discussed being the first JFACC, control of the air, Saddam Hussein's strategy, two surprising lapses, and where Iraq's center of gravity truly lay.

Horner had been commander, 9th Air Force, and commander, US Central Command Air Forces at Shaw AFB, S.C., since March 1987. That also made him the JFACC for Central Command.

CENTCOM had run a war game called Internal Look against a notional Mideast enemy—strongly resembling Iran—short-

ly before Iraq invaded Kuwait on Aug. 2, 1990.

"Suddenly, real-world intelligence looks like war game intel," Horner said.

He hurried to Tampa, Fla., to meet with Schwarzkopf. He listened as the CENTCOM staff briefed the outline of a ground campaign. "You could see Schwarzkopf's hand in it," said Horner. Next came air.

"It was terrible," Horner recalled. "Like AirLand Battle. No thought to it. Schwarzkopf was getting ready to go into a rage."

Before that happened, Horner interjected, "Can I have a minute here?" If he were to brief President George H. W. Bush, Horner told the general, "Here's what I'd tell him." Horner continued, "I just talked about effects, basing, potential responses."

Impressed, Schwarzkopf ordered Horner to join him the next day and brief the President.

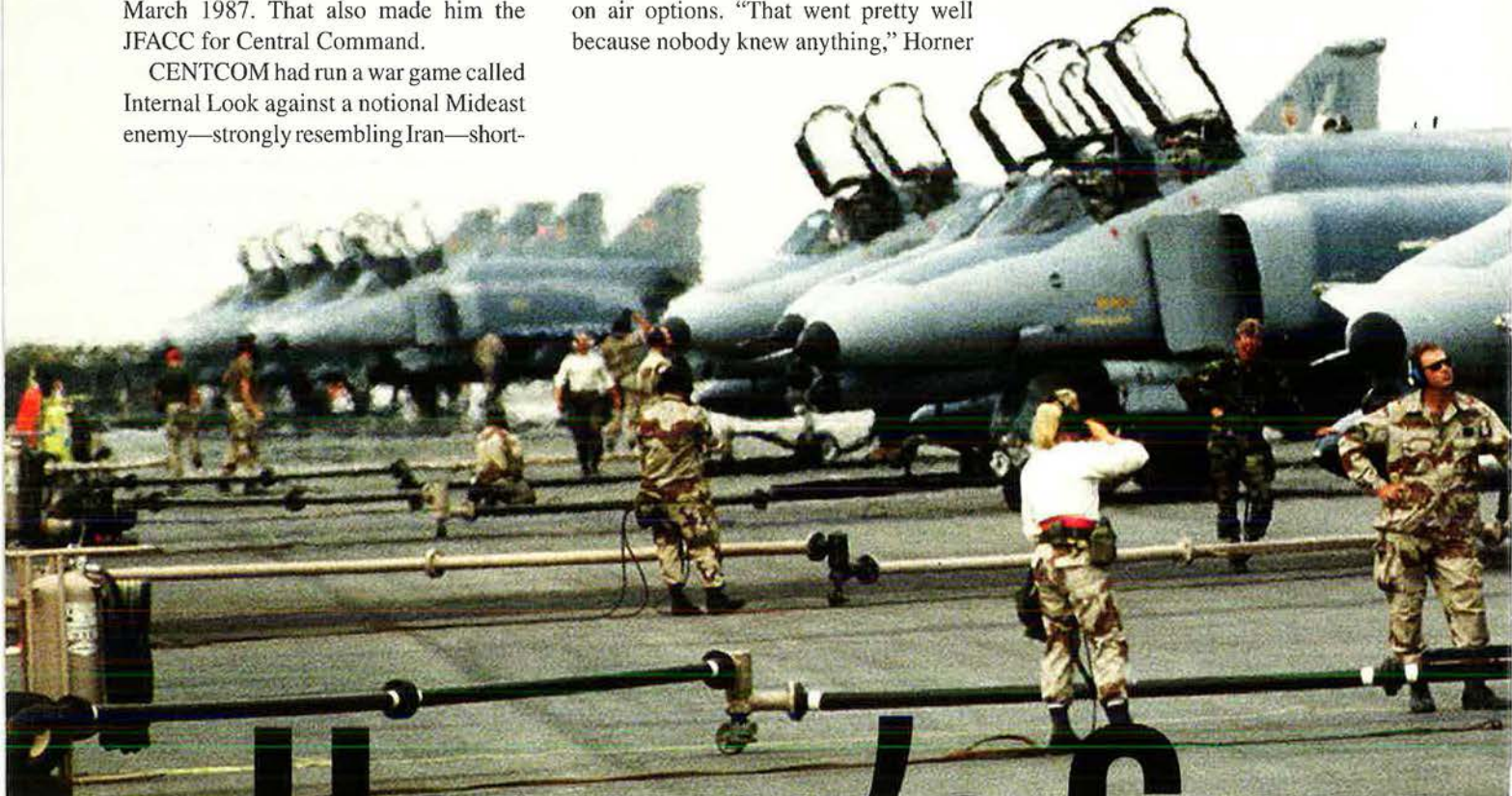
At Camp David, Horner briefed Bush on air options. "That went pretty well because nobody knew anything," Horner

said. Bush said his objectives were to limit loss of life, both Iraqi and allied. Bush sent Defense Secretary Richard B. Cheney to Riyadh to confer with King Fahd of Saudi Arabia. This, Horner said, "was the most welcome news in the world." The US was not going to run the show unless it was in agreement with its allies.

#### "THAT'S WHEN I GOT BUSTER"

By Aug. 6, Horner was in Saudi Arabia, designated by Schwarzkopf as CENTCOM's forward commander in charge of all US military forces flowing into the theater until Schwarzkopf arrived at the end of the month.

"My initial staff came from the US Military Training Mission in Riyadh," Horner noted. Soon others deployed from his 9th Air Force staff. Those in the Tactical Air Control Center in Riyadh "had worked together in Blue Flag and [Joint Chiefs



# HORNER'S GULF

Ground crews refuel F-4G Wild Weasels for a mission during Desert Storm.



of Staff] exercises. We had probably the only staff that could build an air campaign plan. The only target list we didn't have was stuff the CIA was holding back."

Horner's duties as CENTCOM forward meant he had to find someone else to run air planning—and fast. "That's when I got Buster," he said of then-Brig. Gen. Buster C. Glosson. "I called Buster and said, 'I need a planner.' Buster jumped ship [from the Navy's USS *La Salle*, where he was attached to the Joint Task Force Middle East] and came to Riyadh."

Also, "I got Corder to offset Buster," Horner said. Maj. Gen. John A. Corder

was deputy commander of operations for CENTCOM Air Forces in the Persian Gulf from November 1990 through the end of Operation Desert Storm in March 1991. The intense, intellectual Corder was a B-52 navigator turned Vietnam pilot with special expertise in electronic warfare.

Most of all, Horner said he wanted senior commanders around him who weren't "yes men."

Desert Storm was a coalition fight. "We can lead as long as we don't act like we are in charge," Horner decided. "All allies were treated equally."

He said, "People around the world look up to the United States Air Force but they do not want to be overshadowed." It was incumbent on USAF to listen to the allies "very carefully."

Horner went out on a limb to share intelligence when it affected coalition operations. "We took down security walls. You can't have an ally and have secrets. We didn't give them sources, but we gave them information."



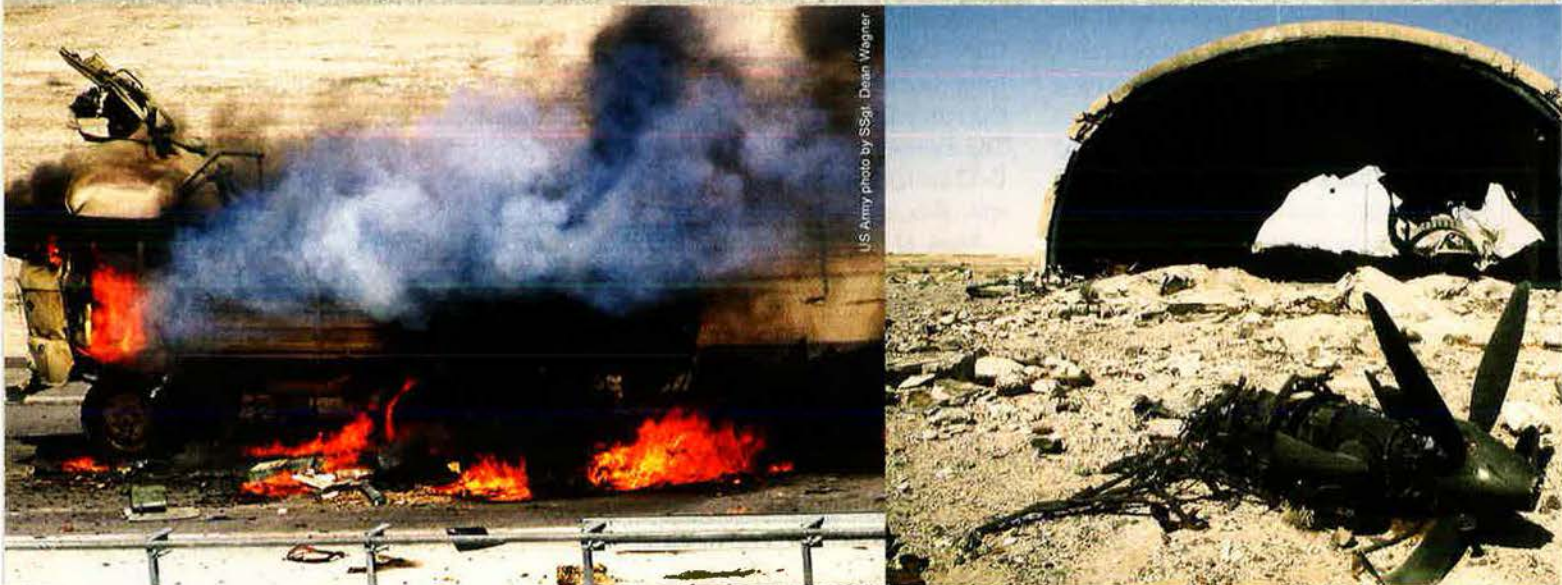
DOD photo

# WAR

By Rebecca Grant

The air commander calls Desert Storm a hard-fought win for airpower.





U.S. Army photo by S Sgt. Deann Wagner

By far the most important relationship was the one Horner had already established with Schwarzkopf. Combat in Vietnam had given them a common perspective.

“Vietnam was such a disaster for us that we swore it would never happen again,” Horner said. The generals had different experiences but “similar views” on how to do things better.

Unifying airpower was one essential fix. There had never before been “one guy running the air war.” When Horner had been a major at Tactical Air Command headquarters, Gen. William W. Momyer “was our four-star and he’d been in North Africa in P-40s. He’d talk to us about the importance of getting control of the air in terms of a single manager for the air.” Momyer told cautionary tales about how the lack of unified command led to frustrations in North Africa and later Vietnam.

The Goldwater-Nichols military reorganization of 1986 authorized combatant commanders to designate a single air commander, but it was up to the CENTCOM boss to make the call.

Schwarzkopf decided to do that. Hence, Horner was the JFACC, the Area Air Defense Commander, the Airspace Control Authority, and the Coordinating Authority for Interdiction.

Horner used that authority planning the opening of Desert Storm on Jan. 17, 1991. “Gain control of the air,” Horner decided. “That’s what I’m going to do before anything else. We never did it in Vietnam.”

“Much of the strategic targeting played into command of the air,” he said. Navy analysts at what is now the Joint Warfare

Analysis Center at Dahlgren, Va., prepared a secret study of the air defense system in Iraq. Brig. Gen. Larry L. Henry devised a wave of drones and electronic countermeasures to deceive and activate the air defense system to expose it to attack.

#### APPORTIONING AIR?

Horner already had intelligence suggesting Iraq’s integrated air defenses would crumble: In 1988, he had met with a Pakistani fighter pilot in Islamabad. “He’d been thrown out of Iraq by the Russians for teaching tactics. The Russians disqualified him because that was contrary to Russia’s ground control intercept (GCI) model of air defense. This led me to conclude Iraq had a very good regional air force and we studied how to take it apart. Take out the radars and the Iraqi pilots were blind.”

Technology was on America’s side, too. “The technology we had at our fingertips, the world had failed to comprehend,” Horner said. He did recall thinking, “If stealth doesn’t work, we will lose the entire war.” TAC chief Gen. Wilbur L. “Bill” Creech “chided me for having doubts. But that was a vicious, vicious environment,” Horner said of Iraq’s air defenses.

Horner spent little time speculating about what impact strategic targeting would have in isolation. “Let’s see how it works” was his attitude toward it. He later concluded that his strategic planners were guilty of “mirror-imaging” the adversary. Hitting intelligence, electricity, etc., wasn’t getting at Saddam’s true priorities.

Schwarzkopf tasked the air component to degrade Iraqi divisions by 50 percent. Every night Horner and staff drove over to

the Saudi Ministry of Defense headquarters to brief Schwarzkopf on current air strikes and plans for the next night. “Schwarzkopf liked the way Buster briefed. Buster was a detail guy,” Horner said. “I’m not.”

“The strategy all along was to hit tanks and artillery,” Horner recalled.

“Schwarzkopf was concerned about the lives of his infantry,” Horner said. Schwarzkopf told him to kill Iraqi armor and Iraqi tanks and artillery so when the ground war began it would take away their ability to inflict casualties on coalition ground forces.

Schwarzkopf especially wanted to hit Iraq’s vaunted Republican Guard. For Horner, there never was an artificial distinction between strategic targets and ground force targets.

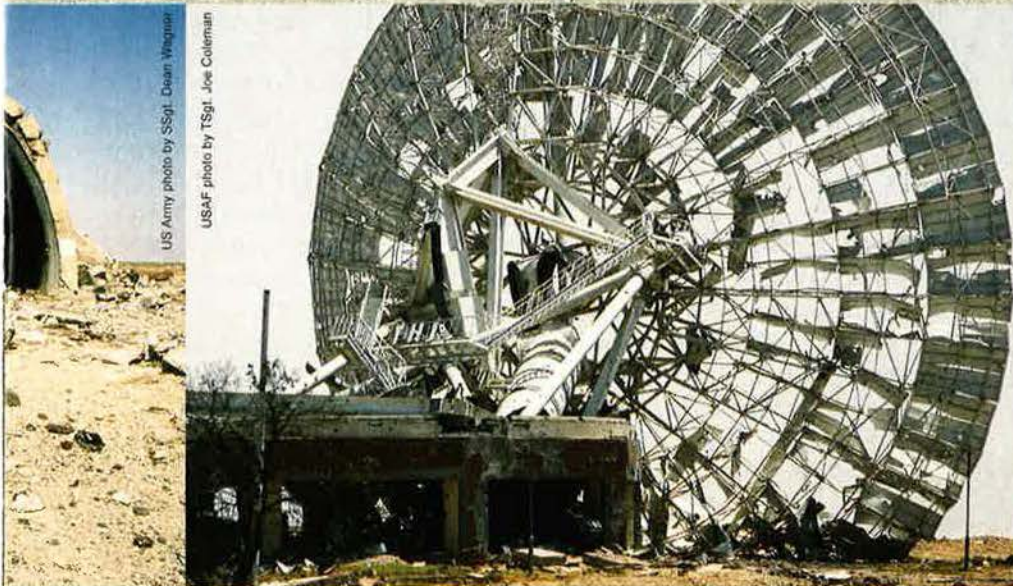
In their earlier work on CENTCOM war games, Schwarzkopf had asked how Horner would apportion air.

“Nobody knows how to apportion air,” Horner explained to his boss.

“You can’t do it. What you’ve got to do is tell me what you want done, how you want to do things. I will put together the best air plan to accomplish that or assist you in accomplishing that, and then after we fly it we’ll say, ‘Well, so many sorties for close air support, so many for interdiction, so many for counterair.’ And that’s the way you apportion air. It’s all after the fact. It’s all accountants, record keeping. Anybody that says, ‘Well, we’re going to do 30 percent close air support’ is a damn idiot. Fire them.”

Schwarzkopf kept the role of land component commander, and a dispute about air support might set up Horner





US Army photo by SSgt. Dean Wagner

USAF photo by TSgt. Joe Coleman



POD photo by Ken Hixson

to oppose his boss. "I will get in very stringent arguments with you," Horner told Schwarzkopf in 1989, but "once you make up your mind as unified commander, that's what we'll do."

Schwarzkopf had not set a date for the ground attack because it depended on the air campaign's progress. With air superiority in hand, subordinate ground commanders grew restive.

"Army guys, if they're airborne corps commanders or they're [from] Korea, you can work with them," Horner said. "If they come from Europe or they're infantry or mech, you've got to hit them with a two-by-four before they begin to understand" the proper use of airpower.

### DELIBERATE DECEPTION

Selecting targets became a colorful debate. Targets nominated by ground forces didn't always check out. Often, "they were using old photos and bad imagery," Horner explained. "Underling generals that would try and stir the pot" were a problem, he said.

Horner assured Schwarzkopf, "I'm going to give you more sorties than you can possibly use. There will be no reserve close air support system. The Tactical Air Control Center can divert any sortie to a target if a ground unit needs it."

"Saddam had convinced himself he could win by inflicting casualties. He learned lessons from Vietnam, too," said Horner. "His strategy was to let us attack into his soft units—infantry—then hit us with his Republican Guard and inflict enough casualties that the American people would demand we quit."

**Left to right: A truck burns on Highway 8 after Iraqi forces retreated from Kuwait. For the coalition, gaining control of the air involved destroying aircraft shelters like this one at Jalibah AB, Iraq. A satellite communications antenna in Kuwait lies in ruins. Lt. Gen. Charles Horner marches in a celebration parade in Washington, D.C., in June 1991. He was the first JFACC, the single air commander for US and coalition air operations. Horner said of Iraq's air force, "We studied how to take it apart."**

Under pressure from the air war, Saddam attempted to start the ground battle his way. Three experienced Iraqi divisions attacked the Saudi border town of Khafji.

Why Khafji? "He thought he was attacking the 82nd Airborne and could rip into them with his tanks," said Horner. The Iraqis had fallen for a deliberate radio traffic deception making it appear the XVIII Airborne Corps was gathering south of the town.

Saddam's plan failed when an E-8 JSTARS ground surveillance aircraft—a still-experimental platform rushed into operational service for the war—spotted the armored vehicle movements. Schwarzkopf approved a buffer zone, pulling all coalition forces back several miles to allow air strikes to hit the Iraqi formations rapidly. "We did that early. No troops were within artillery range of the border."

With the buffer in place, Horner redirected air strikes against the lead elements. "Most of his losses were north of the border," said Horner. "A dug-in Army is tough to kill; an army on the roads is a piece of cake."

Horner believed as JFACC he should look ahead and anticipate problems. In his book *Every Man a Tiger* he wrote that his "two chief anticipatory lapses" were Khafji and the effect of Saddam's Scud tactical ballistic missile attacks on Israel.

Saddam believed that attacking Israel—and provoking that country into an armed response—would split off some of the Arab members of the coalition who regarded Israel as an enemy.

"We were under a lot of pressure about the Scuds," Horner said, and he even received a phone call from Cheney. "I can't stop everything," he explained to the Defense Secretary. "I could put more effort on it but it will take away from attacks on the Iraqi army and Baghdad."

Scud attacks diminished as American F-15Es and other jets hunted for the Scud transporter-erector-launchers scattered across the Iraqi desert. To Horner, though, the solution was Patriot missiles—designed to intercept aircraft but useful against ballistic missiles as well.

"Scuds were a psychological weapon and Patriots were a psychological answer," he concluded.

On at least one occasion Horner thought he'd be fired, he told an audience at a Mitchell Institute for Aerospace Studies





**Horner takes notes during a Desert Storm meeting. By mid-February 1991, the coalition controlled the air, and the Republican Guard was nearly decimated.**

presentation in 2011. On Feb. 7, 1991, two F-15Cs shot down two Iraqi Su-22s and one Su-7 attempting to flee to Iran, Horner recalled.

"I called Schwarzkopf and said, 'I've got good news and bad news.' He said, 'What's the good news?' 'We shot down [three] Iraqis.' 'What's the bad news?' 'We shot them down 40 miles inside Iran. And we knew we shouldn't have been there but fangs came out and they missed the street signs and they went roaring past.'"

Horner was referring to pilots hot for battle who pursued the enemy too far. Would repercussions from Washington prompt Schwarzkopf to fire Horner? "I knew he'd call the Pentagon. ... I'm waiting for Schwarzkopf to say, 'Chuck, come up to the office, I need to talk to you about something.'"

Horner tore out a page out of his notebook and wrote a letter of resignation. He did this in part because "the generals didn't write their letters of resignation in Vietnam. They tried to cope with idiocy. I'll tell you, it was the saddest moment of my life." Horner went back to work and waited for "the shoe to drop."

"[I] went the next night. ... It doesn't drop. Went the next night, the next night, the next night. Finally I lost the letter. I wish I had that letter to this day."

By mid-February, the campaign was a success, both in control of the air and in attrition of Iraqi ground forces. "Tank plinking"—dedicating individual bombs (usually those with precision guidance) to specific armored vehicles, one at a time—and other tactics were decimating the Republican Guard.

"I'm the one who called it tank plinking," Horner recalled. "I liked the idea that the tank wasn't invincible."

### PERFORMANCE OF AIRMEN

The ground war took just four days to send what was left of Iraq's invaders running for home.

Horner concluded long after the war that Iraq's most vital center of gravity was the backing Saddam got from the Republican Guard—the elite, better-trained, better-equipped, better-treated, most loyal units.

"While we bombed secret police headquarters, that had little effect," said Horner. "When the Republican Guard became combat ineffective, Saddam knew this could cause him to lose power. That's why Saddam asked to withdraw from Kuwait," Horner said of Saddam's back channel bid for the USSR to arrange a deal prior to the ground war.

The proof came years later, when Horner talked with an Iraqi general who had defected. They met in London. Horner said the Iraqi "was with Saddam Hussein all through the war" in a bunker under a residential area. The Iraqi said that when the US announced cessation of offensive operations, Saddam was euphoric, announcing that the Iraqis had won.

Saddam's goal was simply to stay in power. "It wasn't to defeat the Americans," Horner observed.

Horner offered some thoughts on "lessons" from Desert Storm.

"First was how [the] political leadership conducted themselves: They were perfect. Iraq out of Kuwait: It was a political objective that was military achievable. We were all very glad we weren't asked to go north to Baghdad in 1991. The Saudis didn't want us to go; we didn't want to go," Horner noted.

Second was the performance of airmen. "It always comes back to Creech.

You push authority and responsibility down" to lower levels, Horner said. He related how he visited a bomb dump at Al Dhafra Air Base in the United Arab Emirates. An airman told him "those guys in Riyadh are dumber than dirt," said Horner. The ATO called for 2,000-pound bombs, but the bomb dump at Al Dhafra didn't have any, so the airmen took it upon themselves to load aircraft with 1,000-pound bombs so pilots could still fly their missions.

"A good call," Horner said.

Squadron leadership had input—again, unlike Vietnam. In Desert Storm, "flight leaders could make a decision and they had a voice. They could call the TACC and say, 'This is bull,'" Horner said.

That didn't mean flight leads always got their way. At one point, some B-52 pilots sought to avoid a mission due to the threat of SA-6 surface-to-air missiles. "I told them to go north," Horner said.

Desert Storm confirmed the value of investing in advanced technology.

Airpower is dependent on technology. "We catch a lot of hell for it because it's expensive. But if you think about the impact of stealth, precision munitions, ISR, we've fundamentally changed the way wars are fought and the way that people die in battle. That's a good thing. But we've got to continue with our technology development," he told the Mitchell Institute audience.

The war also proved that airpower could take the lead.

"We didn't have to fight ground force on ground force," Horner asserted. "Immediately after, the Army went into a defensive crouch" about who had done what in the war, and what it meant for the future. Tempers flared when USAF Chief of Staff Gen. Merrill A. McPeak gave a detailed briefing about the air campaign in March 1991, in which he said Desert Storm represented the first time in history an army had been defeated by airpower.

Nevertheless, Horner said, quoting ballplayer Dizzy Dean, "If you done it, it ain't bragging." ★

*Rebecca Grant is president of IRIS Independent Research. Her most recent article for Air Force Magazine, "Flexibility in the Storm," appeared in the February issue.*





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**E**VERYWHERE the Air Force is deployed, it is a Total Force, with Active Duty, Air National Guard, and Air Force Reserve Command serving side by side. Only back in garrison are things different—for now.

However, inside the Pentagon, the Total Force Continuum office is working to make it easier for airmen to transition across components and is analyzing and planning the right force mix for every major mission in the Air Force, all in an effort to provide maximum airpower capacity at the best value.

The Total Force Continuum, or TFC, grew out of the Total Force Task Force, established in early 2013 to determine whether and how the service's structure should change to meet mission requirements.

"The results of this task force will inform our strategic planning and programming for Fiscal 2015 and beyond and will also serve as a resource to the congressionally directed National Commission on the Structure of the Air Force that will be examining Total Force issues later this year," then-Secretary of the Air Force Michael B. Donley said in February 2013 at the Air Force Association's Air Warfare Symposium in Orlando, Fla.

Brig. Gen. Patrick C. Malackowski, military deputy for Total Force Continuum, told *Air Force Magazine* that before 2012, USAF had been creating associations. These combine an Active Duty and reserve component entity into a classic association, an active association, or an air reserve component association. According to Malackowski, Donley asked the Air Force to look at why it was recommending more associations and where best to establish them.

When Gen. Mark A. Welsh III became the Chief of Staff in 2012, he told leaders they must change the structure of the Air Force from the inside, "or somebody else will do it for us," Malackowski said.

The idea behind the Total Force initiative was to garner as much capacity as possible, Malackowski said, because after more than 20 years of continuous war, "the force was getting tired both in resources, like platforms, and our airmen." Retention and affiliation rates

# TOWARD A TOT

The integration seen on deployment still isn't natural at home station.



USAF photo by S/A Alex Fox Echols III



# TOTAL FORCE

By Jennifer Hlad, Senior Editor



were decreasing, he said. There was a recognition that neither the budget pressure on the Defense Department nor the mission requirements were likely to go away.

Instead of trying to “buy our way into being a better Air Force,” leaders are working to “get better by smartly adjusting and evolving into a better Total Force.”

In the long term that means adapting the operationally indistinguishable Total Force concept that already exists in deployed environments to the garrison. Instead of potentially having one Active Duty wing and one reserve component wing at a base, there will just be one Total Force wing.

“At some point I think we’re going to get to the maturity where we’re going to be able to drop the Total Force moniker, and we’re going to be Airmen with a capital A. ... That’s where we’re headed,” said Brig. Gen. Craig L. La Fave, special assistant to the chief of Air Force Reserve and military deputy for Total Force Continuum.

The goal is integration, not assimilation, said Brig. Gen. Jeffrey B. Cashman, special assistant to the director of the Air National Guard and military deputy for Total Force Continuum.

“We can’t afford to lose the specific qualities of each component that give us the distinct value of them. So we’re not trying to make everyone look like Active Duty or Guard or anything like that, but instead, to capture each of those unique values and put them together side by side, in much the same way that we’ve been doing overseas for the past 15 years,” Cashman noted.

Since its inception the TFC has had many successes.

The Air Force moved to a Total Force recruiting system, went from separate active and reserve compo-

A1C Nickalos Barentine and A1C Alexis Aragon refuel an F-22 at Red Flag at Nellis AFB, Nev., in January. The realistic combat training exercise emphasized Total Force integration—exactly what takes place in a real-world deployment.





Air Force senior leaders look over a 2014 Total Force aircrew management charter that sought to integrate resources. L-r: Then-ANG Director Lt. Gen. Stanley Clarke, Secretary of the Air Force Deborah Lee James, USAF Chief of Staff Gen. Mark Welsh III, and Air Force Reserve Chief Lt. Gen. James Jackson.

ment officer training schools to one school, and instituted performance reports every two years for traditional Guardsmen.

Previously, Guardsmen didn't typically get performance reports, which meant no paper trail for airmen who wanted to transition to Active Duty.

In the active component, leaders identified that they could use Guard and Reserve airmen for two or three years to serve on Active Duty as Reserve Officer Training Corps instructors at universities, La Fave said.

"We're just in the phase of collecting applications now, but that's a good example of walking through that door from one component to another component," he said.

The effort to man those ROTC instructor billets also brought up another issue: Why does the Air Force only commission Active Duty component officers through ROTC?

So in the next year, there will be about 100 airmen—the expected annual number—who are commissioned directly into the Air Force Reserve from ROTC, Cashman said.

### INTERMISSION

There is also a new component in the Total Force: the Civil Air Patrol. The Air Force announced in August 2015 that when conducting missions for the Air Force as the official auxiliary, CAP is part of the definition of the Total Force.

Additionally, Active Duty and career status active Guard or Reserve members can apply for a program that allows up to 40 airmen to be inactivated and transferred to the Individual Ready Reserve for up to three years before returning to Active Duty. The program, known as the Career Intermission Program, began in 2015 as a way for top performers to take time off for personal or professional reasons, but eventually return to duty.

There is a misconception that CIP airmen who transition out of Active Duty status to the Guard or Reserve can stay in the same job and simply spend less time at it, Cashman said. Although the Total Force Continuum is working to make it easier for airmen to transition between the components, an Active Duty airman must move to a different billet if he or she wishes to move to the reserve components, and vice versa.

"This mythical ability to sit in your same seat and dial up or down your participation as it suits you does not exist—and will not exist," Cashman said. "It's the needs of the Air Force that you serve, not the needs of the airmen."

Despite the successes TFC has had in overcoming obstacles on the road to its over-the-horizon goal, many challenges remain. Cashman said he



USAF photo by SSgt. Kelly Goonan

CMSAF James Cody (right) listens to SSgt. Mike Hamm explain equipment in an E-8 JSTARS. Active Duty airmen from the 461st Air Control Wing fly the JSTARS alongside airmen from Hamm's unit, the Georgia ANG's 116th Air Control Wing.



Welsh speaks to the 153rd Airlift Wing in 2013 at Cheyenne Arpt., Wyo. He acknowledged the unit's work, hand in hand with Air Mobility Command's 30th Airlift Squadron.

believes cultural differences may be the most problematic, while La Fave rejected the idea of "barriers."

"We've got three distinct components: We're not here to eliminate that," he said. "What we've done early in our Total Force evolution is we built windows between the components, so we could see it, get a common understanding. What we're talking about doing now is building doors, a flow between components, but not an elimination."

Even legislative issues often referred to as barriers "are really challenges for all three components," not among components, he said.

CMSgt. Lorraine F. Regan, special assistant for Total Force enlisted issues, said she primarily sees administrative hurdles.

"We've been working together side by side, deploying, for many years," Regan said. "Operationally, tactically, we work very well together." However there are still many administrative, policy, and systemic hindrances that conspire to make it difficult to transition among components.

"I think integration as a whole—we've been doing it well for many years. We've just got to get the right kind of guidance and the right policies in place to facilitate that integration better," Regan said.



USAF photo by Scott M. Ash

Right now, the TFC is working to get an integrated personnel pay system online to overcome the issue of late paychecks every time an airman switches components.

There also is a push to consolidate some functions in the field, Cashman said, using the example of Scott AFB, Ill., where each component has a separate supply depot.

"At the grassroots level, we're looking to gain efficiencies there," he said.

#### THE RIGHT RATIO

In addition to integration, the TFC office has been working on a mathematical analysis of the force mix.

"We started about a year ago, to analyze every major mission area. There were 35 of them in the way we broke it out, and we built an objective mathematical model to which you could say, 'What if we went 70-30 active-reserve? What if we went 85-15? How much does it cost? How much capac-

ity does it deliver to the Air Force?'" Cashman explained.

Then, he said, planners measured the capacity against the Air Force's requirements to find the most efficient ways to man the missions.

They discovered that the Total Force is below the number of airmen necessary to execute the mission right now, Cashman said. They also found that for 24/7 missions, the most economical way to staff is with the Active Duty force, while unsurprisingly, missions having a heavy surge requirement are most economically filled with the reserve components.

"That's what we've learned from going through the \$52 billion Air Force investment in our personnel, the 437,000 billets we analyzed in the last year. And we can, in future budget proposals, show some objective metrics underpinning the decisions we make," he said.

In fact, some of that math was incorporated into the Fiscal 2016 and

An 18th Aggressor Squadron F-16 prepares for takeoff from Eielson AFB, Alaska, in January, where it supports Red Flag-Alaska training for all three components.



USAF photo by SSgt. Shawn Nickel





An instructor and students perform remotely piloted aircraft maintenance training at Det. 13 of the 372nd Training Squadron. The Creech AFB, Nev., detachment also trains ANG and Reserve personnel.

2017 budget proposals, though Fiscal 2018 is the first year it informs every decision, Cashman said.

It comes down to force mixing to produce capacity, Malackowski said.

“The Chief and the Secretary do not have enough airmen to do the missions that are required, ... and how they make do is by the quality of people like Chief Regan. Our airmen just keep coming back and saying, ‘Yes, ma’am’ and ‘Yes, sir,’ ... and that’s across all three components,” he said.

The Total Force transformation may not be complete, but much has changed since Operation Desert Storm 25 years ago, Cashman, La Fave, Malackowski, and Regan said.

“For those of us who were serving [during Desert Storm], the mission delivery—the most important thing that our Air Force does—the history books will say that all the units delivered the mission exactly the same,” Malackowski said.

“But if you walked the flight line ... we certainly looked different. And we certainly didn’t go to the chow hall and integrate like you’re doing in this office today.”

Regan was in the active component during the first Gulf War and said things are “dramatically different” now.

“I can’t recall having very much engagement with any reserve component members back then, so I think that speaks a lot to how far the Air Force

has really come,” she said. “Today, when I go into almost any community, people notice if there are representatives of all the components there, and if it’s not mentioned, people will ask, ... and they’re trying to build their teams with that Total Force mentality in mind.”

Desert Storm may have been the beginning of the cultural evolution of the Total Force, Cashman said.

“The dramatic changes we’ve seen in the last three years, even, were founded on the experiences of the Air Force’s senior leaders now, over the last 25 years of Air Force engagement of war, where they all fought side by side with other component members. Their perception of what the reserve component is, is very different than the generation before them,” he said.

### GOOD HEAD START

As the Air Force has moved forward, Total Force integration efforts have converged with not just the Budget Control Act and sequestration in recent years, but also with Russian aggression in Ukraine, the rise of ISIS, and other new mission demands on the Air Force, La Fave said.

“This is something that we’ve gotten a pretty good head start on, but it’s a requirement. The fact is, we, the Air Force, have been at war for 25 years and the requirements aren’t going away. So we’re looking at ways of leveraging

those strengths of the three components to fight our nation’s wars.

“In better times, if there were unlimited budgets and unlimited numbers of aircraft we could order, and it was quiet on the eastern and western fronts, different story. But here we are today trying to solve our nation’s problems with a capable Air Force made up of three components,” La Fave said.

Malackowski agreed.

“The demands on the Air Force and the demands on the department have increased at an exponential level, and unless you grow airmen and you grow budgets—and you know we’re not doing that—you’ve got to get better. It’s my personal belief that it’s the best Air Force that it’s ever been, and it’s been an honor to serve with it, but we also know that we have to get better. And so this Total Force Continuum is certainly working to do that.”

In September 2015, Air Force Secretary Deborah Lee James wrote that making Total Force integration a permanent part of the Air Force culture is “a critical part of our evolution.”

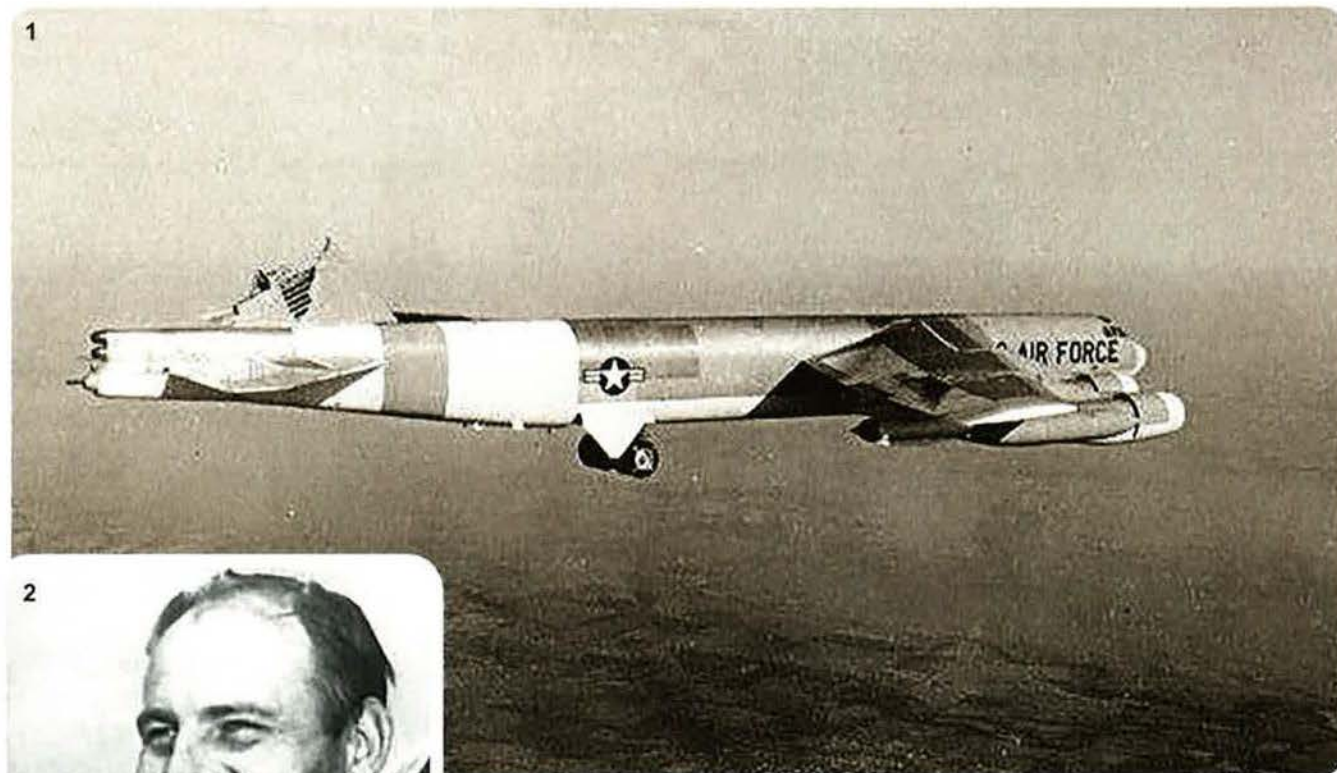
“If we are to remain the world’s most dominant Air Force, we must continue to remove barriers that inhibit Total Force integration. As we move forward, I am committed to ensuring a seamless and efficient Total Force,” she said.

That commitment to the Total Force concept at the highest levels is encouraging, Cashman and Regan said, because it shows it has truly become part of the Air Force’s culture, even if the end is not yet in sight.

“From the strategic level, we’re still in the middle chapters of a very long book,” La Fave said. “We’re doing great, we’re fighting our nation’s wars with the resources and the great airmen we’re given, but I think there’s great change to come, and we’re here to shape that.”



# Lucky—and Good



USAF photo



IAF

1. USAF B-52H bomber, sans vertical stabilizer. 2. B-52 pilot Charles Fisher. 3. The miracle F-15 fighter, safely on the ground. 4. The Israeli F-15. 5. Lacking an entire wing, the Eagle comes in for a landing.

At times, aviation gods smile on a pilot. Here are two cases in point. First was the Jan. 10, 1964, flight of B-52H bomber, serial No. 61-0023. It was on loan to Boeing with an all-Boeing crew. Flying over Colorado, the BUFF hit ferocious turbulence, which sheared off its huge vertical stabilizer. The pilot, Charles Fisher, got the floundering bomber under control with speed changes, differential thrust, fuel transfers, and application of speed brakes. Somehow, after a six-hour white-knuckle flight, Fisher landed the big bomber safely at Blytheville AFB, Ark. Case No. 2: On May 1, 1983, an Israeli F-15D and an A-4 Skyhawk collided. The A-4 sheared off all of the F-15's right wing. Diving in a tight spiral, the F-15 pilot, Zivi Nedivi, lit the augmentors, which somehow stabilized the fighter and allowed the Eagle to regain altitude. Nedivi landed at a nearby airfield. Only after he exited the cockpit did Nedivi see he had flown and landed a one-wing Eagle.





# RED TAILS

Photos from USAF, the Air Force Historical Research Agency, and Toni Frissell via the Library of Congress

They were pilots, maintainers, weathermen, and administrators.  
They were Tuskegee Airmen.



*The group that became known as Tuskegee Airmen began when the 99th Pursuit Squadron was formed 75 years ago this month at Chanute Field, Ill. This photo is of Pilot Class 43-C at Tuskegee AAF, Ala., taken in 1943. The success of the Tuskegee Airmen at flying and fighting with a variety of combat aircraft in World War II paved the way for racial integration of the armed forces.*





USAF photo via blackarchives.org



**R**unning for his third presidential term, Franklin Roosevelt made a 1940 campaign promise to allow the training of black military pilots. In cooperation with the Tuskegee Institute in Alabama, the Army in 1941 created a program to induct and train what would eventually amount to more than 14,000 airmen, of whom about 1,000 would become pilots; the others became navigators, bombardiers, radio operators, administrators, weathermen, and other support personnel. Collectively, these "Tuskegee Airmen"—whose numbers include whites who were instructors, unit commanders, and other associated personnel—built a solid combat record.



1



BUY WAR BONDS



5



6

[1] Then-Capt. Benjamin Davis Jr. welcomes some of the first black aviation cadets at Tuskegee. The college landed the contract to host the enterprise because it already had a program to train black civilian pilots, had an airfield, and enjoyed generally good flying weather. Early pilot candidates had to be college graduates,

but as the war went on, high school graduates were accepted, then given some college-level instruction before becoming aviation cadets. Less than half of the more than 2,000 pilot candidates who began the training completed the program and earned their Army Air Forces wings. [2] This 1943 poster was not just a promo-

tional ad but served as a symbol of pride in the African-American contribution to the war effort. [3] "Red Tail" P-51s of the 332nd Fighter Group take off on a bomber-escort mission in August 1944. Black units flew P-39s, P-40s, P-47s, P-51s, and B-25 Mitchell bombers, but the bomber crews did not see combat. The



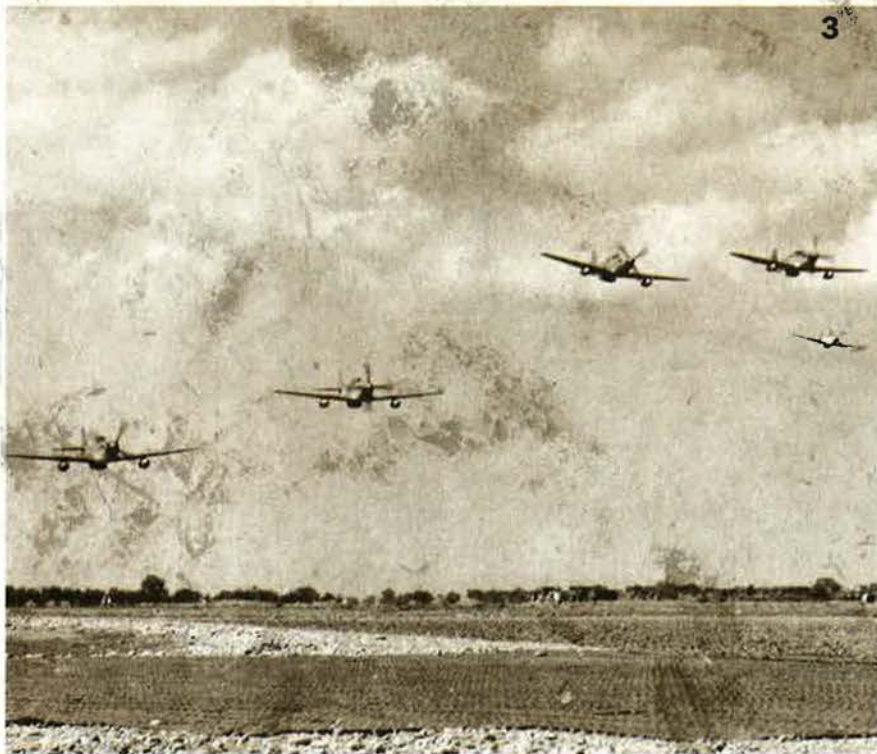


Photo courtesy of Charles McGee



Tuskegee units saw their first combat in North Africa, then moved to bases in Sicily and then to the mainland of Italy. [4] Charles McGee—now a retired colonel—named his P-51 Kitten, a nickname for his wife. [5] White aviation cadets and black maintenance students receive instruction on a P-40's Allison engine. Though

referred to as the Tuskegee program, instruction in maintenance and flying was performed at a number of bases and facilities in the Southeast US. [6] The Tuskegee program started with white instructors and commanders, but these positions were eventually taken over by blacks with combat experience. [7] Marcellus Smith of

Louisville, Ky., and Roscoe Brown of New York work on a P-51's Merlin engine. [8] Davis, commanding officer of the 332nd FG, with Edward Glead, operations officer. They were photographed at the unit's Ramitelli, Italy, base.





[1] The iconic red tail identified P-51s of the 332nd FG. The 332nd was the second Tuskegee unit to see battle, following the 99th Fighter Squadron, which merged into it. Although often credited with never having lost a bomber to enemy fighters, in reality some 27 Tuskegee-escorted bombers were shot down—still significantly fewer than other escort groups in

Fifteenth Air Force. [2] SSgt. James McGee working in Italy on a P-39 Airacobra. [3] Tuskegee Airmen leaving a parachute hut in Ramitelli. [4] Second Lt. Andrew Marshall was brought down by flak while flying over Greece on Oct. 6, 1944. Partisans hid Marshall from German troops and helped him get back to his squadron. [5] During the African campaign,

Davis, then commander of the 99th FS, met with Mediterranean Allied Air Forces chief Lt. Gen. Carl A. "Tooe" Spaatz and Secretary of War Henry Stimson (l-r). [6] Four Ramitelli-based Red Tails in formation. Tuskegee Airmen were among the first to engage with—and shoot down—German Me-262 fighters. [7] As Tuskegee Institute was gearing up to begin





its military training program, First Lady Eleanor Roosevelt paid a visit in March 1941. Here, she is posing in a Piper Cub piloted by "Chief" Charles Anderson, the top instructor in the civilian flight training course that formed the core of the military program then taking shape. [8] An armorer loads .50-caliber ammo belts on a P-51 being readied for action

against German targets in September 1944. [9] A modern-day P-51 decorated as a Red Tail flies over Langley AFB, Va., in a 2004 Heritage Flight display. [10] Tuskegee Airmen at a March 1945 briefing at Ramitelli. The 332nd flew 179 bomber-escort missions in Europe. Likely due to the lateness of its arrival in the theater—and the decline of Luftwaffe opposition to-

ward the end of the war—the 332nd produced no aces (pilots having shot down five or more enemy aircraft), but three Tuskegee pilots shot down four aircraft each. The 99th FS and 332nd FG together accounted for 112 enemy aircraft destroyed air-to-air.





**[1]** Leo Gray—today a retired lieutenant colonel—in 1945. **[2]** First Lt. Charles Hall points to a freshly painted kill marking on his P-40L Warhawk—the first aerial victory for the Tuskegee Airmen, earned while escorting B-25 Mitchell bombers over Sicily. **[3]** Capt. Wendell Pruitt leaves a ring with crew chief SSgt. Samuel Jacobs for safekeeping

before a 1944 mission. **[4]** William Campbell (l) and Thurston Gaines Jr. suit up at Ramitelli in March 1945. **[5]** A ground crew installs a fuel tank on a P-51 for a long-range escort mission. **[6]** A restored P-51 "Red Tail" named Tuskegee Airmen in a 2009 photo. **[7]** After flying instruction, advanced students went on to learn fighters. Pilot produc-

tion continued throughout the war, eventually training 685 fighter pilots and 245 bomber pilots. Some 355 Tuskegee pilots deployed overseas, and 81 were killed, some because of accidents. Of those shot down, 31 were prisoners of war. No Tuskegee Airman deployed to the Pacific Theater. **[8]** Lt. Woodrow Crockett (left) and Glead (right) plan a mission at





Ramitelli in March 1945. Gleed's flight jacket was later displayed at the National Museum of the US Air Force in Dayton, Ohio. [9] Davis Jr. receives the Distinguished Flying Cross from his father, Brig. Gen. Benjamin Davis Sr., in September 1944. The elder Davis was the first black general in the US Army, and his son became the first black

general in the US Air Force. Tuskegee Airmen earned 96 Distinguished Flying Crosses. The Tuskegee Airmen organization recognizes anyone who served with the Tuskegee units or bases between 1941 and 1949 as one of their number. President Harry Truman issued the executive order integrating the US military on July 26, 1948, but most of the ser-

vices were slow to comply. The Air Force, created in 1947, had already announced it would integrate and became the first to do so, in 1949. Besides Davis, two other Tuskegee Airmen—Daniel "Chappie" James Jr. and Lucius Theus—became Air Force generals. James became the first black four-star general in the service. ✪





# High-Altitude ISR at Risk

By Aaron M. U. Church, Senior Editor

The future of the U-2 and Global Hawk missions are up in the air.

USAF photo by TSgt. Christopher Boltz

AIR FORCE Magazine / March 2016





*A crew chief escorts an RQ-4 back to a hangar in Southwest Asia. Because of sequestration, USAF tried to mothball the Global Hawk in 2013.*

**T**he Air Force's high-altitude intelligence, surveillance, and reconnaissance capability, centered at Beale AFB, Calif., is both a critical national asset and an endangered species. Despite being tasked at or near maximum capacity supporting combatant commanders, plans call for cutting USAF's high-altitude ISR fleet in half.

Sequestration forced the Air Force to offer up the RQ-4 Global Hawk to make ends meet.

When that idea was barred, the venerable U-2 Dragon Lady was to be sacrificed instead.

Necessity spared it until 2019 when, according to current plans, operational assets will drop from 55 combined U-2 and RQ-4 platforms to just 28.

Beale's 9th Reconnaissance Wing—manager of both fleets—is no stranger to uncertainty about the future of its mission, and as the politics play out, “our job here is to execute the mission, and that’s what these airmen here have to be focused on, nothing else,” wing commander Col. Douglas J. Lee told *Air Force Magazine* in an interview at Beale. That being said, “at the end of the day, though, I can only execute the mission if I have the resources assigned to me to accomplish that mission.” Russian

aggression in Eastern Europe, heightened tensions with China, renewed threats in the Middle East, and other uncertainties have made things “more complicated” and kept Beale busy, 9th Operations Group Commander Col. Darren B. Halford acknowledged.

The U-2 fleet is operating at “max sustainment” tempo and “if we did much more, I would call it a surge,” he said.

The RQ-4 has likewise been heavily tasked, given its long range and endurance over the vastness of the Pacific.

“In the past four years, we’ve had a 1,000 percent sortie increase and a 2,200 percent on-station increase in the Pacific,” said Lt. Col. Geoffrey Church, commander of the 12th Reconnaissance Squadron, Beale’s resident RQ-4 unit. Because it’s almost half the high-altitude ISR capacity, “when the U-2 goes away, I think it’s safe to say there will be some reduction in capacity,” Halford said.

With the budgetary strictures that are in place “there is a reality that we’re going to have to do less,” he said.

This directly affects government policy-makers and a commander’s ability to stay ahead of potential threats and make the best decision. “What the United States needs to understand is

that if the Air Force has less resources, we can only fly less,” said Lee. “If we fly [fewer] missions, we are accepting risk. That’s a function for national decision-makers to say: Do [we] want to accept that risk, making decisions with less ISR information?”

#### **COMPLEMENTARY COMPETING**

Air Force officials have made no secret that cutting the U-2 fleet is a purely budget-driven measure forced by the 2011 Budget Control Act. “We would love to have this platform, but unfortunately we can’t afford both” the U-2 and the RQ-4 if sequestration continues, explained Lee. “They are complementary assets that fly different mission profiles,” and given the threat environment, demand for them is only increasing. “I will always advocate how best to use those platforms together. ... The question is, are you, the taxpayer, through Congress, going to fund the Air Force with both?” Lee asked rhetorically. “If you’re not, ... we’re forced to make a risked-decision” to eliminate one of the fleets.

The 9th RW operates 27 manned U-2S models and 28 unmanned RQ-4 Block 30s. Both types are constantly dispersed from Beale to several per-



manent and semipermanent forward operating locations worldwide. The wing also oversees a handful of Block 40 Global Hawks stationed at Grand Forks AFB, N.D.

These aircraft collect everything from radar and electro-optical imagery to signals intelligence and high-resolution wet-film photos in the case of the U-2. The RQ-4 Block 40 offers ground moving target data as its unique contribution.

The Air Force originally attempted to divest Global Hawk in Fiscal 2013, citing the U-2's broader, more sophisticated array of sensors. Congress blocked the move, prompting service officials to request retiring the U-2 as early as this year instead. More recent estimates showed upgrading the Global Hawk to carry sensors comparable to those of the U-2 would actually cost less than holding onto the U-2 over the next five years, according to Air Force officials. They then asked for, in the Fiscal 2016 budget request, a delay in retirement citing "current operational requirements" and the need to "reduce risk by aligning U-2 divestitures with anticipated fielding of enhanced RQ-4 Block 30 sensors." Plans now call for holding onto the U-2 until 2019.

Since it's been on the chopping block several times before, Lee said he is preparing for divestiture but also mindful that they may be called on to keep the Dragon Lady flying—possibly much longer. "I don't know what's going to hold past this year or next, ... which is why I have to be postured to execute that mission" in any case, he said.

The U-2 gathers 70 percent of all high-altitude imagery. This helped forestall its demise, but the two platforms "unfortunately have been pitted against

each other" due to sequestration, observed Halford. "In reality ... both have strengths and both have weaknesses." The RQ-4 has tremendous range and endurance beyond what a pilot in a cramped cockpit can tolerate at 70,000 feet. The RQ-4 can fly a "24-plus-hour sortie. You can range the entire continent of Africa, the vastness of the Pacific," required by certain missions, noted Lee. For its part, "the U-2 gives you the ability to carry heavy sensors that produce high-fidelity images and intelligence to the decision-maker, and is extraordinarily responsive."

#### MR. POTATO HEAD

To retire the U-2, Congress stipulated that the Air Force demonstrate the RQ-4 can collect the same quality of imagery and data as the Dragon Lady. As directed by the Fiscal 2016 defense authorization bill, "before we can even start to think about retiring the U-2, we have to demonstrate parity with the RQ-4 sensors," Church said. From a sensor standpoint, Global Hawk's electro-optical suite is less capable than the U-2's, and it cannot carry the "old school wet film" Optical Bar Camera (OBC) required for treaty verification.

Sigint is the one area where the two platforms are already equivalent. "They have a unique set of sensors that go onto the U-2 and we have a unique set of sensors that go onto the RQ-4," Church said, but in terms of Sigint "you're getting about the exact same information off of both platforms." Global Hawk is less flexible than the U-2 in quickly adapting payload to meet mission requirements. The U-2 has a "Mr. Potato Head nose" that allows maintainers to swap sensor packages and within

several hours "tailor a sensor package to a particular requirement," Halford explained. This also allows for quick fielding of new sensor technology on the U-2.

Efforts are underway to address the Global Hawk shortcomings. Northrop Grumman is developing a universal payload adapter for the RQ-4 to permit payload swap-outs and easier integration of new sensors. The first Global Hawk is being modified "so that you could literally plug and play new sensors," said Church. The adapter is the foundation for bringing Global Hawk's sensor suite up to U-2 standards, as well.

The first payload developed for the Block 30 is the new MS-177 electro-optical sensor. It is on par with the U-2's Senior Year Electro-Optical Reconnaissance System IIC. "We are starting to move forward with new cameras to put on the RQ-4 that should start being tested at Edwards here very, very shortly," Church said in an interview at Beale.

Modernization plans call for upgrading MS-177 to "give us our 10 spectral bands" for optimal coverage, said Church. After testing is completed at Edwards AFB, Calif., "if that camera is actually good to go, then we will be able to roll that out in about 2017," well ahead of the U-2's planned phaseout, he said. The same MS-177 contract



*When Congress blocked retirement of the RQ-4, the Air Force suggested divesting the fleet of U-2s like this one at Beale AFB, Calif.*

Staff photo by Aaron M. U. Church





*Upgrades have kept the U-2 potent, but quality-of-life investments for deployed support personnel and pilots, like Lt. Col. Merryl Tengesdal, have suffered.*

adds the U-2's OBC that produces the world's highest resolution broad-area imagery, capturing a 135,000-square nautical-mile swath in a single pass. "The OBC requirement really stems from a Department of State requirement for treaty verification" rather than from the Pentagon, Church stated, but the payload should be operational on the RQ-4 "around the same time" as the electro-optical sensor.

While the Air Force is working to mitigate some of the RQ-4's shortcomings, what the unmanned aircraft needs even after upgrades is a pilot's pair of eyes and judgment, Lee pointed out. Global Hawk operators lack any significant degree of situational awareness, greatly diminishing their ability to operate in adverse weather, respond to emergencies, or exploit pop-up opportunities. "I always get concerned when I hear the word 'replacement'" used to describe the RQ-4's relationship to the U-2, said Lee. "Nowhere in Air Force literature have I seen that we're going to retire the U-2 because we have a great replacement."

### THE U-2 GLIDE SLOPE

Though the U-2 celebrated its 60th anniversary last year, today's U-2S model is much newer than even many legacy fighter fleets and boasts a glass cockpit, state-of-the-art sensors, and recently completed structural upgrades to decrease the effects of high altitude on pilots.

Regardless of its ultimate fate, since the U-2S is technically earmarked for divestiture, the service is "prohibited from spending new money on new advancements" without explicit permission from the Secretary of the Air Force, said Halford. "The upgrades that we're working on right now are really on a glide slope to keep us very viable up through 2019." Most of the specially requested funds are going toward sensor improvement projects that are either already far along or not specific to the U-2 alone. Other efforts include finding replacement suppliers for specialized, out-of-production components. Halford described this as "unique equipment, and we need to make certain that the supply chain and fundamentals of the aircraft stay safe and solid through the end."

Sustaining the U-2 presents another challenge. While there's no formal contingency plan for keeping the aircraft beyond 2019, the fleet has an estimated 40 years of serviceable life left.

The threat environment and political turbulence present the real possibility the U-2 may see its expected retirement delayed yet again. "We're not banking anything to get us beyond 2019, but we're also trying to hedge such that we're not hollow when we get there, in case, as before, it ends up being continued," Halford said.

The U-2 community has become adept at dealing in uncertainty and has kept the aircraft on a solid path. Infrastructure and quality of life in-

vestments for airmen supporting the mission have been more challenging. Investment in ancillary improvements, such as dormitories to house personnel at forward operating locations, are "such a long lead time item, and such a significant infrastructure investment that everybody goes, 'Well, OK, you're on again-off again every five years,'" so we'll allocate the funds elsewhere," said Halford. But "it's those kinds of things that set the foundation for the program and allow us to care for our airmen," he said.

### SCARIEST PLACES

Lockheed Martin's Skunk Works—the U-2's original designer—announced last year it is undertaking an independent study into developing a possible follow-on to the spyplane, dubbed TR-X. The aircraft would combine the U-2's best features with new capabilities and characteristics suited to future threats and missions.

"I think it's exciting that industry is coming up with ideas on how we can modernize," Lt. Gen. Robert P. "Bob" Otto, deputy chief of staff for ISR, said



at a roundtable in Washington, D.C., last October. In evaluating any potential successor to the platforms—which Otto noted have substantial service life and viability remaining—USAF must ask, “What gap would it fill?”

The Air Force is focused on developing concepts, tactics, and technology to conduct high-altitude ISR in highly contested airspace. Whatever the next high-altitude platform is, the service wants it to “be able to be used in anti-access, area-denial-type environments, which we expect to be more lethal than they are today,” stipulated Otto. A future unmanned, or optionally manned, platform must improve beyond Global Hawk, to be capable in nearly all weather, incorporating advanced collision avoidance features.

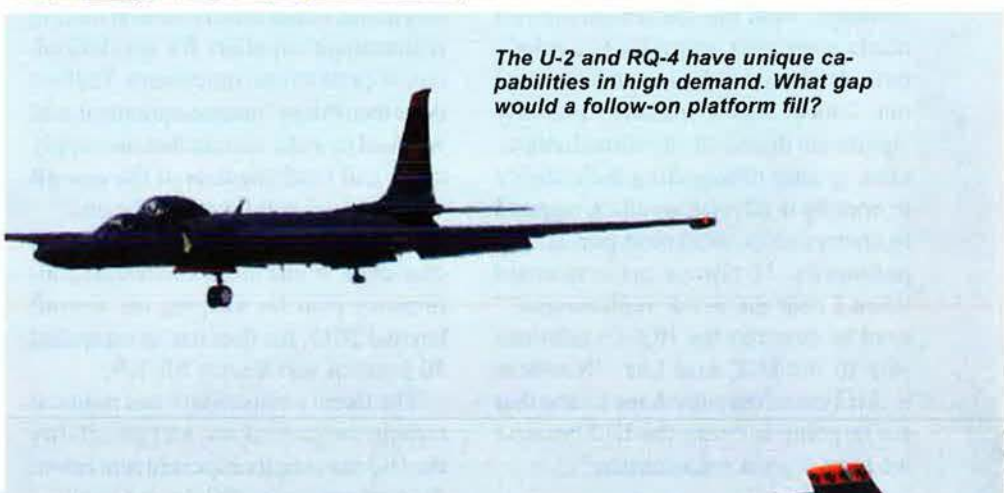
“Then we need exquisite sensors that allow us to either stand in, and allow us to do the observation from a Geoint and signals intelligence perspective, or stand out and have the range to be able to do those things” outside the reach of adversaries’ defenses, he said.

12th RS commander Church said, “We have a very difficult problem ... finding, fixing, and tracking mobile targets in an A2/AD environment.” Strike aircraft cannot loiter in heavily defended airspace, and to quickly and precisely transfer data without losing a target is critical in the high-end fight. “To be able to help our brothers and sisters who will be going into the scariest environment imaginable, we need some way to be able to pass them the coordinates in a very expeditious manner,” he said. “Given the appropriate sensors, it’s something that we can do from a stand-off” distance with the U-2 and Global Hawk. Although it is a “very, very difficult problem to solve,” Church said he is confident that with the right mix of tactics and technology, the Air Force can achieve it. ✪

Staff photo by Aaron M. Church



**At Beale, SrA. Daniel Perez and SSgt. Derek Harris connect ground power to an RQ-4 before running a maintenance check on it.**



**The U-2 and RQ-4 have unique capabilities in high demand. What gap would a follow-on platform fill?**

USAF photo by A1C Bobby Cummings





# Hypersonic Weapons Come of Age

By Mark J. Lewis

Will the US—or some other nation—be first to field these game-changing weapons?

*An experimental hypersonic scramjet—aboard a sounding rocket—launches at the Pacific Missile Range Facility in Hawaii. Hypersonic weapons could compress the shooter-to-target timeline.*

**“17 September 2035 . . .** The enemy did not detect the approaching hypersonic missiles until it was too late. . . . The enemy [integrated air defense system], saturated by the formation of decoy-jammers, had missed the one fleeting opportunity to target the high-speed munitions. Now in the terminal phase, the hypersonic missiles streaked into their targets.”

The vignette above was taken from “Air Force Future Operating Concept: A View of the Air Force in 2035,” a paper released by USAF at AFA’s 2015 Air & Space Conference. Endorsed by both the Secretary of the Air Force and the Chief of Staff, the document presents a view of the service two decades hence. Though fictional for now, the vignette captures the great promise of nearly unstoppable high-speed weapons that could strike quickly at targets deep within an enemy’s territory—weapons that today are rapidly accelerating toward reality.

This most recent document is just one in a series of USAF publications that have highlighted the utility of such high-speed weapons. A year earlier, USAF released “America’s Air Force: A Call to the Future.” In it, Chief of Staff Gen. Mark A. Welsh III urged the service to “continue to adapt and respond faster than our potential adversaries.” Hypersonics was one of five key game-changing technologies the report identified, the others being nanotechnology, unmanned systems, autonomy, and directed energy.

Hypersonics generally refers to flight in excess of about five times the speed of sound, or above Mach 5. “A Call to the Future” noted that the “leap” to hypersonics will have a revolutionary effect on how USAF approaches its core missions, “from investments, to force posture, to tactics, techniques, and procedures.” The paper said that the catchphrase “speed is life” is often true, and while “we may not always desire to operate at the fastest possible speed, the ability to do so creates a significant advantage.”

Coincident with the release of “A Call to the Future,” the Air Force Scientific Advisory Board completed a classified technology readiness study.

Former Air Force Historian Richard P. Hallion and retired Maj. Gen. Curtis M.



Bedke have also recently written about the utility of hypersonic weapons for AFA's Mitchell Institute for Aerospace Studies, in "Hypersonic Weapons and US National Security: A 21st Century Breakthrough." Hallion and Bedke highlighted the main advantage of this technology: that it can counter the so-called "tyranny of distance" associated with global reach. Such weapons would compress the shooter-to-target timeline, allowing for the prosecution of fleeting targets or providing more decision time before engagement. Hypersonic weapons, they wrote, would enhance joint operations, would be able to address a variety of targets, and would be deployable from a variety of platforms.

To accomplish this, Hallion and Bedke call for a national strategy that

## PROGRESS AND SETBACKS

The idea of a hypersonic weapon is not new. In fact, high-speed military systems have been a dream of technologists since at least the 1930s, when German engineer Eugen Sänger and his wife, Irene Bredt, did studies of vehicle concepts capable of ocean-spanning flights using skipping trajectories. The earliest man-made self-propelled hypersonic object was the two-stage American "Bumper" rocket, assembled from a captured German V-2 with a US Army WAC Corporal sounding rocket as an upper stage, which reached a speed of 2.3 kilometers per second (5,145 mph) on Feb. 24, 1949.

After those early steps came some more successes but also a long list of failed hypersonic programs and unrealized promises.

flight test of a new hypersonic engine design suffered a frustrating loss of flight telemetry. Similarly, the US Army's Advanced Hypersonic Weapon, an unpowered hypersonic glide vehicle, had a successful flight in the Pacific Missile Range Facility in 2011, followed by a launch failure three years later.

Some of these setbacks, such as HyFly and the AHW, had nothing to do with the soundness of the hypersonic technologies being studied. Other failures, such as the DARPA flights, yielded increased understanding of aerodynamics and materials. Despite this, even some enthusiastic supporters of high-speed technology have quipped, "Hypersonics is the future—and always will be."

That view is now changing, due not only to tangible flight successes and



*A B-52 carries the X-51 under its wing before its first flight in May 2010 at Edwards AFB, Calif. On the program's last flight three years later, the Waverider reached Mach 5.1, demonstrating the feasibility of air-breathing scramjet propulsion.*

includes continued research and development, maintenance, and support for testing infrastructure. They also call for new investments in a future workforce.

The credibility of these various reports has been enhanced by recent successful flight efforts, especially the Air Force's X-51 program and the series of Hypersonic International Flight Research Experimentation (HIFiRE) trials conducted jointly with Australia. Taken with other well-publicized activities around the world, there is a renewed sense that hypersonic weapons are not only plausible but seemingly inevitable.

In the early 1960s, USAF began a project to build a hypersonic vehicle called the Aerospace Plane, canceled after the Air Force Scientific Advisory Board identified "many clearly infeasible factors" in the program.

The roster of abandoned hypersonic programs has grown since, including the 1980s X-30 National Aerospace Plane (NASP), the Navy's HyFly test program (discontinued after three failed tests), and the Defense Advanced Research Project Agency's HTV-2 hypersonic glider (canceled after two flights).

Even ongoing hypersonic efforts have had setbacks. The August 2015 HIFiRE

concrete investments, but also to a shift of ambitions from expensive vehicle concepts to more practical military systems. A key milestone among these was the Air Force's X-51 program, led by the Air Force Research Laboratory in concert with the Air Force Test Center and industry partners. The first X-51 vehicle flew on May 26, 2010, and the last on May 1, 2013. Though neither the second nor third flights achieved program objectives, the first achieved nearly all of its objectives and the fourth flight was a complete success.

Launched from beneath the wing of a B-52 bomber, each Boeing-built X-51 was



initially powered by a solid rocket motor derived from an Army Tactical Missile System (ATACMS) booster, intended to carry the test vehicle to 4.8 times the speed of sound, then separate and allow the X-51's main engine to take over. On its last flight, the X-51's hypersonic "scramjet" engine, built by Rocketdyne, accelerated the craft for 210 seconds, to a final speed of Mach 5.1 before its fuel was exhausted and the vehicle coasted to a planned crash into the Pacific.

In addition to proving the propulsion technology, the X-51 flights represented a triumph of Air Force-led research and design where numerical simulation, using the latest in computational codes for design and analysis, was combined with state-of-the-art ground test and real-world flight experience.

## RAMJETS TO SCRAMJETS

Hypersonic scramjets were almost six decades in the making. In the late 1950s, Richard J. Weber and John S. MacKay wrote their landmark National Advisory Committee for Aeronautics (NACA) Technical Note 4386 exploring a concept for a new type of aircraft engine—one that could burn fuel in air moving at high Mach numbers. Working at the Lewis Flight Propulsion Laboratory (the precursor to today's NASA John H. Glenn Research Center at Lewis Field in Cleveland) Weber and MacKay looked at ways to increase the flight speed of a conventional ramjet engine. Though the NACA researchers didn't know it at the time, engineers in the Soviet Union were working on the same problems.

entering the engine, the air decelerates to low relative velocity, resulting in a corresponding rise in pressure and temperature. That hot compressed air moves into a combustor where fuel is injected and mixed. The combination ignites and adds heat energy, resulting in hot gas accelerating through a nozzle to create net thrust. Because the air is compressed by the ramming effect of the engine's motion, a ramjet doesn't require a mechanical compressor ahead of the combustor. Without a compressor, there's no need for turbines, so a ramjet has no primary moving parts.

Because of their dependence on their own motion through the air, ramjets work poorly at low speeds and can't produce any thrust at all when standing



USAF photo by Greg L. Davis

The scramjets that powered the X-51 represent an attractive alternative to rockets, the current propulsion choice for air-to-air or intercontinental missiles. Rockets produce high thrust and can fly outside the atmosphere, but because they must carry all of their fuel and oxidizer with them, they're ill-suited for high-speed cruise within the atmosphere. For long-range, high-speed cruise within the atmosphere, it makes more sense that the engine be an "air-breather"—gathering oxygen as it flies to burn with the carried fuel. It's the same principle used by all modern jet engines, which gather oxygen through the inlet.

A ramjet is the mechanically simplest type of jet engine. The development of the modern ramjet dates from the 1920s, though the basic concept was proposed over 100 years ago by the Frenchman René Lorin. By the late 1940s prototype ramjet engines were being tested and flown in Europe and the United States and were later used to power the Soviet Union's Burya cruise missile, the US Navy's Gorgon IV missile, and USAF's Bomarc interceptor.

The ramjet derives its name from the basic operating principle where air is forced into an inlet by the engine's own motion through the air. On

still. As a result, ramjets are generally reserved for supersonic flight, beyond Mach 1, the speed of sound. That means they must be accelerated to operational speed by another kind of engine, such as a rocket motor (in the case of the Bomarc missile) or a gas turbine engine.

Ramjets also perform poorly at very high speeds, above about Mach 4, although the exact limits depend on a number of factors. There are two primary reasons for this performance loss. First, any craft flying faster than the speed of sound generates shock waves—sudden increases in local temperature



and pressure that create the well-known sonic boom. Shock waves waste energy, adding drag on an airplane but also causing a loss of energy in the ramjet inlet that ultimately reduces thrust. This energy loss becomes increasingly severe at higher speeds.

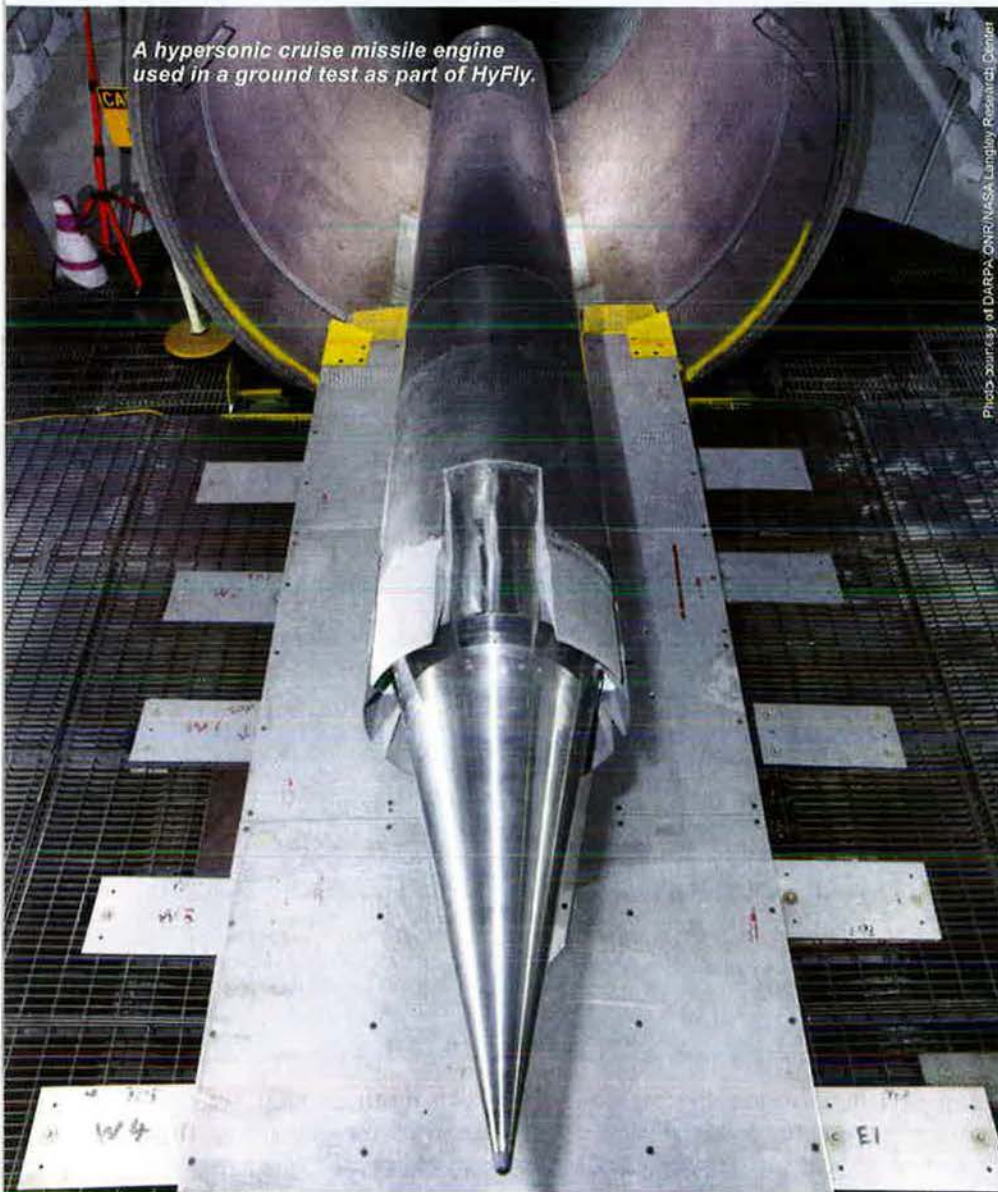
Another problem has to do with the temperatures associated with the ram

through the entire engine flow path? By keeping the air moving at supersonic speeds, inside the engine, thrust could be produced all the way up the Mach scale. The resulting engine type has the appropriate name of supersonic combustion ramjet, or “scramjet.”

Such an engine makes a whole new realm of atmospheric flight possible,

spend only one or two thousandths of a second in the combustor before exiting through the nozzle. Even if combustion were possible, the very process of adding heat to fast-moving air results in significant energy losses as compared to ramjets.

Despite efforts beginning in the 1960s, including the construction of various scramjet test articles (notably, the pioneering work of Antonio Ferri), these challenges and others delayed the practical development of a scramjet-powered vehicle for more than 45 years. The HyShot research team at Australia’s University of Queensland flew what is generally credited as the first scramjet in July 2002 on the nose of a sounding rocket, though its thrust was less than the



A hypersonic cruise missile engine used in a ground test as part of HyFly.

Photo courtesy of DARPA-COVR/NASA Langley Research Center



compression effect. At extremely high speeds the temperature of the air as it slows down in the inlet can be so high that it’s above the temperature at which fuel burns. When that happens, combustion stops and there can be no energy addition inside the engine—hence, no thrust.

Weber and MacKay asked a simple question: What would happen if the air that enters a ramjet at high Mach number doesn’t slow down much but instead continues to move at high speeds

with a corresponding list of possible missions and vehicle applications. However, actually building a practical scramjet proved quite difficult. For example, trying to burn fuel in a supersonic stream has been likened to lighting a match in a hurricane. There is precious little time to inject the fuel, mix it with the air, and burn it to completion.

In a reasonably sized scramjet, the air entering the front of the engine would

overall drag. HyShot was soon followed by two successful flights of NASA’s highly sophisticated X-43 vehicle, proving once and for all that scramjet thrust could be greater than vehicle drag.

Though impressive accomplishments and important steps along the way, both the Queensland work and NASA’s X-43 were powered by scramjets that burned hydrogen and could only operate for a few seconds.

The Air Force’s X-51 took scramjets further by burning a more easily handled jet fuel for almost 3.5 minutes in flight, albeit at a more moderate flight speed. It was the defining breakthrough that may lead the way to practical hypersonic missiles.

USAF continues to invest in hypersonics, including activities at the Air



Force Research Laboratory and at wind tunnel facilities at the Arnold Engineering Development Complex at Arnold AFB, Tenn. There is significant work being done—on increased thrust, better mixing, ignition, and fuels—to explore ways to improve scramjet performance. In combination with industry partners, USAF researchers are also looking to combine scramjets with other engine types for an expanded flight envelope.

Lessons learned on the X-51 are being applied to solving operational and scaling issues. At the same time, the Air Force Office of Scientific Research sponsors ongoing university programs to expand the fundamental understanding of high-speed aerody-

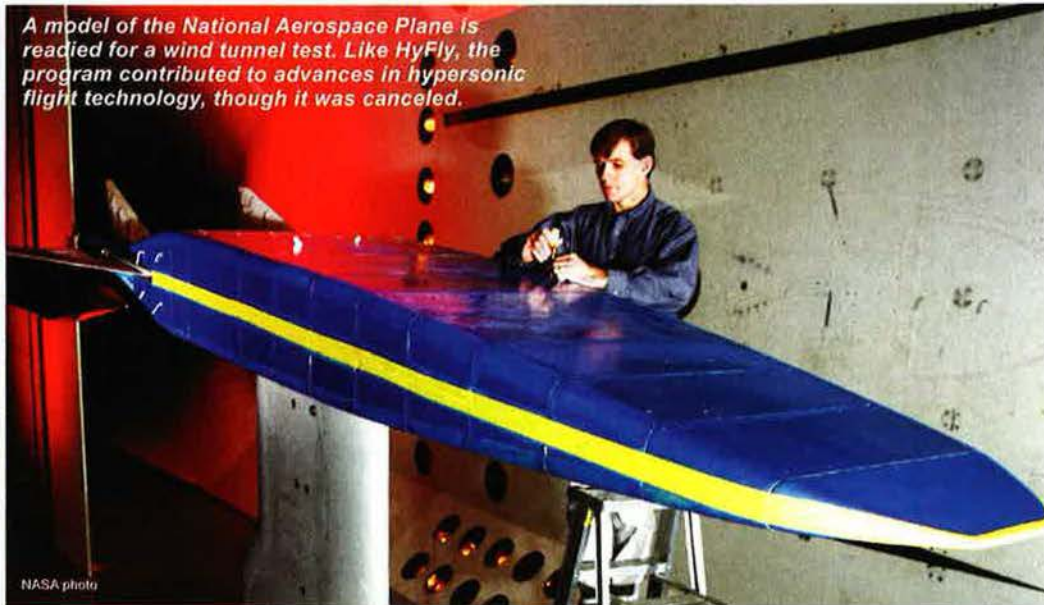
lead in X-43 and the HyBoLt—Hypersonic Boundary Layer Transition— aerodynamics experiment. Although hypersonics funding at NASA has been decreasing in the last few years, the agency recently committed to expanding its research efforts for fundamental science and to providing ongoing test and modeling support.

Despite these successes, there's a long way to go to achieving fully operational weapons systems. Advanced guidance systems, sensors, and warheads will be required to make practical weapons. Figuring out how to integrate these weapons with existing or future platforms will be a challenge.

Two DARPA programs, funded in part with USAF dollars, are attempt-

China's People's Liberation Army has boasted of a rocket-powered hypersonic missile apparently designed to attack aircraft carriers. Russian leaders, including Deputy Prime Minister Dmitry Rogozin, have voiced strong support for continued hypersonics development, and Russia has announced a joint program with India to develop a hypersonic successor to the BrahMos supersonic cruise missile.

The push for practical hypersonic weapons has been construed by some as a new arms race, focused on speed. As Hallion and Bedke have warned, hypersonic weapon technology is "ripe for exploitation as a theater and global strike game changer" but it's not yet clear "whether America will own that advan-



namics, develop new modeling and simulation techniques, and invent new high-temperature materials and instrumentation.

Working with the Department of Defense Test Resource Management Center and AEDC, the Office of Scientific Research has also been developing programs that allow undergraduate and graduate students to participate in hypersonic testing, with the goal of replenishing the workforce that specializes in hypersonics.

The Air Force is partnering with NASA, too. Historically, the civilian space agency has been an important contributor and developed many aspects of scramjet propulsion. NASA engineers played a key role in programs such as X-51, HIFiRE, and took the

ing to demonstrate technologies for a realistic weapon, but critics note that at their current pace the first planned flights won't occur until the end of this decade, years after the X-51.

Of particular note is the DARPA Tactical Boost Glide program. Instead of using scramjets, TBG is an unpowered hypersonic glider that will be rocket-boostered to a high Mach number. TBG builds on lessons learned from DARPA's HTV-2 and may offer an attractive alternative concept for a hypersonic missile.

The US is hardly alone in developing hypersonic systems. Russia, India, and China have been active in the field.

tage first." Though the US is investing in hypersonics and their maturation, "it is not on a guaranteed path to near-term success." As the authors noted, there's still no firm national commitment to a disciplined plan tackling the remaining hypersonic challenges, let alone a plan to develop and acquire high-speed weapons even if planned demonstrations are successful.

The US has clearly established itself as the early leader in the hypersonics field, but it remains to be seen whether the first practical hypersonic weapons will bear the markings of the US or the insignia of some other nation. ✪

Mark J. Lewis was Chief Scientist of the Air Force from 2004 to 2008. He is currently the director of the Institute for Defense Analyses' Science & Technology Policy Institute. This is his first article for Air Force Magazine.

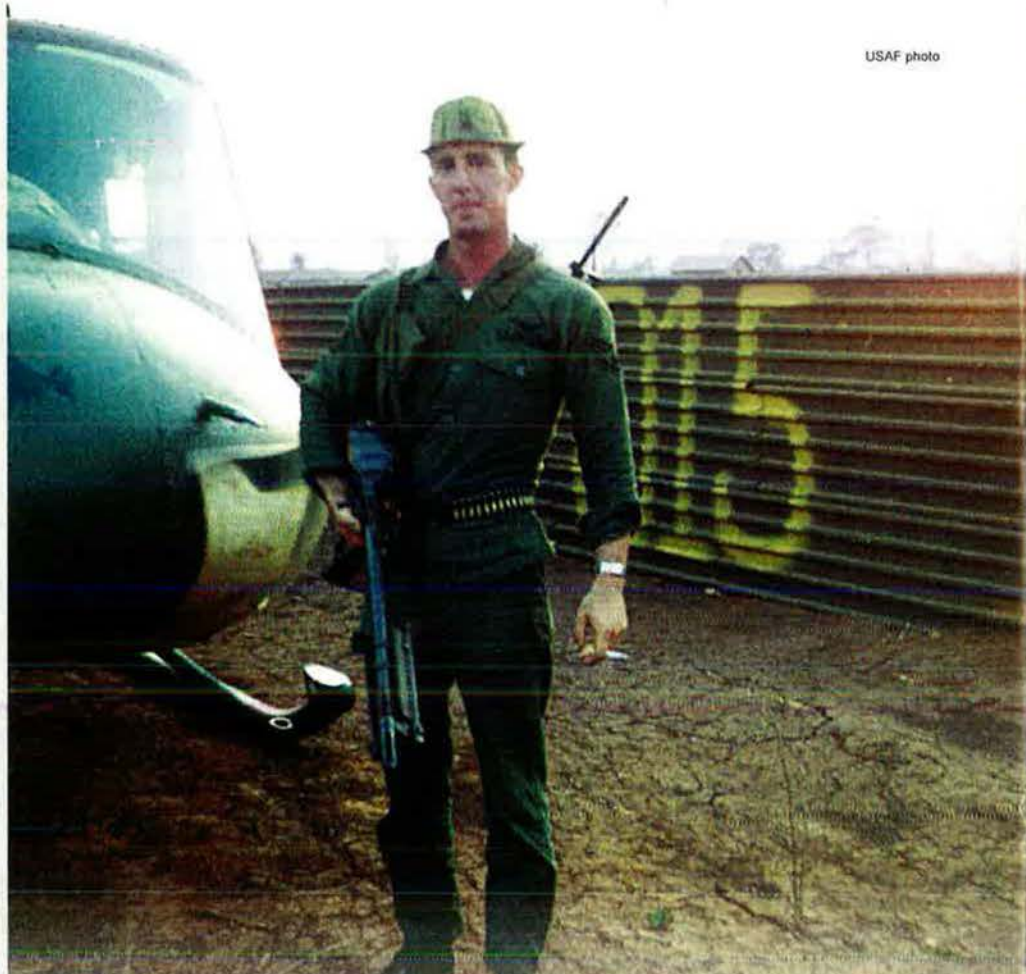


**I**N 1984, former Sgt. Eric L. Roberts II bought his wife, Sue, a necklace with a small pendant, a replica of a Silver Star medal. It was his way of saying thanks to her for spending more than a decade fighting for him and a fellow airman, retired CMSgt. Ronald W. Brodeur, to receive the recognition they were promised in 1969.

Neither Roberts nor Brodeur realized then that they were just 15 years into a 46-year odyssey.

In February 1969, Roberts and then-Staff Sergeant Brodeur were assigned to the 20th Special Operations Squadron as UH-1P helicopter gunners. While on a mission near Duc Lap, South Vietnam, an explosion rocked their helicopter as they worked to rescue six stranded Special Forces soldiers who were surrounded by the enemy in the jungle. It was the "most significant" mission of the airmen's time in the war, Roberts and Brodeur later said.

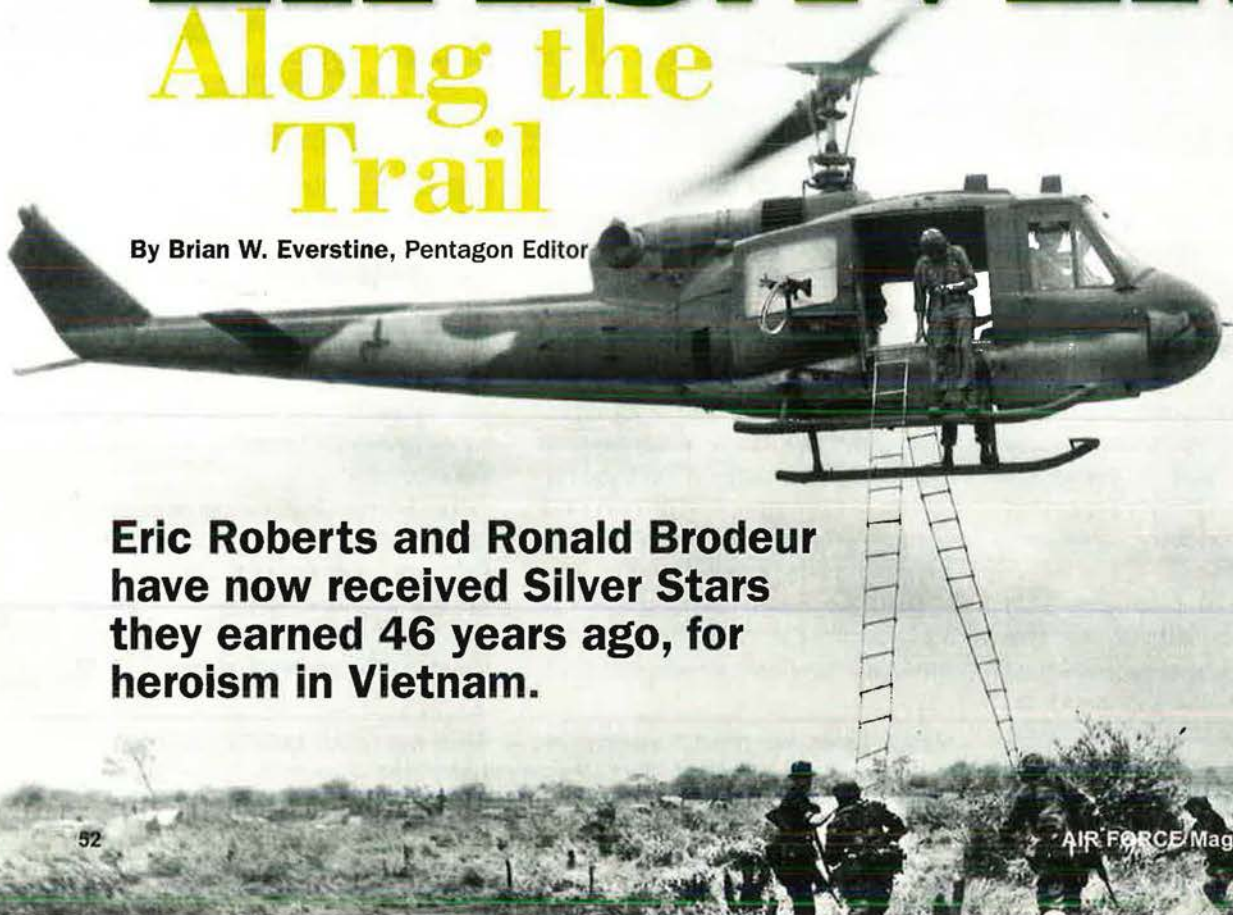
The pilots and gunners were originally put in for the Distinguished Fly-



# LIFESAVERS

## Along the Trail

By Brian W. Everstine, Pentagon Editor



**Eric Roberts and Ronald Brodeur have now received Silver Stars they earned 46 years ago, for heroism in Vietnam.**





**SSgt. Ronald Brodeur (top left) and Sgt. Eric Roberts (above) were helicopter gunners in the Vietnam War. Assigned to the 20th Special Operations Squadron, they supported Special Forces missions like retrieving troops (bottom left).**

ing Cross but were later upgraded to Silver Stars. The pilots received their Silver Stars in 1969.

The administrative effort to get the gunners' medals languished for decades, however. Paperwork was lost or put aside. In 1984, the group thought the Silver Star award would finally be approved but a Pentagon review board said "no" to the upgrade, reversing the approval that first came 15 years earlier.

Sue Roberts swore to keep the necklace tucked away until the Air Force finally approved the upgrade to Silver Star. On Dec. 17, 2015, as Air Force Chief of Staff Gen. Mark A. Welsh III pinned the Silver Stars on the chests of Roberts and Brodeur during a ceremony at the Pentagon, she sat proudly in the audience, wearing her necklace for the first time.

"This award was a long time coming," Eric Roberts commented.

## THE MISSION

The airmen called her "Patches."

The 20th Special Operations Squadron had just eight UH-1 aircraft. The small fleet was in constant use supporting special operations, so the airmen only had limited time to fix, or "patch

up," any problems or holes in their aircraft. Many times the crews had just hours to repair large-scale damage and get their UH-1s ready for another day of tough flying.

"Patches brought us home many days with big holes in her skin, and I remember days coming home with tree branches sticking out of the main rotor blades," Brodeur said. "And what we did when we got home, ... we stayed up and fixed her. She had to be ready the next morning."

Crews of the 20th SOS "Green Hornets" were tasked with inserting, retrieving, and supporting Army special operations forces in classified missions as part of Project Daniel Boone, targeting enemy supply lines throughout Vietnam and Cambodia in 1969. The Air Force crews were on constant alert, responding to calls to support three to four Army Special Forces teams that, at any given time, were on recon missions along the Ho Chi Minh Trail.

The squadron's UH-1s picked up the famed "Pony Express" missions that had previously been flown by CH-3Cs. These smaller, green UH-1s quickly were given the "Green Hornet" nickname, one that is still attached to

the 20th Special Operations Squadron.

The Green Hornets were "a secret unit doing secret work," Welsh said during the December award ceremony at the Pentagon.

On Feb. 20, 1969, Roberts and Brodeur's crew was tasked with a regular mission to support Army Special Forces near Duc Lap. The soldiers' missions had been named for tools, and this was called "RT Pick." As the day went on, however, the team became "compromised and on the run," Roberts said.

The six troops came under fire near a river. With the water on one side, the enemy quickly surrounded them and moved in. They lit the field on fire "to smoke them out" and to prevent the helicopter from landing. Instead, the helo moved into a low hover, Welsh said. The area had been repeatedly mortared, so trees were blown out, breaking up the tree line, also complicating the UH-1's ability to easily hover.

As the helicopter located the Special Forces soldiers and moved in close enough to retrieve them, Roberts and Brodeur held on to the chopper's skids and directed the pilots to make sure the rear rotor was not going to hit a tree.

Strapped into their harnesses, the two airmen fired their M60 machine guns to provide cover.

As the soldiers made their way toward the helicopter, one of them triggered a Claymore mine on the ground. The ensuing





blast rocked the helicopter and blew the airmen from the skids. Brodeur fell off the chopper and dangled from his harness. Roberts, on the other side, was blown into the helicopter.

The explosion had blown open the copilot's door, leaving him unprotected. Brodeur, exposed to enemy fire, righted himself with his harness and climbed back to his skid.

"After I recovered and I got back on my skid and near my gun, I glanced back and there was nobody in the doorway. My heart stopped," Brodeur said. "Then I saw this guy scooting back up on the skid to get back to his gun."

Roberts, recovering from the blast, had disconnected himself from his safety harness and, exposing himself to the enemy fire, climbed out onto his skid. Without any safety connection to the chopper, he shuffled to the copilot's position and closed the open door to protect him and then returned to his position.

"My first reaction—if I'm blown inside the helicopter, the enemy is firing at me, I don't know what happened, my head's ringing, I'm checking to see if I'm hurt—is probably not to unhook my harness, climb out on the left skid, ... and then walk up the left skid and shut the door to protect the copilot," Welsh said. "That's not what I would have done. It is what Eric Roberts did."



The aircraft was able to remain in the hover, and the soldiers climbed in as the two airmen provided suppressive fire.

The last soldier, the team's radioman, was shot in the back as he climbed on board. Luckily, the round destroyed the radio but did not injure him.

Because of the Green Hornet crew's efforts, no lives were lost.

Roberts and Brodeur "are looking back on this thinking, 'This is pretty routine, this is just what the squadron did. It's what our job was, what we're expected to do, what our teammates did all the time,'" Welsh said during the ceremony. "According to the laws of this nation and the standards of our service, that was gallantry in action. It's incredibly appropriate, finally, that we have the chance to say, 'Thank you for what you did, for who you are, for the example you set.'"

#### DOCUMENTING IT—AGAIN

After Eric told her the story in 1971, Sue Roberts picked up the effort for award of the Silver Star. The group was able to get a pilot and the squadron commander from the mission to rewrite the award nominations. Since the initial information was lost, the group had to completely rebuild all the documentation, according to Roberts.



*UH-1 helicopters (left) from the 20th SOS, circa 1969. Below: At a Pentagon award ceremony in December, Air Force Chief of Staff Gen. Mark Welsh describes the actions of Brodeur*

*and Roberts (center and right) in Vietnam. Welsh presented the two gunners with Silver Stars—the award the two pilots on the same mission had already received in 1969.*

Staff photo by Brian W. Everstine



As time progressed, more information became declassified and was used to bolster the cause for the award upgrade. In 1984, the two finally received DFCs, but an upgrade to the Silver Star was denied.

“The first iteration of this award wasn’t actually presented until 1984 as the Distinguished Flying Cross to these two gentlemen,” Welsh explained at the 2015 ceremony. “It was presented then only because Sue Roberts ... pursued it. The awards recommendations for these two guys in the back of the helicopter were separated from the pilot and copilot’s awards and decorations recommendations and just never reached completion.”

The lack of details about the mission—and a broader understanding of the role of Air Force combat helicopters in Vietnam—limited the clarity and importance of what the airmen did, they said.

“Part of the problem with these boards, is that most people didn’t realize or didn’t understand that we had the mission that we were doing,” Brodeur said of the Green Hornets. “They thought this doesn’t happen. And because it was special operations, it was a covert operation. We didn’t talk about it. ... We weren’t supposed to be there.”

Also, the process changed as years went on. During the Vietnam War, Pacific Air Forces would approve the awards, Roberts said. Now the packets had to go through a review process at the Pentagon. While the two airmen had repeatedly

been approved for Silver Stars at lower levels, they faced additional bureaucracy.

“All those years went by, and they didn’t follow that process from the ’60s and ’70s,” Brodeur said.

Additionally, the airmen said the Air Force medal review board largely included experts on fixed-wing flight. There wasn’t as much knowledge of combat helicopter operations, especially not on the relatively small group of Green Hornets that fought in Vietnam—specifically, of how the airmen had to expose themselves to enemy fire to help the helicopter safely hover near blown-out trees in the landing zone, Roberts said.

“Three fixed-wing pilots sat down at the Pentagon and they said, ‘No,’” he recounted.

For 31 more years, the group pressed the service off and on. Seven years ago, the upgrade process started again and in 2015, the Silver Star was finally approved, Welsh said.

“We took a little break, but the battle went on,” Roberts said. “We found out more information, more information was declassified. ... We were able to give a better description of the mission, of what was involved.”

The Air Force has awarded 285 Silver Stars, with 107 of them for Vietnam, including the two for Roberts and Brodeur.

“That’s not a whole lot when you think of all the combat sorties and contingencies” the Air Force has been a part of, said Welsh. “It’s a very select group of warriors, for a reason,” he said.

Roberts and Brodeur stood on a stage in the Hall of Heroes in December at the Pentagon to finally receive their medals in front of more than 100 guests. Several Green Hornets, including former commanders, were in the audience to see two of their own finally receive the recognition they fought so hard to get.

The reception was surreal, the two honorees said.

“It’s very unbelievable, because of the way we came home—what we met when we came home,” Roberts said. “For now, for so many people discussing it and acknowledging it, it’s a little hard to believe sometimes.”

During their speeches, each said the medal is shared among the current and former members of the 20th Special Operations Squadron who have not received the proper recognition and whose valor, they said, has largely been overlooked.

“As a unit, all of the Green Hornets own this recognition,” Brodeur said.

“We want to share the acknowledgment and the recognition we received today with every one of them,” Roberts said. “They know who they are and they know what they did as a member of the Green Hornets, and we love them for it.”





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Compiled by Chequita Wood, Media Research Editor

(As of Feb. 19, 2016)



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- DASD** Deputy Assistant Secretary of Defense
- DDI** Director for Defense Intelligence
- PDUSD** Principal Deputy Undersecretary of Defense
- USD** Undersecretary of Defense



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# All Eyes on Khe Sanh

By John T. Correll

**T**he forward combat base at Khe Sanh in January 1968 was rough and temporary, a fortified sprawl of trenches and sandbag bunkers with a concertina wire perimeter and an airstrip running down the back side.

It was in a mountain valley in a remote corner of South Vietnam, just below the Demilitarized Zone and eight miles from the Laos border.

The principal garrison was four US Marine Corps battalions, there at the insistence of Military Assistance Command Vietnam. The marines had been at Khe Sanh in varying strength since 1966, but they did not share MACV's assessment of its importance.

"When you're at Khe Sanh, you're not really anywhere," said Marine Corps Brig. Gen. Lowell E. English in 1966. "It's far away from everything. You could lose it and you haven't lost a damn thing."

The main advocate for holding Khe Sanh was Gen. William C. Westmore-

land, MACV commander, who persuaded President Lyndon B. Johnson and the Joint Chiefs of Staff of its value. Westmoreland believed in the importance of Khe Sanh, but he was also using the marines as bait to lure the North Vietnamese into a decisive set-piece battle.

Such a battle seemed in prospect Jan. 21 when the North Vietnamese Army attacked Khe Sanh. It was the precursor of the Tet offensive and the concurrent strikes on more than 100 population centers and military installations all over South Vietnam.

For the next 77 days, Khe Sanh held the attention of the world as the longest battle of the Vietnam War unfolded there. No event during Tet stimulated more news coverage. Khe Sanh was the subject of fully 25 percent of all Vietnam film reports on network TV evening news in February and March.

Johnson kept a scale model of Khe Sanh in the White House situation room. "The

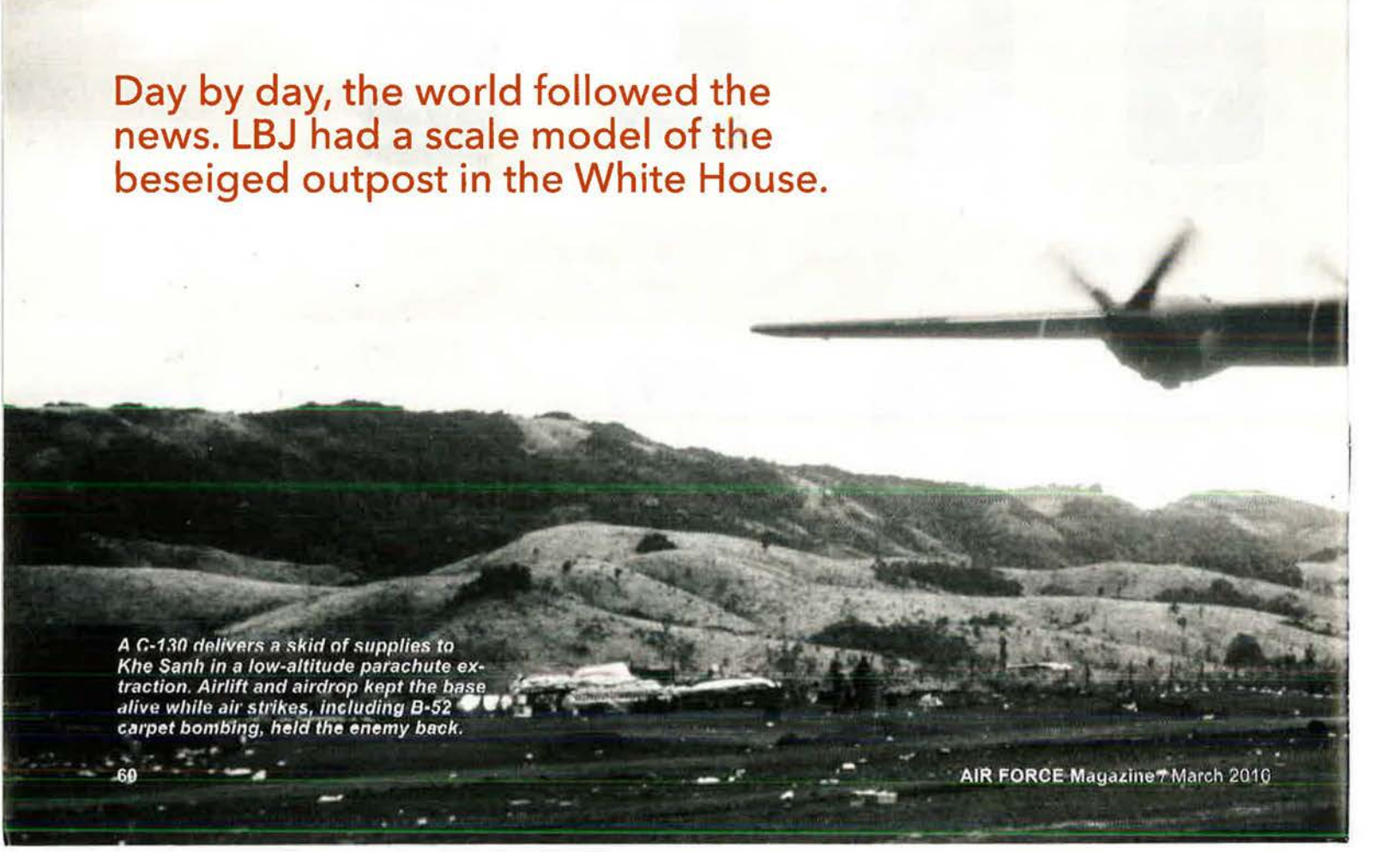
eyes of the nation and the eyes of the entire world—the eyes of all of history itself—are on that little, brave band of defenders who hold the pass at Khe Sanh," he said.

Khe Sanh was surrounded. The only way in or out was by air. The garrison was sustained through the siege by airlift and airdrop and the NVA—which outnumbered the marines by more than four to one—came under devastating counterattack by air strikes, including carpet bombing by Air Force B-52s.

On Feb. 9, the *New York Times* reported, "High military officials said yesterday that the United States was prepared to defend Khe Sanh at all costs."

Khe Sanh not only held; it was also a resounding defeat for the North Vietnamese. They failed to take the base and sustained far greater casualties than they inflicted. However, the tactical US victory occurred in the context of the strategic calamity of Tet when US commitment to the Vietnam War disintegrated.

Day by day, the world followed the news. LBJ had a scale model of the besieged outpost in the White House.



A G-130 delivers a skid of supplies to Khe Sanh in a low-altitude parachute extraction. Airlift and airdrop kept the base alive while air strikes, including B-52 carpet bombing, held the enemy back.



*Khe Sanh was the Newsweek cover story on March 18. The siege generated more press coverage in the United States than any other aspect of the Tet offensive.*

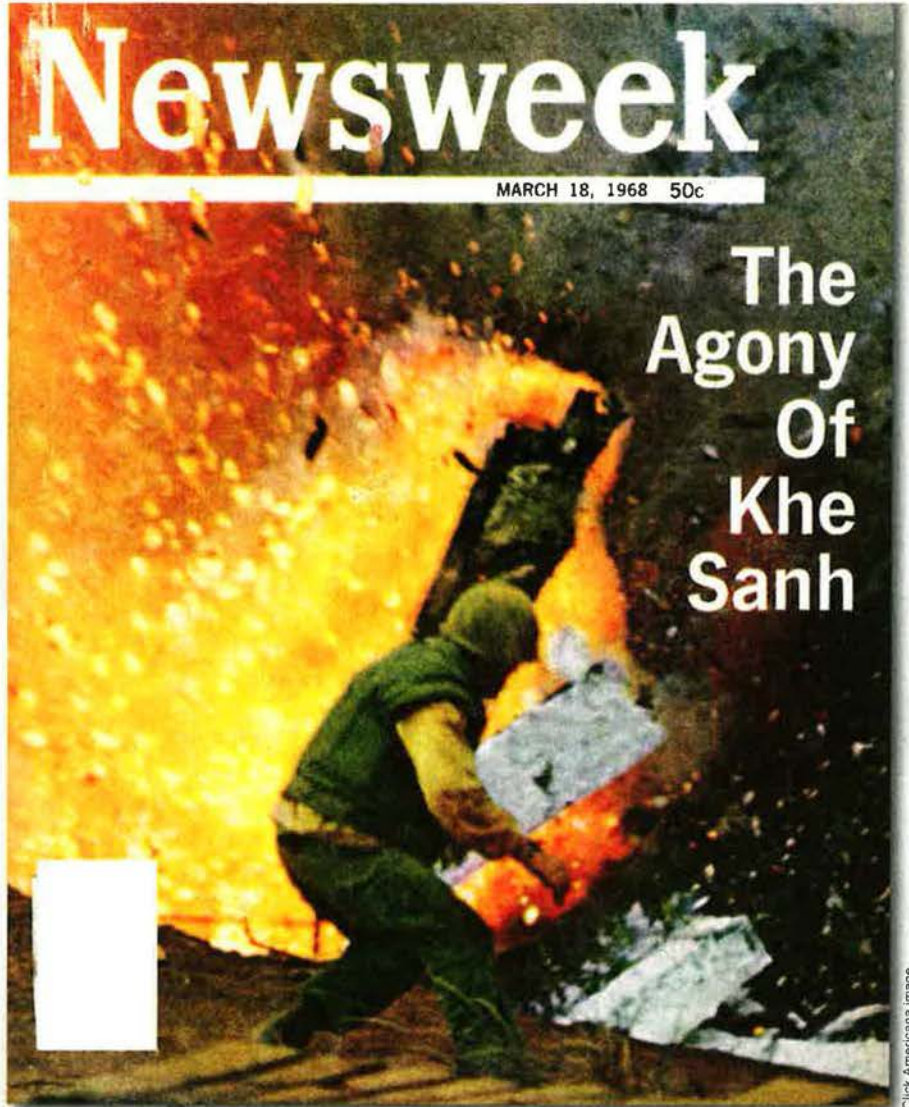
By March, Johnson had dropped his candidacy for reelection, halted the bombing of North Vietnam, and opened negotiations to seek a peaceful settlement to the war. By summer, the United States had abandoned Khe Sanh, redeployed the forces, and closed the base.

In an interview 20 years later, Westmoreland was asked which of his decisions he was proudest. "The decision to hold Khe Sanh," he said.

### GIAP AND HIS LEGEND

Everybody on the US side—including Westmoreland—was certain that Khe Sanh and Tet were the handiwork of North Vietnam's great military hero, Gen. Vo Nguyen Giap, and that he was attempting to repeat his famous victory over the French at Dien Bien Phu. He was reported to be present at Khe Sanh, personally directing the battle.

In fact, Giap had been shunted aside. He opposed the Tet strategy and was not



Click Americana image



USAF photo



even in Vietnam when the operation began. He returned in February 1968 from his self-imposed exile in eastern Europe but remained on the sidelines.

The driving force behind the Tet offensive was Le Duan, first secretary of the Vietnamese Communist party, who had managed to marginalize both Giap and the aging North Vietnamese leader Ho Chi Minh. He recruited Gen. Van Tien Dung to implement his strategy.

Le Duan's plan was called GO-GU (General Offensive-General Uprising) and anticipated that dramatic large-scale attacks would spark a mass uprising to overthrow the South Vietnamese regime in Saigon. It supplanted the strategy of Ho and Giap, which emphasized a protracted struggle.

"It remains unclear whether Hanoi intended Khe Sanh as a diversion to pave the way for Tet, or if the countrywide attacks were supposed to preoccupy the allies while Khe Sanh was overrun," said Vietnam War historian John Prados.

Westmoreland himself was in no doubt. "I believed then, and I continue to believe that the 'General Uprising' was in reality a feint, a secondary attack," he said in 1993. Westmoreland was aware of Giap's stated opposition to the plan but in his memoirs dismissed it as "camouflage, a planned deception."

Khe Sanh was compared constantly to Dien Bien Phu. "As the enemy build-up at Khe Sanh developed, almost every mail from the United States brought me letters warning that I was inviting another Dien Bien Phu and urging me to abandon Khe Sanh," Westmoreland said.

There were definite similarities. In 1954, the Viet Minh army commanded by Giap laid siege for 56 days to Dien Bien Phu, a French army outpost in a remote mountain valley. Land access was cut off and Giap's artillery bombarded the base relentlessly.

However, there were differences. Whereas Giap controlled the hills at Dien Bien Phu, the marines occupied the key hills around Khe Sanh. The biggest difference was airpower: airlift, airdrop, close air support, and heavy bombing.

At Dien Bien Phu, Giap's artillery closed the airstrip. At Khe Sanh, airplanes and helicopters continued to land during the siege. French bombers did little damage in 1954, but the air strikes at Khe Sanh, especially those by the B-52s, were enormously effective.

### THE FOGGY MOUNTAIN TOP

Khe Sanh was supposed to be the far western end of the "McNamara Line," a string of strong points and barriers across Vietnam below the DMZ ordered by Secretary of Defense Robert S. McNamara in 1966. The project was never completed.

The marines went to Khe Sanh in October 1966 and increased their presence during a series of attacks and challenges in 1967. There had been no land access to the base since August 1967 when the North Vietnamese cut National Route 9, a glorified name for the one-lane dirt road that ran through Khe Sanh village. A side road branched off toward the combat base.

The base was situated on a plateau, about four miles wide, with rugged mountains and densely vegetated jungle on all sides. The sole source of drinking water was a

stream that ran parallel with the perimeter, but was about 150 yards outside.

At the beginning of 1968, the main complement at the combat base was four Marine battalions that also occupied five hills—designated by their height in meters—to the north and west. The Long Vei Special Forces camp, several miles away, was defended by four companies of Montagnard irregulars and 24 US Army advisors.

In addition, the Special Forces and a battalion of South Vietnamese rangers had their own compound, FOB-3, along the south side of the main base and were further deployed around the eastern end. The marines distrusted indigenous forces and would not allow the Vietnamese inside their lines. The Special Forces were not particularly welcome either.

Strength estimates for the battle and siege vary, but the matchup was about 7,000 defenders—6,000 marines plus the indigenous troops—against a North Vietnamese Army attacking force of some 30,000.

The airstrip, built by the Seabees, was 3,895 feet long and made of pierced steel planking. The runway overshot the base perimeter on the eastern end by 150 yards, with machine guns covering the exposed extension.

Air Force twin-engine C-123 transports did not need the entire runway to land. They could turn off onto a parking ramp, but the four-engine C-130 turboprops had to go all the way to the end and taxi back, tracked by mortar shells all the way.

Nearby, a deep ravine dropped to lower elevations, forming a channel through

**Artillery bombardment was relentless, but the marines, in their trenches and fortified bunkers, took relatively few casualties. They responded effectively with their own artillery, armor, and rifle fire.**

USAF photo





which moist air rose, creating fog and mist. The sun seldom burned through until late morning, so the airfield was usually below minimum conditions for landing until then. Fog obscured the view again in the late afternoon.

The fog was a factor for artillery and mortar batteries as well, but spotters could see well enough to direct their barrages as soon as the overcast began to dissipate.

The Marines had heavy artillery at Khe Sanh, as well as five tanks they could move around for best advantage. There were marine guns on the hilltops, plus additional artillery support from Camp Carroll, 14 miles to the east but still within range.

### THE SIEGE BEGINS

The Battle of Khe Sanh began half an hour after midnight on Jan. 21, with a rocket and infantry assault on Hill 861, northwest of Khe Sanh. It was a limited action, easily thrown back, and a prelude to the main event, an attack on Khe Sanh combat base at 5:30 a.m.

The airstrip, bunkers, and trenches were hit by massive artillery, mortar, and rocket fire. "Within minutes of the opening salvo, enemy shells hit the base's ammunition supply point," the official Marine history of the battle said. "More than 1,500 tons of ammunition began exploding. At 1000, a large quantity of C-4 [plastic explosive] and other explosives went up with a tremendous blast, rocking the entire combat base."

The siege at Khe Sanh was already 10 days old when the Tet offensive opened on the night of Jan. 30-31, the beginning

of the Lunar New Year holiday. The North Vietnamese and the Viet Cong struck in locations from the DMZ in the north to the Mekong Delta in the south.

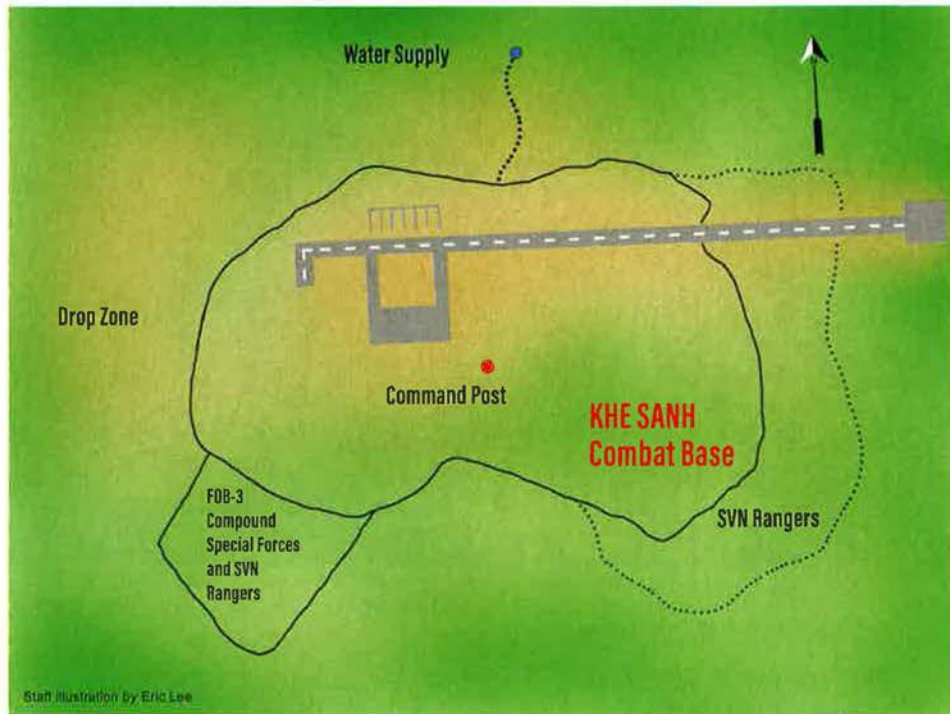
It undercut assurances by Westmoreland, given in a speech two months previously, that the enemy was "certainly losing" and that his hopes were "bankrupt." Further damage ensued when the *New York Times* reported that Westmoreland was asking for 206,000 more troops—in addition to the 510,000 he already had—and that tactical nuclear weapons had been considered for the defense of Khe Sanh.

Meanwhile, Westmoreland was having more trouble with the Marines. The independent-minded Marines were an uneasy fit in the joint command structure. In particular, they chafed under the control of Westmoreland and his staff who ran MACV with a near-total

Army perspective. MACV regarded the Marines as ill-suited for anything except "over-the-beach operations" and thought their defensive preparations at Khe Sanh were inadequate.

In later years, Westmoreland denied repeatedly that he had clashed with the marines, but shortly after Tet began, he sent a cable to Army Gen. Earle G. Wheeler, Chairman of the Joint Chiefs of Staff, saying "the military professionalism of the Marines falls far short of the standards demanded by our armed forces."

Westmoreland lost confidence in them altogether after the fall of the Lang Vei Special Forces camp the night of Feb. 7. The NVA, using PT-76 Soviet tanks in battle for the first time, overran the camp, killing or wounding almost 300 of the 487 defenders. The contingency plan committed the marines at the combat base to reinforce Lang Vei if required.



*Below: The biggest champion of the stand at Khe Sanh was Westmoreland. Below right: National Security Advisor Walt Rostow (far right) briefs President Johnson (second from left) on developments at Khe Sanh, using a scale model.*

USMC photo by Lance Cpl. D. J. Bruschi



AIR FORCE Magazine / March 2016



White House photo by Yoichi Okamoto.



When called upon, they did not come, regarding the situation as too hazardous and the chances of success as too low.

On Feb. 9, Westmoreland established "MACV Forward" at Phu Bai, commanded by his deputy, Gen. Creighton W. Abrams Jr., in charge of both Army and Marine forces in the northern part of the country.

The Marines took it as "a slap in the face" and were not altogether mollified in March when MACV Forward was dissolved and its assets converted to form the Provisional Corps Vietnam, subordinate to the III Marine Amphibious Force.

The North Vietnamese scored one of their few triumphs of the battle Feb. 10 when they hit a Marine KC-130, laden with fuel for the base, on its final approach. It burst into flames as it rolled down the runway and exploded. The wreckage was pushed off to the side, where it became the standard backdrop for filmed television reports from Khe Sanh.

After that, C-130s were prohibited from landing. The C-123s, a poorer target because they used less runway, continued to come and go, but they carried only a third as much cargo as the C-130s.

Even so, more than half of the deliveries were made by parachute drop from an altitude of a few hundred feet. (By contrast, the French at Dien Bien Phu airdropped their deliveries from 10,000 feet and more than half of them fell into enemy hands.)

The drop zone at Khe Sanh was just beyond the western end of the runway, protected by a forward detachment of dug-in marines. A few bundles fell long or wide of the drop zone, but 99.5 percent fell within the boundaries and were recovered.

During the siege, Air Force airlifters flew 1,120 sorties over and into Khe Sanh, including regular landings to deliver passengers and bring out the wounded.

Operation Niagara—the concentrated effort to disrupt the NVA attack by airpower—began Jan. 22. Over the course of the siege, Air Force, Marine, and Navy tactical aircraft averaged 300 strike sorties a day, but the heavy damage was inflicted by the B-52s, which flew about 35 sorties a day.

Each three-ship cell of B-52s carpet-bombed a 1.2-mile strip, which created havoc among the besiegers. About 15,000 NVA and Viet Cong troops were killed, most of them by airpower. "The thing that broke their backs was basically the fire of the B-52s," Westmoreland said.

The marines expressed their appreciation for the B-52 strikes but regarded airpower at Khe Sanh as a "supporting arm."

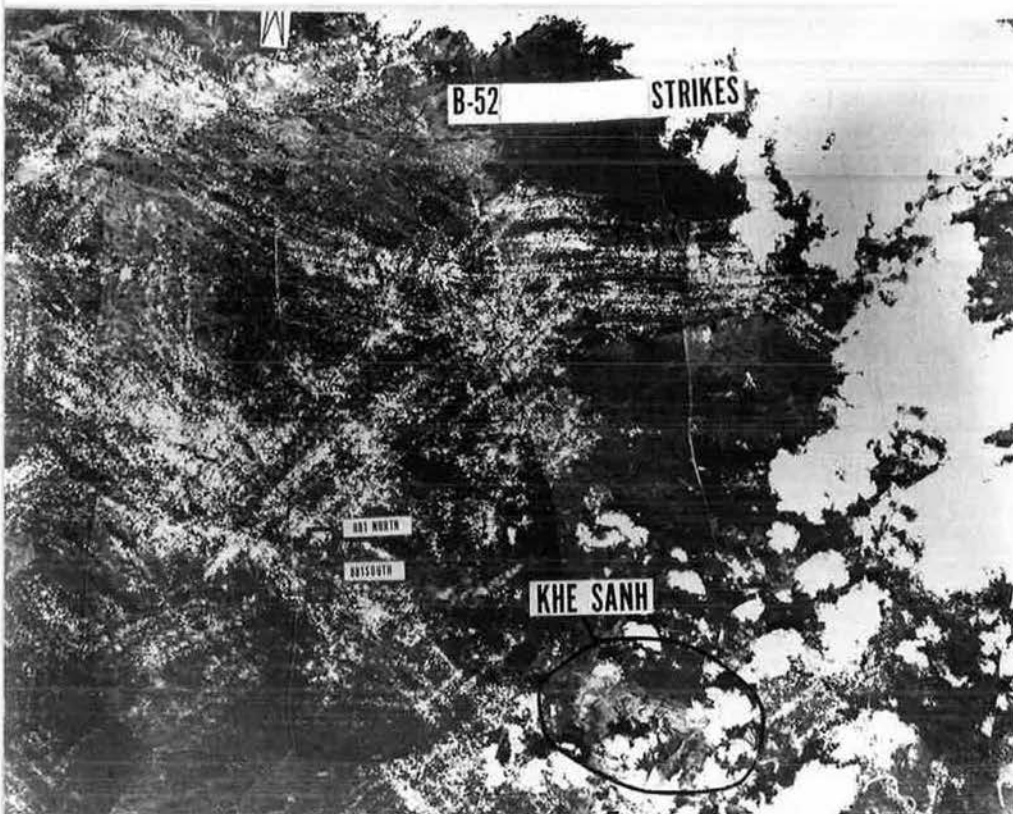
## 77 DAYS

"By the end of February, the Americans and the South Vietnamese had erected some 510 bunkers, dug miles of trenchline, and laid hundreds of minefields and trip flares," said Marine Corps historian Capt. Moyers S. Shore II. "Each sector was guarded by a maze of double-apron, tanglefoot, and concertina barbed wire obstacles."

The enemy shelling was constant. The worst day was Feb. 23, when 1,307 rounds landed on Khe Sanh combat base. According to *Detroit News* correspondent Robert Pisor, enemy rockets and shells left the camp looking like "a shanty slum."

As the days passed, clutter accumulated and many accounts mention the proliferation of rats. There were rat-killing contests, and according to *Time* magazine, one sergeant killed 34 rats to establish a base record.

Sharpshooters and snipers were effective on both sides. NVA marksmen had rifles and scopes comparable to those of



USAF photo

Nothing hurt the North Vietnamese attack force more than carpet bombing by Air Force B-52s. The stripes of white dots seen above aren't street lights—they are the damage from B-52 bomb runs.

## THE "SUPPORTING ARM"

Airplanes and helicopters were the favorite targets of the North Vietnamese gunners, so they got in and out as quickly as they could.

"The aircraft landed in the assault configuration," said Air Force Maj. Gen. Burl W. McLaughlin, commander of the MACV airlift division. "At touchdown, the loadmaster opened the ramp and door and upon reaching the offload area, pushed the pallets out while the aircraft continued taxiing slowly. Passengers scampered aboard the aircraft. Three minutes from touchdown to gear up was average; several times it took only 55 seconds."

From then on, the C-130s made their deliveries by low-level extraction and parachute drop. With the Low-Altitude Parachute Extraction System (LAPES), the aircraft skimmed in a few feet above the runway, the cargo door open, and released a roller-mounted cargo pallet that was yanked out by a blossoming parachute.

LAPES worked fairly well, but the Ground Proximity Extraction System was better. The C-130 swooped in low, trailing a cable with a hook on the end. It snagged a cable stretched along the ground, efficiently pulling the cargo pallet out the door.



the Americans. When the marines picked off one especially accurate shooter, his replacement was inept, expending up to 30 rounds a day without hitting anyone. The marines had him spotted but let him alone lest he be replaced by a better shooter.

Incredibly, the NVA never made any attempt to interrupt or contaminate the water supply, which was outside the base perimeter. Nor was there any serious effort to destroy the radio relay site on a hill defended by a single Marine platoon.

Operation Pegasus, to re-establish ground contact with Khe Sanh, began April 1. It was spearheaded by the Army's 1st Air Cavalry Division with substantial participation from the 1st Marine Division and the South Vietnamese army. Within a week, the operation had reached the Khe Sanh plateau.

There is disagreement about when the siege officially ended, but April 7 is generally recognized as the 77th and final day. For their part, the marines refer to it testily as the "so-called siege," and are even more insistent that they were not rescued by the Operation Pegasus relief force.

### THE OUTPOST ABANDONED

Casualty estimates for Khe Sanh vary. A credible compilation by John Prados figures the overall allied loss, including collateral actions, indigenous forces, and the relief effort, at 730 dead, 2,642 wounded, and seven missing. The official casualty count says 205 of those were marines. Guesses at the NVA loss range from 10,000 to almost 30,000, with the most likely number somewhere around 15,000.

Negotiations with North Vietnam began in Paris May 10. The United States was clearly headed for the exits. Fighting continued sporadically around Khe Sanh, but what was left of the main NVA force had scattered. North Vietnam did not again try a major offensive until the Easter Invasion of 1972 when most of the US forces had gone home. That initiative was foiled as well, primarily by US airpower.

Westmoreland's senior Army and Marine officers told him it was time to abandon Khe Sanh. In his memoirs, Westmoreland says that, given the developing political situation, he "agreed in principle" but "decided to leave the decision on Khe Sanh to my successor."

He was going back to the United States to be Army Chief of Staff and refused

to approve the evacuation of the base on his watch.

Westmoreland left Vietnam June 11 and the next day, the new MACV commander, Creighton Abrams, ordered Khe Sanh's closure.

Nothing would be left for the enemy. Convoys of trucks hauled away supplies, materials, and equipment. Work parties destroyed 800 bunkers and three miles of concertina wire. Sandbags were slit and spilled. The Seabees ripped up the runway. Vehicle hulks that could not be salvaged were cut up with torches and bulldozed

of battle and Khe Sanh has reverted to obscurity. Sometimes, American veterans endure the long bus ride from Hue or Da Nang to see it again.

There is a small museum where visitors can inspect a "restored" sandbag bunker and a trench. Displays include the wreckage of two American helicopters, a 155 mm howitzer, and the hulk of a tank. The museum caretakers do not disclose that the wreckage was brought in from elsewhere and that they filled the sandbags themselves. Souvenir sellers offer US dog tags and

Photo by Sgt. Jim M. Reed, USMC



Aerial view of the west end of Khe Sanh taken by a helicopter squadron HMM-364 member on a supply flight to the base during the siege.

into trenches. The ground was dusted with tear gas to discourage scavengers. Khe Sanh combat base was closed July 5 with evacuation completed July 6.

Of all of the retrospectives, none were more upbeat than Westmoreland's. "Khe Sanh will stand in history, I am convinced, as a classic example of how to defeat a numerically superior besieging force by coordinated application of firepower," he said in his memoirs.

With the passage of almost half a century, vegetation has grown over the scars

other "artifacts," most of them "recently forged by industrious villagers," according to the *Los Angeles Times*.

A vertical slab marker declares that during the battle, the NVA killed 112,000 enemy troops and shot down 197 US airplanes in driving the Americans from Khe Sanh in what amounted to "another Dien Bien Phu" for the United States.

Fifty years after it all happened, much about the history of the stand at Khe Sanh depends on who is telling the story. ★

John T. Correll was editor in chief of Air Force Magazine for 18 years and is now a contributor. His most recent articles, "The Lost Art of Naming Operations" and "Command and Control Evolution," appeared in the February issue.



# Sijan, by McCain

Sen. John S. McCain, Arizona Republican, is perhaps the nation's best-known POW. In 1998, the former Vietnam War Navy pilot gave the keynote speech dedicating the National Prisoner of War Museum at Andersonville, Ga. McCain had spent more than five years in confinement in Hanoi, where he was tortured repeatedly. On this occasion, though, McCain spoke movingly of another POW who stood first in the senator's hall of heroes. The story of USAF Capt. Lance P. Sijan, Medal of Honor, is well-known. Still, McCain—because it was McCain—told the Sijan story with special force and eloquence.

**A** long time ago, I lived for a time in the company of heroes—men who endured great hardships, but who refused to lose faith in their God, their country, and their comrades.

I am a witness to a thousand acts of compassion, sacrifice, and endurance. But of all the men whose dignity humbles me, one name is revered among all others.

I never knew Lance Sijan, but I wish I had.

I wish I would have had one moment to tell him how much I admired him; how indebted I was to him for showing me, for showing all of us, our duty; for showing us how to be free.

I lived alone once in a room next door to men who had once lived with Lance Sijan. He was gone before I heard of him, but the men who had lived with him told me his story.

Air Force Capt. Lance Sijan was shot down near Vinh, North Vietnam, on Nov. 9, 1967. For a day and a half, he lay semiconscious on the ground, grievously injured with a compound fracture of his left leg, a brain concussion, and a fractured skull.

He made radio contact with rescue aircraft, but they were unable to locate him in the dense jungle. On Nov. 11, they abandoned the search.

Crawling on the jungle floor at night, Lance fell into a sinkhole, injuring himself further.

For six weeks, he evaded capture. On Christmas Day, starved, racked with pain, he passed out on a dirt road, where a few hours later the North Vietnamese found him.

The Code of Conduct for American prisoners of war requires every prisoner to evade capture, and when captured, to seize opportunities for escape. It instructs prisoners to resist giving the enemy any military information beyond name, rank, and serial number.

Lance Sijan obeyed the code to the letter.

A short time after he was captured, he overpowered an armed guard and managed to escape. Recaptured several hours later, he was tortured for information but refused to provide anything beyond what the code allowed.

By the time he reached prison in Hanoi, he was close to death. Over six feet tall, he weighed less than 100 pounds when he was placed in a cell with two other Americans, Bob Craner and Guy Gruters.



Naval aviator John McCain (left) in mid-1960s. First Lt. Lance Sijan (right) on an F-4 ladder.

## "Dedication Remarks"

Sen. John S. McCain (R-Ariz.)  
National Prisoner of War Museum  
Andersonville, Ga.  
April 9, 1998

Find the full text on the  
Air Force Magazine's website  
[www.afmag.com](http://www.afmag.com)  
"Keeper File"

He lived there nearly a month. In and out of consciousness, often delirious, he would push on the walls and scratch the floor searching vainly for a way out.

When he was lucid, and not consumed with pain, he would quiz his cellmates about the camp's security and talk with them about escaping again.

Interrogated repeatedly, he refused to say anything. He was savagely beaten for his silence, kicked repeatedly, and struck with a bamboo club.

His cellmates heard him scream profanities at his guards, and then after hours of torture, they heard him say in a weak voice: "I'm not going to tell you anything. I can't talk to you. It's against the code."

His cellmates tried to comfort him during his last hours. Working in shifts timed to the tolling of a nearby church bell, they cradled his head in their ... laps, talked quietly [to] him of his courage and faith, and told him to hang on.

Occasionally he would shake off his delirium and joke with his friends about his circumstances.

Finally, near the end, the guards came for him. Lance knew that they were taking him away to die.

And as they placed him on a stretcher, he said to his friends, "It's over. It's over."

A few days later, the camp commander told Bob Craner what he knew already, that his friend was dead. And Bob, a good man and tough resistor himself, resolved to spread the legend of Lance Sijan throughout the prisons of Hanoi so that his fellow Americans could draw strength from the example of a man who would not yield his humanity no matter how terrible the consequences.

A few weeks later, when I was moved to the cell next to Bob's, he told me the story of Lance Sijan: a free man from a free country, who kept his dignity to the last moment of his life.

When you leave here today, think of Lance Sijan, and carry his dignity with you. Keep his memory alive, confident in your faith that almighty God blessed him, and gave him the strength to prevail over his enemies.

Though they took his life, they could not take his dignity. Lance Sijan prevailed. ✪





*Published by the Air Force Association*

# WINGMAN



**AFA INTERNS:**  
Training for  
Leadership

ALSO:  
APROTC & the Air Show  
Chapter News



# FIVE for the FORCE

By Gideon Grudo, Digital Platforms Editor

## AFA's summer 2016 internship program begins soon. Here's a look at last year's interns.

Five interns from the Arnold Air Society and its sister Silver Wings organization spent last summer at the Air Force Association in Arlington, Va. From a public relations hopeful to potential pilots, the slate of interns had unanimous praise for the program.

So did retired Brig. Gen. Daniel P. Woodward, co-executive director of Arnold Air Society and Silver Wings. "I cannot say enough about the leadership of AFA and what they did to make this program truly great for our students," he commented. When Woodward became co-director in 2013, the AFA internship program was a fledgling effort. Only a year old then, the program allowed two interns to get administrative experience, though little else.

With help from AFA leadership, Woodward pushed to upgrade the program. He said that AFA Executive Vice President Mark A. Barrett did a "phenomenal" job improving the quality of the internship.

Who were the live students who benefitted? They are AFA members, as are all AAS cadets and college students in Silver Wings—a professional organization supporting national defense and focused on community service.







### WANT TO BE AN AFA INTERN?

AAS/SW is accepting nominations for AFA 2016 summer internships. Students can expect immersion in AFA departments such as: Communications, CyberPatriot, Government Relations, Mitchell Institute for Aerospace Studies, and the Air Force Memorial Foundation. See details at <http://bit.ly/1ZiO3Bf>.

Favorite Color

-  Columbia Gorge Chapter, Ore.
-  Happy Valley, Ore.
-  Happy Valley, Ore.
-  Any Middle Eastern food
-  Anything by Lady Gaga or Taylor Swift
-  Oregon State University Beavers









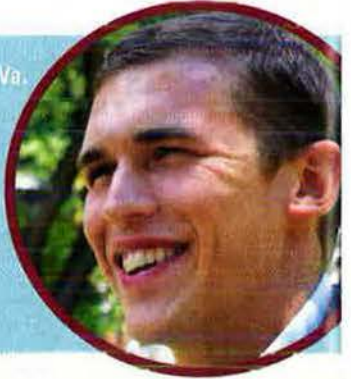
-  Pride of the Adirondacks Chapter, N.Y.
-  Rochester, N.Y.
-  Clarkson University, N.Y.
-  Steak
-  Tampa Bay Buccaneers
-  Missed *Wingman* cover photoshoot; was taking a flight physical









-  Inland Empire Chapter, Wash.
-  Olympia, Wash.
-  Goodfellow AFB, TX
-  A nice steak
-  "Babel" by Mumford and Sons
-  Seattle Seahawks



-  Northern Shenandoah Valley Chapter, Va.
-  Warrenton, Va.
-  University of Virginia
-  Pulled pork barbecue with cole slaw and dirty rice
-  "Daughters" by John Mayer
-  Hail to the Washington Redskins



-  Columbia Palmetto Chapter, S.C.
-  Clover, S.C.
-  Columbia, S.C.
-  Pizza, all day, every day
-  "Home" by Edward Sharpe and the Magnetic Zeros
-  University of South Carolina Gamecocks





## Emilie M. DeClercq

Loves any aircraft Gen. John A. Sfraud has flown.



Then-Lt. Gen. David L. Goldfein asked me why I joined Silver Wings. I said, "There were two cute AFROTC boys on my floor whom I wanted to spend more time with."

I never thought that volunteering with cute cadets would lead me to one of the best experiences of my life.

My internship [was] nothing short of amazing.

My favorite experience was with veteran and AFA member Molly Mae Potter on Capitol Hill, where we advocated for airmen with PTSD [post-traumatic stress disorder] or a traumatic brain injury (TBI). As someone who has a TBI,

it meant the world to me to spend time with Molly. I had finally met someone who understood exactly how I felt, and for the first time I didn't feel alone.

My dream is to be an Air Force civilian focused on diversity, sexual assault prevention, mental health, and family programming.

## Cadet Nicholas F. Donato



Founder & President, Pride of the Adirondacks Chapter

I've had a desire to fly for years. Just before high school, I decided I wanted to join the military and figured the Air Force would be the best branch. Since starting ROTC, I haven't regretted that.

The best takeaway from my AFA internship was the mentoring I received from current and retired airmen, from

staff sergeants all the way to generals. Understanding their experiences and perspectives will pay dividends. One of the greatest things I did while at AFA was help plan and execute the AFA Congressional Fly-In. I sat in on meetings with staffers and realized more of what goes on in the grander scheme of

things. It was also nice to work on a big project and see it through until the end.

I plan to finish my degree in aeronautical engineering, commission into the Air Force, and attend pilot training. I'd like to fly either fighter or mobility aircraft. I may apply for test pilot or weapons school.

## 2nd Lt. Joshua A. Garvison

Considers retired B-1 pilot Col. Gregory M. Cain his greatest mentor.



I chose the Air Force because of the community of people who call themselves airmen—we take care of each other. [I was] a first-year cadet with a horrible transfer GPA, when a colonel took me under his wing and spent a lot of time molding me into an officer willing to do the same for others. That's what the Air

Force is about: mentorship, leadership, and community.

AFA gave me a lot of opportunity to network. I toured a number of ground-level shops, met with congressmen and senators, and talked with people who were genuinely interested in my story. When I met several generals at a

backyard barbecue, someone asked me why I was there. I jokingly threw in a number, praising ROTC and chastising [the Air Force Academy]. Not sure if I made enemies in high places or if they all just gave me a courtesy laugh.

I hope to be a career airman, being a positive influence and good officer.

## Cadet Nathaniel R. Jewell



Likes soft serve ice cream.

I chose the Air Force because I wanted to fly in some capacity and clearly the Air Force has the most opportunities to be an aviator. I have always admired the courage, sacrifice, and purpose of military service members.

AFA was unbelievably good to us. The first weekend, we had a BBQ at an

AAS/SW staff member's home and were fortunate to spend the evening talking with a variety of general officers and their spouses. We attended two AFA Air Force Breakfasts with distinguished leaders. Another staff member hosted us for two officership lessons over lunch. Additionally, we [went] to Capitol Hill

several times for meetings and saw Gen. Paul Selva's and Gen. Darren McDew's confirmation hearings in front of the Senate Armed Services Committee.

I am trying to get to pilot training [for] the F-22, F-35, or F-15. If not fighters, I'd love to fly the C-17 around the world.

## Cadet Savannah G. Knight

Has four younger brothers and an older sister.



My dad is a retired major and my mom was an Air Force nurse.

People always ask me why I chose the Air Force and the answer is simple: I want to be a part of something bigger than myself.

I want to be able to travel while serving my country and also know-

ing that I am helping people all over the world.

Interning with AFA taught me many life lessons: how to stay on a schedule, how to network with people, and how to quickly acclimate to a place that you're not familiar with. I learned that our senior Air Force leadership is invested

in us and the future of the Air Force, and they're doing everything they can.

Over the next 10 years, I will begin my career as a public affairs officer. I plan on soaking up every second that I can get.

I see myself in 10 years working at an overseas majcom, starting a family, and living the Air Force dream!



# THUNDERSTRUCK

By Evan McCauley

One hundred-fifty cadets stood nervously at parade rest as the standard Thursday announcements droned on.

It was 7 a.m. on Sept. 17, 2015, the day before the Air Force's 68th anniversary, and it was business as usual for the Air Force ROTC leadership lab at Det. 330, University of Maryland, College Park.

Many cadets had already been up since 3:30 a.m. to commute to the campus and had been in training since 5:30 a.m.; they were ready to get announcements over with and get on with the orders of the day.

Then thunder struck.

"Ladies and gentlemen, do you know what's going on right in our backyard this weekend?" I asked the cadets.

Crickets.

Finally, the cadet vice wing commander, Kenneth DiGiovanni, spoke up.

"Sir, isn't there an air show at Joint Base Andrews?"

"Ding, ding, ding!" I crowed. "You are correct. And have I got a sweet volunteer opportunity for you."

That's all it took. That's how easy it was. On only two days' notice, 11 AFROTC cadets responded to my announcement and stepped up to work a refreshment stand at the air show at JB Andrews, Md. They braved long lines of traffic, long waits for shuttle buses, sun, and jet exhaust on the flight line for the sweet opportunity: sell frozen lemonade and ice cream alongside members of the Air Force Association's Thomas W. Anthony Chapter, Md., centered around Andrews. All day Saturday, they peddled treats from a cart to a crowd described by the *Washington Post* as numbering "tens of thousands."

Funds raised by the refreshment sales went to the chapter's outreach effort at Andrews.

## LUCKY GUY

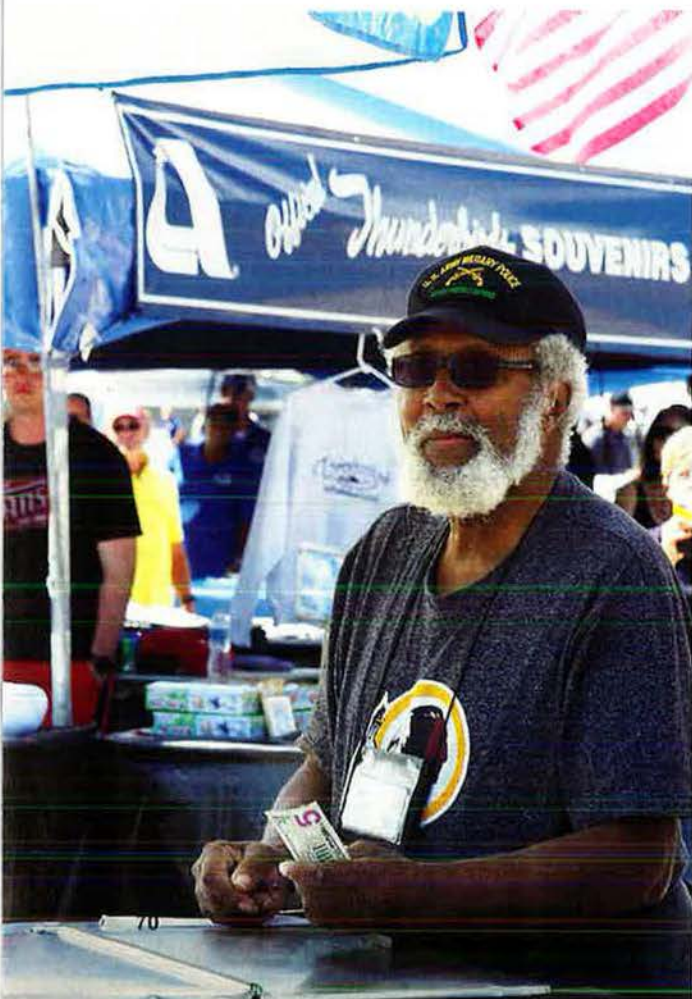
I'm a lucky guy. Not only do I have the privilege of being an Air Force ROTC instructor at the University of Maryland, but I was also recently selected to serve as the Maryland state president for AFA.

Could any two positions complement each other more perfectly?

As an ROTC instructor, I build leaders of character. Our detachment works hard to recruit, develop, assess, train, and educate the world's best leaders. Cadets come from 20 universities in the area, including community colleges.

As Maryland AFA state president, I work with an executive committee, our three state chapters, and 1,930 members to educate the public about, advocate for, and provide support to the US Air Force.

The relationship between the cadets of Det. 330 and its neighboring D.C., Maryland, and Virginia AFA chapters goes back years. Det. 330 has been active since 1920 and exclusively Air Force since 1949. Detachment records show that both the Donald W. Steele Sr. Memorial Chapter of Northern Virginia and the Anthony Chapter have consistently provided annual \$500 and \$1,000 scholarships for our cadets who demonstrate excellence in academic and military training performance. Members



(Above) JB Andrews, Md., hosted its first air show since 2012—and AFROTC cadets helped the Thomas W. Anthony Chapter work it. Triere Green (in green cap), a communications major at Prince George's Community College, serves a customer, while UMD cadet Thomas Leonard counts cash. At right is Patrick Forbus, UMD aerospace engineering major.

(Left) The Anthony Chapter officers had worked the refreshment cart themselves the day before. Here, Chapter VP John Higginbotham pauses as the roar of a jet stops everyone in their tracks.



## The cadets were surprised by the chance to work an air show. The chapter was surprised that so many volunteered.

from these chapters have presented their scholarships at the detachment's annual awards banquet and formal dining-out each spring. But since my arrival in 2014, I have observed that the collaboration has otherwise decreased.

I'm trying to change that. As a cadre member on a three-year rotation, I have time to ensure the cadets are aware of what support AFA provides, how to access it, and in turn, make our AFA chapters aware of what support our cadets can provide.

It's been encouraging to learn how much my cadets already know about AFA. Kalyn Toledo, a George Mason University freshman, spent an hour volunteering at the air show. When asked about AFA, she said it is "awesome" to have an organization devoted to the public understanding of the Air Force.

Ronald Weedon, a Frederick (Md.) Community College freshman, agreed. As an Arnold Air Society candidate, he knew "quite a bit" about the association. (All AAS cadets are also AFA members.)

### BLUEBIRD DAY

Weedon was one of the most enthusiastic recruits for the Andrews air show. Spirits were high on that beautiful bluebird day. When the USAF aerial demonstration squadron, the Thunderbirds, fired up their engines, rattling the chests of thousands of air show spectators, the cadets were thunderstruck.

Weedon had never been to an air show or even seen a military fighter aircraft up close. "It was an amazing experience. I really want to become a pilot so this was a great opportunity to check out how it's done and what it's like," he said.

Weedon and our 10 volunteers stood out; at one point during the day, the Andrews event coordinators told John L. Huggins Jr., the Anthony Chapter president, that he had "too many volunteers," and some would have to rotate out temporarily and enjoy the air show.

Huggins concluded this was one of the best problems to have—certainly better than too few volunteers.

So to rewind to the leadership lab two days before the air show. Yes, I made that announcement requesting cadet volunteers for AFA. But that's not really when thunder struck. Joshua Novick, a UMD sophomore, took it from there and rallied the volunteers, coordinated logistics, showed up early, stayed late, and made the whole event a success.

Cadets like Novick and his team, much like our AFA volunteers, are the ones who make thunder strike, with detailed planning and hard work.

We all have this capability, when we commit to educating, advocating, and supporting our Air Force.

When will you make thunder strike? ★

*Capt. Evan McCauley is the AFROTC Det. 330 education flight commander at the University of Maryland, College Park, and Maryland AFA state president.*



**AIR FORCE ASSOCIATION and  
AIR FORCE MEMORIAL FOUNDATION**

# ANNUAL GIVING FORM

The Air Force Association's Annual Fund helps provide the financial support needed to carry out the Association's mission. Like most nonprofit organizations, the Air Force Association is not supported by membership dues alone. The organization relies upon generous contributions to support the programs, awards, scholarships, and initiatives that enable AFA to reach thousands of people every year. You are a significant part of our success!

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Your contribution is tax deductible.

For more information contact  
Wesley Sherman at 703-247-5831 or WSherman@afa.org



# CHAPTER NEWS

By June L. Kim, Associate Editor

Updates from across the United States on AFA's activities, outreach, awards, and advocacy.

## NORTHERN UTAH CHAPTER

The Northern Utah Chapter teamed up with the state's AFA Aerospace Education Foundation in December to host a Live Rube Goldberg Machine Contest. Held at Weber State University in Ogden, Utah, the contest encouraged "out-of-the-box problem solving for students [to build] overly elaborate and hilariously conceived wacky contraptions to perform a single task," said James D. Aadland, chapter treasurer. The contest had a middle school and high school division.

Ten teams created machines to open an umbrella, said Aadland. The judges focused on the unique steps involved, he said.

A team of home-schooled children won Division I while Division II winners came from Northern Utah Academy for Math, Engineering, and Science.

The engineering directorate at Hill AFB, Utah, provided judges for the contest and Total Quality Systems provided awards, said Aadland. "Without their support, the contest would lack much of the excitement." Utah AEF President Frances Bradshaw coordinated between the university and Hill while Aadland coordinated the competition with Rube Goldberg, Inc. This was the chapter's second time hosting the competition.

The contest is named after Rube Goldberg who "was a Pulitzer Prize-winning cartoonist best known for his zany invention cartoons," according to the organization's website.

## CAPE FEAR CHAPTER

The Cape Fear Chapter in North Carolina invited US Rep. David Rouzer (R-N.C.) to speak at a chapter meeting over the winter. Rouzer gave an update on activities from the House of Representatives, said Chapter President John Lasley Jr. "A lively Q&A session followed," he said. During the same meeting, the chapter also presented an AFA Community Partner plaque to Rick Catlin, president of Catlin Engineers and Scientists, for his partnership with the chapter.



Photo by Bob George

Students compete to build a "wacky" contraption to open an umbrella at the Live Rube Goldberg Machine Contest hosted by the Northern Utah Chapter.

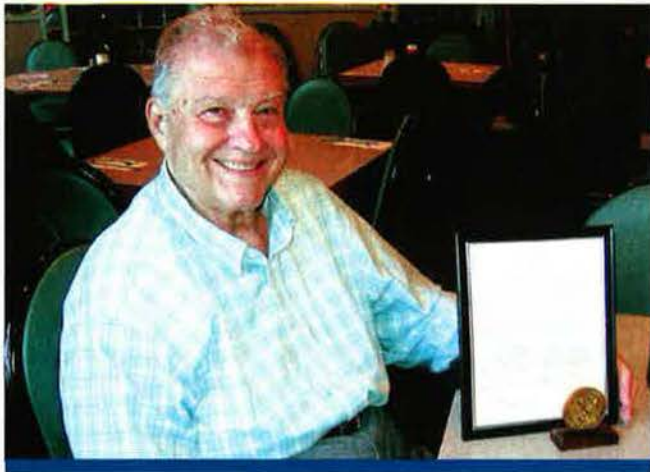
## GREEN MOUNTAIN CHAPTER

Champlain College in Burlington, Vt., now hosts a training "cloud" for CyberPatriot, AFA's national youth cyber education initiative. Assistant Professor Duane Dunston, lead CyberPatriot mentor to five teams in the area, received a grant through the college and an endowment that will fund the cloud to help students train for CyberPatriot, according to Vermont's Green Mountain Chapter VP Richard F. Lorenz. The chapter developed a partnership with the college over the last few years when Dunston began mentoring a local high school's CyberPatriot team. "We didn't recruit him. ... He just volunteered and started out as a mentor," said Lorenz.

The \$12,780 grant allows "various operating systems [to be] available 24/7 and will also have unsecure systems that can test skills on a routine basis of varying levels of difficulty," said Lorenz. The cloud is accessible to students and schools participating in CyberPatriot. Students can watch videos regarding security, forensics, and system administration and test what they've learned. The grant also provides funding for 10 local schools to participate in CyberPatriot for a year, said Lorenz. Dunston, who has already hosted three training events since last spring, "has become one of our greatest champions here in Vermont," said Lorenz.



Photo by David Ribbe



Joseph Traina, chapter senior VP and secretary of the Gen. Carl A. Spaatz Chapter received a 2015 Medal of Merit at a chapter luncheon in New York last fall, according to Chapter President David Ribbe.



Photo by Amanda Morales, Sarasota Observer

Sarasota Military Academy students in Florida engage in a practice round of CyberPatriot competition. L-r: Jacob Diercks, Tyler Weigand, Kylee Eubanks, and Ian Przybylowicz. The Sarasota-Manatee Chapter "has been actively recruiting schools to participate in CyberPatriot," said Chapter President Michael Richardson. The final competition will be in April in Baltimore.

Photo by Col. David Hiltz



More than 240 participants came out for Paul Revere Chapter's 5K Veterans Fun Run last fall in Bedford, Mass. The chapter raised more than \$8,000. Veterans ran for free, said Keith Taylor, former chapter president.

## MINUTEMAN CHAPTER

The Massachusetts state AFA held an awards dinner at the USS *Constitution* Museum in Boston to honor five outstanding airmen: SMSgt. Joseph Barden, MSgt. Kim Brown, MSgt. Gregory Pauli, MSgt. Kevin Walker, and SSgt. Timothy Wachta. Each was "selected for their mission contributions and outstanding performance," said Joseph P. Bisognano Jr., Minuteman Chapter treasurer. "This dinner was an opportunity to say thank you to five of our very best Massachusetts airmen who have made tremendous sacrifices while supporting our nation."

Barden is with the 66th Security Forces Squadron at Hanscom AFB, Mass.; Brown is with the 102nd Intelligence Wing at Otis ANGB, Mass.; and Pauli with the 439th Airlift Wing at Westover Air Reserve Base. Walker was with the 319th Recruiting Squadron at Hanscom before being reassigned, and Wachta is with the 104th Fighter Wing at Barnes ANGB, Mass.

## AFA Emerging Leader



### Capt. Devon Lynn Messecar

Home State: Massachusetts.  
Chapter: Paul Revere Chapter.  
Joined AFA: 2012.  
AFA Offices: Currently Communications VP  
Military Service: Active Duty since 2007  
Occupation: Program manager, Acquisition  
Education: B.A., Michigan State University; M.A., American Military University

### Q&A:

#### How did you first hear of AFA and what compelled you to join?

I've known about the Air Force Association for a long time but never really understood the benefits. ... I never knew what separated AFA from other organizations. Then, as I was planning for a base event, Paul Revere Chapter President, [Paul] Zauner, convinced me to join. ... I was looking for some support from the chapter to pull off various [base] activities. [He] liked how I advertised the event and asked that I join the chapter's VPs as the VP of Communications. Through this opportunity, I saw a lot more about what the chapter was doing around Hanscom AFB, but noted that people on base just didn't realize how supportive the chapter has been.

The Air Force Association's Emerging Leaders Program began in 2013 as a way to prepare volunteers for future AFA leadership roles. Here's the third profile in AFA's third group of Emerging Leaders.

#### What do you enjoy most about your AFA membership?

I enjoy the camaraderie and personal connections I've made with all kinds of people who have a similar appreciation for the Air Force.

#### What do you think AFA needs to improve most to increase exposure and draw in more members?

AFA needs to be represented as the top notch charitable organization that it is. Additionally, I'd like to see AFA take a more personal interest in the lives of airmen. We have a generation more and more interested in giving back to the community, not just in donations but in action. AFA has the opportunity to be [the] voice [of a more politically vocal generation] and share the motivations of the generation currently serving.

#### How will you bring awareness of AFA and what it does for the Air Force?

We don't always know how to market our great deeds to the public and other AFA members. We have a lot of people who keep their heads down, do the job and never seek recognition. ... I want to showcase them and their involvement. Through articles, op-eds, social media, etc., I think we can bring awareness to what many of our members do day-to-day.



Photo by SMSgt. Tynisa T. Haskins



Former Army Sgt. William Jackson, an expert on the Nike Air Defense System, was a guest speaker at the Thomas B. McGuire Jr. Chapter in Now Jorcsy. The chapter held a series of presentations to highlight the US military's capabilities "in intercepting and defending against long-range threats," said Chapter President SMSgt. Tynisa Haskins.

Photo via Robert D. Schure



Army Gen. Frank Grass, Chief of the National Guard Bureau, spoke at the annual Salute to Veterans in St. Louis last fall. Grass, who is an AFA member, posed with members of the 70th Mobile Public Affairs Detachment Army National Guard Band from Springfield. Spirit of St. Louis Chapter VP Robert Schure is in the back row, second from left.

## HOLIDAY NOTES

- The Ute-Rocky Mountain Chapter in Utah brought a festive spirit to Hill AFB, Utah, when it contributed to the base's holiday party. The chapter provided fruit and cheese platters, nuts, and various snacks, said Utah State President Lacy Bizios. The party included Santa Claus arriving on an F-16, fun activities for children, and gifts for military families. "With many of our Hill AFB families dealing with deployments, this was a great start to the holiday season," said Bizios. "We were honored to help."
- The Mel Harmon Chapter held their annual Christmas party at the Pueblo Weisbrod Aircraft Museum in Pueblo, Colo., in honor of disabled veteran Adam Pottorf and his family. The chapter bought gifts for their child and provided the family with a food basket and gift cards, said Chapter President Margaret E. Fichman.

## Reunions

**525th Fighter-Interceptor Sq.** April 22-24, Omaha, NE. **Contact:** Frank Litt, PO Box 33435, Fort Worth, TX 76162 (817-294-1136) (525bulldogs@sbcglobal.net).

**561st Fighter Sq.** Nellis AFB, NV. March 26. **Contact:** Deborah Systemann (weasel.reunion@hotmail.com).

**601st-615th AC&WS.** April 25-29, Comfort Inn, Omaha, NE. **Contact:** Fay Dickey (425-422-5171) (faydickey@gvtel.com).

**Cheyenne Mountain 50th Anniversary.** April 15, Colorado Springs, CO. **Contact:** Mike Pierson (719-554-3842) (pa.wf@us.af.mil).

**TAC ACP/ABNCP/TDCA,** Det 2, 4500 Support Sq/8ACCS/8 TDCS, Seymour Johnson and Tinker AFB. May 6-8, Best Western Hotel, Goldsboro, NC. **Contact:** (tacabncpreunioncommittee@verizon.net).

**AFA**

# Birthday

For the past 70 years, our membership base has included veterans, Total Force Airmen, civilians, spouses, and airpower advocates. Our members come from all walks of life but join together as one voice in support of our Air Force and Air Force family.

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## B-2 Spirit



The B-2 Spirit entered USAF service in 1993 as the world's first "stealth" bomber. This long-range, four-engine, subsonic Northrop aircraft was a flying wing, with no fuselage or tail. It drew its stealthiness from extremely low radar, acoustic, infrared, and visual signatures, plus advanced avionics. These, in combination, thwarted detection and tracking systems that might have allowed a foe to direct missiles or interceptors against it.

The B-2 emerged from top-secret 1970s research into "very low observable" technologies. Body and wing surfaces blended together smoothly to deflect radar. Engines were buried in its wing to conceal fans and cut exhaust signatures. Radar-absorbent coatings added more camouflage. Redundant computers managed all functions.

Designed as a nuclear bomber for striking the Soviet Union, the B-2 was redesigned for conventional war when the Soviet threat faded in the mid-1980s. Because of the B-2's high cost, the US cut production from a planned 132 to only 21 bombers.

The B-2 made its combat debut March 24, 1999, during Operation Allied Force. Two B-2s, after 16-hour flights from Whiteman AFB, Mo., each dropped 16 GPG-aided bombs on Gerb targets, scoring 32 direct hits. In October 2001, six B-2s opened the war in Afghanistan; all six flew sorties lasting more than 40 hours to hit al Qaeda and Taliban targets. B-2s made big contributions in Iraq in 2003 and Libya in 2011. The bomber can still deliver nuclear weapons, too, if ever required.

—Robert S. Dudley with Walter J. Boyne

**This aircraft:** USAF B-2A Spirit—#88-0329, *Spirit of Missouri*—as it looked in June 1996 when assigned to 393rd Bomb Squadron, 509th Bomb Wing, Whiteman AFB, Mo.

**A B-2 flies over the Pacific as part of US Pacific Command's continuous bomber presence.**



USAF photo by SSgt. Bennie J. Davis III

### In Brief

Designed, built by Northrop ★ purpose, long-range strike ★ first flight July 17, 1989 ★ number built 21 ★ crew of two pilots ★ four General Electric F118-GE-100 non-afterburning turbofan engines ★ defensive armament, none. **Specific to Block 30:** max payload 40,000+ lb of conventional or nuclear munitions ★ max speed Mach .95 (630 mph) ★ cruise speed Mach .85 (560 mph) ★ max range 6,900 mi (unrefueled) ★ weight (max T/O) 376,000 lb ★ span 172 ft ★ length 69 ft ★ height 17 ft ★ ceiling 50,000 ft.

### Famous Fliers

**Distinguished Flying Cross:** Eric Single, Paul Tibbets IV. **First Combat Mission:** Eric Single-Steve Basham; Steve Sicking-Darrell Davis. **Notable Flights:** Mel Deaile-Brian Neal (44.3-hour combat sortie); Rex Bailey (first to 500 B-2 flight hours); Rich Vandenburg (first to 1,000 and 1,500 B-2 ft hours); Justin Amann-Brian McKay, William Eldridge-Kevin Minor (round-the-world flights); Justin Grieve-Ryan Link (both ejected and survived crash caused by equipment failure). **USAF Notables:** Mike Loh-John Bellanger (B-2 delivery), Jennifer Wilson

(first combat sortie by female B-2 pilot), Tony Imondi (first SAC pilot to fly B-2), Ron Marcotte, Thomas Goslin, Leroy Barnidge, Anthony Przybyslawski, Douglas Raaberg, Christopher Miller, Gregory Biscone, Garrett Harencak, Robert Wheeler, Scott Vander Hamm, Thomas Bussiere, Glen Vanherck, Jeff Long, Terry Sunnarborg. **Other Notable:** David Arthurton (RAF, first non-US pilot). **Test Pilots:** First flight—Bruce Hinds (Northrop) and Richard Couch (USAF).

### Interesting Facts

Won Collier Trophy in 1991 ★ similar in size to classic Northrop flying wings of the 1940s ★ carries all munitions internally ★ with a single refueling, can reach any target on Earth ★ featured in films "Independence Day" and "Sum of All Fears" ★ cost an average of \$2.1 billion per aircraft due to low production ★ named for states, with two exceptions—*Spirit of America* and *Spirit of Kitty Hawk*.

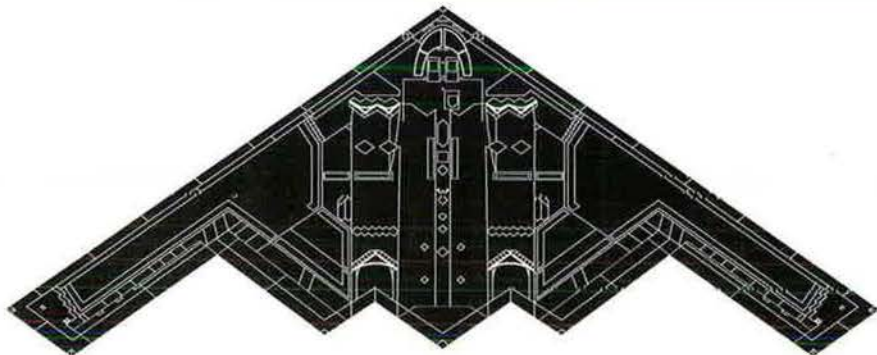


Illustration by Zaur Eytanbekov





# AFA and Deloitte are proud to support our Air Force Wounded Warriors at the 2016 Air Force Trials



AFA is proud to support the 2016 Air Force Trials through our Wounded Airman Program. We remain committed to taking care of our wounded, ill and injured Airmen that have given so much to our Air Force and our nation. We can't do it without your support. **100% of funds donated to AFA's Wounded Airman Program are used in direct support of wounded Airmen.** The WAP is operated and administered by AFA with staff time and overhead fees covered by AFA's general fund. In other words, if you give \$100 to the WAP, that \$100 will go toward the support we give our wounded Airmen.

We are extremely proud to support our Warriors and the families on their Road to the Warrior Games!

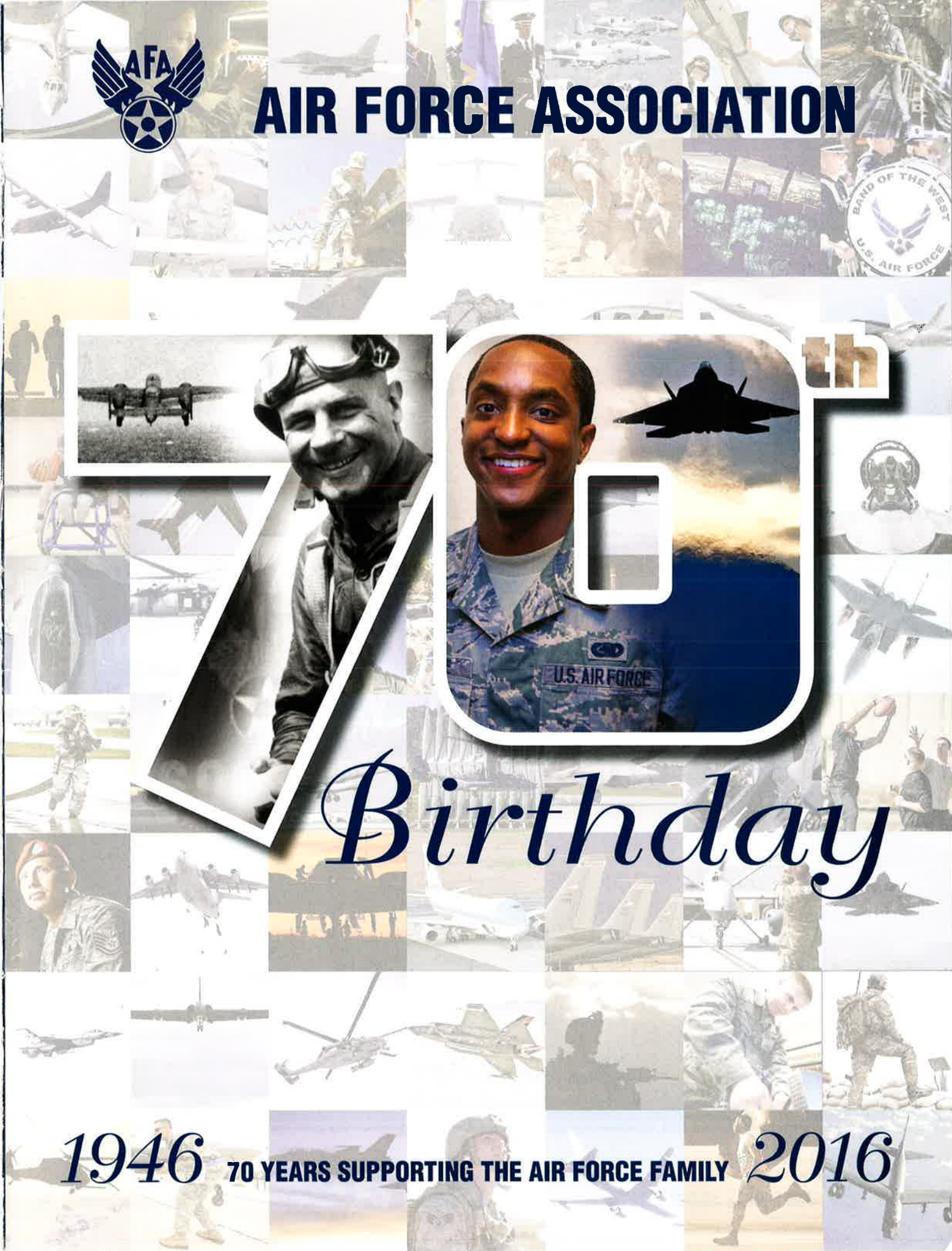
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# AIR FORCE ASSOCIATION



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