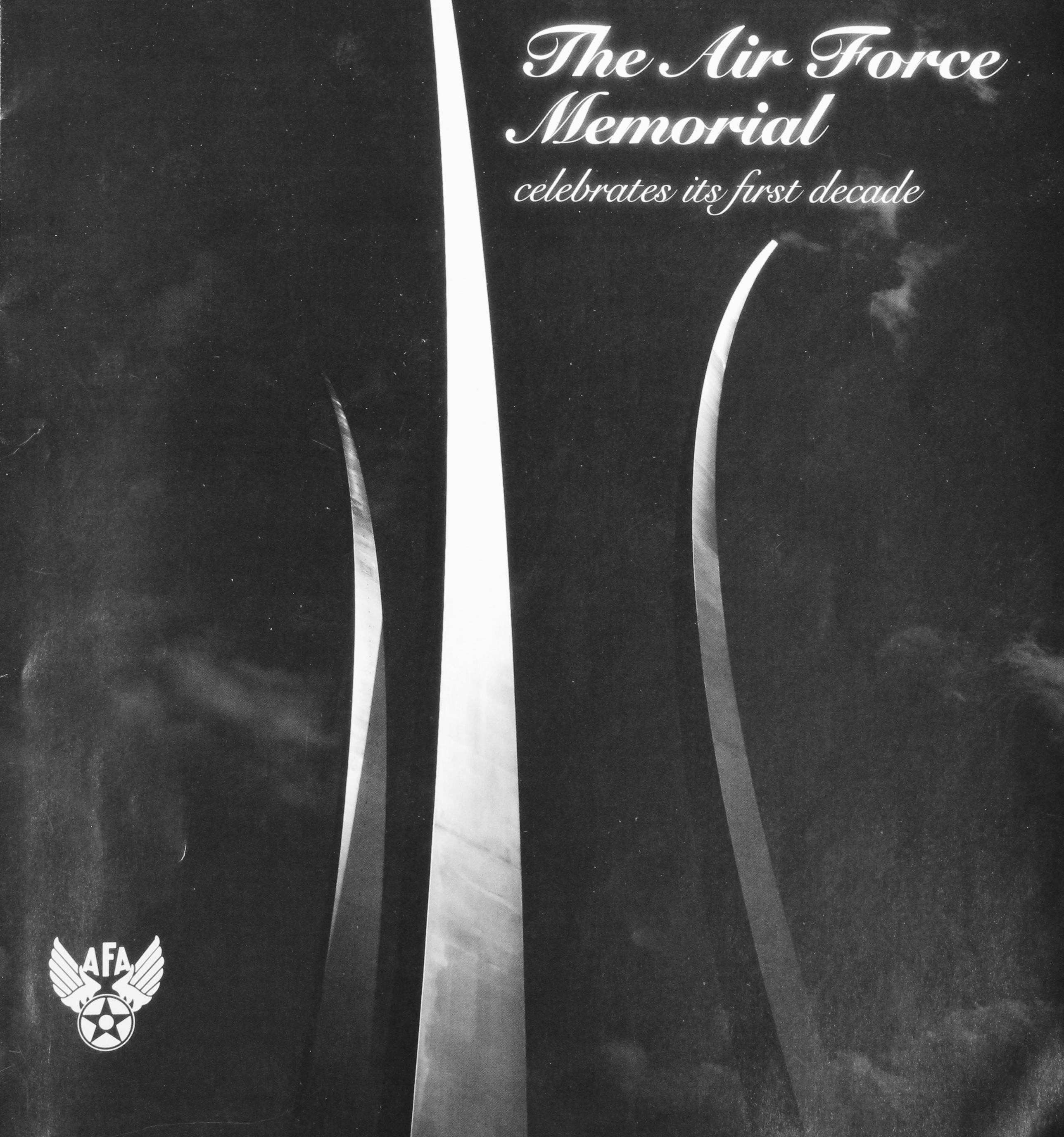
October 2016/$10

Journal of the Air Force Association

AIR FORCE MAGAZINE

The Air Force Memorial

celebrates its first decade



Journal of the Air Force Association
AIR FORCE MAGAZINE
October 2016, Vol. 99, No. 10

FEATURES

About the cover: The Air Force Memorial commemorates airpower and honors airmen of past and present. See "These Magnificent Spires," p. 20. Photo by Randall Scott.

Journal of the Air Force Association
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AIR FORCE Magazine (ISSN 0730-6784) October 2016 (Vol. 99, No. 10) is published monthly by the Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Phone (703) 247-5800. Periodical postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** $45 per year; $30 e-Membership; $110 for three-year membership. **Life Membership (nonrefundable):** $600 single payment, $630 extended payments. **Subscription Rate:** $45 per year; $29 per year additional for postage to foreign addresses (except Canada and Mexico, which are $10 per year additional). Regular issues $10 each. USAF Almanac issue $20 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send changes of address to Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Publisher assumes no responsibility for unsolicited material.

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By Adam J. Hebert, Editor in Chief

Ready for War in Space

North Korea launched multiple ballistic missiles into the waters around Japan in August. When North Korea conducted a nuclear weapons test in September, USAF quickly responded with B-1 and F-16 "show-of-force" flights with South Korean F-15s—to demonstrate solidarity between two democracies the DPRK routinely threatens.

If the situation on the Korean Peninsula deteriorates into open warfare, the Air Force response will rely heavily on spacepower. The Air Force could be tasked with providing missile warning and tracking information to deployed forces and command authorities. Vital military communications links are space-based. GPS guided weapons allow for accurate strikes in all weather conditions. Key command and control networks run through space.

On-orbit capabilities set the US apart, but are increasingly threatened.

For at least a dozen years, USAF has been busy telling anyone who will listen that space is not a benign environment: It is a congested and contested realm. Unfortunately, satellites can take 10 years to design and launch, then remain in service for decades more. The threat environment changed faster than Air Force Space Command's equipment.

"Most US military space systems were not designed with threats in mind, and were built for long-term functionality and efficiency," Gen. John E. Hyten, AFSPC commander, said in a speech explaining the problem in April. "Without the need to factor in threats, longevity and cost were the critical factors to design. … This is no longer an adequate methodology to equip space forces."

North Korea's aggressive actions show why USAF is making its military space community ever more combat-focused. Military space systems are vulnerable to enemy attack, and North Korea is one of 11 nations capable of putting rockets into orbit—or of attacking space-based assets where they reside. Others include Russia, China, and Iran.

These are not hypothetical problems. Over the past two years, both Russia and China reportedly tested anti-satellite (ASAT) weapons, and China in 2007 famously and recklessly destroyed a satellite in a test, creating a huge orbiting debris field.

"Why are nations spending so much money to counter our space capabilities?" Hyten asked in a recent interview with *Air Force Magazine.* "The answer is pretty simple—because they recognize it is a strength of our nation."

In other words, America's space assets are so valuable, other nations are willing to invest significant time and resources to threaten them. Military space is an American asymmetric advantage so important, potential enemies will not concede it. China's ASAT test was "a hard problem to solve," one space command official said, "and they solved it."

It fell on airmen to make the most of USAF's space systems, and the command adapted its tactics, techniques, and procedures to address the changing threats. "Training must shift," Hyten wrote in a Space Mission Force white paper released July 15, outlining his vision for keeping space units ready to defeat real-world threats. Still rolling out, the Space Mission Force has AFSPC's airmen alternate four-month operational periods with four-month training and education cycles (See "Making Space More Military," August, p. 30.)

"Forces must demonstrate their ability to react to a thinking adversary and operate as warfighters in this environment and not simply provide space services," Hyten wrote.

Realistic, intelligence-based threat assessments and improved training will be key. AFSPC must "determine the most likely and most dangerous scenarios posed by potential adversaries," Hyten wrote. Other command officials have said operators will train to overcome capabilities, regardless of stated intentions. North Korea's stated intentions contain a lot of bluster, but still must be taken seriously. China, on the other hand, is deliberately opaque.

What is China's military trying to achieve? The Communist leaders aren't saying, which is why the Air Force needs to prepare against its capabilities and not make assumptions about intentions. This summer, China announced it had launched a satellite with a robotic arm to clean up space debris. Perhaps that is its intended purpose, but this is clearly dual-use technology that could also be used for military purposes.

Space operators require "training beyond current expertise and limits," the white paper reads, "perhaps even to mission failure, to foster learning and growth." The paper states that space aggressors will provide "a professional, thinking adversary replicating known and predicted threats." This will replicate the advanced training that has long benefitted USAF aircrews.

"At the end of that keystroke is a billion-dollar spacecraft. That billion-dollar spacecraft is critical to the lives and limbs of Americans and allies overseas in harm's way right now, and if you make a mistake, that mistake could cost us a battle, a life," Hyten said in the interview. Of AFSPC's operators, "you can't just say, 'I'm a geek,'" he added. "You can't just say, 'I'm a warfighter.' You have to be both."

Recent North Korean, Chinese, and Russian actions show why this dual focus is necessary. Fortunately, "nobody in Space Command five years from now will remember the way things used to be," Hyten said. "Once we have established [the Space Mission Force], the folks that are there will never know that it was ever any different."

The US does not want war in space and it has, by far, the most to lose in such a scenario. Space Command must institutionalize the shift to combat readiness to protect unique military advantages—so America's enemies do not view US satellites as billion-dollar targets. ✪

Letters

letters@afa.org

Why They're Going

The pilot shortage cover piece, focused almost entirely on fighters, presents a one-dimensional view of the reasons pilots leave the active force to fly for the airlines *["Pilot Shortage," August, p. 36].* By interviewing the people who, although nominally in charge, apparently have no plan to address the issue other than throwing money at it or extending Active Duty service committment, you overlooked interviewing the pilots to get their perspective.

A real-life example, albeit not from the fighter community:

An Air Force airdrop-qualified instructor pilot, chosen as part of a competitively selected program designated as Phoenix Reach to cross train from C-17s into KC-135s, where he is also an IP, a Daedalian award winner with over 100 combat missions, on the major's list, goes on leave for 10 days. When he returns, he is informed that he has been nominated as a nonvolunteer for a program that will spend a year training him in an Arabic language, followed by a year in either Pakistan or Afghanistan, return to a Stateside assignment for a year, followed by another year in either Pakistan or Afghanistan. This program is a nonflying billet.

As it turns out, if he is one of the 48 Air Force personnel chosen for this nonflying, thankless assignment, his ADSC will have been completed, and he will probably leave Active Duty, fly for the airlines, and transfer to the Air Force Guard or Reserve. Poor management at the top levels creates such situations. After spending millions to train a pilot in two different airframes, the Air Force, by even considering that option, sends a clear signal to the entire corps, and it's not a positive one.

Col. Robert I. Recker Jr.,
USAFR (Ret.)
Travelers Rest, S.C.

Let me start by telling you who I am. I am an 80-year-old retired Air Force recruiter. And I am responding to the pilot shortage. The last eight years of my 23 years, I was an Air Force recruiter. I started recruiting in Albany, N.Y. Because of my background, I volunteered to teach at the recruiting school in Texas. I was then assigned to the Bronx, N.Y., and finished my Air Force career as a recruiter supervisor in Boston. The pilot shortage is going to fall on the field recruiters. Now, if I were a recruiter supervisor today, I would do the following:

I would have all the recruiting cars, including mine, wrapped with current advertising. This can be done very easily. When I was a recruiter I noticed many recruiters didn't want people to know what they were doing with a government car at home. Now it is time to be seen.

I would assign my recruiters to identify all the airports in their area, the smallest to the largest. Then I would have them visit each one to get familiar with them and see what kinds of pilots get their training there and also to meet with the flight instructors.

An Air Force C-17 can land on a 3,500-foot runway. So I would schedule a C-17 to fly into many of the airports. I would set up groups to come and see the plane. Now, I can understand why some of the visitors would say, "I don't want to fly a large truck, I want to fly a fast fighter." Inside the C-17 would be a new F-35 for them to see, and for the helicopter guys I would have one of our latest helicopters.

Now this is in addition to the college recruiting visits we have been doing for years. And I would make sure that my recruiters visited the Civil Air Patrol and other groups that have an interest in aviation.

My motto would be: "It's balls to the wall, guys. The Air Force needs pilots and we are going to find them."

MSgt. Bob Eldridge,
USAF (Ret.)
Woodstock, Ga.

Article 5

Thanks for the very well-written article "Inventing NATO" by Mr. Correll *[August, p. 62].* It was especially interesting to read the details of NATO's creation, and for those who might think NATO is irrelevant, perhaps this article will help them understand why it is so important that we continue to support that organization even with the

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

Index to Advertisers

unbalanced price we Americans pay. I was assigned to AIRCENT (NATO Air Forces Central Europe) as the senior US logistician, 1996-99, and saw many places and things most Americans are unaware of that convince me of the need to support NATO.

We had 16 NATO nations at the time, and I witnessed the addition of the Poles and Czechs, in addition to others since. Each nation assigned to AIRCENT sponsored an annual social event, and I specifically remember the Canadian reception. The senior Canadian, a colonel, was speaking from the podium after dinner and jokingly questioned the application of Article 5 (an attack on one nation is an attack on all) all the way across the Atlantic to Canada, should the need arise. We all laughed at his comments at the time.

Fast forward to 9/11/2001, and I was on my last assignment to Tinker Air Force Base when we found out that NATO was sending five AWACS aircraft to Tinker. The reason was that most of our own AWACS, based at Tinker, were scattered all around the globe. NATO indeed did invoke Article 5 and did come across the Atlantic to our aid, as stated at the very end of Correll's article. NATO flew cover for us during those tense months following 9/11. This is the part that really needs emphasis, because I believe 99 percent of the American public have no clue that NATO came to America's aid.

No matter what price we are paying, one only needs to consider the consequences if we abandon NATO. I firmly believe NATO is the glue that holds our European allies together, and has done so since 1949. We cannot afford not to continue to support this crucial alliance.

Col. Frank Alfter,
USAF (Ret.)
Beavercreek, Ohio

Music To Our Ears

As a Life Member of the Air Force Association, I receive the monthly *Air Force Magazine* and I love it. [It] keeps me updated on current issues facing the Air Force and our nation.

One of my favorite items included in the magazine is a one-page section called "Verbatim." I have finally read a quote that has hit a nerve *["Verbatim: Sour Note," August, p. 21].*

Here is the quote by Rep. Martha McSally (R-Ariz), a retired USAF colonel and A-10 pilot, as quoted in the *Air Force Times,* June 26, 2016: "For every dollar that is spent on our bands to entertain at social functions, that's a dollar we're not spending on national security and our troops and families. ... While our communities certainly do enjoy being entertained by our military bands, they would prefer to be protected by our military."

What a crock. Can't believe this came from a retired military member, let alone a colonel. I guess when you get elected to Congress you lose all sense of what is important to our troops and citizens backing those troops.

As you may be aware, military bands provide martial music during official events, including state arrivals, military funerals, ship commissioning, and change of command and promotion ceremonies; they conduct public performances in support of military public relations and recruitment activities, such as street parades and concerts; and they provide popular music groups to entertain deployed military personnel. Most bands of the US armed forces reconfigure into combat units during wartime during which they have nonmusical responsibilities, including guarding prisoners of war and defending command centers.

The military bands do more than "play music" (although this is a most inspiring part of their mission), and we need Congress to know and understand their importance. Bands inspire our military members and make service members proud of what they are accomplishing by serving our nation.

Just wanted you to know that the words of Representative McSally are (I believe) not the thoughts of the majority of military personnel nor of the general public. When the "Star-Spangled Banner" is played, we all still get a gleam of pride in our eyes. We need our bands.

Lt. Col. David L. Naquin,
USAF (Ret.)
Gatlinburg, Tenn.

Catching Up With Fiction

The Third Offset may have finally caught up with the imagination of Capt. Dale Brown, USAF (Ret.) *["The Third Offset," August, p. 24].* Dale is a prolific author known for such novels as *Flight of the Old Dog* and the character of Brig. Gen. Patrick McLanahan. On p. 28, Defense Secretary Carter describes the "arsenal plane" as a concept with many new long-range standoff munitions, creating a new

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AFA's Mission

Our mission is to promote a dominant United States Air Force and a strong national defense and to honor airmen and our Air Force heritage. To accomplish this, we:

Educate the public on the critical need for unmatched aerospace power and a technically superior workforce to ensure US national security.

Advocate for aerospace power and STEM education.

Support the Total Air Force family and promote aerospace education.

challenge for adversaries by mixing old and new. Imagine the EB-57 working in tandem with space assets such as the X-37. The pictures of DARPA autonomous drones and the HTV-2 on p. 27 add much capability to the mix.

Col. Victor P. Budura Jr., USAF (Ret.)
Huntsville, Ala.

Of Pilots and Reapers

Reference the August 2016 *Air Force Magazine* article "Reaper and the RPA Resurgence" *[August, p. 52]*.

In the first paragraph [on p. 58] it states, "Aircrews would be able to log combat time while flying aircraft in a hostile airspace regardless of where they were controlling them from." I hope this is just an idle and passing notion of the author's. It would surely dilute the respect given to the combat time flown in Vietnam and previous wars if RPA pilots now can log combat flying time from a desk in the USA.

Maj. John Hurley, USAF (Ret.)
Williamsburg, Colo.

The August issue was first rate, as always. Will Skowronski's two excellent featured articles, "Pilot Shortage" and "Reaper and the RPA Resurgence," were so closely interrelated it surprises me that he never proposed what I believe to be the single most obvious and practicable solution to USAF's growing pilot shortage and the manning challenge for the expanding RPA fleet: Re-establish warrant officer ranks in the Air Force. USAF, to my knowledge, is the only service in the free world that does not recognize this "specialty officer" as an essential and cost-effective limited-duty position. It's time we fixed that.

I do know whereof I speak, having spent 29 years on Active Duty as an Army enlisted person (to sergeant, E-5), Army warrant officer/helicopter pilot (to CWO-2), and Air Force commissioned officer/fighter pilot (to O-5). I retired in 2000 and was recalled to Active Duty in 2009 to fly MQ-1B Predators, just one of many retirees brought back to help ease the critical shortage of pilots in the rapidly expanding combat RPA field. Here is what I learned from that final assignment:

Remotely piloted aircraft are still piloted aircraft first and ISR systems second. The absolute minimum requirement to act as an RPA pilot should be an FAA private pilot certificate with instrument rating, though a commercial pilot certificate would be much better. A cyber-war gaming superstar, no matter how adept on a computer, would be eaten alive by air traffic control in common use airspace. Computers are easier to learn than flying.

Taking qualified USAF pilots involuntarily straight from SUPT or, even worse, out of their primary weapon systems—especially fighters—to place them in the RPA career field is a tremendous waste of taxpayer money and does a huge injustice to the pilots. Most will separate as soon as they become eligible. That practice also causes much anxiety across the non-RPA pilot community ("Who's next?") and even diminishes USAF pilot training accessions. My own son, now a Marine Corps F-35 IP, is a perfect example. He had an AFROTC pilot slot at Florida State but elected to commission in the Marines when the Air Force began assigning new SUPT grads to RPAs. And he's not alone. Although it might divert some high-caliber talent to the other services, USAF's failure to effectively manage its RPA pilot shortage is hurting the Air Force across the board.

RPA pilots need expertise, experience, and authority. Lower-ranking pilots need strong supervision. As a squadron supervisor (and later commanding the 426th ERS at NAS Sigonella during OUP/Libya in 2011), I found that most lieutenants had some difficulty dealing with combat solutions that most captains and majors with the same or even less RPA experience did not. I can't even imagine the challenge of riding herd on seven or eight enlisted pilots under those same combat situations. Furthermore, I am convinced that any pilot who makes the decision to pull the trigger that will send some soul to kingdom come needs to be an officer.

The solution is a warrant officer corps. A decade from now the Air Force could have a well-seasoned and sharply honed corps of warrant officer RPA aviators performing the ISR mission in lieu of expensively trained SUPT graduate commissioned officers.

That's more detail than most of your readers or even Air Force leaders need to have. I submit this only to show how a warrant officer flight training program might be established and managed with huge benefits in morale, recruitment, and cost savings to the Air Force, along with a positive and significant impact on our national security. I hope somebody's listening.

Lt. Col. Gary Peppers, USAF (Ret.)
Cape Coral, Fla.

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By Megan Scully

To Retire or Not Retire, Continued

The Air Force's cost-saving effort to retire its venerable fleet of A-10 Warthogs has gotten quite a bit more difficult following the release of a government report chiding defense officials for not fully studying the effects of sending the jets to the boneyard.

The Government Accountability Office report, released in August, is expected to fuel renewed congressional opposition to the Air Force plan that begins divestment of the close air support aircraft in Fiscal 2018 and stands down the entire fleet by 2022.

Lawmakers, led by A-10 supporters on the Senate Armed Services Committee, have already rejected previous requests for the fleet's retirement, which Air Force officials have said would save $4.2 billion over several years and allow the service to invest its limited funds in higher-priority items, like the F-35 strike fighter.

The report only strengthens arguments that retiring the A-10 would shortchange the critical close air support mission, leading to less protection overhead for combat troops on the ground just as the low-flying fighters have been tapped for missions against ISIS and supporting NATO's assurance efforts in Eastern Europe.

Neither the Air Force nor the Defense Department had "quality information" on the full implications of standing down the A-10, including mission gaps created by the loss of the aircraft and options to mitigate those capability shortfalls, the report states.

"The nonpartisan GAO has concluded what we've been arguing for years: There is no justification for the Air Force to prematurely retire the A-10 fleet, and doing so could leave the military with a serious capability gap our military needs to confront complex security challenges around the world," Senate Armed Services Chairman John McCain (R-Ariz.) said in an August statement.

What's more, the report challenges the Air Force's savings projections, concluding it did not strictly follow best practices. Pentagon officials have argued that cost—coupled with the need to invest in multimission aircraft—was the driving factor behind the decision to divest the A-10s.

Indeed, the Air Force's 2014 budget request included plans to retain all 283 A-10s through at least 2035. Just one year later, the service sought to scrap the fleet as it grappled with the effects of budget gaps.

The GAO report suggests the about-face came with little thought about what would take the place of the A-10. The Air Force has a number of aircraft, including F-15s and F-16s, capable of the close air support mission, but the A-10 attack jet is perhaps best suited for the task.

Air Force plans indicate it would replace A-10 squadrons one-for-one with F-35 squadrons. But according to the GAO, the loss of A-10 squadrons will outpace the fielding of the F-35, with four fewer squadrons by the end of the five-year budget plan.

Critics of USAF's plan say the Army and Marine Corps rely on overhead coverage the A-10 provides, and these ground forces would feel the pinch of its absence. This is an argument McCain and other A-10 supporters have put forth again and again.

"The Air Force's rush to divest the A-10 before a fully operational replacement is available puts our ground troops and our nation's close air support capabilities at risk," New Hampshire Republican Sen. Kelly Ayotte said in a statement. Her husband flew A-10 missions in Iraq.

The report acknowledges that the Air Force is not blind to the capability shortfalls and is taking a number of steps to address them, including creating an Air Force group focused on close air support, developing new weapons, and responding to the needs of joint terminal attack controllers. USAF has also noted that other aircraft, such as F-16 fighters and B-1 bombers, ably perform CAS missions thanks to advanced targeting, data links, and precision weapons. But these fast-and-high flyers lack the emotional appeal offered by the slow, rugged, and highly visible Warthog.

Air Force officials haven't yet determined the extent to which the service will change or reprioritize training requirements for other aircraft—a decision that could have reverberating effects on other missions.

It's safe to say that all of the concerns raised by GAO will be highlighted again as Congress gets to work on the Fiscal 2018 budget request early next year.

"At a time of growing threats to our national security, any divestment of this critical aircraft without the fielding of a suitable replacement would leave our men and women in uniform without the best close air support weapon in our arsenal that is needed now more than ever to meet the challenges of a more dangerous world," McCain said.

Megan Scully is a reporter for CQ Roll Call.

A-10s over Arizona, Sen. John McCain's home state.

USAF photo by SrA Chris Massey

By John A. Tirpak, Editorial Director

Number confusion, price dizziness; What's included, anyway?; Compete the teams; Begging for a budget ....

STICKER SHOCK AND AWE

The Air Force is forging ahead with its new Ground Based Strategic Deterrent—the replacement for the Minuteman III—even though there's a staggering disagreement within the Pentagon over what the program will actually cost. The price dispute is so profound USAF may have to find $22 billion from other sources to fund GBSD.

The Air Force took the project to Pentagon acquisition, technology, and logistics chief Frank Kendall's Defense Acquisition Board in August to get his green light for Milestone A, the Technology Maturation and Risk Reduction, or TMRR, phase. The Air Force went in with its own estimate of what the program would cost—about $62.3 billion for 642 missiles—but other agencies had sharply different views of what would and wouldn't be covered by that estimate.

According to Pentagon officials, the Office of the Secretary of Defense's Cost Assessment and Program Evaluation, or CAPE, shop came up with a figure of $85 billion for research and development, procurement, and military construction. That's a discrepancy of more than a third from USAF's estimate, and other defense agencies also had different numbers.

Usually, a lack of consensus on a program's cost is a showstopper, but Kendall opted to let USAF go ahead with gathering information from contractors and nail down a price later.

Air Force Secretary Deborah Lee James, during a State of the Air Force press conference at the Pentagon in August, said the GBSD "is not on hold." At the DAB meeting, "something we learned ... is that the magnitude of this type of ICBM work" is not well-understood, she said. "We have not collectively done it for more than 40 years." There is a "level of complexity that has to be worked through," and the Air Force is collaborating with other Pentagon agencies "to ensure that we all have a common understanding of the assumptions that we have to put down on paper in order to properly cost out" a budget for the new missile.

In an Acquisition Decision Memorandum about the meeting, Kendall agreed, writing that the uncertainty about costs is due to the fact that "historical data" on what such a program will cost is "limited," and "there has been a long gap" since the last time strategic missiles were built, making cost methodology problematic.

The Air Force's Nuclear Weapons Center at Kirtland AFB, N.M., sent out its request for information on July 29 to get industry's ideas on how to design, develop, and base the new weapon; responses were due back Oct. 12. Boeing, Lockheed Martin, and Northrop Grumman have expressed interest in the project.

Kendall gave USAF until March 2018 to build a cost consensus within the Pentagon. By then, he wrote, technical risk will have been reduced and USAF should have a solid handle on the GBSD's ultimate tab. In the meantime, he let the CAPE's

photo credit

The replacement for a Minuteman III is still over the horizon.

$85 billion then-year estimate stand. It broke out R&D as costing $22.6 billion, procurement at $61.5 billion, and military construction at $0.7 billion.

Accepting the CAPE's figure throws an enormous monkey wrench into USAF's carefully timed plans to modernize not just the ICBM fleet but nearly a dozen other major elements of its combat forces, since it will have to budget to the new number. The service has for several years crafted 10- and 20-year investment programs to ensure that there are no surprises beyond the FYDP, or future years defense program, and that projects it simply can't afford don't even get started. Potentially at risk from USAF's early ICBM estimate are the F-35 fighter, KC-46 tanker, B-21 bomber, a replacement for the JSTARS radar airplane, the T-X trainer, a new strategic cruise missile, a penetrating combat aircraft (PCA) to complement the F-22 and F-35, an F-22 and F-35 upgrade program, a new Combat Rescue Helicopter, and more.

There's little argument that the Minuteman III, built in the 1970s, is in need of replacement.The Air Force believes that structurally and technologically, the system's ability to perform is rapidly eroding. The credibility of the 40-year-old missile is at risk.

The GBSD program also includes a new command and control system for the nuclear deterrent, to replace the existing system, which was built in the 1960s.

Kendall approved the Air Force's request to develop the new ICBM and acquire 642 of them. Of that number, 400 would be deployed and the remainder used for periodic live testing to demonstrate that the deterrent force actually works. He also directed the Air Force to budget $1.25 billion a year for GBSD operations in the period from initial capability—around 2030—through 2040. The GBSD is expected to serve until 2075.

ACCESSORIES SOLD SEPARATELY

A big part of the USAF/CAPE cost discrepancy apparently lies in calculating the involvement of the DOD enterprise

that designs nuclear warheads and tests them, versus the separate process of hiring contractors to design and develop a missile to carry a specific payload.

James has on many occasions voiced a hope that the Pentagon would create a separate account for funding the nuclear deterrent force, noting that it is so expensive it could push out of the budget projects the Air Force deems "existential." Though that wish has at least once been publicly rebuffed by Defense Secretary Ashton B. Carter, James has continued to air the possibility, saying it is still being "looked at." She has argued that the Navy secured a separate funding line for replacing its ballistic missile-carrying Ohio-class submarines and Trident missiles, and that the Air Force should get similar treatment so as not to endanger its carefully planned modernization program for conventional systems.

One Air Force official pointed out that the CAPE invariably has a "more pessimistic" view of costs than do the services, but allowed, "At the end of the day, ... they are often right" about the ultimate price tag. A notable exception has been the F-35 fighter, on which CAPE estimates have declined significantly for several years, lagging lower cost estimates offered by the F-35 program office.

USAF has decided against a mobile basing system to increase the GBSD's survivability. Former Chief of Staff Gen. Mark A. Welsh III said that in the first meetings on how to proceed with the program, mobility was a consideration, but it was resolved that the ICBM fleet could serve its purpose without moving it around to keep adversary targeteers guessing how much of the force they could knock out with a first strike.

In the 1980s, the Air Force looked at a wide range of mobility schemes for what became the Peacekeeper missile, since retired. This included rail, large trucks, and even C-5 Galaxy aircraft. The Air Force will base the GBSD in existing silos, which will be upgraded, along with their command and control apparatus.

USAF plans to evaluate industry proposals, neck down to two competing industry teams by the end of 2017, and award the GBSD contract in 2019, with an in-service date of "the late 2020s."

The Minuteman III will have to retire around 2030, because its service life can't be extended after that, USAF has said.

The Air Force is pursuing the GBSD at the same time the Navy is overhauling its own element of the strategic triad, the ballistic missile submarine fleet. Both the Ohio-class submarines and the Trident missiles they carry need an upgrade first, then a replacement.

Under a joint service memorandum of understanding signed between Navy acquisition chief Sean J. Stackley and then-Air Force acquisition chief William A. LaPlante in 2015, the two services will seek to save money by adapting into their new missiles some common elements, such as guidance systems and rocket motors, although the systems will not be common in the whole.

In addition to the GBSD, the Air Force is gearing up to replace the existing bomber leg of the triad with new B-21 bomber and replace the AGM-86 Air Launched Cruise Missile with a weapon known as the Long-Range Standoff (LRSO) missile. The LRSO is highly classified, and all the Air Force will say is that the Defense Acquisition Board reviewed the status of the project in May. Service officials have swung back and forth on describing the missile, some saying it could be a hypersonic weapon and others saying it will merely be a fast and highly stealthy munition.

Though both figures are classified, Pentagon officials have suggested that an estimate of $60 billion for the B-21 and $30 billion for the LRSO are not unrealistic. Combined with the CAPE's figure of $85 billion for the GBSD, the total cost to replace USAF's legs of the nuclear deterrent over the next 20 years (not including operations) comes out to about $175 billion. Add in the $122 billion cost (not including development) of replacing the Ohio-class boats and their Trident missiles, and the strategic modernization bill comes out to nearly $300 billion.

CAN YOU CR WAY CLEAR?

In what has become an annual ritual, Secretary of the Air Force Deborah Lee James pleaded with Congress in August to pass a defense budget, detailing the harm that would come from yet another continuing resolution. The pain would come in the form of $1.3 billion less to spend, she said.

Speaking at one of the quarterly State of the Air Force press briefings she's conducted with the sitting Chief of Staff in recent years—this time with the new Chief, Gen. David L. Goldfein—James explained that a CR would sharply affect "more than 60 Air Force acquisition new starts and upgrades" in the service's plan. A CR holds the spending levels of the last-passed defense authorization bill in place until a new one is signed into law. By definition, it rules out spending on new-start programs.

Projects that would be on hold because of a CR include upgrades to the B-2 and B-52 bombers, the MQ-9 Reaper remotely piloted aircraft, and C-130 Hercules, James said. The B-2 is getting new stealth and navigation systems; the B-52s a new "digital backbone," providing capability to carry new and more varied munitions and in more configurations, such as internal and external loads simultaneously. The MQ-9 fleet is being upgraded with longer wings and external fuel tanks to extend its range, while the C-130s are long overdue for avionics modernization.

Production of the Joint Direct Attack Munition, one of USAF's preferred weapons in the fight against ISIS, would be "limited to the [Fiscal Year] '16 quantity, which we feel is unacceptable, particularly in light of current operations against Daesh and other extremists around the world," James said.

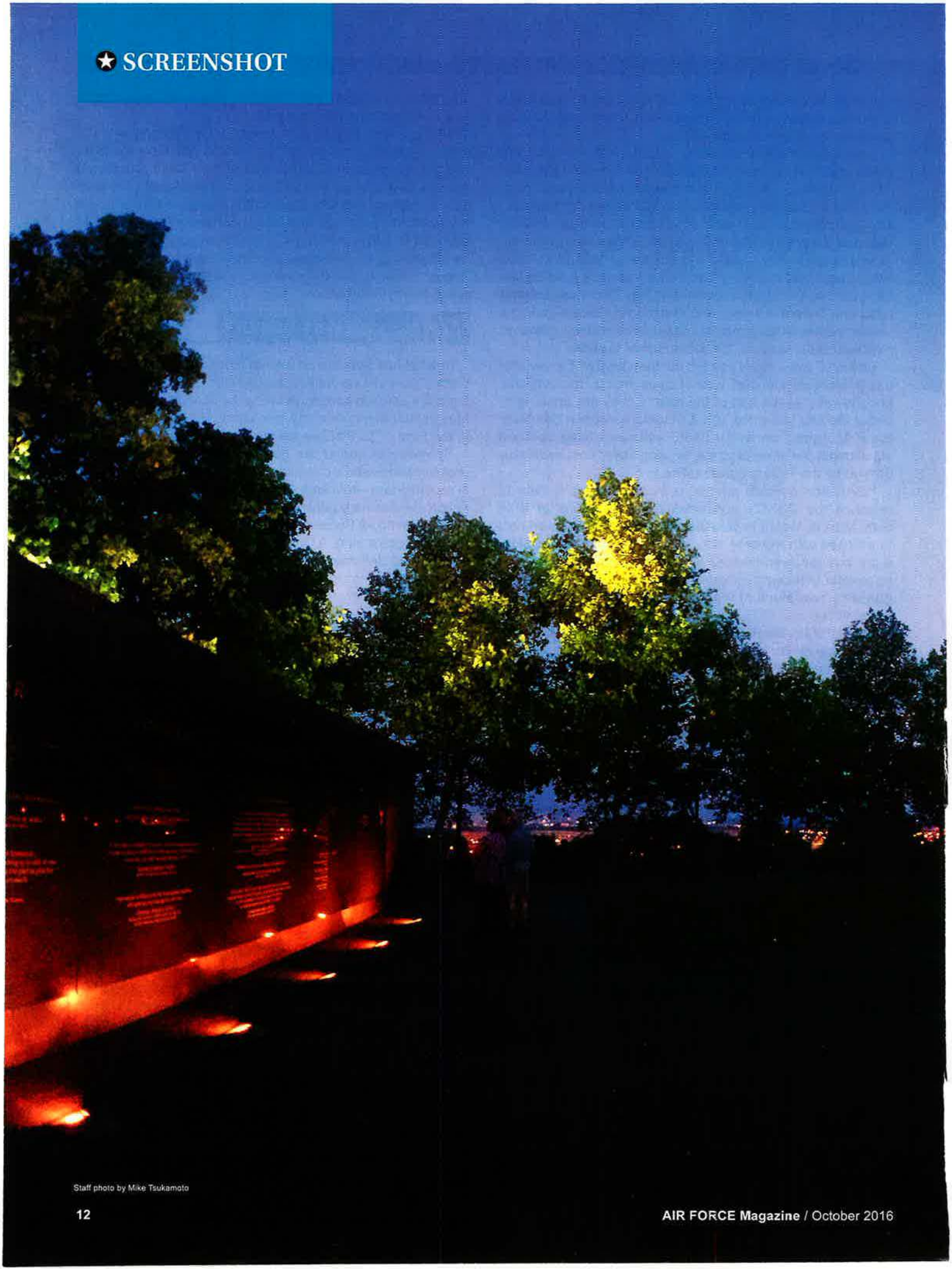
The KC-46 tanker, having just gotten the go-ahead for production, would be held to 12 aircraft instead of the 15 called for in the USAF budget, slowing its fielding, James warned. Even at 15 a year, the planned 179-aircraft KC-46 fleet wouldn't deliver until 2028—and still wouldn't replace all the KC-135Rs that by then will be 80 years old.

A CR would "slow everything down" for developing the B-21 bomber USAF wants to field in the 2020s, James noted. The situation would "risk a long-term deterrent capability" for the nation.

Numerous military construction projects, including those involved in bedding down the F-35 fighter at new locations, new dormitories for airmen, and "important missile maintenance facilities" would be halted by a CR, James stated.

"We know the congressional staff is working hard, even while their members are back at home this summer," James said, but failure to pass a budget would cause "many, many perturbations in our system." ✪

SCREENSHOT



Staff photo by Mike Tsukamoto

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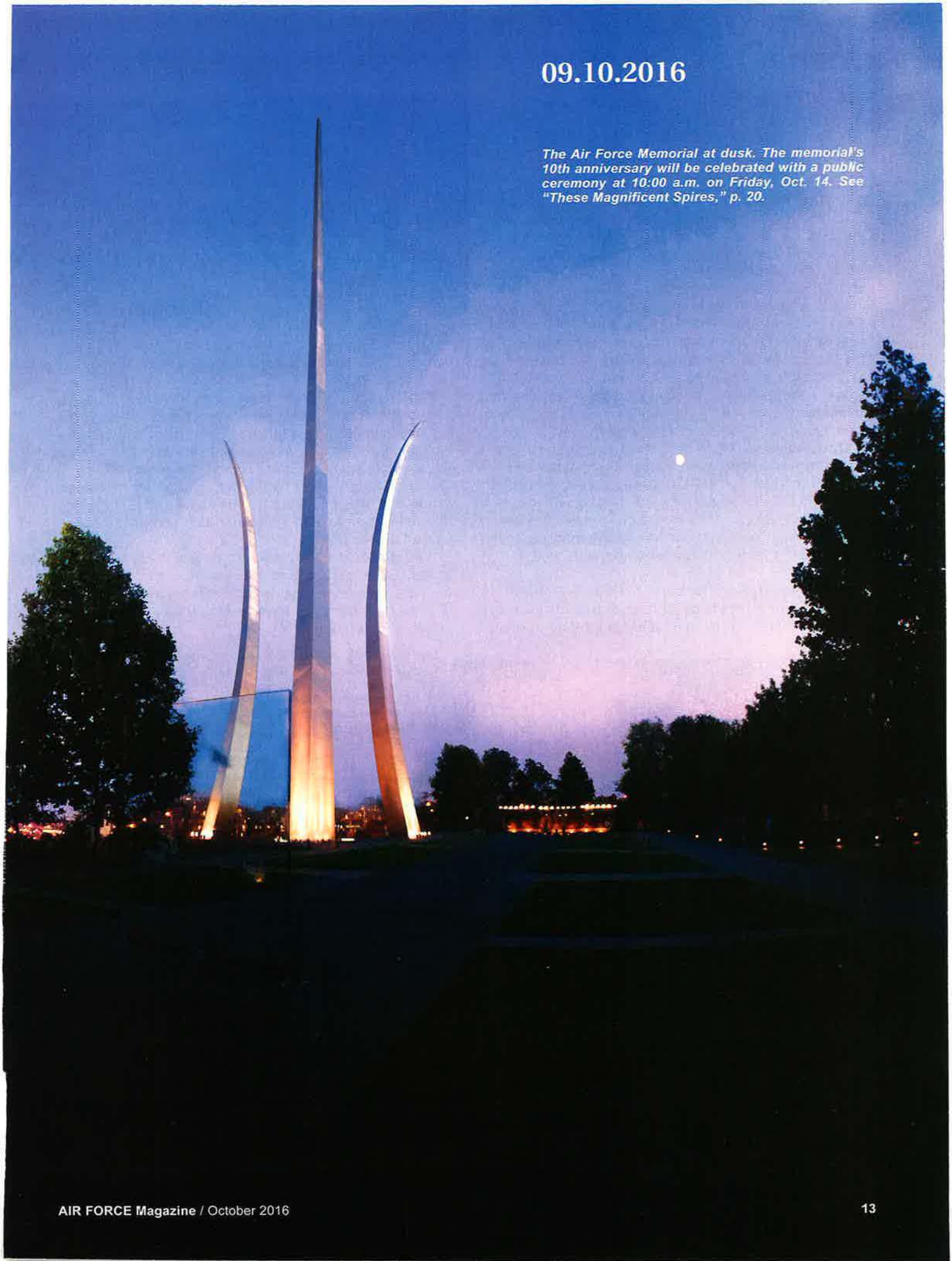


The Air Force Memorial at dusk. The memorial's 10th anniversary will be celebrated with a public ceremony at 10:00 a.m. on Friday, Oct. 14. *See "These Magnificent Spires," p. 20.*

All Three Bombers in Guam

The Air Force deployed its three bomber types to the Pacific at the same time, with all three present on the Andersen AFB, Guam, flight line in August.

B-1s from Ellsworth AFB, S.D., deployed to Guam as part of the continuous bomber presence rotation to the Pacific, replacing B-52s from Minot AFB, N.D., that were still on the flight line when the Lancers arrived, according to Pacific Air Forces. Meanwhile, three B-2s from Whiteman AFB, Mo., landed at Andersen for a short-term deployment.

The stealth bombers flew local and regional training sorties in the Pacific to "demonstrate our readiness and commitment to the Indo-Asia-Pacific region," according to an Air Force news release on the deployment.

At the same time, Air Force Global Strike Command and US Central Command are working on a continuous bomber presence rotation to CENTCOM, Air Force Chief of Staff Gen. David L. Goldfein said Aug. 10. "We're managing the bomber force not only for what we push forward, but also what we do from a global strike perspective from the United States." (See "A New Continuous Bomber Presence," p. 17.)

More Flying Needed To Increase Pilot Retention

The Air Force needs to do more to address its shortage of fighter pilots, such as increasing flight time at home, in addition to giving pilots more money to stay in uniform.

The service is looking to increase the bonus for pilots who elect to stick around following their Active Duty commitment to handle a "crisis" in its pilot levels—a shortage of about 700 right now, Air Force Secretary Deborah Lee James said during a State of the Air Force briefing on Aug. 10. The Air Force is also standing up new F-16 training units, with candidate locations expected to be announced by the end of the year, and augmenting up to two existing training locations to increase pilot production by October 2017.

Air Force Chief of Staff Gen. David L. Goldfein, himself a former fighter pilot, said the dramatic change in flying from his time in the cockpit is impacting pilot morale negatively. Goldfein said when he was a captain, he would fly in three flag exercises per year, along with a rotation to the National Training Center—all skills that he came to use in Desert Storm. But now, pilots are getting about half that training due to the decrease in the fighter fleet and an increased operations tempo.

"I'm a believer that morale and readiness are absolutely linked," Goldfein said. "And where we have high readiness, we have reasonably high morale. The quality of service is high. And where we have low readiness, we have our largest morale issues."

USAF photo by SrA Mozer D Da Cunha

My, What Big Teeth You Have: ***Colombian air force Capt. Juan Monsalve readies for takeoff from Barksdale AFB, La., during a Green Flag East exercise. The aircraft is a Super Tucano. Green Flag East is a joint close-air-support exercise to improve interoperability between the US and Colombia.***

By **Brian W. Everstine**, Pentagon Editor

Ready, Aim ... : ***MSgt. Audra Jimenez mounts an AIM-120 air-to-air missile to an F-15 on the flight line at Graf Ignatievo, Bulgaria. Elements of four F-15 squadrons conducted air policing missions with the Bulgarian air force, keeping watch on the nation's airspace. The deployment was part of Operation Atlantic Resolve.***

USAF photo by SSgt Joe W. McFadden

USAF Considering Upgrading Chapman's Award

The Air Force is pressing to upgrade the valor award for fallen TSgt. John A. Chapman from an Air Force Cross to a Medal of Honor after new video shows he continued fighting alone after a Navy SEAL team he was with left him on an Afghan mountainside.

Chapman was killed in a 2002 battle on an Afghan mountain, after the SEAL team he was with retreated, thinking he was already dead. But new video suggests Chapman was still alive and killed two more insurgents and provided cover fire to an Army rescue helicopter before he was killed, the *New York Times* reported on Aug. 28. Opinions seemed to change when Air Force officials, using new video enhancement technology, reviewed video from the battle caught by a Predator overhead, the *Times* reported.

Air Force Secretary Deborah Lee James is reportedly pressing for the Air Force Cross to be upgraded to a Medal of Honor. It would be the Air Force's first Medal of Honor awarded in the Global War on Terrorism. Air Force officials said Defense Department policy prohibits the discussion of possible award upgrades, and there has been no official update since the service said last year it was reviewing previously awarded medals.

Wolters Takes Command of USAFE

Gen. Tod D. Wolters on Aug. 11 received his fourth star and took command of US Air Forces in Europe-Air Forces Africa during a ceremony at Ramstein AB, Germany. Wolters took command from Gen. Frank Gorenc, who retired after running USAFE for three years.

Wolters previously served as the director of operations for the Joint Staff. He said during the ceremony that USAF needs to continue to "get better" in Europe because as the Air Force improves its presence and operations in the region, adversaries are doing the same.

Engine Failure Led to F-16 Crash

An unrecoverable engine malfunction caused an F-16 assigned to the 52nd Fighter Wing at Spangdahlem AB, Germany, to crash in August 2015, USAFE-AFAFRICA investigators found.

They concluded a structural failure of the bearing cage within the lower governor ballhead bearing caused the main engine control to malfunction and, as a result, prohibited fuel flow, according to an executive summary of the findings. The pilot was unable to restart the failed engine despite five attempts because the lack of fuel caused a loss of thrust. The pilot, assigned to the 480th Fighter Squadron at Spangdahlem, ejected after jettisoning

Rescue Whirlys: ***An HH-60 helicopter takes off from a field near Kotzebue, Alaska, after loading simulated casualties during Arctic Chinook. The joint US Northern Command and Coast Guard exercise focused on multinational search and rescue, in case a mass rescue operation is needed in the Arctic.***

the fuel tanks and experienced minor injuries. The aircraft was destroyed on impact near Grafenwoehr, Germany.

Loss of the jet was valued at $39.8 million. The investigation board found maintenance records did not suggest there were problems with the aircraft before the crash, according to a news release announcing the findings. There were no civilian injuries or casualties.

Hill F-16s To Find New Life as Trainers

The Air Force in August announced new possible homes for the F-16s at Hill AFB, Utah, as the base moves to the F-35 and the service looks to fill a need for new fighter pilots.

It's the third possible move for the Hill Vipers, first expected to move on to replace A-10 units, then expected to stay through 2018. The Air Force on Aug. 11 announced it will augment pilot training at up to two existing F-16 locations: Luke AFB, Ariz.; Holloman AFB, N.M.; JBSA-Lackland's Kelly Field Annex, Texas; or Tucson Arpt., Ariz., according to a news release. The service was to begin site surveys in mid-August, and Air Force Secretary Deborah Lee James said USAF will select the locations by the end of the year.

The Air Force in 2015 used the Hill F-16s to warn about the need for retiring A-10s. At the time, the service wanted to use the F-16s as a replacement mission for some A-10 units in the Air National Guard at Whiteman AFB, Mo., and Fort Wayne Arpt., Ind., and planned to send the F-16s to the Boneyard at Davis-Monthan AFB, Ariz., if the A-10s were kept flying. However, after Congress blocked that move, the service devised a new plan for the F-16s.

As part of the Fiscal 2017 budget request, the service said it would keep them at Hill until at least 2018. Under the new plan, 45 F-16s will transition from the Utah base before then, and there will be no manpower lost as a result of the move, Col. David B. Lyons, commander of the 388th Fighter Wing, said in a Hill press release.

From Bad to Worse

Downwash from an HH-60 Pave Hawk rescue helicopter assigned to the Alaska Air National Guard's 210th Rescue Squadron at JB Elmendorf-Richardson, Alaska, in August 2014 caused a rock to dislodge. It knocked a hiker uncon-

By the Numbers

617,000

The number of new airline pilots the industry will need by 2035, along with 679,000 maintenance technicians, according to a Boeing projection released in August. The projected need comes as the Air Force projects its own shortfall in pilot ranks.

The War on Terrorism

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

Casualties

By Sept. 19, a total of 25 Americans had died in Operation Freedom's Sentinel in Afghanistan, and a total of 25 Americans had died in Operation Inherent Resolve.

The total includes 48 troops and two Department of Defense civilians. Of these deaths, 16 were killed in action with the enemy, while 34 died in noncombat incidents.

There have been 121 troops wounded in action during OFS and 16 troops in OIR.

Busy Month for US Aircraft in Afghanistan

July marked the first full month that US aircraft had the authority to target the Taliban in Afghanistan, and that authority resulted in the busiest month of the past year.

US aircraft in July dropped 130 bombs in Afghanistan, bringing the total for the year to 675 bombs dropped in 3,029 close air support sorties, according to US Air Forces Central Command statistics. These air strikes are not "unilateral"; instead they are specifically tied to what the Afghan forces are doing on the ground, said US Army Brig. Gen. Charles H. Cleveland, the deputy chief of staff for communications for the Resolute Support Mission. In early July, most of the air strikes focused on the Kunduz region, and after that calmed down there was increased fighting in Helmand province, Cleveland said. About 80 of the strikes were tied to the authority to target the Taliban, he said.

At the same time, the Afghan air force has increased its capability. The AAF on Aug. 25 received five more MD-530 attack helicopters, in addition to the 23 that are already operational. These helicopters have seen action in Helmand in particular, Cleveland said. The AAF also has eight A-29 Super Tucanos that it is using for close air support across the country, he said.

A New Continuous Bomber Presence

The Air Force will begin a continuing rotation of B-1 and B-52 aircraft to the US Central Command area of operations, switching between the two aircraft as the current B-52 deployment wraps up.

B-52s in April deployed to CENTCOM for the first time after the Air Force was able to expand a runway to fit the massive bombers. These aircraft replaced B-1Bs, which were forced to leave CENTCOM for the first time since 2001 and return to the continental US for upgrades.

Air Force Chief of Staff Gen. David L. Goldfein said during an Aug. 10 briefing that the newly upgraded B-1s and the B-52s, with the recently improved infrastructure in CENTCOM, will rotate through the area of operations much like USAF bomber squadrons rotate through the Pacific.

However, unlike the Pacific bomber rotation, it is not likely that B-2s would rotate through CENTCOM, and because of current operations tempo, there is not a need for more than one squadron deployed at a time, Goldfein said.

Jets Scrambled To Protect Ground Forces in Syria

The US scrambled aircraft ready to take down Syrian jets that were bombing in the vicinity of US special operations forces near the village of Hasakah on Aug. 18, the Pentagon said.

Two Syrian air force Su-24s dropped unguided munitions in Kurdish-held areas near the village in northeast Syria where US forces were training allied Kurdish fighters, Pentagon spokesman Navy Capt. Jeff Davis said during an Aug. 19 briefing. When the bombing started, the US combined air operations center immediately called Russian officials, who confirmed they were Syrian aircraft.

At the same time ground forces—it's unclear whether they were US or Kurdish—used the emergency guard frequency to try to contact the Syrian jets, which did not respond. The US did not intercept the Syrian fighters, but was ready to "take whatever action is necessary" to protect US forces if they were threatened, said Davis.

B-52s Strike in Afghanistan

B-52s recently struck targets in Afghanistan for the first time since arriving at al Udeid AB, Qatar, in April, and are ramping up sorties targeting ISIS, the Air Force's top officer said during a visit to the base. B-52s conducted two strikes in Afghanistan, dropping 27 weapons in support of counterterrorism operations, Air Forces Central Command said in a news release.

The aircraft have flown almost 270 sorties for Operation Inherent Resolve, dropping more than 1,300 bombs during 325 strikes, according to AFCENT.

"We got the B-52 back in the fight in Afghanistan and Iraq," said Chief of Staff Gen. David L. Goldfein. "We have the B-52 contributing to a significant ground effort and employing weapons in close proximity of friendly troops who are under attack, who are preparing the battlefield in new ways."

scious and inflicted a critical head wound, Pacific Air Forces investigators found.

The helicopter was hovering to rescue another hiker who was already injured and stuck on Copper Mountain, near a ridgeline, when the mishap occurred, according to an accident investigation board report released Aug. 16. The rock struck the previously uninjured hiker while he watched the rescue, causing the head wound. The need for a quick extraction of the first injured hiker; inability to use an alternate, safer rescue site; and the then-uninjured hiker's lifting of his head to watch the rescue hoist—despite instructions to use his backpack to protect himself against falling rocks—substantially contributed to the mishap, investigators found. The second hiker recovered from his wounds at an Alaskan hospital, according to news reports.

Air Force Buys 30 More Reapers

The Air Force recently awarded General Atomics Aeronautical Systems a $371 million contract for 30 more MQ-9 Reapers.

Say Hello to My Little Friends: *A B-1, part of the continous bomber presence at Andersen AFB, Guam, flies over Osan AB, South Korea, accompanied by four F-16s. The show of force came after North Korea tested a nuclear weapon in September.*

The sole-source contract calls for providing the aircraft in its 2015 production configuration, with delivery expected to be completed by 2019. The contract comes as the Air Force is working to build up its remotely piloted aircraft fleet, including new operating locations. Air Force Secretary Deborah Lee James said the service will release a list of candidate bases for two new RPA operating bases—one wing and one operations group—this fall. The Air Force had earlier announced plans to procure a total of 75 more MQ-9s as a way to address overworked manpower and capacity issues.

Additional Duties Reduction Announced

In an effort to "streamline demands" on airmen's time, Secretary Deborah Lee James and Chief of Staff Gen. David L. Goldfein released an Air Force-wide memorandum on Aug. 18 announcing a broad reduction in airmen's additional duties.

The announcement emerges from a series of meetings with airmen at installations around the world and focuses on duties articulated in Air Force policy. According to a fact sheet released with the memo, immediate changes include the reassignment of some duties—like voting assistance counselor and approving official for government purchase cards—and the elimination of others—like buddy care monitor and records custodian.

Reassigned duties will be transferred from squadrons to commander support staff at the group or wing level. Reassignment will in some cases be slowed by personnel limitations, as the Air Force is working to rebuild commander staffing levels. Beginning Oct. 1, the inspector general will revise unit-level inspection standards in accordance with the reductions.

The memo also announced the intention to conduct a similar review of computer-based training requirements and duties originating from laws and from Department of Defense policies. USAF's review of additional duties is motivated in part by recognition of the unique challenges placed on units in an era of force reduction.

Air Force's 100th F-35

The Air Force's 100th F-35 Lightning II strike fighter arrived at Luke AFB, Ariz., on Aug. 26, less than a month after the service declared its latest fifth generation aircraft ready for combat, according to a news release.

Luke, which received its first F-35 in 2014, now boasts more than 40 strike fighters, including Australian and Norwegian jets. The base also recently activated its third of six F-35 training units, the 63rd Fighter Squadron.

"This marks a milestone and shows the fact that the F-35 program has continued to grow, progress, and support initial operational capability," Brig. Gen. Brook J. Leonard, the 56th Fighter Wing commander, said.

"It is also a 'scare factor' for our enemies that we are able to produce such an incredible platform at such a high production rate and that it's getting out in the field in larger and larger numbers."

F-35 Targets Last Unmanned Phantom

The last unmanned QF-4 Phantom targeting drone flew as an F-35 target in August at White Sands Missile Range, N.M.

Manned Phantoms will continue to be flown through December, when the 82nd Aerial Targets Squadron, Det. 1, will finish its transition to flying QF-16s, according to a 49th Wing news release. The QF-4 was also flown at Tyndall AFB, Fla., but the last was shot down in May 2015.

The 82nd ATRS has been flying the QF-16s since September 2014. The use of the modified F-16s "initiates the next chapter in advanced aerial targets, predominantly in support of more technologically superior air-to-air weapons test and evaluation programs," said Lt. Col. Ryan Inman, the former 82nd ATRS commander, in the release. ✪

Forward Deployed

By Jennifer Hlad

Humanitarian concerns loom; Retaking Mosul; Working the timeline; B-52 back in the fight ....

Iraq and Syria are the most well-known fronts in the air war against ISIS—with the US having conducted more than 6,500 strikes in Iraq and nearly 4,800 in Syria as of Aug. 30—but the battlefield has expanded. On Aug. 1, the US began air strikes against ISIS targets in Libya.

US aircraft launched 108 air strikes in Libya in that first month, according to US Africa Command data. And the strikes seem to have made a big impact: In early September, Libyan forces were poised to take back the city of Sirte from ISIS after roughly four months of fighting. Sirte was the terror group's stronghold in Libya.

In nearby Yemen, US forces have only been launching intermittent strikes, as Saudi Arabia leads the campaign against al Qaeda there. But the deteriorating humanitarian situation throughout the country and recent reports of Saudi Arabian air strikes hitting a school and a hospital have raised serious concerns in Washington about continued US military assistance to Saudi Arabia.

A bipartisan group of 64 members of Congress in late August urged President Barack Obama to postpone plans to sell $1.15 billion worth of weapons to Saudi Arabia, noting in a letter penned by Rep. Ted Lieu (D-Calif.) that Amnesty International "has documented at least 33 unlawful air strikes by the Saudi Arabian-led coalition across Yemen that appear to have deliberately targeted civilians."

Rep. Adam Smith (D-Wash.), ranking member of the House Armed Services Committee, said in a written statement the US must "work with Saudi Arabia to ensure that Yemen does not become an established haven for al Qaeda in the Arabian Peninsula, [ISIS], or any other terrorist organization; nor become a proxy for malign Iranian activities."

In a briefing with reporters at the Pentagon, Army Gen. Joseph L. Votel, head of US Central Command, addressed concerns about civilian casualties in Yemen, saying the US will "continue to emphasize to all the parties involved" in the conflict that everyone must minimize the chance of civilians being killed.

Votel also discussed plans for Iraqi forces to launch a campaign to retake Mosul by the end of the year; Defense Secretary Ashton B. Carter in April said he wanted to get forces in place before the start of Ramadan to wrest control of the northern Iraqi city from ISIS, but three weeks after the holy month had ended, Votel said there was no rush to get to Mosul.

However, at the Pentagon on Aug. 30, Votel asserted that he believes Iraqi forces are on track to launch the offensive before the end of the year.

"They own the timeline here for this ... but I think we are proceeding apace exactly where we hope to be at this particular time," Votel said.

In just a few weeks, ISIS "lost a hold" on Manbij, in Syria—which was liberated in mid-August—as well as border crossings in Syria and Iraq, Votel said, cutting off lines of communication and making it more difficult for the group to bring in new fighters.

"We are causing the enemy to have to look in multiple directions, and they are struggling to respond under this pressure," he said. "I do believe our approach, which requires that we work by, with, and through the indigenous forces, is working. We are making progress against [ISIS] in Iraq and Syria."

Still, he said, "there is much work ... to be done," and the fight will not be over when Mosul or the Syrian city of Raqqa is retaken.

"We will continue to deal with them," Votel said. "They will continue to adapt and we will continue to deal with the next evolution" of ISIS.

In an August visit to the US Central Command area of operations, Air Force Chief of Staff Gen. David L. Goldfein noted the importance of airpower in the continuing fight against ISIS. He stressed that it is "not about coalition partners following an American effort," but rather "Americans being part of ... an effective coalition that brings the best capabilities of each coalition partner to the campaign."

Goldfein said the B-52 is "back in the fight" in Afghanistan and for Operation Inherent Resolve, where as of mid-August, it had flown nearly 270 sorties since April. The aircraft is "contributing to a significant ground effort and dropping weapons in close proximity of friendly troops who are under attack," he said.

The Chief used the CENTCOM visit to tout the dependability of airpower.

"You can rely on your Air Force," he said. "We're going to fly to the sounds of the guns or we're going to die trying." ✪

Jennifer Hlad is a freelance journalist based in the Middle East and a former Air Force Magazine *senior editor.*

A soaring inspiration, the Air Force Memorial celebrates its 10th anniversary this month.

Staff photo by Mike Tsukamoto

The three silvery spires soar up, arching and narrowing until they seem to disappear in the air. They almost look like contrails, but they're stainless steel, not smoke. Yes, you actually can hear aircraft engines—usually from airliners approaching nearby Reagan National Airport.

This is the US Air Force Memorial in Arlington, Va., designed to evoke the spectacular grace of flight and to honor the commitment, heroism, and sacrifice of all the men and women who have served the cause of American airpower.

Dedicated Oct. 14, 2006, the memorial, set atop a hill overlooking both the Pentagon and Arlington National Cemetery, is now a decade old. In just 10 years it has become the Air Force's ceremonial stage, hosting promotions and retirements, historic commemorations, band concerts, and drill team performances. It is the scene of speeches, parades, and Honor Flight visits. Couples get engaged there. Spouses and children visit to remember departed loved ones. Airmen—currently serving, retired, and even those who served in USAF's predecessor organizations—come for inspiration. They show off the memorial to their families or just lean back and take in the majesty of the spires.

The spires did not rise easily. Like many monuments in Washington, the Air Force Memorial endured controversies so heady that it changed shape and location a number of times. It faced court challenges and congressional objections.

But today it's a place to celebrate the Air Force on a grand scale. That was the vision of the dedicated group that navigated it from dream to reality. Ten years on, it's been embraced by the Air Force, other services, foreign airmen, and random visitors to the nation's capital alike.

"It has become what we had hoped for and expected," said retired Air Force Col. Pete Lindquist, who served as Air Force Memorial Foundation director of operations from 1996 to 2012.

IN THE BEGINNING

The origins of the memorial began in the wake of US victory in the 1991 Gulf War. A small group of Air Force Association leaders, headed by O. R. "Ollie" Crawford, saw airpower's dominance in that campaign as something worthy of commemoration.

Crawford helped form a foundation that included himself, John R. Alison, George M. Douglas, Martin H. Harris, Thomas J. McKee, and Jack C. Price as trustees. The group was incorporated and granted nonprofit, tax-exempt status in 1992. Retired Lt. Gen. Robert D. Springer accepted the job of executive director, and the Air Force Sergeants Association promised its full support.

In 1993, business executive Joseph Coors Jr. came aboard as foundation chairman. H. Ross Perot Jr. agreed to serve as chairman of the foundation's site and design committee. Congress passed, and President Bill Clinton signed, legislation authorizing the building of an Air Force Memorial on federal land.

That signature started a clock ticking. The foundation had seven years to raise enough money and win the necessary permits to start construction.

The National Park Service led the site and design committees on a tour of 18 possible locations in the Washington, D.C., area. The committee liked a number of them, including a small plot adjacent to the National Mall, near the Smithsonian's National Air and Space Museum. They settled, though, on an area of Northern Virginia known as Arlington Ridge.

The site was directly in line with the east-west axis of the mall, just across the Potomac River. It was on land off the northern end of Arlington Cemetery and between two existing attractions: the Netherlands Carillon—a thank-you from the Dutch for US aid during and after World War II—and the Marine Corps War Memorial, the iconic giant statue that depicts raising the flag during the battle for Iwo Jima. Coincidentally, it was only a short distance from the site of the first flight of a US military airplane, on adjacent Fort Myer.

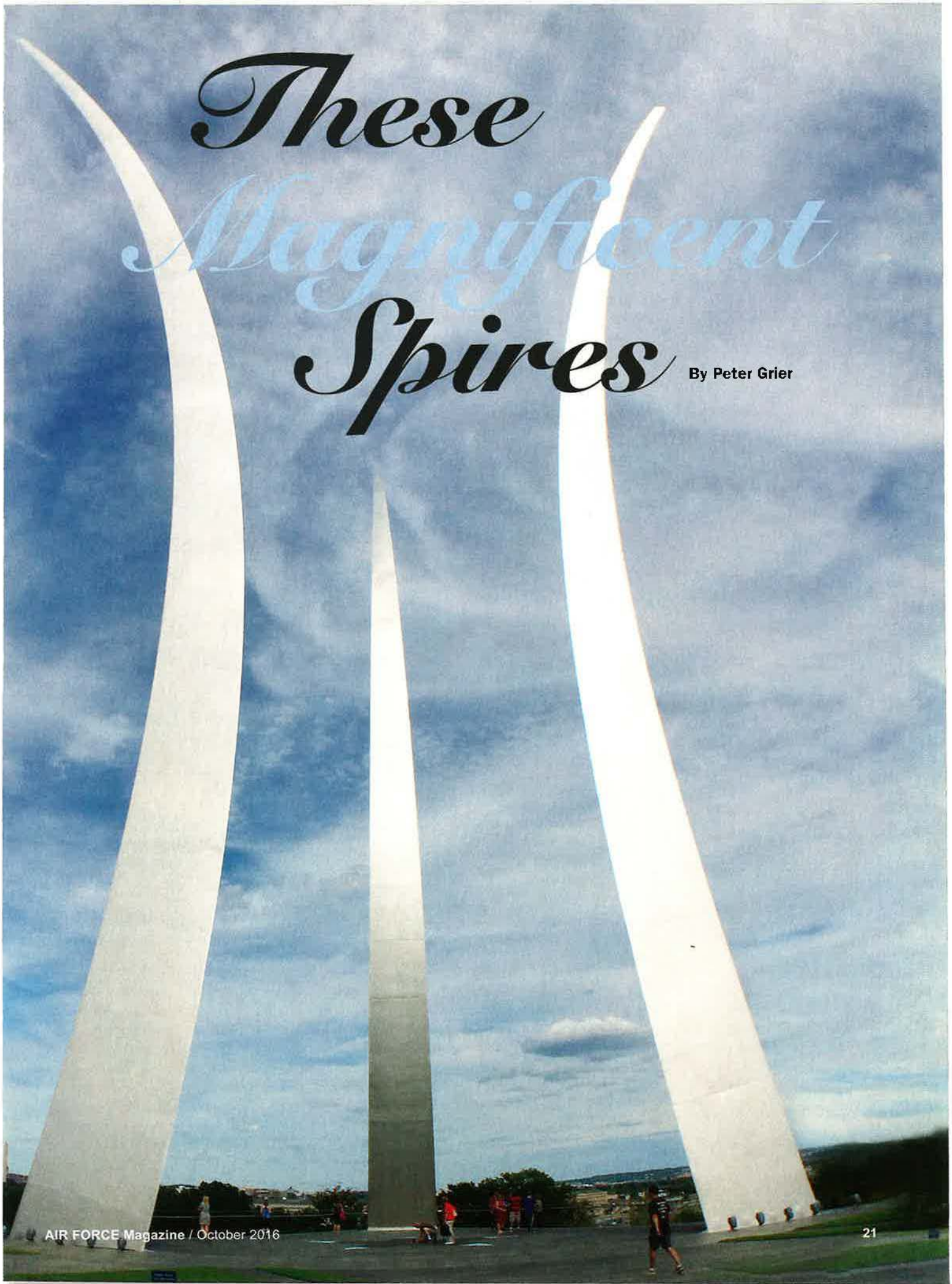
Given the proximity to the Iwo Jima Memorial, the foundation informed senior Marine Corps leaders of its plan in February 1994. None raised objections to the Air Force building its own memorial in the vicinity.

More permission was needed, though. Erecting memorials in and around the nation's capital is a complicated process, as a number of panels and commissions have the power to say yes or no.

Within a year the foundation quickly won site approval from the National Capital Memorial Commission and

These Magnificent Spires

By Peter Grier



the Commission of Fine Arts. The National Capital Planning Commission balked, however. The foundation worked with the group and agreed to a number of design parameters that eased its objections.

All signals seemed to say "go" in 1996, as the foundation had all the site and design approvals it needed. Fund-raising started in earnest.

This first iteration of the Air Force Memorial was quite different from the one now standing. Due to the site height limits, architect James Ingo Freed had produced a design only 50 feet tall, with space below for an interpretive center and other functions (later eliminated for practicality and cost). Viewed from above, the design was a five-pointed star.

Not everyone in the Air Force loved it. Retired Gen. John A. Shaud, former AFA executive director and memorial foundation trustee, attended a fund-raiser for the memorial entitled "Soaring to Glory." A model of the proposed design was on display.

As Shaud recalls in a written reflection on the memorial's construction, Gen. Michael J. Dugan, former Air Force Chief of Staff, was also present at the fund-raiser and said, "I like the slogan ... 'Soaring to Glory,' but looking at the model, that ain't it."

The more the guests looked at the design, Shaud wrote, the more "we tended to agree with Mike." The Secretary of the Air Force remarked, "It looks like a moon lander." Over time, a more pejorative nickname circulated: "the ashtray."

Although it was 50 feet tall, it appeared stubby and squat.

SITE OBJECTIONS

Then a storm arose that the foundation hadn't foreseen. It started small. Residents of the leafy neighborhood near the Arlington Ridge site began raising objections. They used the space as something of a neighborhood park for dog walking, Frisbee flying, and other activities. Some worried that the presence of a third memorial on the site would bring more people and vehicles and interfere with these activities.

The opponents knew they needed allies. The objection of a neighborhood association by itself wouldn't derail the project.

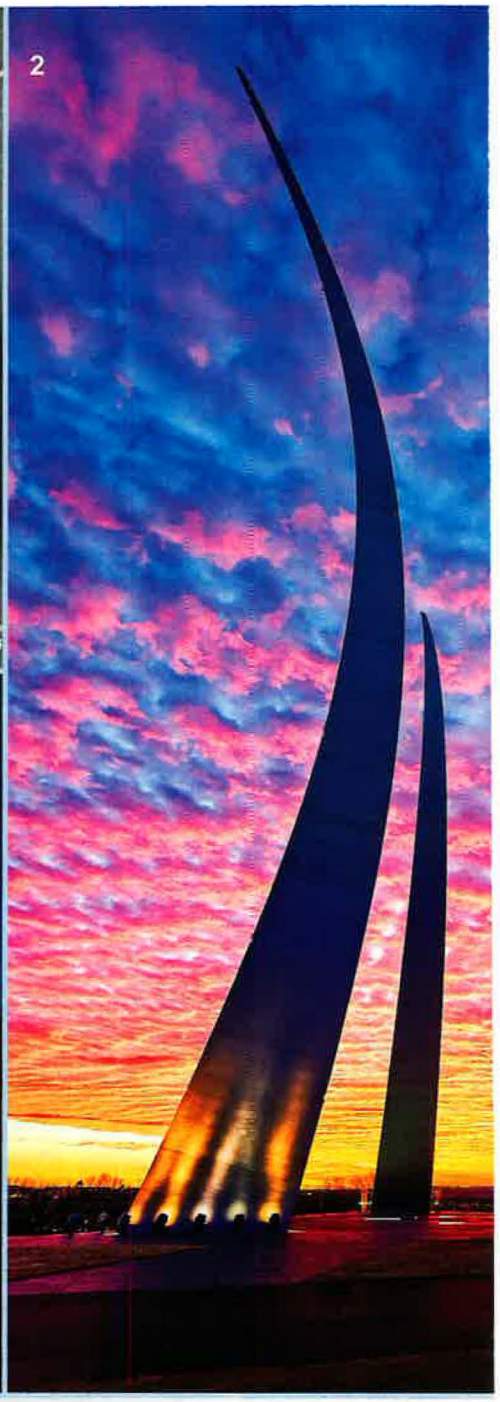
"They partnered with some retired marine folks and organizations and it certainly escalated from there," said Lindquist. "We were portrayed as impacting the hallowed ground of the Marine Corps."

The opposition organized into a group called the Friends of Iwo Jima and began lobbying Congress. On July 30, 1997, Rep. Gerald B. H. Solomon (R-N.Y.), a Marine Corps veteran, introduced legislation prohibiting any new memorials near the Iwo Jima statue. A similar bill was introduced in the Senate in October.

Opponents pursued court action via a civil suit as well. They got some support from active marines despite the fact that the corps had been consulted throughout the process, and the memorial had already received the explicit approval of the Marine Corps Commandant, Gen. Carl E. Mundy Jr.

The foundation had followed the legal planning process by the book and successfully defended itself in the courts a number of times. In June 1998, a US District Court judge dismissed the Friends of Iwo Jima suit against the foundation via summary judgment.

/1/ A model of the originally proposed Air Force Memorial that was to be built on Arlington Ridge in Virginia. Visible on the right is the Marine Corps War Memorial, on the left is the Netherlands Carillon. /2/ An illustration of the first proposed memorial at night. /3/ Spires under construction at Mariani Metal Fabricators in 2005. /4/ The spires are erected in 2006. /5/ An aerial photograph of the memorial construction site in November 2005, with the Navy Annex behind it.



An appeals court upheld this action in May 1999. Meanwhile, the House and Senate bills that would have blocked the memorial went nowhere.

Foundation officials forged ahead with fund-raising and other activities. At a dedication ceremony for the Arlington Ridge site held Sept. 18, 1997, some participants noticed that the Iwo Jima Memorial was more than 500 feet away, up a hill, and screened by a copse of trees. No part of it—not even the tip of the flagpole—was visible from the site.

In the court of public opinion, though, the Air Force Memorial wasn't faring well. The dispute over its siting was reverberating in the Pentagon and beyond.

"There were some very concerned individuals at high levels in both services—the Marine Corps and Air Force—because what was happening was, this little tiff over memorials was really causing some consternation between active duty forces," recalled Lindquist.

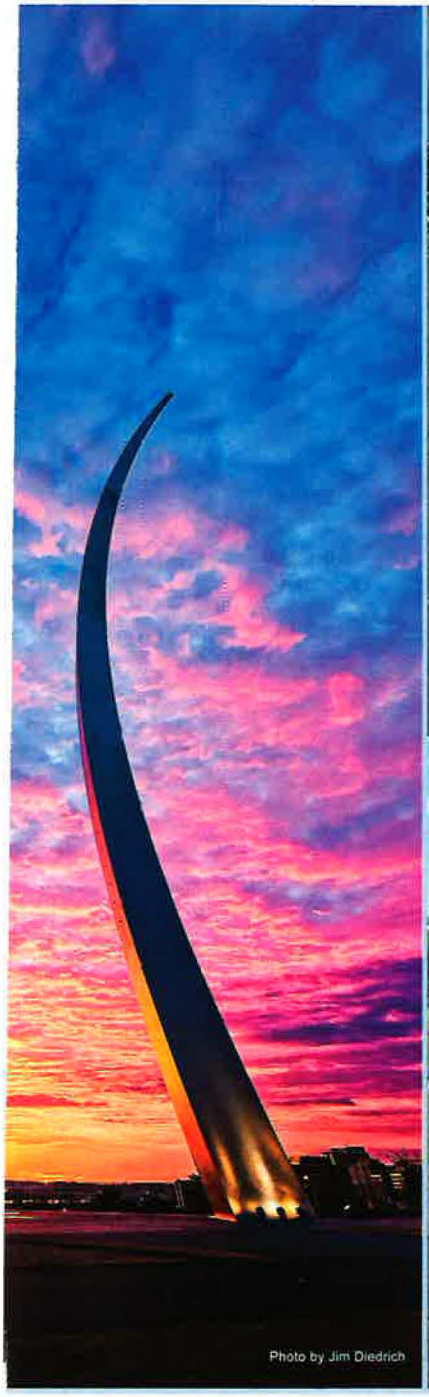
Sen. John Warner (R-Va.) and Deputy Defense Secretary Rudy deLeon were instrumental in brokering a compromise. Congressman Solomon organized a meeting on the Hill attended by several senators and congressmen and the Friends of Iwo Jima. The Air Force was represented by Secretary F. Whitten Peters and Shaud, who represented AFA as its executive director.

"The Friends of Iwo Jima, mainly retired Marine generals, were each prepared to make a speech," and they did, Shaud recalls. "Peters nudged me and asked, 'When do you think we ought to say something?' I replied, 'Sir, look at the body language of the senators and congressmen. Let them go on ... and on.'"

Finally, Warner asked if the Air Force had anything to say.

Peters initially deferred to Shaud, who answered, "The Air Force is following the Wing Walkers Creed, which is, 'Don't let go of something 'til you have hold of something else.'"

Later, while walking down the Capitol steps, Peters asked Shaud how he



felt they did. "Sir, I think just fine,'" Shaud recollects. "And that turned out to be true."

Warner brokered a swap: If the trustees gave up the Arlington Ridge site, they could have a parcel of land by the Navy Annex, adjacent to the southern border of Arlington Cemetery.

The proposed new location was in many ways a superior site—on a hill that overlooked the Pentagon on one side, Arlington cemetery on another, and then across the Potomac to the Washington Monument and all of D.C. beyond. The site selection committee had, in fact, visited the Navy Annex as part of its original tour and liked it. At the time, though, defense officials said the annex buildings wouldn't be removed for another 20 years.

The fight over the Arlington Ridge site had already eaten up some of that time. Then the Pentagon decided it didn't have to wait and demolish the entire Navy Annex—a series of eight buildings—all at once. Instead, the new plan called for razing just one of them. Added to space from a parking lot, this would provide a promontory for a highly visible memorial. Better yet, it could now soar upward, freed of the height limits of Arlington Ridge.

In October 2001, the foundation board decided to accept the deal. Members

/1/ Stonework contractor Marcel Machler chisels the lettering of the dedication into the granite at the site. /2/ The brilliant multicolor sky of a Washington, D.C., dawn forms a backdrop for the silvery spires of the memorial. /3/ A star and seal are inlaid in the stonework below the spires. /4/ A remembrance left at the Missing Man display. /5/ AFA conducts a wreath-laying ceremony, like this one in 2013, at the memorial during the National Convention every year. So far in 2016, wreath-laying ceremonies have commemorated Memorial Day, the Civil Air Patrol, National POW/MIA Recognition Day, the 20th anniversary of the Khobar Towers bombing, and other events and significant dates. /6/ Panels inscribed with USAF core values—Integrity, Service, Excellence—are displayed with inspiring quotes from airpower advocates.

knew if they insisted on the first site, more litigation would follow, costing them dollars and time. The whole process of building the memorial would drag out, and they might run out the clock, with the risk that Congress might not extend the authorizing legislation.

That December, President George W. Bush signed a defense authorization bill that, among other things, allowed the transfer of up to three acres of the Navy Annex property for the Air Force memorial.

Everyone said "it turned out to be in our favor," observed retired Maj. Gen. Edward F. Grillo Jr., who served as foundation president. "It ended up being a far better site, and in my opinion, a far better design."

NEW OPPORTUNITIES

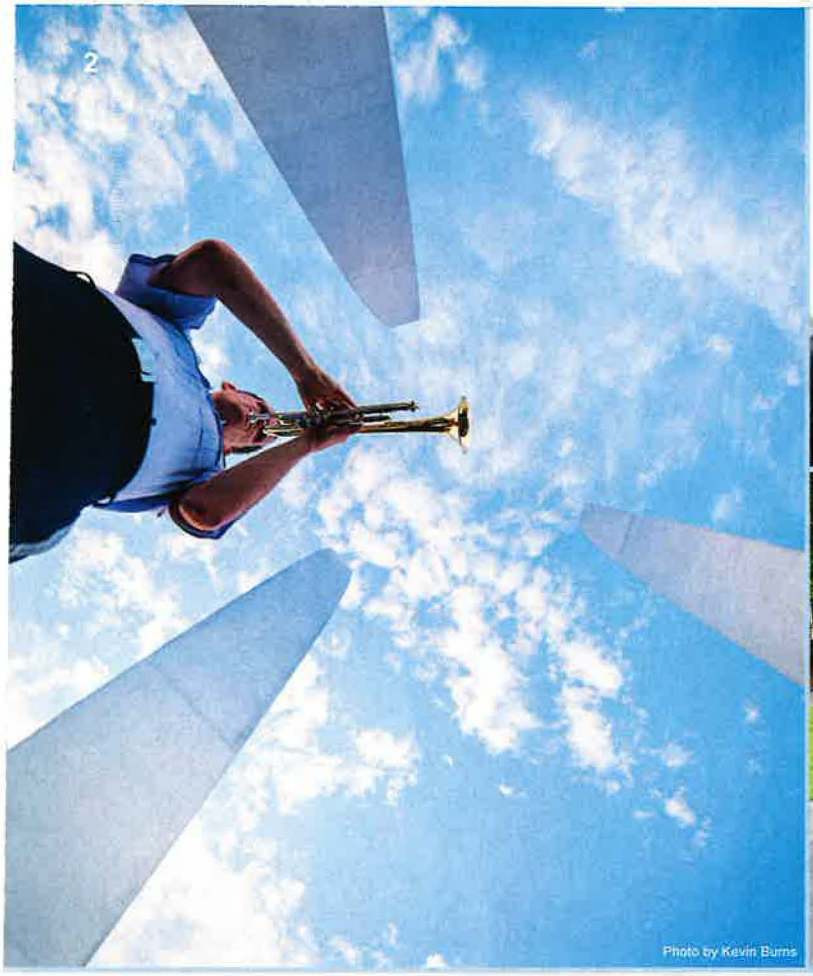
A new site, having fewer restrictions, offered new opportunities. The foundation in early 2002 asked five architectural firms to submit new ideas. Among those taking part was the winner of the first design contest, James Ingo Freed of the firm Pei Cobb Freed & Partners. His firm had designed the Grand Louvre museum project in Paris and the US Holocaust Memorial Museum in Washington, D.C.

Shaud thinks music may also have helped inspire the look of the memorial. One day during this period, he got a call in his AFA office informing him that the competing architects were meeting downstairs. They wanted him to talk about the differences between the Army, Navy, and Air Force.

In the elevator on the way down he mused about what to say. The different elements in which each service moved were obvious—land, sea, and air. How to illustrate that? He decided that architects—probably all of them fine arts majors of some sort—might respond to songs.

Shaud told them the land-based Army could be symbolized by inexorable marches such as the "Battle Hymn of the Republic." The Navy sings a more majestic hymn to the expanse and loneliness of the ocean, while the Air Force is all about the grace of flight. The Air Force hymn, "Lord, Guard and Guide the Men Who Fly," is in three-four time, the meter of a flowing waltz, Shaud told the architects.

"The architectural symbol is the dynamic curve—not the column of soldiers on the march or the profound emotion of being at sea," Shaud wrote in his reflection on the memorial.



/1/ A formation of P-51 Mustangs fly over the memorial for the 70th anniversary of the end of World War II. The Air Force Band accompanied the flyover with music from the World War II era. /2/ A USAF bugler plays under the spires. /3/ The Honor Guard statue stands watch at the memorial. /4/ Notes and photographs are often left at the base of the Missing Man display. Ghostly images of fighter jets are etched into the glass panel. /5/ Michael Eloy and Kimiko Eloy salute as the colors are presented at a Veterans Day ceremony at the memorial. /6/ At a ceremony in 2010, Cheryl Marie Michell Van Riper holds a photo of her aunt, Marie Michell, who was a Women Airforce Service Pilot (WASP) in World War II. The wreath-laying at the memorial was part of a two-day event during which WASP members received the Congressional Gold Medal.

Dynamic curves carried the day. When the designs were unveiled, Freed's new entry was stunning—and far different from his original star. It presented three soaring spires, their joints concealed and smooth as possible, reaching into the Virginia sky.

"The bottom line is that Jim Freed came in and hit a home run with the committee," said Lindquist.

The three spires are different heights and curve asymmetrically. They are reminiscent of the Thunderbirds executing their bomb burst formation or perhaps the path of a rocket to space.

"The Air Force Memorial is rooted in the necessary symbolic transition of making the medium of the Air Force visible. ... At the same time, it enshrines the past in permanent remembrance of the pioneers of flight who came before and pays homage to those of the future," wrote Freed in 2004.

The spires emerge from a prow-like enclosure at the edge of the memorial's site. Offset below is the Honor Guard, a larger-than-life and meticulously detailed statue of Honor Guard airmen meant to complement the tall steel arcs. They stand at one end of a parade ground marked by paths that resemble runways. At the other is a glass contemplation wall, etched with the images of F-16s in a missing man formation.

The Honor Guard statue is said to have been added at the insistence of Perot, who wanted to know "where's the photo op?" He wanted to be sure there was an element of the memorial where visitors could pose for a picture, without the photographer having to be hundreds of feet away to capture the soaring spires.

The area is enclosed on two ends by black granite walls that contain quotes from noted Air Force and Air Corps leaders about service values, excerpts from letters of airmen serving their country far from home, and the names of Air Force and Air Corps recipients of the Medal of Honor.

Shaud remembers discussing how to identify the Medal of Honor recipients. Should they be listed by unit or by hometown?

"We decided to identify them by their hometown. Where do we get people like that? From the villages of America," he said.

With the new design in hand the foundation had to go back and restart the process of winning approval from various D.C. boards. That went smoothly and on Sept. 15, 2004, there was a formal groundbreaking and dedication ceremony at the Navy Annex site.

Demolition of the northernmost wing of the Navy Annex began a month later, and excavations for the spires and other features began in January 2005.

As a construction project, the Air Force Memorial was challenging. The steel spires were supposed to appear as seamless as possible. It took more than a year to construct the spires and lay their foundation. The concrete took five months to set.


White House photo by Paul Morse


USAF photo by Jim Varhegyi

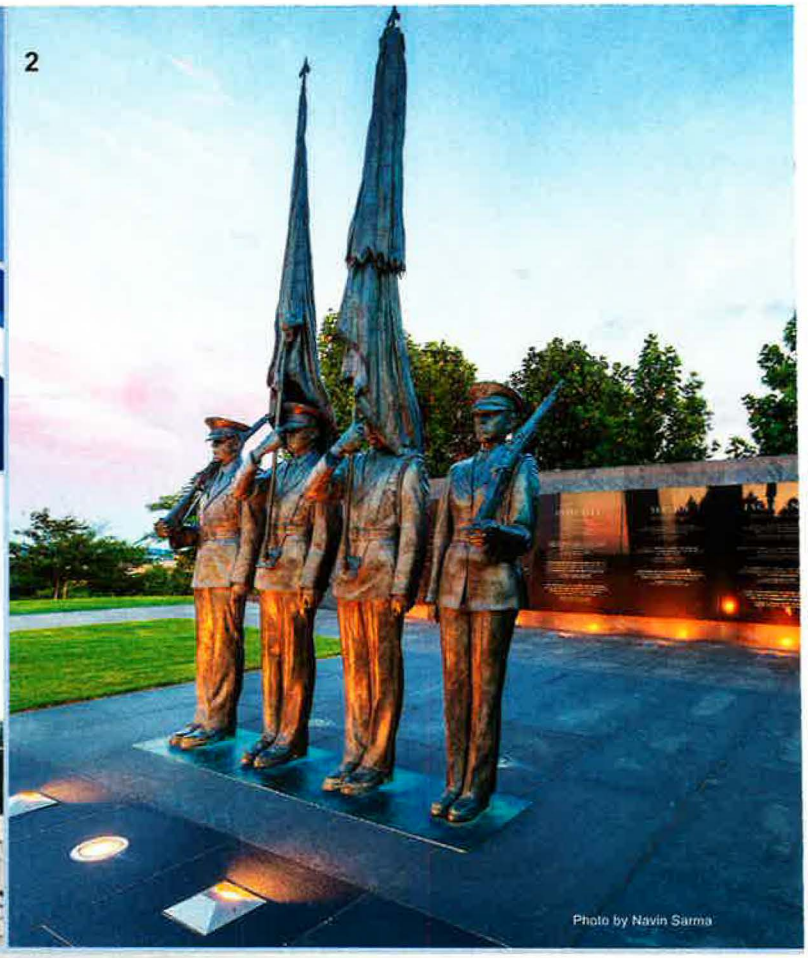


Photo by Navin Sarma

"One of the real challenges we had was trying to figure out how long it would take to build something so unique," Grillo said.

At one point a scale model of the spires was tested in a wind tunnel. This revealed that the structure might be subject to a phenomenon known as "galloping"—dangerous rhythmic swaying induced by wind of a specific speed.

The memorial needed some sort of movement-damping system to ensure against the fate of the famous Tacoma Narrows Bridge, nicknamed "Galloping Gertie," which collapsed in 1940 due to wind-induced twisting. Engineers settled on a simple solution of three-quarter ton metal balls contained in steel boxes lined with rubber. The balls would be free to roll about if a spire swayed in the wind, mitigating the wind's effect.

There were also concerns from nearby Reagan National Airport that the spires would be a hazard to navigation. Eventually, the FAA was satisfied that they posed no risk, but like all towers, the memorial was topped with a blinking red light to warn off errant aircraft.

Finally, the end of the long march neared. Dedication was set for Oct. 14, 2006. Logistics planning began far in advance—after all, President Bush and many other VIPs were involved.

HITTING THE MARK

Then came the inevitable last-minute hitch. Contractors pouring concrete in the spires' inner structures saw that the amount they were putting in didn't seem to match the amount collecting in expected places. They discovered that wet concrete had been leaking into some of the damping boxes—entombing the supposedly free-moving balls in an immovable jacket.

Workers went on a 24/7 schedule to get the monument ready in time. "There were actually people in there hand-chipping the stuff around those balls. ... But there was no way in the world we were going to delay the dedication," said Grillo.

Mere hours beforehand—even while attendees began to arrive—workers were still planting trees and laying sod on the memorial's hill. The weather on dedication day was beautiful. Bush spoke from a podium at the base of the spires.

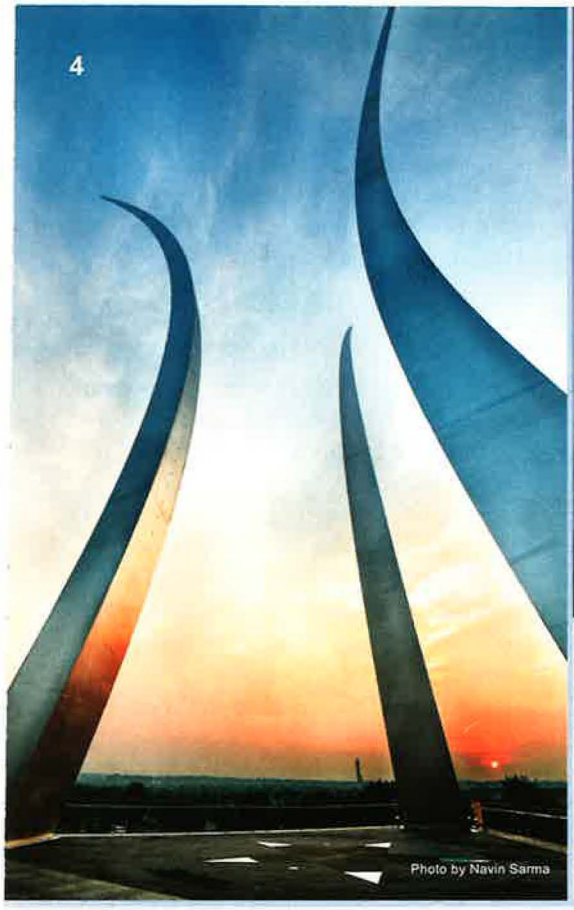
"Under these magnificent spires, we pay tribute to the men and women of the Air Force who stand ready to give all to their country," he said.

A historic parade of US aircraft, from a Wright brothers biplane to an F-117 stealth fighter, flew overhead as a series of luminaries spoke of the history of US military aviation, from the Air Service to the Air Corps to the Air Force. It all concluded with a spectacular show from the Thunderbirds. At one point, they approached the hill from the Pentagon side, low and out of sight of the crowd. Then they swung upward behind the spires in the bomb burst maneuver, mirroring the spires' shape. Some attendees said the sight caused the hair to stand up on the back of their necks.

"It was an awesome dedication," said Grillo. To this day, AFA facilitates the

Support Your Air Force Memorial

The operational mission of the Air Force Memorial is paid for through the contributions of generous supporters such as you. To help preserve the memorial for the future, please consider donating to the Air Force Memorial Foundation. You can donate by visiting http://www.airforcememorial.com/donate or by sending cash or check to One Air Force Memorial Drive, Arlington, VA 22204. The Air Force Memorial Foundation is a 501 (c) (3) nonprofit, and all donations are tax-deductible.



/1/ The Air Force Thunderbirds, USAF's aerial demonstration team, perform a starburst maneuver over the spires at the dedication of the memorial in 2006. /2/ The bronze Honor Guard statue is lit when night falls. /3/ Volunteers representing the Tuskegee Airmen participate in a Memorial Day ceremony in 2015. Chief Master Sergeant of the Air Force James Cody delivered the keynote speech at the event. Many other dignitaries have spoken at the memorial. /4/ The memorial depicted with a sunrise. The site offers views of the Washington Monument, across the Potomac River, the Pentagon, and other landmarks. /5/ A USAF Honor Guard runs through a training drill beneath the spires.

Mystery and Memory

There is already some lore and mystery about the memorial. One black and white photo is a puzzle. It's always there, propped on a low curb at the base of the Missing Man panel, where visitors often leave mementos of their Air Force loved ones.

The photo is of a group of World War II airmen gathered at what might be a pub. They're all smiling, having a good time. There's no clue as to why the picture is special.

But it is—to somebody. A few months after it first appeared, it became tattered from the weather. Barbara S. Taylor, Air Force Memorial managing director, picked it up and disposed of it. After several weeks, walking by the same spot, she noticed it had reappeared in the form of a new copy of the same scene.

Since then, the process has repeated over and over. Taylor, a retired Air Force chief master sergeant, removes the photo when it becomes worn, and then it gets replaced. Somehow.

"I've never seen or caught the person doing it. I don't even want to know who that person is," said Taylor.

She finds the riddle of the reappearing photo inspirational, saying it shows how much the Air Force Memorial means in the lives of ordinary service members and their families and friends.

Over the years the memorial has hosted numerous personal ceremonies and remembrances, big and small. Its first funeral service came in 2013. Air Force Col. Francis Jay McGouldrick Jr., then a major, had gone missing in Laos in 1968 after his B-57 collided with another aircraft. After nearly 40 years a joint US-Laotian team discovered his remains. In 2013, his casket lay in state at the base of the memorial spires for the repatriation and funeral service before he was buried in Arlington National Cemetery.

The brave men who volunteered for the "Flying Tigers" squadrons in China in World War II were honored in a 2012 event at the memorial.

In 2013, Jerry Yellin, the pilot who flew the last combat mission of World War II, (a P-51 sortie over Japan on Aug. 14, 1945) spoke at the memorial in support of setting aside a day to commemorate the "Greatest Generation."

In 2014, a group of Gold Star mothers organized a ceremony for 22 pararescuemen and combat controllers killed in the years since Sept. 11, 2001. PJs attending the event hit the pavement and did push-ups in honor of their fallen comrades.

Then there are the quieter, more personal moments. Taylor said that when Honor Flights of veterans arrive she walks around and searches out Air Corps vets in particular, to thank them for their service so many years ago.

"I'm incredibly blessed to be the caretaker of this memorial," she declared.

memorial's day-to-day operations on behalf of the Air Force, and more than 1.7 million visitors have passed through the memorial since its dedication.

One aspect of the memorial is not visible to visitors. Foundation members decided to engrave, on the highest of the spires, a phrase from an Air Force-beloved poem, "High Flight," written in early World War II by John Gillespie Magee Jr.

The inscription on the 270-foot spire reads, "Put out my hand and touched the face of God." ✪

Peter Grier, a Washington, D.C., editor for the Christian Science Monitor, *is a longtime contributor to* Air Force Magazine. *His most recent article, "Buzz," appeared in September.*

It's getting chilly in Europe, politically. The Cold War seems to be blowing back in, in all but name.

NATO leaders gathered in Warsaw, Poland, in early July. While there, they warned openly about the threat posed by Russia, particularly the danger Moscow's aggressive actions present to former Soviet republics and old Warsaw Pact members.

The alliance has formally shifted its overall strategy—once characterized by "engagement" with Russia and then "reassurance" for those nations on Russia's western edge—toward "deterrence."

The alliance is at a defining moment, NATO Secretary General Jens Stoltenberg said on the first day of the two-day summit, faced with unpredictable threats on all its frontiers. The defensive actions recently taken by the 28 members are the "biggest since the end of the Cold War," he said.

While "no one wants confrontation" with Russia, Stoltenberg asserted, NATO is fully within its rights to treat Vladimir Putin's regime as hostile. Prudent defensive measures cannot be viewed as provocative, he said. Nevertheless, it's essential that a dialogue be maintained with Russia, he added, and that it should not be isolated, lest there be "miscalculations and accidents."

The partners announced plans for greater deterrent moves in Europe, more effort against ISIS, and continued operations in Afghanistan. The subject of NATO's nuclear posture was addressed only broadly—noting that alliance members enjoy the protections of the US, British, and French nuclear forces—but the allies did agree to step up their member-nation capabilities with regard to civil defense and preparedness. One US official said the nuclear posture might be a topic for the next summit.

ROTATING THROUGH EASTERN EUROPE

Though these meetings typically happen every other year, the situation is considered fluid enough to warrant a meeting in 2017. It will happen in Brussels. The next full-up meeting is slated for 2018 in Istanbul.

In its final communiqué after the meeting of member heads of state, NATO agreed to stand up by next year four new army battalions to rotate in and out of Estonia, Latvia, Lithuania, and Poland. US diplomatic officials told reporters in background sessions that these forces are intended as a "trip wire," and if Russia moved against the Baltic nations, NATO would unambiguously invoke Article 5 of its treaty: that an attack on one is an attack on all.

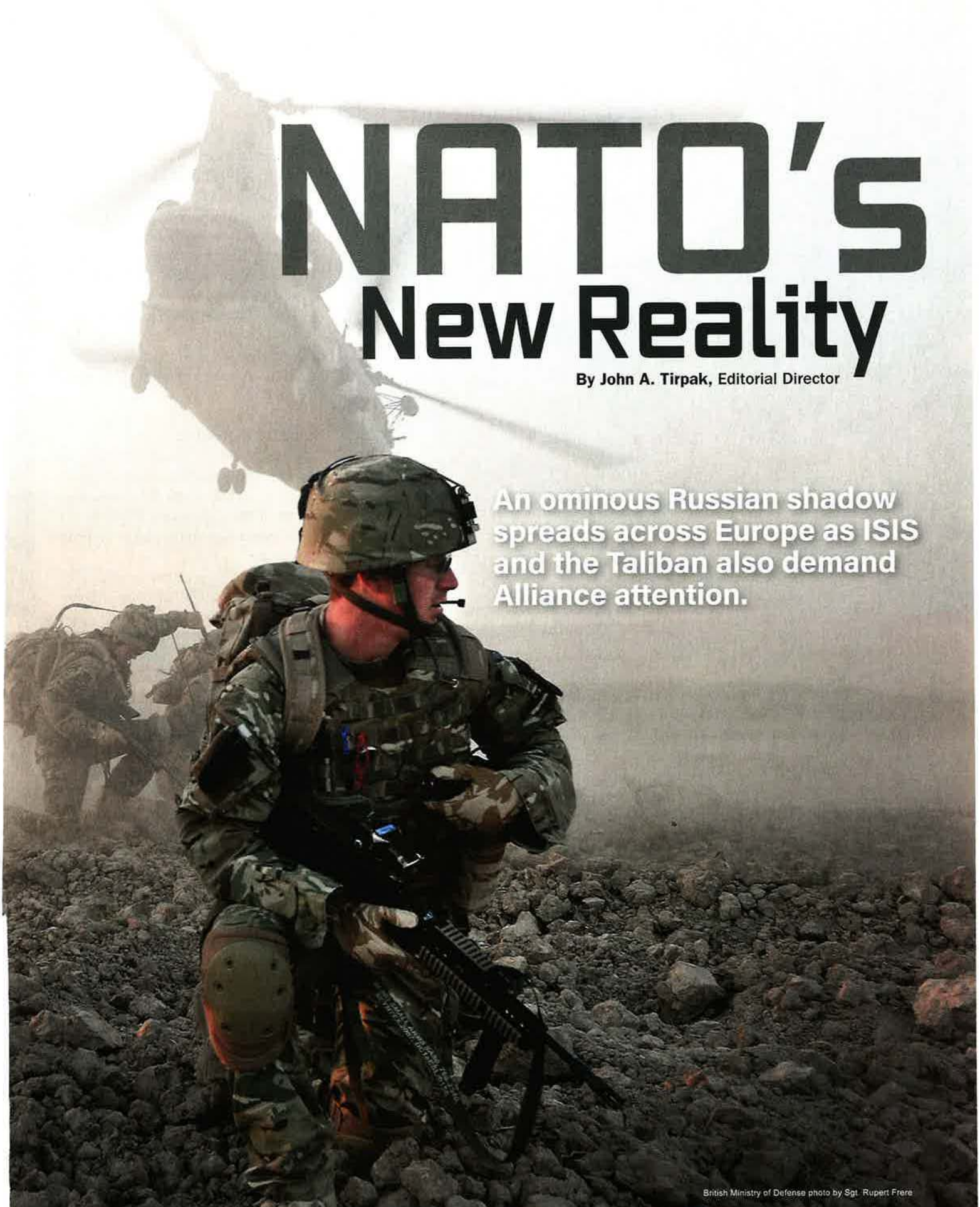
The officials said that though relatively small in size, the battalions will have the military capability to delay or stop a Russian advance in time for other NATO forces to arrive,

In 2010, British soldiers are inserted into an area in Helmand province previously under Taliban influence. It costs NATO partners $5 billion a year to maintain operations in Afghanistan. The US will pay $1 billion of that.

NATO's New Reality

By John A. Tirpak, Editorial Director

An ominous Russian shadow spreads across Europe as ISIS and the Taliban also demand Alliance attention.



British Ministry of Defense photo by Sgt. Rupert Frere

Russian Federation Ministry of Defense photo by Igor Rudenko

Airborne troops from Russia, Belarus, and Serbia during joint training for Slavic Brotherhood 2015, preparing troops to overcome domestic insurgencies.

especially since any such moves would likely be detected by intelligence before they began.

The 1,000-man battalions will be fielded by the US, Britain, Canada, and Germany. The US will position its troops in Poland, while Britain will place its battalion in Estonia. Canada will place a battalion in Latvia, and Germany will deploy its forces to Lithuania. The forces amount to 4,000 more troops.

Poland was a logical place for the US to deploy a battalion, one official said, because it offers good logistical infrastructure by rail, sea, and road for rapid reinforcement of the region, and the nation shares a border with the Russian enclave of Kaliningrad. Poland operates US-made aircraft such as the F-16 and is eager to provide support and have the more direct backing of the US. A regional headquarters will also be set up in Poland.

Though most NATO countries are not yet living up to their commitments—agreed at the 2014 Wales Summit—to spend two percent of their GDP on defense, a number of countries are doing much better than that, notably the US, Britain, Estonia, Greece, and Poland, Stoltenberg said. He urged wealthier countries, like Germany, that have not met the goal, to do more.

Though "we still have a long way to go," collectively, the alliance budgeted about $8 billion more for defense in 2016 than in the previous year, he said. "We have turned a corner." Stoltenberg said those NATO members without the resources to add substantially to collective forces can make contributions in other ways, such as by hosting people and offering basing.

President Barack Obama, at the close of the summit, said the partners had a "very candid conversation" about partner defense spending.

"There's a recognition that, given the threats that we face and the capabilities that we need, everybody has got to step up and everybody has got to do better," Obama said.

CYBER WARFARE

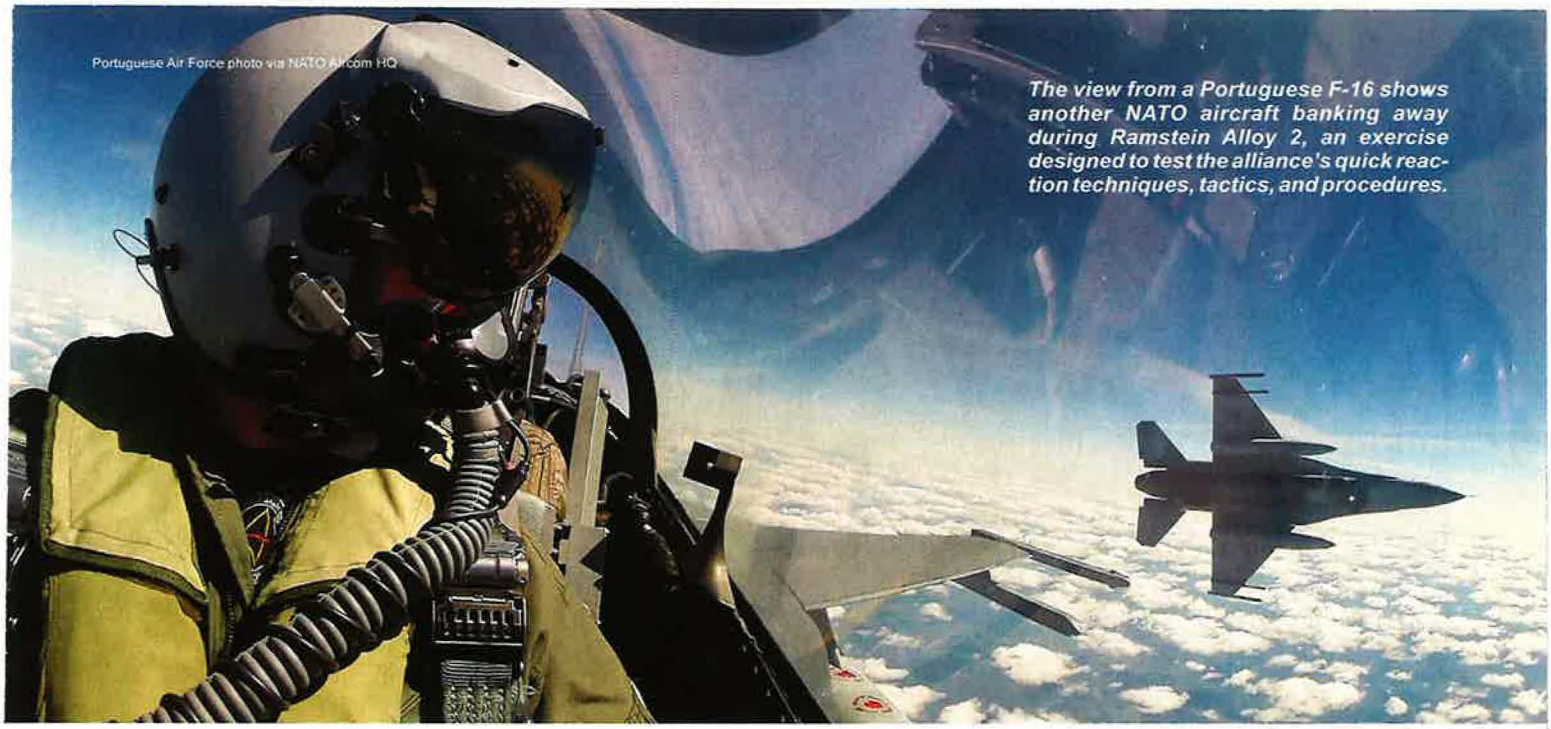
Stoltenberg noted that NATO's rapid response forces are "three times bigger" now than they were at the Wales meeting, and the alliance is moving to bolster its activities and capabilities in a number of other areas.

The partners agreed to collectively increase their individual and alliance capabilities in cyber warfare, and recognize—as the US Air Force has done for many years—that cyberspace is a combat domain all its own. Stoltenberg said Russia's "hybrid" warfare, as seen in Georgia and Ukraine, has been preceded and accompanied by heavy use of cyber attacks.

NATO declared its ballistic missile defense systems operational, reiterating that the system is limited and protective—and oriented toward rogue nations like Syria and Iran. Though Moscow continues to complain bitterly that the system is an illegal defense against its ballistic missiles, alliance officials repeatedly explained the system isn't physically oriented toward Russia and would be ineffective against

An M1A2 Abrams main battle tank fires at targets during the NATO exercise Nordic Tank Challenge in May at Holstebro, Denmark.

US Army photo by SSgt. Michael Behlin



Portuguese Air Force photo via NATO Aircom HQ

The view from a Portuguese F-16 shows another NATO aircraft banking away during Ramstein Alloy 2, an exercise designed to test the alliance's quick reaction techniques, tactics, and procedures.

a large-scale Russian ballistic missile strike.

Ukraine is not yet being considered for NATO membership and has no Article 5 protection, but the alliance accepted and endorsed a Ukrainian plan for bringing its internal democratic and human rights policies in line with those required by NATO for membership. The partners agreed to continue a package of nonlethal support for Ukraine in its conflict with Russia. This package helps Ukraine with logistics, cyber defenses, and aid for wounded soldiers.

Stoltenberg said future assistance will help Ukraine in detecting and disarming mines and improvised explosive devices and defend against other forms of hybrid warfare.

The partners said they won't recognize Russia's illegal annexation of Crimea.

Russia has claimed that NATO's rules prevent countries involved in a civil war—read Ukraine or Georgia—from membership consideration, but Stoltenberg said Russia can't veto the membership process by instigating such a conflict.

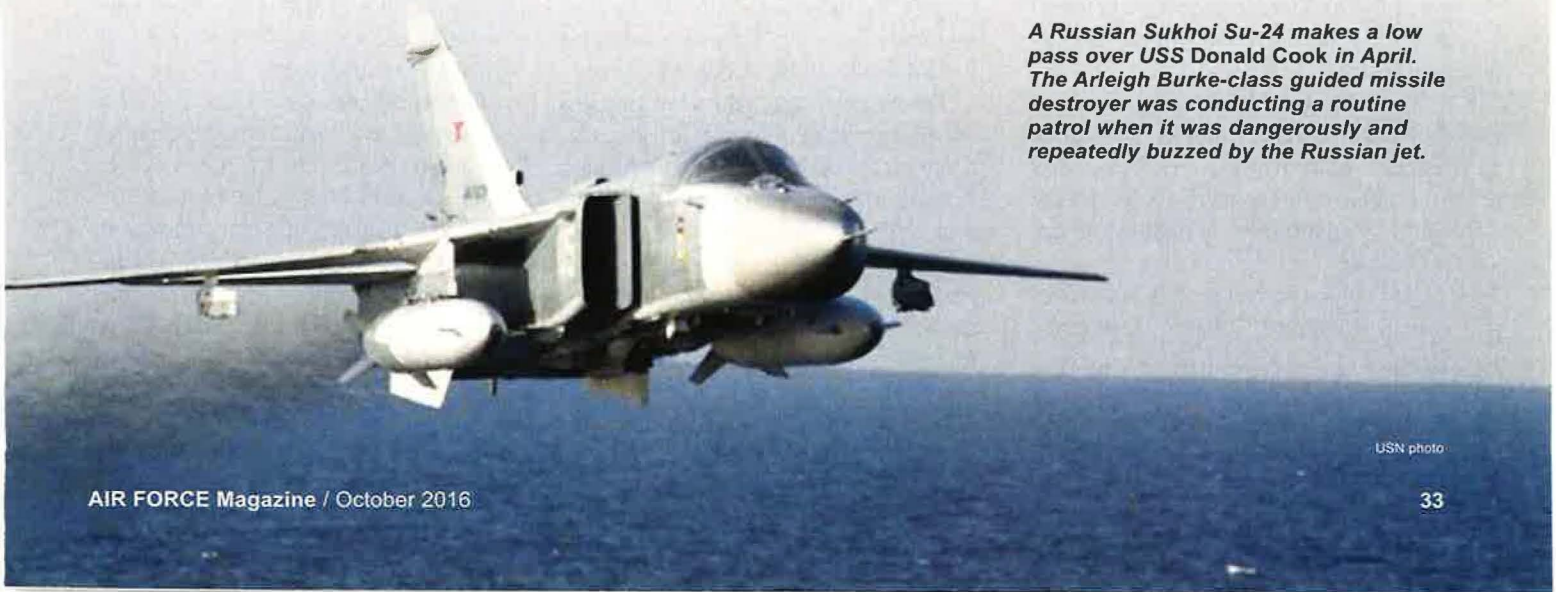
"The door is open" to new applicants, Stoltenberg said, noting that Montenegro was on the cusp of formal NATO membership to become the alliance's 29th member.

There will be an increase in NATO forces stationed in Romania, a member since 2004, and there will be cooperative exercises with two nations involved in active territorial disputes with Russia—Ukraine and Georgia. NATO will move to increase its presence in the Black Sea, as well, to counter a Russian naval buildup in the region.

The alliance said it will continue Operation Resolute Support in Afghanistan "beyond 2016," but said it had secured member funding for the mission into 2020. The US will provide $1 billion a year of the $5 billion a year it costs to maintain the NATO effort in Afghanistan.

"We are committed to the long haul," Stoltenberg said, as long as Afghanistan keeps its end of the deal by continuing to respect human rights and the rights of women and fight government corruption. Though the Taliban is still a threat, he warned that some elements of the Taliban are rebranding themselves as franchises of ISIS and said NATO will work more closely with nongovernmental organizations such as the Red Cross to improve their security in the country.

US diplomats said it's important to keep supporting Afghanistan because there is a historical lesson to learn from the Soviet Union's experience there. Russia, one official said, stopped providing support for Kabul's security forces just two years after the Soviet occupation ended. Those security forces collapsed without funding and support, creating the environment that allowed the rise of the Taliban and al Qaeda in Afghanistan.



A Russian Sukhoi Su-24 makes a low pass over USS Donald Cook in April. The Arleigh Burke-class guided missile destroyer was conducting a routine patrol when it was dangerously and repeatedly buzzed by the Russian jet.

USN photo

NATO photo

NATO Secretary General Jens Stoltenberg (l) and President Barack Obama on July 6 at the NATO summit in Warsaw. NATO has formally shifted toward a strategy of "deterrence" toward Russia.

"We don't want to repeat that," he said.

NATO agreed to step up its training of Iraqi troops inside Iraq. This training had been done in Jordan, but there is a need for increasing both the number of troops trained and the pace of the training because much of the effort is focused on detecting and destroying improvised explosive devices. As Iraqi forces struggle to retake territory held by ISIS, they are encountering a massive amount of mines and booby traps. This is slowing the pace of clearing cities and repatriating refugees.

The alliance-owned E-3 AWACS aircraft that are permanently based in Germany are being deployed for the US-led coalition fighting ISIS. They will operate from member nation Turkey, and officials said they will be there to maintain close watch on Russia's air strikes in Syria and to watch for violations of Turkish airspace.

No change in these plans was announced when, a week after the summit, Turkey went through a short-lived attempted military coup d'etat.

To better manage the migrant crisis, in which thousands of refugees are pouring into Europe from Syria and Libya, NATO will deploy more naval forces to the central Mediterranean to interdict human trafficking.

NATO also agreed to increase its cooperation with the military branch of the European Union, which has a somewhat different set of members from NATO. This agreement was in part to reassure members of both organizations against the backdrop of Britain's vote to depart the EU. The agreement calls for greater cooperation on countering cyber and hybrid warfare and more naval cooperation. In background briefings, senior NATO officials said the interoperability of NATO and EU forces—when they are not one and the same—is "robust," thanks to shared equipment and efforts at building more inclusive networks.

CONSIDERING LIBYA

The alliance didn't state any plans for further involvement in Libya, where it forced former dictator Muammar Qaddafi from power in 2011. One senior US defense official told reporters on background that the alliance has a standing offer of technical advice and support on establishing a civilian-controlled military—but not weaponry—to the nascent Libyan government. There is real hope that Libya will establish a "well-functioning security apparatus," but it's not there yet. As to the offer of assistance, he said, "They're considering it. And there will be no decisions here."

The NATO meeting didn't openly discuss the role of airpower in the new, deterrence-focused posture of the alliance. A senior US defense official noted, however, that airpower is inherently the most flexible of capabilities and can be put into position most rapidly in a crisis—in most cases, "within 72 hours." He said there have been increasing deployments of F-22 fighters to Europe, an uptick in bomber rotations from the US, and an extension of the F-15C presence in the UK.

Though the last decade has seen a number of closures of Air Force bases in Europe, he said there's an "ample" number of European bases that could host US-based aircraft if needed.

Stoltenberg, during a think-tank symposium taking place adjacent to the NATO event, was asked about the prospect of other nations, particularly Finland or Sweden, formally joining the alliance. He responded that NATO, by policy, only extends invitations to countries that ask to join, and in the case of Finland or Sweden, it hasn't happened yet.

Moreover, "as a Norwegian, I know better" than to suggest other countries enter the alliance—because it rarely works out when "people outside your country tell you what you should do." Membership is "for them to decide."

That said, the two European Union countries maintain military forces described by one diplomat as "fully interoperable" with NATO, and both have long since maintained NATO-required standards of human rights, so their membership could be accommodated quickly. The diplomat said if a conflict between NATO and Russia erupted, it would be impossible for the Scandinavian countries to "step aside" and let it happen around them.

Stoltenberg concluded the summit by saying there's work to do on improving alliance capabilities in many areas. The potential topics for Brussels next year and Istanbul in 2018 include streamlining the ability of alliance ground forces to move through each other's territory and bolstering NATO's integrated air defense system, potentially establishing an impenetrable anti-access, area-denial system as robust as Russia's.

There will be more attention paid to upgrading NATO's electronic warfare-electronic attack capabilities. Russia has "world-class" capacity in this area, one diplomat acknowledged.

Obama said that the US has "delivered on [our] promise" to strengthen its alliances around the world. The US has increased its presence in Europe, he said, and the imminent inclusion of Montenegro is an indication that "the door to NATO membership remains open to nations that can meet our high standards." The alliance is "as strong, as nimble, and as ready as ever," and "nobody should ever doubt the resolve" of NATO "to stay united and focused on the future." ✪

USAF photo by A1C Lauren Ely

THE OXYGEN IN THE FIGHT

By John A. Tirpak, Editorial Director

Russian Federation Ministry of Defense photo

USAF photo by SrA. Chris Drzazgowski

Gen. David Goldfein, the new Chief of Staff, faces a daunting to-do list but says the Air Force is up to its challenges.

Left: USAF Chief of Staff Gen. David Goldfein speaks to an audience in San Antonio. Manpower issues are impacting readiness, the new Chief says. Middle: Russian Su-27 fighters practice an intercept during Caucasus 2016, a Russian air force training exercise. Goldfein is no fan of Russia's provocative stunts. Bottom: An A-10 performs a low-level strafe.

IT'S just as well that Gen. David L. Goldfein, the Air Force's new Chief of Staff, ascended to the job from the vice chief position, as he's had to hit the ground running in confronting some heavy challenges and at least one "crisis."

In an interview in early August, Goldfein said he has his man, train, and equip work cut out for him. The Air Force needs to expand, act fast to stem a critical and growing shortage of fighter pilots and maintainers, cope with the demands of a major ongoing combat operation, rebuild the service's relationship with Congress, and fix some long-term problems with the service's structure. All this must be done while dealing with a resurgent Russia and a hefty modernization program.

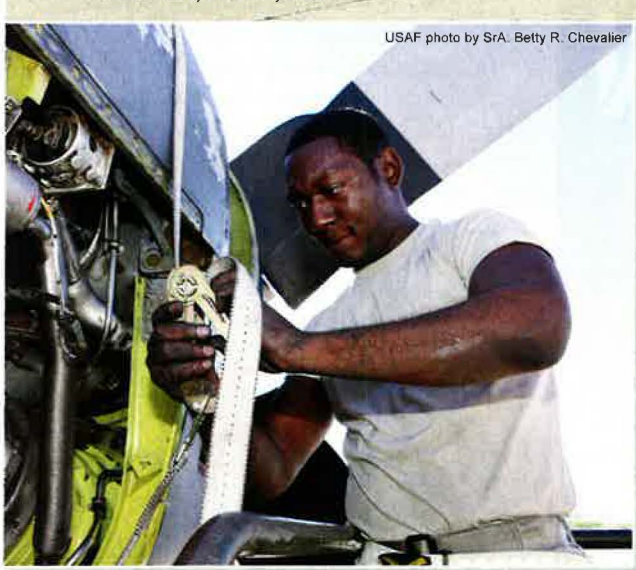
It's a daunting list, but Goldfein believes the Air Force is up to it.

"We're in ... a full sprint to build our numbers back to 321,000" Active Duty people, he said, up from the current level of 308,000. The Air Force has put a lot of resources into recruiting and the training pipeline, he said, to match manning levels to the extraordinary demands put on the service. That number is a combination of what Congress has authorized, as well as a discretionary two percent allowed to the Secretary of the Air Force, Deborah Lee James, to fill critical deficits on a temporary basis.

Truth be told, the needed number—to fill an across-the-board shortage of about 20 percent in many specialties—is much higher than 321,000, but Goldfein wouldn't name a specific target for end strength.

"I've not seen the data that gives me the fidelity" to unequivocally set a personnel goal, he said, adding that, based on his long experience, "once you've [set] a number, that number never dies. You're married to it." USAF is on track to reach the 321,000 figure by 2019.

USAF Photo by SrA. Stormy Archer



USAF photo by SrA. Betty R. Chevalier

Left: Airmen unload a GBU-12 from an F-35 during Northern Lightning in August, an exercise at Volk Field, Wis. Bottom: SrA. George Thompson tightens a ratchet strap around the engine of an EC-130H Compass Call aircraft.

Gen. Mark A. Welsh III, Goldfein's predecessor, said shortly before retiring in May that he thinks the Air Force needs between 350,000 and 370,000 people on Active Duty to meet growing demands in intelligence, surveillance, and reconnaissance, the nuclear enterprise, battlefield airmen and security, space operators, and mission growth and to fill shortages among fighter pilots and maintainers. The pilot and maintainer shortages alone are so steep they constitute crises, Goldfein asserted.

The manpower issue is "defining our readiness ceiling, in terms of what we can produce and sustain" and is the "No. 1 priority in our budget submission," he said.

There's also worrying data from the recruiting service, which has always made its quotas early in the month. The quotas aren't being met until late in the month, now, Goldfein noted, and he's concerned this could be a "leading indicator" of difficult times ahead.

The competition with the private sector to attract a limited cohort of Air Force-eligible people is getting more intense—and not just in high school graduates. Boeing said in August that it anticipates a worldwide airline industry need for more than 617,000 new pilots in the next 20 years.

To retain pilots—the Air Force is 700 fighter pilots short now and expects a 1,000-pilot deficit next year—Goldfein said he plans to attack the problem on two fronts: quality of life and "quality of service."

The former can be addressed with money, he thinks, by increasing aviation incentive bonuses. If the Air Force can take the cost of college tuition "off the table" for a pilot's family, or "pay off school loans," such moves would clearly reduce the pressure for pilots to seek fatter paychecks with the airlines, he said.

Moreover, industry can rarely compete with the Air Force culture that looks after an airman's family when he or she is deployed, he said.

"That, to me, is as important a quality of life issue as money," he said.

Quality of service is a tougher nut to crack. It involves making sure pilots, maintainers, and people in all specialties get to do what they signed up for, work on cutting-edge technology, and can "be the best" at their work.

"If they can't go out and be the best they can be" because of funding-restricted flying hours or parts availability, for example, "frustration builds up, and I think people are going to vote with their feet." Goldfein said there's an inextricable link between morale and readiness.

"The Secretary and I have got to get both [quality of life and quality of service] right," he said. "If we attack only one or the other, we may not make an impact."

THE SQUADRON LEVEL

He's not too concerned if some people leave to take up jobs with contractors, doing essentially the same jobs—maintenance or flying remotely piloted aircraft, for instance—since they "continue to produce airpower." He'd rather they stay in uniform, of course, but he's thrilled if departing people join the Guard or Reserve. That's a win, he said. "I only lose them if they take off the uniform and they don't put it back on again."

Goldfein said he's long been troubled that cumulative budget and manpower cuts have pushed functions that should be done at the squadron—especially support tasks—to higher levels.

"We succeed or fail in the Air Force at the squadron level," he said. Over time, USAF has "pulled the rug out" from under this basic unit, and he wants to fix that.

There won't be a mad dash to reorganize, though, he said. He'll take his time developing a new concept of operations for what the 21st century squadron needs to look like. The overall organizational chart may be flatter—eliminating, say, the group. For now, "I'm going to resist mightily the tendency to start attacking the ... org chart," he said.

There will probably be some restructuring, but it won't happen overnight, and he's going to get a lot of input from many levels before tweaking things. First, there'll be a "crisp, concise, written in English" concept of operations—"no more than four or five pages"—of how to put functions where they belong. There will need to be a milestone calendar with reachable goals.

"I'm looking to move out on this plan 1 January 2017," he said. "If we're

ready beforehand, great. But we're going to go slow to go fast. It's going to be a four-year effort."

Asked if the campaign against ISIS is a war, Goldfein replied "Yes, absolutely," and said the Air Force is making progress.

"Everything I've seen is actually really trending in the right direction," said Goldfein, who was head of US Air Forces Central Command from 2011 to 2013. The ground forces being supported by USAF are making "steady improvement" in taking advantage of coalition airpower, he said.

Lt. Gen. Charles Q. Brown Jr. "did a great job of talking to the combatant commander and the [joint task force] commander about ... this combination of the deep battle and the close battle" and using the "asymmetric capabilities of air, space, and cyber ... as we retake land."

Goldfein said he's "pretty optimistic" about the course of the war, but observed that the character of the air campaign has changed.

"Over time, ... as we've cut people and we've consolidated, ... the fight migrated from a deliberate targeting process against an entrenched enemy and shifted more and more towards a dynamic targeting model," wherein targets of opportunity appear and are attacked.

The Air Force has built "an enterprise around the dynamic targets, which we're really good at. We can find, fix, validate, and hit a target today faster than anybody else on the planet," Goldfein said, but that came at the cost of the previous "deliberate targeting enterprise." He thinks USAF should start working back toward hitting "centers of gravity."

The Air Force has work to do "to improve our ability to sense the enemy and build a target deck that's got ... strategic value that allows us to crush the enemy from both the outside and the inside."

Achieving that will require "exquisite intelligence," he said, because preventing unintended casualties remains one of the highest priorities. ISIS has burrowed into civilian populations and takes human shields when it moves in the open.

What will "winning" in the Levant look like? Goldfein said he believes the desired end state is a region living under the rule of law, with a government that "provides essential services" for the people who live there and a way for those people to have jobs and support their families.

Top: SrA. Jacob Del Tedesco unscrews an A-10 grip at Moody AFB, Ga. Maintainers are in short supply. Bottom: An air strike destroys an ISIS position in Iraq in early August. The fight against ISIS is a war, says Goldfein.

Those three "fundamentals" come in "after the military has created a [secure] environment," but "those take time to be established." He doesn't have a forecast of how long it will take. His thinking, he said, was shaped by the peace accords hammered out for the Balkans in the 1990s.

Goldfein allowed that "some days" the targets are worth the cost to blow them up, and "some days, perhaps not." Every strike has to be judged on whether or not it created the desired effect on the enemy's ability to maneuver and act. "We have to have a realistic expectation" about that, he said.

He has high hopes for harnessing the power of social media in expanding the depth, speed, and quality of intelligence. It sometimes takes a week of reconnaissance and analysis to catalog a group of targets—like bridges—in an area. But a comment on a blog asking "anybody with a cell phone ... [to] tell me how many bridges are around your town" could produce a target folder in 24 hours, he asserted. He'll be looking for new ways to "fuse that kind of intelligence gathering into the mix."

There's the potential for "a lot of leverage" and "huge gains" from autonomy and artificial intelligence in sorting through the vast amounts of information USAF will be processing from all inputs. He's skeptical, though, of relying on automation and autonomy to replace manpower in the near term.

"I'm a little leery because I have scar tissue from IT [information technology] solutions that actually didn't pan out," he said. "How many times have we ... taken manpower cuts to pay for an IT solution that actually didn't make life any easier at all?" He'll insist on having the benefit proved before he starts substituting IT for people—and slowly at that.

Goldfein is visibly frustrated and more than a bit angry about Russian fighters showboating with "barrel rolls over our airplanes, high-speed passes over our ships at low altitude," and other provocative stunts.

"That's not indicative of a professional air force," he said. If he had a chance to talk to his Russian counterpart, "my message to him would be: 'Knock it off. You're better than this.'" Such stunts belie the professionalism the two air forces showed during the Cold War, when both sides would tolerate armed interceptors flying within a few meters of reconnaissance aircraft "full of people ... [who] have no capability to defend themselves."

He said there developed a "standard of behavior and a certain level of trust" during those countless Cold War intercepts, and "we've got to get back to that level of professionalism."

Moreover, he won't tolerate any USAF pilots acting in such a manner.

"We will never match incompetence with incompetence—ever," Goldfein insisted, and "our commanders in the field will continue to hold our airmen accountable for acting professionally in the air."

His remarks apply to China, as well. He said the 2001 incident where a Navy EP-3 was struck by a Chinese F-8 (which crashed after striking the Navy jet) was due to a pilot who couldn't "physically execute the maneuver" he was trying to perform. To both air forces, "we message them in every possible way" that this is unacceptable behavior—and in any case the threatening maneuvers won't discourage the US in exercising its freedom to operate.

Maintainers work on an MQ-9 Reaper before a mission during Red Flag 16-3 at Creech AFB, Nev.

"We do not change the way we do business. We fly where we need to fly, we sail where we need to sail, we operate in accordance with international law and accepted rules of international behavior," Goldfein said.

The Air Force's relationship with Congress has been rocky for some time—exemplified by a testy March hearing, with Senate Armed Services Committee chair Sen. John McCain (R-Ariz.) browbeating Welsh about the A-10 retirement, calling him untruthful and cutting Welsh off every time the Chief of Staff tried to explain the Air Force's position.

Goldfein said it would be wrong to "grade our relations with Congress based on one single event." He'll aim for a good working relationship, but the desire to get it won't color the way he presents the facts.

The Air Force, he said, has certain values—things "we just truly believe as a service" that will be part of any conversation with Congress. The Air Force has interests, and Congress does, too, and when they overlap, great, but when they don't, it shouldn't be "overplayed."

"What we've got to do is find out where we do have common interests, without us sacrificing on our ideals. That's the way I intend to approach it as the Chief." Goldfein plans to be a "good listener," keying in on areas where the interests of Congress and the Air Force align.

It's "not actually their job to take my advice," he said, but "I believe it's their job to respect the position and listen [and] I also have got to be OK with them disagreeing when our interests don't align." No matter what, he'll always present the "best military advice that is not driven by [other] considerations."

AS GOOD AS IT GETS

Moreover, he said, it would be foolish to hope to "redefine" the relationship by winning affection for "any one particular leader through the power of his or her personality."

If the Air Force has a poor relationship with Congress, but "we haven't sacrificed our ideals and we've been good listeners and we've laid out our interests ... in a meaningful and coherent fashion," and the service has real data to back its positions, then "maybe it's as good as we're ever going to do."

If there's "bad news" because "we know that our interests just can't align, then that's something I think a Chief ought to be ready to deliver, and I intend to."

The "good news," though, is that his predecessors "have really set the stage" for him, and in his conversations with the Hill, most of the time, "our interests are understood."

One of the areas of friction has been the Air Force's huge oversupply of bases and facilities. By the Pentagon's last estimate, USAF has 32 percent more infrastructure than it needs, but Congress has rejected Pentagon requests for a new round of Base Closure and Realignment (BRAC) for years. Can anything be done, short of BRAC, to help the Air Force slim down?

There's promise in some ideas for a "public-private partnership" at some facilities where USAF has "no use for it" but still must, "for environmental reasons, keep water and electricity ... going to it" and might allow a private concern to use the facility. That idea works best when the base is located adjacent to a thriving city with economic demand, he pointed out.

Another approach might be to shrink a base's footprint. "Sometimes our costs ... are associated with just how far out to the perimeter" facilities have to be maintained. "As we get smaller, we can lean more and more to a smaller footprint."

Even so, these approaches are just "nibbling at the edges. They're not going to produce great savings. We really need a BRAC."

Goldfein said the three most valuable experiences on his way up the Air Force ladder were serving as aide—and then executive officer—to Chief of Staff Gen. Michael E. Ryan; a year-long school assignment with the State Department; and serving as director of the Joint Staff.

Ryan, Goldfein explained, took the time to "share his thinking with me" about how he ran the Air Force and approached the Balkans war, and "I still rely on that experience today."

In the State Department assignment, Goldfein went to school with people "from every government agency" and got insight into "a completely different way of thinking and a different culture." Many of the foreign service officers with whom he studied are now high-ranking State Department officials, and Goldfein said he was able to "build a network that I still tap into today."

The Joint Staff assignment allowed him to "see our Air Force from the outside" and learn how to optimize what each service brings to the fight. It is "powerful" when each service's approach to problem solving is "an equal part of the dialogue," and the experience "helped me to start to really think at the strategic level of a service Chief," he said.

Providing a full-power Air Force is his overriding goal, though. USAF's contribution in strategic readiness, mobility, air superiority, homeland defense, and intelligence—to name just a few—"underwrites every military operation," Goldfein stated. "What we deliver to the joint team has become the oxygen that they breathe. ... When you have it, you don't even think about it. When you don't have it, that's all you think about." ✪

Masters of Nuclear Deterrence

By Brian W. Everstine, Pentagon Editor

In the decades since the end of the Cold War, the Air Force's weapons, delivery systems, and nuclear infrastructure have not been the only parts of the strategic deterrent that have grown old and waned from public view.

The expertise of the airmen themselves has also atrophied.

In 2015, the Air Force decided to address a lack of professional education and institutional knowledge concerning nuclear deterrence. The service created a new way to handpick its best officers to shape future policy and ensure they are experts in the entire nuclear enterprise. It did this through the creation of the School for Advanced Nuclear Deterrence Studies, or SANDS, at Kirtland AFB, N.M.

"There was a shift away from a focus on nuclear deterrence after the collapse of the Soviet Union and the onset of terrorism in the '90s and 2000s. We stood up in 2015, basically 25 years since the end of the Cold War," SANDS Director Adam Lowther said in an interview with *Air Force Magazine*. "Having a school that really focuses on deterrence and builds up that expertise, and sends those experts back out into the force so that they can spread the knowledge and provide that assistance to senior leaders: That is invaluable. It does a lot of good to correct some of the challenges that we faced in the past."

The school, which grew from idea to reality in just a few months in 2015, was scheduled to graduate its first six officers in September. They will be tasked with reshaping the Air Force's institutional thinking on nuclear deterrence.

USAF's new SANDS school aims to create experts in the art and science of deterrence.

USAF photo by A1C J. T. Armstrong

Between 2007 and 2014, there was a long string of problems in USAF's nuclear community that triggered numerous reviews, recommendations, and soul-searching within the service. The criticisms and reviews corresponded with a time of deep morale problems in the Air Force's nuclear community. In response, the service directed a grassroots review of its personnel called the Force Improvement Program. Teams of experts interviewed airmen of all ranks to determine what could be done to improve the nuclear community. Part of this review stressed the need for increased professional military education in the ranks of nuclear-related career fields.

"Strategic deterrence is really important," Gen. Stephen W. Wilson, Air Force vice chief of staff, said in January 2015 when he was commander of Air Force Global Strike Command. "It's having the capability, the will, and an incredible force that will do that. It's something we're thinking a lot about. This year our focus is kind of on education and training, and it's a focus on what is strategic deterrence in the 21st century? What does that really mean?"

It was during this Force Improvement Program review, and a critical evaluation of the education pipeline for nuclear officers, when Wilson received a briefing on what Air Mobility Command does for its top officers.

A BROADER VIEW

Air Mobility Command in 2007 started the Advanced Study of Air Mobility program at the US Air Force Expeditionary Center at JB McGuire-Dix-Lakehurst, N.J., with the help of the Air Force Institute of Technology. Under the program, a hand-selected cadre of officers and civilians participate in a 13-month master's-level course designed specifically for officers in air mobility-related career fields. The students travel across the Air Force and to allies around the world to get "a much broader view of the Air Force and the Department of Defense," Maj. John Lacy, a student in the first AMC class, said in a press release at the time. These students moved on to planning jobs in the Joint Staff, Air Mobility Command, and NATO.

Wilson saw this program and said, he "wouldn't mind having a school like that," Lowther said.

"SANDS is for the best and brightest of the command," Wilson said as the first class convened. "It will draw on educators and curricula from across the nation. These students will be the 'Jedi Knights,' the really smart folks every combatant command wants."

In January 2015, the command got the ball rolling. With help from instructors with AFIT and Lowther himself as director, the group formed a curriculum focused on nuclear deterrence combined with a business degree-like study of leadership. By May, the first class of Air Force majors was hand-selected by their commanders and top officials within Air Force Global Strike Command. By August, the students had arrived at Kirtland for classes.

"By Air Force standards, by federal bureaucracy standards, it was incredibly fast," Lowther said, noting that normally the development of a program like this would take years, not months.

The classes in the yearlong program vary from intense classroom work at Kirtland to globe traveling to meet with allies, Lowther said.

Faculty members from AFIT come down for weeks at a time, and students focus on one topic at a time. About two-

B-52Hs taxi during Exercise Constant Vigilance at Minot AFB, N.D., in April.

thirds of the classes focus on operations management, with the rest focusing on nuclear weapons effects, policy, and history, Lowther said.

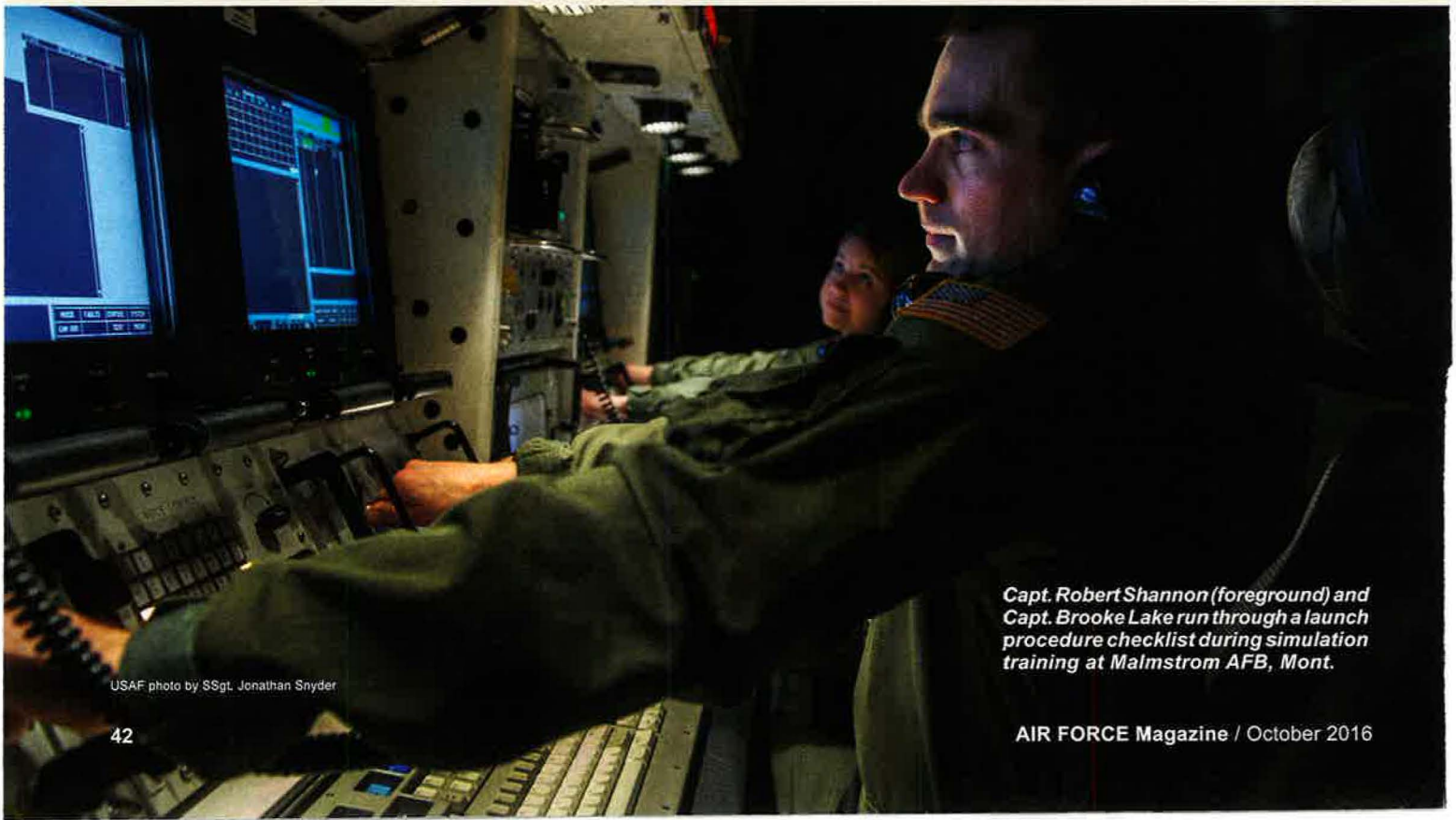
"The idea is that when someone graduates from SANDS and they go back to the unit, go to the planning staff, they will have already visited and understand the vast array of organizations and entities that make up the military and Department of Energy aspects of the nuclear enterprise," he said.

The classes go on about 20 trips during the program, including visiting all the nuclear weapons labs. Students visit Air Force nuclear operational bases and weapons storage areas, along with headquarters trips to US Strategic Command, Air Force Global Strike Command, and Headquarters Air Force at the Pentagon, along with other agencies in Washington. Students travel throughout Europe to visit allies and NATO, along with another trip through Asia to discuss nuclear issues and threats with Japan and South Korea.

Additionally, top leaders such as Gen. Robin Rand, commander of Global Strike Command, and Adm. Cecil D. Haney, commander of US Strategic Command, conduct long visits with students at Kirtland. Rand was scheduled to speak at the commencement of the first class.

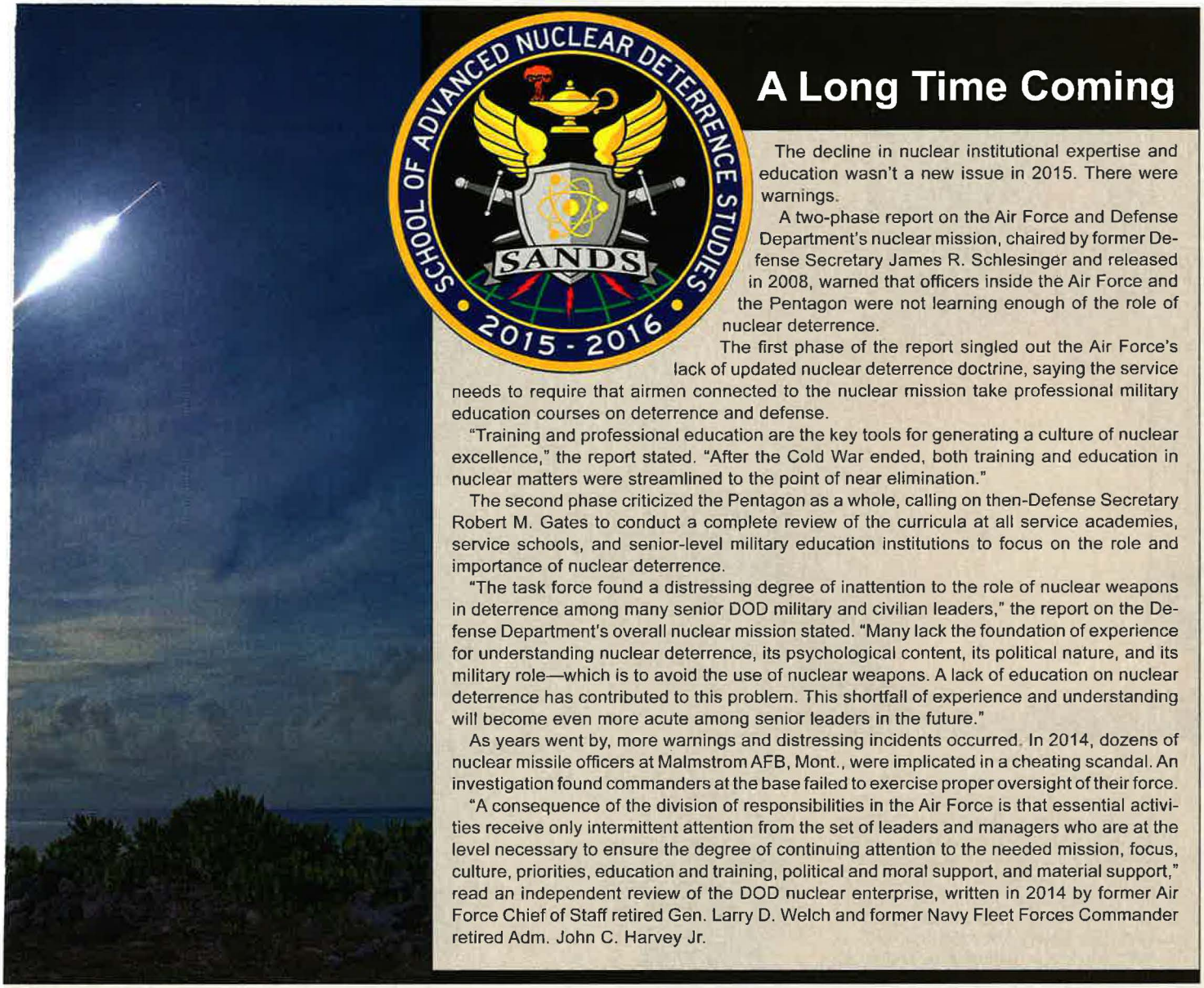
An inert Minuteman III ICBM re-enters the atmosphere near the Ronald Reagan Ballistic Missile Test Site at Kwajalein Atoll, in the Marshall Islands.

Air Force Global Strike Command photo



Capt. Robert Shannon (foreground) and Capt. Brooke Lake run through a launch procedure checklist during simulation training at Malmstrom AFB, Mont.

USAF photo by SSgt. Jonathan Snyder



A Long Time Coming

The decline in nuclear institutional expertise and education wasn't a new issue in 2015. There were warnings.

A two-phase report on the Air Force and Defense Department's nuclear mission, chaired by former Defense Secretary James R. Schlesinger and released in 2008, warned that officers inside the Air Force and the Pentagon were not learning enough of the role of nuclear deterrence.

The first phase of the report singled out the Air Force's lack of updated nuclear deterrence doctrine, saying the service needs to require that airmen connected to the nuclear mission take professional military education courses on deterrence and defense.

"Training and professional education are the key tools for generating a culture of nuclear excellence," the report stated. "After the Cold War ended, both training and education in nuclear matters were streamlined to the point of near elimination."

The second phase criticized the Pentagon as a whole, calling on then-Defense Secretary Robert M. Gates to conduct a complete review of the curricula at all service academies, service schools, and senior-level military education institutions to focus on the role and importance of nuclear deterrence.

"The task force found a distressing degree of inattention to the role of nuclear weapons in deterrence among many senior DOD military and civilian leaders," the report on the Defense Department's overall nuclear mission stated. "Many lack the foundation of experience for understanding nuclear deterrence, its psychological content, its political nature, and its military role—which is to avoid the use of nuclear weapons. A lack of education on nuclear deterrence has contributed to this problem. This shortfall of experience and understanding will become even more acute among senior leaders in the future."

As years went by, more warnings and distressing incidents occurred. In 2014, dozens of nuclear missile officers at Malmstrom AFB, Mont., were implicated in a cheating scandal. An investigation found commanders at the base failed to exercise proper oversight of their force.

"A consequence of the division of responsibilities in the Air Force is that essential activities receive only intermittent attention from the set of leaders and managers who are at the level necessary to ensure the degree of continuing attention to the needed mission, focus, culture, priorities, education and training, political and moral support, and material support," read an independent review of the DOD nuclear enterprise, written in 2014 by former Air Force Chief of Staff retired Gen. Larry D. Welch and former Navy Fleet Forces Commander retired Adm. John C. Harvey Jr.

"It's an unprecedented opportunity to see the nuclear enterprise up close and personal and get to talk to leadership," Lowther said. "You just don't get it anywhere else."

The first class of students included three missileers, a B-52 navigator, a B-52 electronic weapons officer, and a career missile security forces officer.

"I hope to gain a broader understanding of the policy and strategy that goes into how the US executes nuclear deterrence around the world," said Maj. Matthew Boone, deputy director of AFGSC's Commander's Action Group, in a news release when the class began. "This is also a great opportunity to learn from experts who are on the cutting edge of our field."

EXPANDING CLASSES

The group is expanding beyond just Air Force students. The second class that just started this summer includes a B-2 pilot, a B-52 pilot, a B-52 navigator, a B-52 electronic weapons officer, three missileers, a British Ministry of Defense civilian, a civilian with Air Force Global Strike Command, and a US Navy officer.

"This course has given me the opportunity to work closely with Air Force professionals who represent the other two legs of the triad," Lt. Jeremy Dawson, a US Navy submarine officer in the second class, said in a news release. "Their experiences and perspectives, combined with the curriculum, have provided insights into the overall strategic enterprise that cannot be replicated in any other environment. This will help me to communicate the significance of nuclear deterrence to my sailors in a way that helps them to appreciate" [the importance of] their day-to-day roles and responsibilities," he said.

The third class, which is scheduled to begin in June 2017, is expected to include US Army explosive ordnance disposal and nuclear and counterproliferation officers, among others, Lowther said. The plan is to have 12 Air Force officers, plus a mix of other services and international students in future classes.

The classes themselves will evolve, be tweaked "to make the program better every single year," Lowther said.

"We are constantly trying to adapt as we learn and develop best practices," he said. "It definitely changes as we see things that can be done differently or better."

The SANDS graduates have their next jobs handpicked for them, with an emphasis on planning. Each job is approved by Maj. Gen. Michael E. Fortney, AFGSC vice commander. The students will go on to Headquar-

Top: A ground-based interceptor is launched from Vandenberg AFB, Calif., for a test over the Pacific Ocean. Top right: Gen. Robin Rand (l), chief of AFGSC, and Adm. Cecil Haney (r), head of US Strategic Command, at Vandenberg to watch the launch of a Minuteman III missile shipped from Minot. Right: SSgt. Daniel Santell (l) and SrA. Gildo Pena-Lopez de-arm an AGM-86B cruise missile during a training exercise at Barksdale AFB, La.

ters Air Force, to STRATCOM, or to command units. The goal is for them to become experts in the breadth of nuclear deterrence and recreate institutional knowledge that has been depleted over the past few decades, Lowther said.

EXPERTS NEEDED

"As we develop people who understand and can articulate what deterrence means in the 21st century, how do we get the workforce the right education, training, and experience to do that?" Wilson said in May in Washington when he was deputy commander of STRATCOM. "How do we get deterrence thinking in their lexicon? How do we use that human capital to help us solve some of our hard problems? ... How do we develop the human capital, the people, in the changing and thinking that needs to go forward for 21st century deterrence?"

Wilson described human capital as one "of our major lines of effort because what will be successful is when our folks really understand this deeply, that they can articulate it, they can articulate why it's important, and that we have a foundational level across not just places like STRATCOM, but throughout our military."

Despite its inspiration in a similar AMC program, SANDS' in-depth study and emphasis on the future is unprecedented in its nuclear focus.

"There's really been nothing like SANDS before it existed," Lowther said. "Part of the reason it was created is because the nuclear career force and Global Strike Command identified there's a need for greater nuclear expertise."

In fact, the Air Force seems to "have lost a good bit of knowledge in the years following the stand down of Strategic Air Command," Lowther said. The program is "in part to restore some of that knowledge and understanding of how deterrence works, of nuclear policy, and understanding of adversaries and how they act—to help design a better nuclear strategy and policy."

The Air Force is starting small, with the six graduates this fall, but nuclear deterrence studies are a front-burner issue once again. ✪

Ebola Flight

By Will Skowronski, Senior Editor

A carpet was rolled out when the C-17 Globemaster III touched down at JB Andrews, Md., the morning of Aug. 16. The extra measure wasn't for the comfort of VIPs who frequently pass through the base located near Washington, D.C. It was for protection.

Within minutes, Col. Nicholas Conger, an infectious disease consultant, and Maj. Joel M. Villavert, a flight nurse evaluator, assisted Maj. Stephanie LaPierre in exiting an air-tight containment pod to walk down the carpet-covered loading ramp and into an awaiting ambulance.

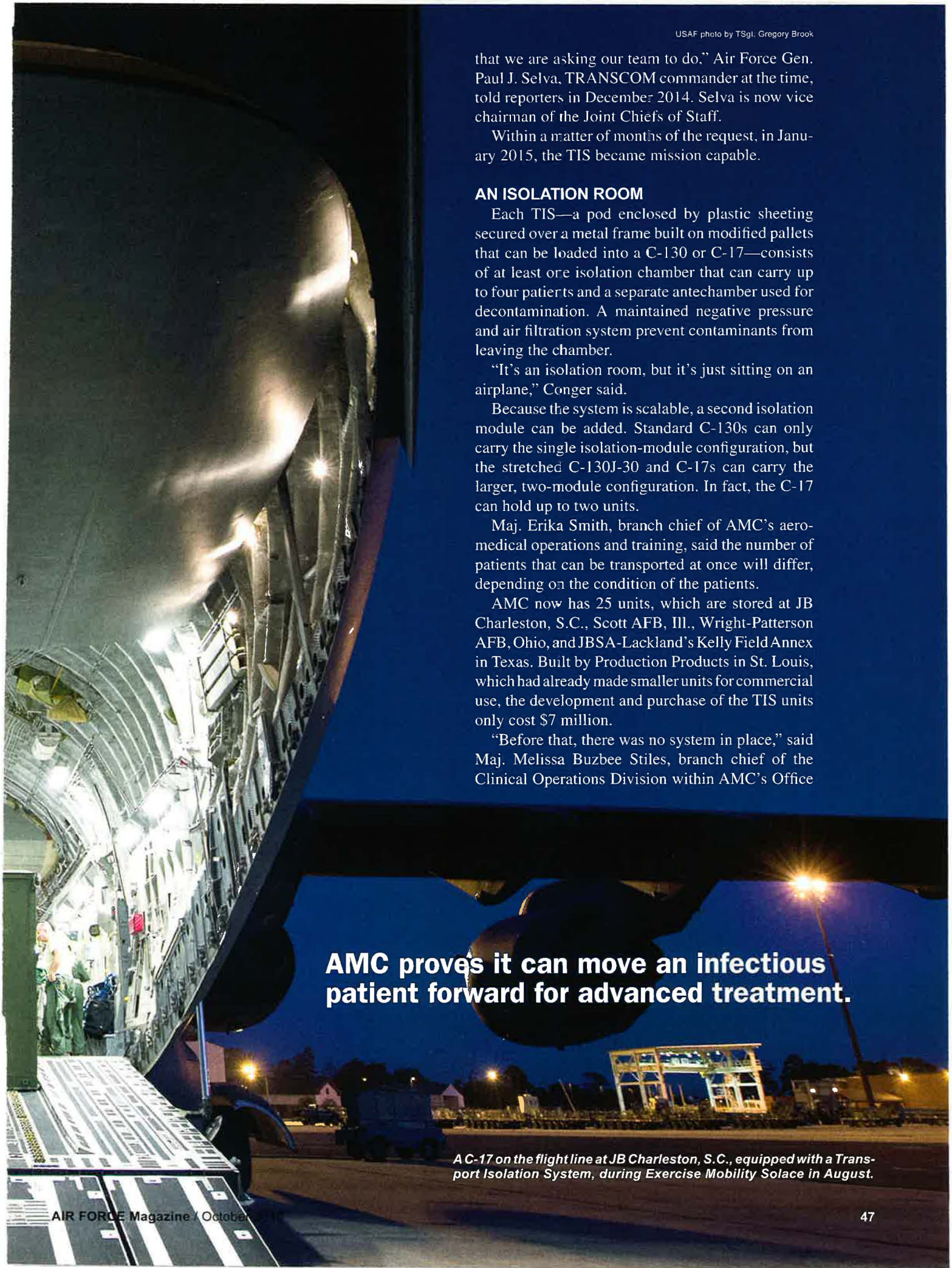
The ambulance promptly headed to Walter Reed National Military Medical Center in Bethesda, Md. LaPierre and anyone who went near her was covered in protective gear from head to toe.

Fortunately for LaPierre, the whole scenario was an exercise to validate Air Mobility Command's concept of operations for transporting a patient, suspected of having Ebola, using the Transport Isolation System.

When 2,800 DOD personnel deployed to West Africa to counter the Ebola outbreak in late 2014, the military did not have the ability to safely evacuate contagious patients back to the United States for care. A commercial carrier was available to transport a single patient, but there would have been no way to move a high number of casualties if an outbreak occurred among troops who required US care.

Seeing an immediate problem, US Transportation Command initiated a joint urgent operational need request in September 2014. TRANSCOM sought a system that could evacuate multiple US personnel if necessary.

"So our approach was: If we're going to put military members in harm's way, the capacity to move a single patient at a time was insufficient to the mission



USAF photo by TSgt. Gregory Brook

that we are asking our team to do," Air Force Gen. Paul J. Selva, TRANSCOM commander at the time, told reporters in December 2014. Selva is now vice chairman of the Joint Chiefs of Staff.

Within a matter of months of the request, in January 2015, the TIS became mission capable.

AN ISOLATION ROOM

Each TIS—a pod enclosed by plastic sheeting secured over a metal frame built on modified pallets that can be loaded into a C-130 or C-17—consists of at least one isolation chamber that can carry up to four patients and a separate antechamber used for decontamination. A maintained negative pressure and air filtration system prevent contaminants from leaving the chamber.

"It's an isolation room, but it's just sitting on an airplane," Conger said.

Because the system is scalable, a second isolation module can be added. Standard C-130s can only carry the single isolation-module configuration, but the stretched C-130J-30 and C-17s can carry the larger, two-module configuration. In fact, the C-17 can hold up to two units.

Maj. Erika Smith, branch chief of AMC's aeromedical operations and training, said the number of patients that can be transported at once will differ, depending on the condition of the patients.

AMC now has 25 units, which are stored at JB Charleston, S.C., Scott AFB, Ill., Wright-Patterson AFB, Ohio, and JBSA-Lackland's Kelly Field Annex in Texas. Built by Production Products in St. Louis, which had already made smaller units for commercial use, the development and purchase of the TIS units only cost $7 million.

"Before that, there was no system in place," said Maj. Melissa Buzbee Stiles, branch chief of the Clinical Operations Division within AMC's Office

AMC proves it can move an infectious patient forward for advanced treatment.

A C-17 on the flight line at JB Charleston, S.C., equipped with a Transport Isolation System, during Exercise Mobility Solace in August.

/1/ Medical and support personnel aboard a C-17 prepare for takeoff during Mobility Solace. The exercise allowed Air Mobility Command and joint partners to evaluate how they would move multiple patients exposed to or infected with the highly contagious Ebola virus. /2/ Capt. Thomas Jones (l) dons protective gear before entering the TIS during Mobility Solace. Col. Nick Conger (r), an infectious disease consultant, helps him. /3/ Conger (l) and Maj. Joel Villavert, a flight nurse evaluator, prepare to transfer a simulated Ebola patient from the TIS to an awaiting ambulance at JB Andrews, Md. /4/ Maj. Stephanie LaPierre, a simulated Ebola patient, is transferred in a containment unit from an ambulance to Walter Reed National Military Medical Center in Bethesda, Md.

of the Command Surgeon. "This is an entirely new concept."

A designated support team, responsible for storing, configuring, loading, and decontaminating the TIS, is located at JB Charleston, Stiles said in an email. The 43rd Aeromedical Evacuation Squadron at Pope Army Airfield, N.C., and 375th AES at Scott will execute any TIS mission.

Infectious disease specialists and critical care teams that would also be part of any TIS flight are tasked from their local units of assignment.

August's Exercise Mobility Solace was the first time the entire evacuation process, including transferring the patient to a medical facility, was practiced, AMC Command Surgeon Brig. Gen. Lee Payne said. But the C-17, assigned to the 436th Airlift Wing at Dover AFB, Del., picked up LaPierre in Charleston, rather than from the simulated outbreak area in Africa.

Smith said the exercise was to validate procedures and timelines, including a 72-hour deadline to get the patient back to the US once the transfer request is received. Conger said the idea is to get the patient Stateside before overt symptoms appear because that is when Ebola is most contagious.

During the flight, an aeromedical evacuation crew practiced caring for LaPierre, a process complicated by the need to carefully don and remove substantial amounts of personal protective equipment in the anteroom section of the TIS to avoid contaminating crew members and the aircraft.

SMSgt. Kristen Smith, superintendent of the 43rd AES, said the enclosed space made communication tricky. During the flight, LaPierre used a small whiteboard to write messages that could be read through the clear plastic lining when a team member wasn't inside the TIS with her.

"It takes a lot more effort to care for the patient" in these intense conditions, Smith said.

But the flight was also to test the TIS itself. Payne said prior practice uses showed a stronger frame and solid doors, rather than the original flaps with zippers, were needed to support the structure.

"Any time you write something down on paper, it sounds really good. But any time you walk through it, you find holes," Payne told *Air Force Magazine* while en route to Andrews. "We're going to learn a lot out of this exercise."

During the flight, an actual hole was found in the TIS' plastic lining. Smith said that while it was unexpected, the negative pressure would have prevented a contamination. Crew members are taught how to repair any openings.

"We'll use the after-action reports and the results of this exercise to continually improve our ability to respond to Ebola-type situations," Stiles said. Further evaluation of the lining will be done in light of the exercise's findings "to ensure the highest quality product with the greatest level of protection is produced," she added in an email.

Conger said practice is "invaluable" for the medical teams and that the run-throughs revealed potential procedure tweaks, such as making wash buckets available in the anteroom to help maintain a clean zone. He said the aeromedical crews, which receive a week of specialized TIS training, would also practice on their way to pick up a patient.

GETTING IT RIGHT

Capt. Richard Elliot, the mission pilot, said the training is important for aircrews because loading the isolation system and addressing the patients' needs require a lot of coordination between the pilots, loadmasters, and medical personnel.

"It's definitely a mission you don't want to get wrong," he said.

After landing at Andrews, LaPierre was loaded into a specialized ambulance, with a portable isolation pod, and driven to Walter Reed, where a medical team practiced transferring her to a contained treatment room.

Chris Gillette, command emergency manager for Walter Reed, said the exercise was an opportunity for the numerous parties involved to run through the procedures developed during tabletop exercises and "see what we can do better," even including figuring out the best way for the ambulance and support vehicles to pull into the hospital.

Though lessons are still being learned, Conger said, there wouldn't have been any contamination breaches during the evacuation if the patient had actually been infected. "So from that perspective, it went very well," he said.

Army Surgeon General Lt. Gen. Nadja Y. West, who served as the Joint Staff surgeon during 2014's Operation United Assistance and was nicknamed "Queen Ebola" at the time, told reporters this August the military will likely play a larger role in future outbreak responses. This is because of the capabilities, including the TIS, the services developed during the USAID-headed relief effort.

"Putting together those isolation systems was really a great lesson on how we could rapidly develop capability if that were to become required, depending on the environment that we were in," said West. She also heads US Army Medical Command.

Smith noted that because the TIS was developed to handle the 2014 Ebola outbreak, the knowledge gained by health care providers, including some who were infected due to breaches, informed AMC's concept of operations.

"We are hopeful that we have taken all of those lessons learned, put that into our plans, [so] we can keep our crew members and health care providers as protected as possible—and also our military airframes, so they can continue to be used throughout to support the mobility operation," she said.

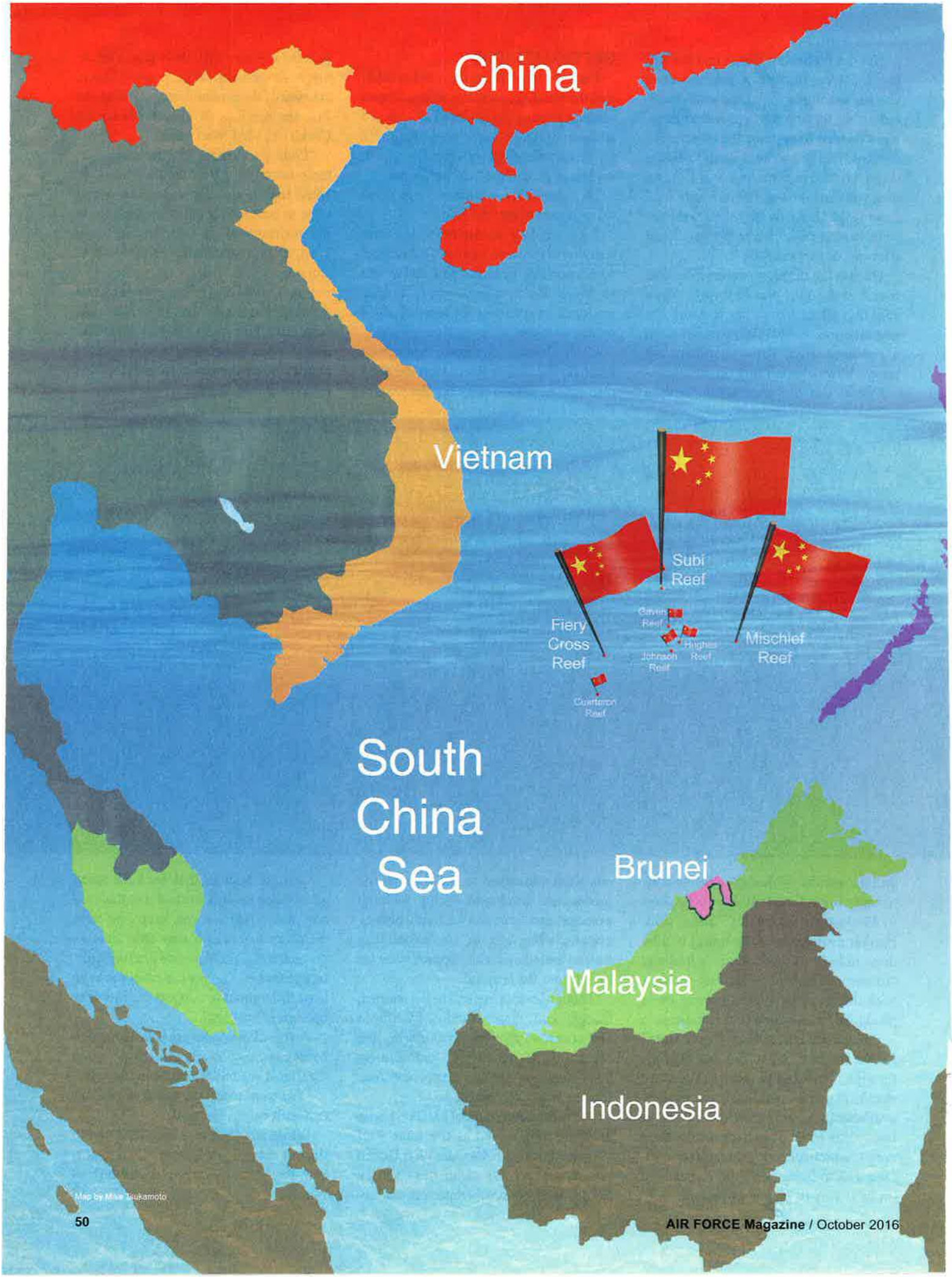
Payne acknowledged that the thought of having a contagious person transported to the United States is disconcerting for some.

"We want everyone to know that we can do it safely," he said.

While no one hopes the TIS is put to the test soon, if AMC were called tomorrow, Payne said, "we could execute this mission." ✪


Staff photo by Will Skowronski

Staff photo by Will Skowronski



Map by Mike Tsukamoto

MISCHIEF in the SOUTH CHINA SEA

Philippines

By Wilson Brissett, Senior Editor

China is still claiming and militarizing the vital international waterway.

Over the last two years, China's activities in the South China Sea have attracted worldwide attention and suspicion. The communist state illegally claims a vast portion of the South China Sea as its territorial waters, and efforts to create land on the high seas have become increasingly militaristic.

In 2014, China accelerated a land reclamation program focused on the Paracel Islands, Spratly Islands, and Scarborough Shoal.

The program involves removing sediment from the bottom of the sea and piling it on coral reefs to create new landmasses. These newly built islands—Mischief Reef, Subi Reef, Fiery Cross Reef, Cuarteron Reef are some of their names—have since become construction sites for both civil and military infrastructure projects.


1
CSIS Asia Maritime Transparency Initiative/DigitalGlobe image


2
Google Earth image


3
CSIS Asia Maritime Transparency Initiative/DigitalGlobe image


4
CSIS Asia Maritime Transparency Initiative/DigitalGlobe image


5
China Ministry of National Defense photo by Lui Rui, Xinhua

In February, Adm. Harry B. Harris Jr., head of US Pacific Command, told the Senate Armed Services Committee, "In a little over two years, China has constructed more than 3,000 acres of artificial land" in the South China Sea.

Satellite imagery shows these new geographical features are now home to airstrips long enough to land military bomber and fighter aircraft, build lighthouses, substantial support buildings, and military-grade radar facilities. Aerial photos also show the Chinese have dredged large areas to create harbors that can service naval ships.

Harris called the program "a strategic frontline in [China's] quest to dominate East Asia" and warned, "These events threaten the region's peace and prosperity."

MANY DISPUTES

Jason Thomson, writing in *The Christian Science Monitor,* believes China has already established a "strategic triangle" for influence in the South China Sea. *Foreign Affairs'* Mira Rapp-Hooper sees China's strategic goal as that of creating "an anti-access, area-denial (A2/AD) capability that aims to keep foreign powers from entering or operating in the waters close to its shores in the event of a major conflict."

The South China Sea expansion has created a series of territorial disputes with China's neighbors Vietnam, the Philippines, Malaysia, and Indonesia. While Harris noted some of these disagreements date as far back as 1974, the escalated pace of China's construction efforts has opened fresh controversy.

The Philippines recently brought a case against China before an international tribunal at The Hague, which ruled on July 12 that China's claims

/1/ A satellite image of Subi Reef taken on July 27, 2012; the green-hued areas were actually under water. Several Chinese ships are in the lagoon. China occupied the reef in 1988 as part of its push to expand its footprint in the South China Sea. /2/ A recent photo of Subi Reef. Note the construction of a large runway and support facilities. /3/ A satellite image/illustration of Mischief Reef shows possible parking areas for Chinese aircraft. The current facilities can accommodate any aircraft in China's fleet. /4/ Dredging ships work on enlarging Mischief Reef. /5/ A Chinese H-6K bomber patrols the reefs and islands in the South China Sea. Such patrols will become a "regular" practice, according to Chinese officials.


1
CSIS Asia Maritime Transparency Initiative/DigitalGlobe image


2


5
CSIS Asia Maritime Transparency Initiative/DigitalGlobe image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4
China Ministry of Defense photo


CSIS Asia Maritime Transparency Initiative/DigitalGlobe image

over much of the South China Sea have no historical or legal validity.

This ruling was unequivocal, but enforcing its outcomes will be difficult. The court's power rests on broad acceptance of the current international system, but "China's actions undermine the international rules-based order," according to Harris.

Indeed, *The Wall Street Journal* reports that Beijing has been unrepentant since the tribunal's judgment, with the Chinese military announcing on Aug. 7 that it had flown H-6K bombers and Su-30 fighter jets over the Spratly Islands and Scarborough Shoal. The newspaper quoted a Chinese air force spokesman as stating that the patrol was "to enhance combat capabilities to deal with various security threats." This development affirms the Defense Department's assessment, in its 2016 "Annual Report to Congress" on China, that the nation has used low-intensity coercion to enhance its presence and control in disputed areas of the East and South China Sea."

The mere existence of the artificial islands and their associated infrastructure makes it difficult to roll back China's claims in the region.

Concern about the reef building is not just about military presence and intimidation. Beijing's expansion into the South China Sea is also an attempt to extend the nation's economic interests at other nations' expense, by creating claims to the fishing grounds, oil, and other natural resources in the sea in general and around the reefs and shoals in particular.

PACOM's Harris said a proper response to the situation "requires national resolve and a willingness to apply all elements of national power." As an example, he pointed to 2016 freedom of navigation operations in which US Navy ships sailed close to disputed Chinese reefs to demonstrate international freedom of the seas. He also announced the availability of $425 million in DOD funding to support Secretary of Defense Ashton B. Carter's Southeast Asia Maritime Security Initiative, which seeks to strengthen military-to-military relationships in the region.

After the latest freedom of navigation operation in May, however, the Chinese air force scrambled fighter jets, complicating the way forward for US strategy on the South China Sea.

China's government and air forces have behaved recklessly in the region in the recent past, and unless Beijing accepts international law in the South China Sea it is entirely possible that armed conflict could break out because of these artificial islands in international waters. ✪


Sina.com.cn photo

/1/ A satellite image of Fiery Cross Reef in 2006. A small vessel or structure can be spotted in a lower inlet. /2/ Fiery Cross Reef in 2015. Construction is ongoing, and China is building a runway at least 10,000 feet long—long enough to accommodate any Chinese aircraft. /3/ A screenshot from the Chinese website sina.com shows Chinese naval personnel on Fiery Cross Reef during a military training exercise in January. /4/ A J-11 fighter pilot fires an air-to-air missile at a simulated target during live-fire training in the South China Sea in July. /5/ A satellite photo of Chinese construction, including large, permanent structures, on Gaven Reef, an artificial island, in February.

The Air Force has been up and down several times in defining the vast medium in which it operates.

In February 1959, the *New York Times* announced that the Earth's atmosphere had been joined with outer space and that the Air Force had coined a new word, "aerospace," to describe it.

The article quoted the testimony of Gen. Thomas D. White, USAF Chief of Staff, to the House Committee on Science and Astronautics. "Since there is no dividing line, no natural barrier, separating these two areas, there can be no operational boundary between them," White said. "Thus, air and space comprise a single continuous operational field in which the Air Force must continue to function. This area is aerospace."

There was more to it than a new word. It was the beginning of the "aerospace" issue, which would persist for another 50 years, spilling over into doctrine, research and development, organizational turf disputes, and even calls for the Air Force to change its name to the Aerospace Force.

The Air Force itself has swung back and forth on whether the medium in which it operates is "air" or "air and space" or "aerospace."

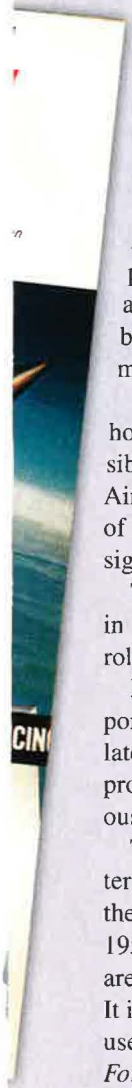
In the beginning there was air. Space did not become of serious interest to the armed forces until the 1950s, and by then, aircraft were flying to altitudes never before achieved and new realms of flight were emerging.

In 1956, Air Force Capt. Iven C. Kincheloe Jr. piloted the Bell X-2 rocket plane to a record altitude of 126,200 feet. By later standards of the space program,

***Covers of* Air Force Magazine, *November 1958 and August 1986 editions. It's generally agreed that the first use by Gen. Thomas White, then USAF Chief of Staff, of the term "aerospace" was in* Air Force Magazine.**

Air and Space and Aerospace

By John T. Correll



it wasn't that high—about 24 miles up—but Kincheloe had reached the edge of the Earth's atmosphere. The press called him "Mr. Space." The Air Force took it as a logical step toward more ambitious regimes of flight.

ICBMs complicated the issue. The Air Force regarded ballistic missiles as pilotless aircraft. The Army saw them as a kind of artillery. The Navy, not to be left out of anything, had space and missile programs of its own.

In 1958, President Dwight D. Eisenhower awarded NASA overall responsibility for human spaceflight but the Air Force managed to hang on to a few of its space-related programs that had significant overlap with suborbital flight.

Thus the context for White's testimony in 1959 was an intense competition for roles and missions (and budgets) in space.

Furthermore, the *New York Times* report on the new word "aerospace" was late in noticing a movement already in progress. The term had been used previously, several times by White.

The concept—although not yet the term—appeared in White's speech to the National Press Club in November 1957 when he said that "air and space are an indivisible field of operations." It is generally conceded that White first used the word "aerospace" in an *Air Force Magazine* article in August 1958. The magazine, quick to spot a trend, adopted a new monthly subhead, "The Magazine of Aerospace Power," on its cover for November 1958.

Clearly, White envisioned that the Air Force would fly and fight in space. In further testimony in 1959, he said that "eventually we will have manned space vehicles as combat weapons."

GAINING MOMENTUM

There are competing claims about who coined the term "aerospace." Credit is variously accorded to one of two Air Force civilian employees who may not have known about each other's work until later.

In an item distributed to base newspapers by Air Force News Service in October 1957, Frank W. Jennings referred to the expanse beyond the Earth's surface as "Air-Space." In a glossary published by Air University in March 1958, Woodford A. Heflin defined "Aero-Space" as the combination of the atmosphere and space, which could be "considered as a single realm" for the launch and control of missiles, satellites, and "dirigible space vehicles."

The first unhyphenated use of "aerospace" was by Jennings in an AFNS release in July 1958. Jennings subsequently pointed out that Heflin's definition implied that air and space were "two separate entities," whereas his interpretation—like White's—was for an indivisible field of operations.

In December 1959, a revision to Air Force basic doctrine declared, "Aerospace is an operationally indivisible medium consisting of the total expanse beyond the Earth's surface. The forces of the Air Force comprise a family of operating systems—air systems, ballistic missiles, and space vehicle systems. These are the fundamental aerospace forces of the nation."

From there, the term caught on fast. By the end of 1959, the Air Force had adopted "Aerospace Power for Peace" as its official slogan, the Aircraft Industries Association was renamed the Aerospace Industries Association, the School of Aerospace Medicine was established, and the exhibition hall at the Air Force Association had become the "Aerospace Panorama."

A major federal contract research center, The Aerospace Corp., came along in 1960. AFA's affiliate, the Air Education Foundation, was redesignated the Aerospace Education Foundation in 1961.

"Aerospace" has been included in standard dictionaries since 1961. The most recent (2008) edition of the Merriam-Webster's Collegiate Dictionary defines it as the "space comprising the Earth's atmosphere and the space beyond," taking no position on whether the regimes of air and space are seamless or separate.

VIEWS TO THE CONTRARY

There was considerable disagreement with the aerospace concept. "That means everybody is out of space except the Air Force," Rep. Daniel J. Flood (D-Pa.) said at a congressional hearing in 1960. "They have now staked out a claim to 'aerospace.'"

The other services saw it as an attempt by the Air Force to grab a proprietary interest in space—which it clearly was. They refused to accept the USAF proclamation of aerospace and the Joint Staff and the Department of Defense agreed with them.

JCS Pub 1, "Dictionary of United States Military Terms for Joint Usage," published in 1962, defined aerospace as "of, or pertaining to, the Earth's envelope of atmosphere and the space above it: two separate entities considered as a single realm for activity in launching, guidance, and control of vehicles which will travel in both realms."

That definition persisted in joint usage into the 21st century, with only the last word "realms" changed to "entities." Then, in March 2012, "aerospace" was abruptly dropped from the official Department of Defense dictionary on instructions from the joint doctrine shop.

There was also criticism from within the Air Force, particularly from those who feared that "aerospace" would rob space of its individuality and interfere with the emergence of an independent space command.

In a widely read monograph from Air University, Lt. Col. David E. Lupton lambasted "the invention of the bastardized word aerospace" and said that the

USAF photo via National Museum of the US Air Force

USAF photo

"aerospace fallacy" was "a hindrance to the development of space doctrine."

Others faulted the Air Force for relying too much on bold assertions. "The bulk of evidence suggests that the 'aerospace' idea was advanced by the Air Force leadership almost entirely by fiat, with little serious analysis or prior systematic thought given to it," said Benjamin S. Lambeth, a foremost analyst of airpower.

"Not only that, it was pressed into Air Force doctrine in complete indifference to the important physical and operational differences which exist between the two mediums," Lambeth said. It was, he added, "a testament to the failure of senior Air Force leaders to think very far beyond aerospace as a slogan for advancing the service's programmatic interests."

Undeterred by the critics, the Air Force stuck with the perspective expressed in the 1984 edition of its basic doctrine, which described aerospace as 'the multidimensional operating environment where air forces can perform all of their missions" and held that space was "the outer reaches of the aerospace operational medium."

INTO THE TRANSATMOSPHERE

A strong vindication for the concept would be an aerospace plane that could operate in both air and space. That was the objective of the Air Force's X-20 Dyna-Soar program, which predated NASA's Project Mercury and was carried forward from the 1950s.

The plan was for a Titan missile to boost Dyna-Soar into space, from where it could re-enter the atmosphere, fire its rockets to resume orbit, and eventually glide to a landing on Earth. The Department of Defense canceled Dyna-Soar in 1963 before its first flight.

Meanwhile, NASA and the Air Force continued experiments with the sleek X-15 rocket plane, carried aloft under the wing of a B-52 bomber and sent hurtling as high as it could go by a burst from its own engines. In 1963, former Air Force test pilot Joseph A. Walker took the X-15 to 354,300 feet—accelerated by an 85-second engine burn and reaching its apogee of 67 miles on a ballistic trajectory. Walker's altitude record stood until broken by the Space Shuttle Columbia in 1981.

The Air Force awarded astronaut wings to X-15 pilots who flew higher than 50 miles, a practice later adopted by NASA as well. However, the X-15 flights, like those of the X-2 before it, were of short duration to test or demonstrate a capability. Kincheloe's flight was 16 minutes, 35 seconds; Walker's was only 11 minutes, eight seconds.

Sustained operational flying was something else. In 1965, the Air Force's SR-71 set the world record for horizontal flight at 85,135 feet, or 16.12 miles, not nearly enough to justify description as aerospace.

New possibilities arose in 1986 when the Air Force announced with great fanfare the X-30 program, dubbed the "National Aerospace Plane." It would use scramjets (supersonic-combustion ramjets) to reach hypersonic speeds up to 8,000 mph, take off from a runway on Earth, enter space orbit or fly in the atmosphere, cruise in the "transatmosphere" as high as 350,000 feet, and descend to land on a conventional runway.

The X-30 was eventually canceled, 500 percent over budget and with no compelling mission, but the quest for an aerospace plane continued. The most recent incarnation is the USAF X-37B robotic spaceplane, a test vehicle that flew in orbit for 674 days on a classified mission before landing on Earth in October 2014. A scaled-up version that could carry pilots was said to be under consideration.

THE SPACE AND AIR FORCE

As space satellites assumed greater importance, Rep. Ken Kramer (R-Colo.) introduced a bill in Congress in 1981 to change the name of the Air Force to the United States Aerospace Force. Kramer's attempt failed but the proposal popped up again sporadically over the next 20 years.

In June 1992, following the great contribution of space assets in the Gulf War, Gen. Merrill A. McPeak, USAF Chief of Staff, restated the Air Force mission in

Far left: White (l) after the 1960 midair recovery of Discoverer XIII, the first man-made object recovered from orbit. Center: (l-r) X-2 pilot Capt. Milburn Apt, Col. Horace Hanes, Air Force Flight Test Center director, and X-2 pilot Capt. Iven Kincheloe next to the X-2 rocket plane in 1956. Kincheloe took the X-2 to a height of about 24 miles in 1956. Left: A painting of the "National Aero-space Plane"—the X-30—taking off. It appeared on the cover of the June 1986 issue of* Air Force Magazine. *The X-30 program went greatly over budget and was eventually canceled.

13 words—"to defend the United States through the control and exploitation of air and space"—with the addition of space.

The other services were happy to have the Air Force carrying nearly the full load in the military space program, providing about 90 percent of the people, systems, and money, but they were unwilling to give the Air Force clear title to space or recognize the existence of aerospace.

In an announcement that sent shock waves through the Air Force, the next Chief, Gen. Ronald R. Fogleman, declared in 1996, "We are now transitioning from an air force into an air and space force on an evolutionary path to a space and air force." Secretary of the Air Force Sheila Widnall joined him in that forecast.

In part, Fogleman was trying to head off the loss of the space mission to a new military service, called the US Space Force by its advocates, but nobody doubted the sincerity of Fogleman's commitment.

"We operate in a medium that encompasses and touches 100 percent of the Earth's surface and population," Fogleman said. "This provides air and space forces with unparalleled access and global awareness."

Fogleman said further, "We've combined air and space superiority into one core competency. This reflects the transition to an air and space force and the need to control the entire vertical dimension." Curiously, all of his references were to air and space; there was no mention of aerospace.

The curiosity deepened with a revised version of Air Force basic doctrine, completed in the last days of Fogleman's tour as Chief in 1997. The word "aerospace" disappeared completely, replaced in every instance by "air and space."

The 46-year run of aerospace in basic doctrine was over. The revision did not explicitly repudiate aerospace, but it said, "Warfare is normally associated with the different mediums of air, land, sea, and space."

In effect, Fogleman's view "promised that air operations would eventually be supplanted by space functions and that the service's space professionals would, in the fullness of time, inherit the Air Force and its most senior leadership positions," Lambeth said.

Because of the timing of Fogleman's departure, the new doctrine document was signed by his successor, Gen. Michael E. Ryan, who would soon have something of his own to say on the subject.

CALL IT AEROSPACE

At first, Ryan took the same direction as Fogleman. At an Air Force Association symposium in November 1997, he said, "Our goal is to eventually evolve from an air and space force, which we call ourselves today, into a space and air force."

Within a few months, Ryan had reconsidered his position. At the Corona South meeting of top Air Force leadership in early 1998, officials decided to refocus on what Ryan called "the integration of air and space power into an aerospace force."

"You will notice the growing use of the word 'aerospace' among the general officers here," Ryan said at the AFA Air Warfare symposium in February. "We all prefer aerospace to air and space force because it captures the seamless nature of the vertical dimension and highlights that it is one environment. Because of our commitment to integrate all the elements of the aerospace force, I am not satisfied that the only thing that holds air and space together is a conjunction."

Ryan did not call for another change to basic doctrine, so recently amended to exclude aerospace, but he found plenty of venues to hammer his point home.

Air University's flagship publication, *Airpower Journal,* became *Aerospace Power Journal* with the winter 1999 issue, in which Ryan said the new name was intended "to reflect what the Air Force is all about."

"In every respect, the Air Force is defined by aerospace power," Ryan said. "Airmen often speak their own language and that language for the next century and beyond is 'aerospace power.'"

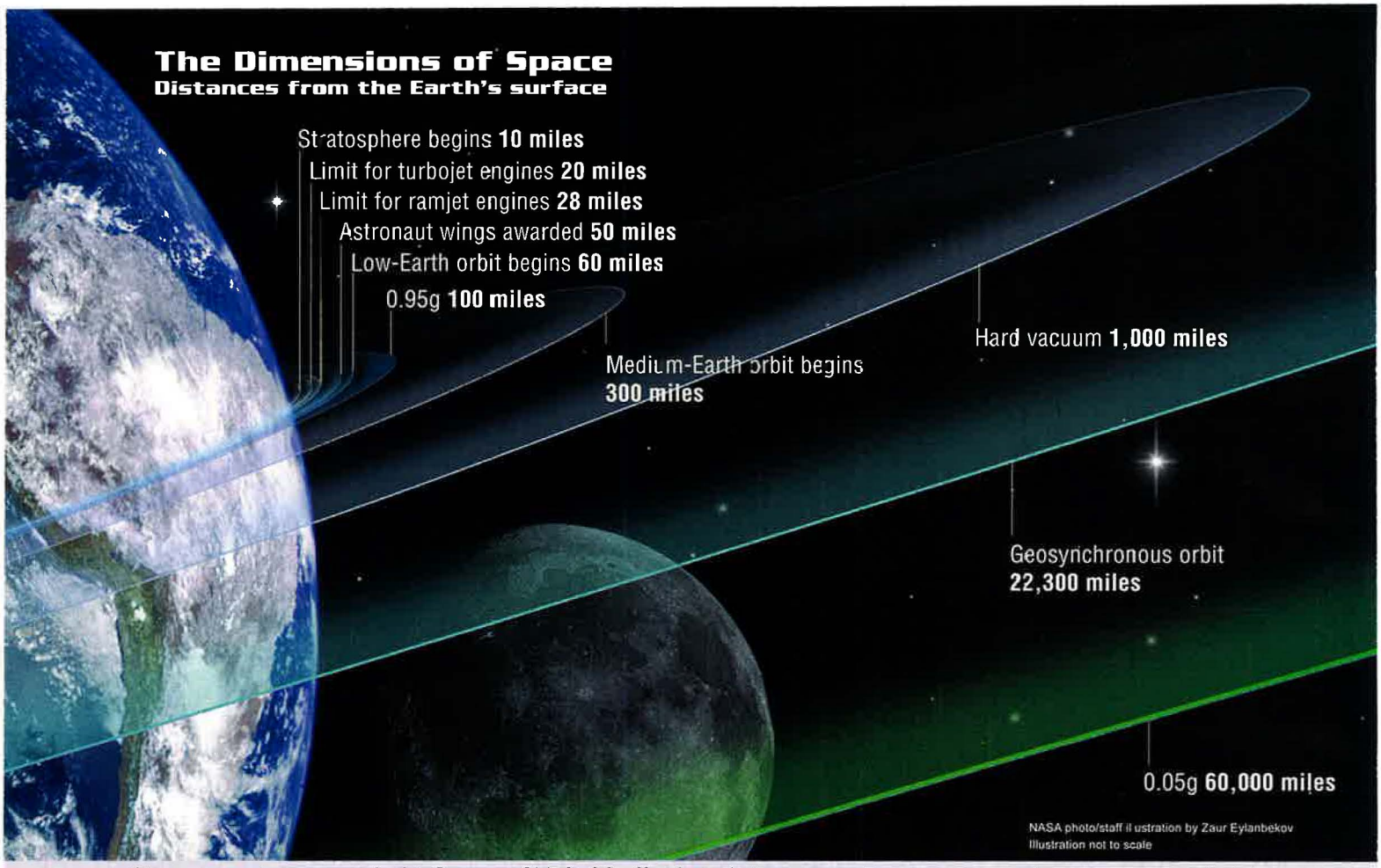
Nor was that all. A white paper published in May 2000 by Secretary of the Air Force F. Whitten Peters and Ryan said USAF was "moving forward into the 21st century as a seamless integrated aerospace force" and that "the environmental differences between air and space do not separate the employment of aerospace power within them."

In June 2000, an Air Force vision statement said, "Our domain stretches from the Earth's surface to the outer reaches of space in a seamless operational medium."

Aerospace had been fully restored after only a brief absence, or so it seemed.

BACK TO AIRPOWER

The stage was set for a reversal by the report in January 2001 of a congressionally chartered commission on space, whose chairman, Donald H. Rumsfeld, was soon to become Secretary of Defense. The commission urged the development of a distinctive space operation and "space culture" within the Air Force and showed little or no interest in aerospace integration.



That perspective resonated with Gen. John P. Jumper, who succeeded Ryan as Chief of Staff in September 2001. In the fall of 2002, *Aerospace Power Journal* became *Air & Space Power Journal.*

In an opening essay in that issue, Jumper noted that the space commission report "does not use the term 'aerospace' because it fails to give the proper respect to the culture and to the physical differences that abide between the environment of air and the environment of space."

"We need to respect those differences, and that's why the description of our warfighting environment as air and space is important. We will respect the fact that space is its own culture and has its own principles. And when we talk about operating in different ways in air and space, we have to also pay great attention to combining the effects of air and space."

A change to basic doctrine in November 2003 made the departure from aerospace explicit. "Air and space are separate domains requiring the exploitation of different sets of physical laws to operate in, but are linked by the effects they can produce together," it said.

In 2010, a "Doctrine Summit" convened by Gen. Norton A. Schwartz, Chief of Staff, adopted airpower as the "unitary term" for what the Air Force does. Gen. Mark A. Welsh III, who followed Schwartz as Chief, said, "America has only one force specifically employed to exploit the unique global advantages realized from operating in air, space, and cyberspace."

To remove any doubt, basic doctrine was revised again in 2013. "Doctrine is about warfighting, not physics," it said. "Air, space, and cyberspace are separate domains, requiring different sets of physical laws to operate in, but linked by the effects they can produce." The latest doctrine adjustment, in February 2015, confirmed airpower as the preferred unifying term.

STAND BY

No matter what the Air Force, the Joint Staff, or anybody else thinks, aerospace is still alive and kicking. As of April 2016, "aerospace" drew 101 million hits on the Google search engine.

Colleges turn out aerospace engineers. Industrial firms have aerospace in their names or have aerospace divisions. Standard & Poors has an "Aerospace and Defense" index for investments. The internet offers advice to those seeking a career in aerospace.

Among the latest adopters are the Russians, who activated the Aerospace Forces as a new military branch in August 2015. The Aerospace Forces (VKS) were formed by a merger of the Russian Air Forces (VVS) and the Russian Aerospace Defense Forces (VKO).

The merger drew a critical reaction from the English-language *Moscow Times,* which complained that air and space are "two different environments," adding that "the laws of physics, however, are nothing compared to the desire of bureaucrats."

Within the US Air Force, airpower has not yet completely taken root as the all-inclusive "unitary term." The keepers of USAF doctrine notice that the "air and space" usage still appears regularly, reinforcing the notion of "hyphenated airmen." Even "aerospace" shows up now and then. ✪

John T. Correll was editor in chief of Air Force Magazine *for 18 years and is now a contributor. His most recent article, "The Push for Rome," appeared in the September issue.*

By Robert S. Dudney

Straight Talk

"We [the Air Force] are too small, too old, less ready, and out of balance for what the nation needs of us."—***Gen. David L. Goldfein, USAF Chief of Staff, Air Force Sergeants Association, Aug. 24.***

Dept. of Red Tape

"The Department of Defense is the world leader in funding high-risk, high-pay off technology, but too many high-tech businesses and startups are turning their backs on us. ... You have to remember that DOD has been accused of having a culture where it's better to do nothing than it is to do 99 things right and one thing wrong."—***Adam Jay Harrison, DOD's director of National Security Technology Accelerator,*** **Financial Times,** ***Sept. 4.***

Veiled Talk

"We've had problems with cyber intrusions from Russia in the past, from other countries in the past, and, look, we're moving into a new era here, where a number of countries have significant capacities. ... Frankly, we've got more capacity than anybody, both offensively and defensively."—***President Obama, remarks at conclusion of G20 Summit in China, Sept. 5.***

Chapman's Honor

"I support moving forward with the Medal of Honor for Sergeant Chapman, because he unquestionably died a hero fighting for his country. We may never know exactly what happened during the final hours of that fight, but, undoubtedly, Sergeant Chapman died a hero."—***Sen. Richard Blumenthal (D-Conn.), referring to USAF TSgt. John Chapman, a combat controller, killed by al Qaeda fighters on March 4, 2002, in Afghanistan,*** **The Hartford Courant,** ***Aug. 28.***

Zinni's Zapper

"I don't want to be part of a strategy that in my heart of hearts I know is going to fail. It's a bad strategy, it's the wrong strategy, and maybe I would tell the President he would be better served to find somebody who believes in it—whoever that idiot may be."—***Retired USMC Gen. Anthony Zinni, former head of US Central Command, on why he couldn't lead the war on ISIS,*** **Time.com,** ***Aug. 31.***

Hollowing Out

"On average, I would go to three flag exercises a year, plus I would do a rotation with the National Training Center with the Army, and that would be a normal battle rhythm. ... Today's pilot—based on the size of the force, the age of the force, and the continued optempo demand in Central Command—is getting about half of that. ... We're able to maintain a higher state of readiness forward, where the combat commanders need it, but the bill payer is home station."—***Gen. David L. Goldfein, USAF Chief of Staff, news conference, Aug. 10.***

No Regrets

"This study concluded that DOD must accelerate its exploitation of autonomy—both to realize the potential military value and to remain ahead of adversaries who also will exploit its operational benefits. ... [It is] vital if the US is to sustain military advantage. ... The decision for DOD to deploy autonomous systems must be based both on trust that they will perform effectively in their intended use and that such use will not result in high-regret, unintended consequences. Without such trust, autonomous systems will not be adopted except in extreme cases."—***Defense Science Board study of autonomous, "thinking" weapons, "Summer Study on Autonomy," June 2016.***

Bucket Brigade

"If we form a hypothesis and build an experiment, you have to be willing to be wrong. Then we can discount that idea and move on to another one. And my experience with commercial industry tells me that innovation in commercial industry is exactly that process. ... Failure is acceptable, ... but it moves at the speed of a small brush fire and it fertilizes everything in its path as it burns out the underbrush. ... We (DOD planners) bring out the fire brigades and we try to put it out."—***USAF Gen. Paul J. Selva, Vice Chairman of the Joint Chiefs of Staff, remarks to Center for Strategic and International Studies, Aug. 25.***

Clear Enough

"As I look at our modernization, I look at [plans for] 179 [KC-46 tanker] aircraft, and I go: 'Is that enough?' I can tell you right now, because of the combatant war fighter needs that I have, ... I'm going to need more of those aircraft."—***Gen. Carlton D. Everhart II, head of Air Mobility Command,*** **Air Force Times,** ***Sept. 1.***

Good Question

"Given that half of the remaining [Guantanamo] detainees are too dangerous to release and that it would be illegal to transfer them to the US, how does [the Obama Administration] expect ... to close Gitmo without violating the law?"—***Question from House Foreign Affairs Committee member, Aug. 25.***

The Next Whatever

"Somewhere around 2028—with key investments in some key technology areas—you'd be able to have some initial operational capability of a penetrating counterair [system]. ... I've gotten into a little hot water with my fighter pilot brethren over this, because I say things like, 'Hey, it may not necessarily be a fighter.' ... A typical fighter pilot for air superiority would say, 'You need 9Gs, two tails, a gun, short range. That's what fighters are.' This is something that's a little bit different and has some different attributes."—***USAF Brig. Gen. Alexus Grynkewich, head of Air Superiority 2030 enterprise capability collaboration team,*** **Defense News,** ***Aug. 28.***

Cheaters

"Syria has engaged in a calculated campaign of intransigence and obfuscation, of deception, and of defiance. We ... remain very concerned that [some legally banned Syrian chemical warfare agents] and associated munitions, subject to declaration and destruction, have been illicitly retained by Syria."—***Kenneth Ward, US representative to the multinational Organization for the Prohibition of Chemical Weapons,*** **Foreign Policy,** ***Aug. 31.***

USAF photo

In a single afternoon—Labor Day, 1952—two-thirds of Strategic Air Command's B-36 fleet was suddenly and violently put out of commission. It was a surprise attack that stripped the US of its main nuclear deterrent against the Soviet Union. Seventy-two of the giant bombers were strewn around, some blown beyond the airfield at Carswell Air Force Base in Texas. The aircraft were stacked in piles, thrown into buildings, broken into pieces, or flung upside down.

Other B-36s, under construction at the Convair factory next door, were severely damaged. Including other types damaged or destroyed, 106 aircraft were put out of action.

The destruction, though, wasn't the result of enemy bombers or saboteurs. The culprit was the weather.

Long thought to have been the work of a tornado, the great B-36 disaster was most likely due to microburst—a weather event wherein a powerful localized column of sinking air (downdraft) can destroy entire buildings. Microbursts were not even characterized until the late 1970s. Weather records show no tornadoes in Texas that day.

The event put the Air Force into paroxysms. Gen. Curtis E. LeMay, SAC chief, demanded a crash program to get the bombers repaired or rebuilt as quickly as possible. Though many were up and running again in only a matter of weeks, it took eight months to get all but one of the bombers—too heavily damaged to be salvaged—back on alert. The costly lesson changed the way SAC did business, heightening weather awareness as a strategic concern and imposing a far more cautious approach to potentially violent storms. Weather has never played this level of havoc with USAF aircraft since.

The B-36 was born out of the needs of World War II. The Air Corps sought a large, intercontinental bomber capable of striking targets thousands of miles from its base. Given the go-ahead in 1941 with the purpose of attacking

The Carswell B-36 Disaster

An intense storm knocked most of SAC's Peacemaker bombers out of commission.

By Sam McGowan

German targets from the US if Britain fell to the Nazis, the B-36's mission was changed to that of attacking Japan from Hawaii. It was to have a 10,000-mile range. Secretary of War Henry L. Stimson waived normal procurement procedures and ordered 100 of the new bombers into production, with deliveries to begin in August 1945.

Due to delays in the Consolidated company's decision to transfer the B-36 program from its San Diego plant to Fort Worth, Texas, the prototype was not unveiled until August 1945 and made its first flight a year later. By the time of its rollout, it wasn't really needed for its intended purpose: B-29s had already become a routine sight in Japanese skies and B-24s—as well as smaller B-25s, A-26s, and even fighters—were reaching Japan from bases in the Ryukyu Islands. Although the atomic bomb quickly put an end to the war, the Air Force continued to see a need for a longer-range aircraft with a bigger payload capacity. The B-36 went forward.

Consolidated—known after its merger with Vultee as Convair—began producing the B-36, now dubbed the Peacemaker, in 1948—the same year Fort Worth AAF was posthumously renamed for city native Maj. Horace S. Carswell Jr., a wartime Medal of Honor recipient.

WING STATUS

Designed with six Pratt &Whitney radial engines, operational B-36s were also given four General Electric J47 jet engines to boost takeoff performance and increase speed during bombing runs. The first deliveries went to SAC's 7th Bombardment Wing at Carswell in June 1948.

Next, the 11th Bombardment Group, based at Carswell, began equipping with Peacemakers. In February 1951, the 11th was elevated to wing status and became the 11th Bombardment Wing (Heavy). By September 1952, two-thirds of SAC's B-36 force was based at Carswell.

Sept. 1, 1952, was a typical summer day for the region, with the high temperatures and humidity that typically produce strong thunderstorms on the Texas plains. Because it was Labor Day, few personnel were on duty. But as conditions were ripe for severe weather and the National Weather Service forecast storms with winds

Two B-36 bombers at Carswell AFB, Texas, after the Labor Day 1952 microburst that knocked out two-thirds of the bomber type—USAF's main nuclear deterrent against the Soviet Union.

Left top: Tail damage to two B-36s after the microburst. Left: The tail section of a B-36 after the aircraft was blown completely off the runway, its fuselage broken in half, and the left wing and tail severed during the brief but vicious storm.

of 60 mph, the skeleton flight line crew went about securing the base's aircraft with tie-downs. According to one source, three-eighths-inch steel cables were used. The sky began to turn green and inky.

The storm hit at dinnertime. At 6:42 p.m., base personnel were convinced a tornado was in progress. The madly spinning anemometer in the control tower recorded winds of 90 mph before the device broke. Troops took cover in concrete or brick buildings. Winds swept across the flight line, with enough force to pick up aircraft, rip them from their steel cable moorings, and fling them into each other, into hangars, or other objects.

Flying debris acted like missiles, ripping through aircraft skins and giving the impression afterward that the bombers had been repeatedly raked by cannon fire. Cockpits were crushed and access doors ripped off. The wind blew big chunks off the roofs of many buildings at the field and tore great gaping holes in hangars.

Had winds been under the 60 mph forecasted that day, the steel cables probably would have been sufficient to hold the aircraft down, but wind speeds were likely well above the recorded 90 mph, creating "takeoff" conditions for some of the aircraft.

When it was over, the flight line was a tangle of airplanes, equipment, and pieces of buildings. The power of the storm was evidenced by the sole Peacemaker declared a total loss: Picked up by the winds, it was carried away, coming to rest in a ravine. Its fuselage was broken, only one wing was still attached, and its tail had been sheared off.

One B-36 suffered severe damage to the nose. Rather than use a new airframe from the factory for a planned special project, the Air Force decided to let Convair use the wreck for that purpose.

Astonishingly, given the force of the storm, much of the damage was determined to be minor. Engineers assessed that some of the bombers could be quickly repaired, while others required depot-level maintenance before they could be returned to service.

OUT OF COMMISSION

The greater damage was to the Air Force's nuclear response capability. Two-thirds of SAC's heavy bombers were temporarily put out of action and unavailable for combat. Had the Soviets decided then to launch an attack in Europe, the US response would have been severely limited. LeMay was forced to declare the 19th Air Division no longer operational.

LeMay had a reputation for quick, decisive action and the sudden loss of most of his nuclear bomber fleet produced a typical response. As soon

as word of the disaster reached him, LeMay ordered a maximum effort to return the bombers to service.

By daybreak the next morning, LeMay and his staff had come up with a response plan called Project Fixit. SAC personnel would perform repairs on the least-damaged third of the bombers, Air Materiel Command personnel from Kelly AFB, Texas, where the B-36 depot was located, would be responsible for another third, and the most heavily damaged remainder would be towed across the field to the Convair factory.

The repair effort began immediately, with crews working around the clock. SAC put the two Carswell wings on an 84-hour workweek until the fixes were complete. The first B-36 was returned to service within a week of the storm and nine more put in service the week after that. Just one month after the disaster, 51 bombers had been returned to service and the two Carswell wings were once again declared operational.

It took until May 11, 1953, to get the last storm-damaged B-36 back on flying status, however. Of the 82 B-36s damaged, all but two were returned to alert service. The one that blew into the ravine was written off and the wreckage later used to gauge the effects of nuclear blast.

The other, which had been returned to Convair for a special project, wound up being rebuilt into a testbed for a nuclear-powered bomber that was never put into production.

The Carswell disaster compelled the Air Force to think about how it should prepare for another such event, especially given that so many USAF fields were in "Tornado Alley."

The Air Force and SAC settled on two possible solutions. One was to secure the airplanes so they would be able to withstand high winds. The other was simply to get them out of harm's way by moving them to another location when severe weather threatened. That option became policy. From then on, when forecasts called for severe thunderstorms, crews would move the huge bombers out of the vulnerable region.

It was not a foolproof plan. Thunderstorms and tornadoes can develop with little warning in the American South and Southwest, and it takes time to assemble crews, get airplanes into the air, and arrange for them to be received elsewhere. These plans have been codified in procedures, and it's usually up to the base's wing commander whether to call for an evacuation of aircraft threatened by weather. Such decisions are fraught: Moving a wing is expensive and disruptive to flight schedules, both at the sending and receiving locations. Still, policy calls for erring on the side of caution, and the movements are seen by some senior commanders as useful exercises in rapid deployability.

The Carswell Labor Day storm was not the first time strong winds damaged large numbers of airplanes, nor was it the last.

In October 1945, a typhoon struck Okinawa and caused tremendous dam-

NOTHING LITTLE ABOUT A MICROBURST

Long thought to have been a tornado, the storm that hit Carswell in September 1952 is now believed to have been a microburst. This phenomenon wasn't identified until the late 1970s by Tetsuya T. "Ted" Fujita of the University of Chicago. A native of Japan, Fujita had written a paper in the 1940s speculating about the presence of strong downdrafts in thunderstorms and after immigrating to the US, continued researching thunderstorm winds. Fujita discerned starburst patterns, indicating damage was caused by strong winds emanating from a central point—not unlike explosions. He had seen similar patterns when he visited Hiroshima and Nagasaki after the detonation of the first atomic bombs. He discovered that some storms produce powerful vertical winds, sometimes in excess of 150 mph, that continue to the ground and are deflected outward on impact. He described the phenomenon as a downburst. If the damage pattern was less than four kilometers (2.5 miles), he called it a microburst.

Microbursts can be either wet—contained within a shaft of rain—or dry, with no rain present. He compared his research to some previously unexplained airline accidents, particularly a Boeing 727 crash at New York's Kennedy Airport in 1975, and concluded they might have been caused by microbursts. Fujita developed the now widely used scale that bears his name, to assess the strength of a tornado.

Thirty-three years after high winds caused so much damage at Carswell, a Delta Airlines L-1011 flew into the ground while on approach to Dallas-Fort Worth Airport, less than 30 miles from Carswell. The accident was determined to have been caused by a microburst that descended within a shaft of rain several airplanes had just flown through without incident.

USAF photo

Despite extensive damage, all but one of the big bombers was repairable.

A ceremony recognizing B-36s coming to Carswell in 1948.

BECOMING CARSWELL

National Museum of the US Air Force photo

Now known as NAS JRB Fort Worth, Texas (the airfield itself is still called Carswell), Carswell AFB dates its post-World War I history back to 1940 when the city of Fort Worth petitioned several aircraft manufacturers to build a facility there. Consolidated Aircraft accepted the city's request, then approached the Air Corps with the suggestion that they build a joint airfield adjacent to their new plant, where they planned to manufacture a four-engined bomber that would become known as the B-24 Liberator.

In June 1941, President Franklin Roosevelt approved a $1.7 million appropriation to build the Lake Worth Bomber Plant airfield. Since it was located in Tarrant County, Texas, the new airfield was initially called Tarrant Field. Air Corps plans called for it to be home to a bomber group.

The Japanese attack on Pearl Harbor came while the airfield and adjacent plant were still under construction. The new Army Air Forces decided that instead of making Tarrant Field an operational base, it would be a combat crew school for B-24 pilot transition and crew training.

The field was officially named Fort Worth Army Airfield during the war. The Consolidated plant turned out B-24s, and bomber crews went through training at the adjacent air base. Meanwhile, the company, which had merged with Vultee and would later become Convair, was working on two new aircraft designs. The first, the B-32, was designed to meet the same requirements as Boeing's B-29. Consolidated lost that contract to Boeing but Far East Air Force Commander Lt. Gen. George C. Kenney insisted that at least some be built to get around the military politics surrounding the B-29s.

Although they only saw limited combat, Consolidated produced 118 B-32s at the Fort Worth factory and their crews were trained at the adjacent air base, renamed for Maj. Horace S. Carswell Jr. in 1948. For much more on Carswell the airman, see "Namesakes" on p. 76.

age at Kadena and Naha air bases. The storm wasn't expected to hit the Ryukyus but made a sudden turn and caught the American bases by surprise. Among the 60 airplanes damaged were several B-29s.

LUCKY TIMING

Four years before the Carswell incident, Tinker AFB, Okla., was struck by two tornadoes only five days apart. The first, on March 20, 1948, caused $10 million in damage. Weather forecasters noticed that conditions five days later on the 25th were identical to those of the 20th and put out the base's first tornado alert ever issued. Sure enough, Tinker was hit again. Damage from the second storm was $6 million.

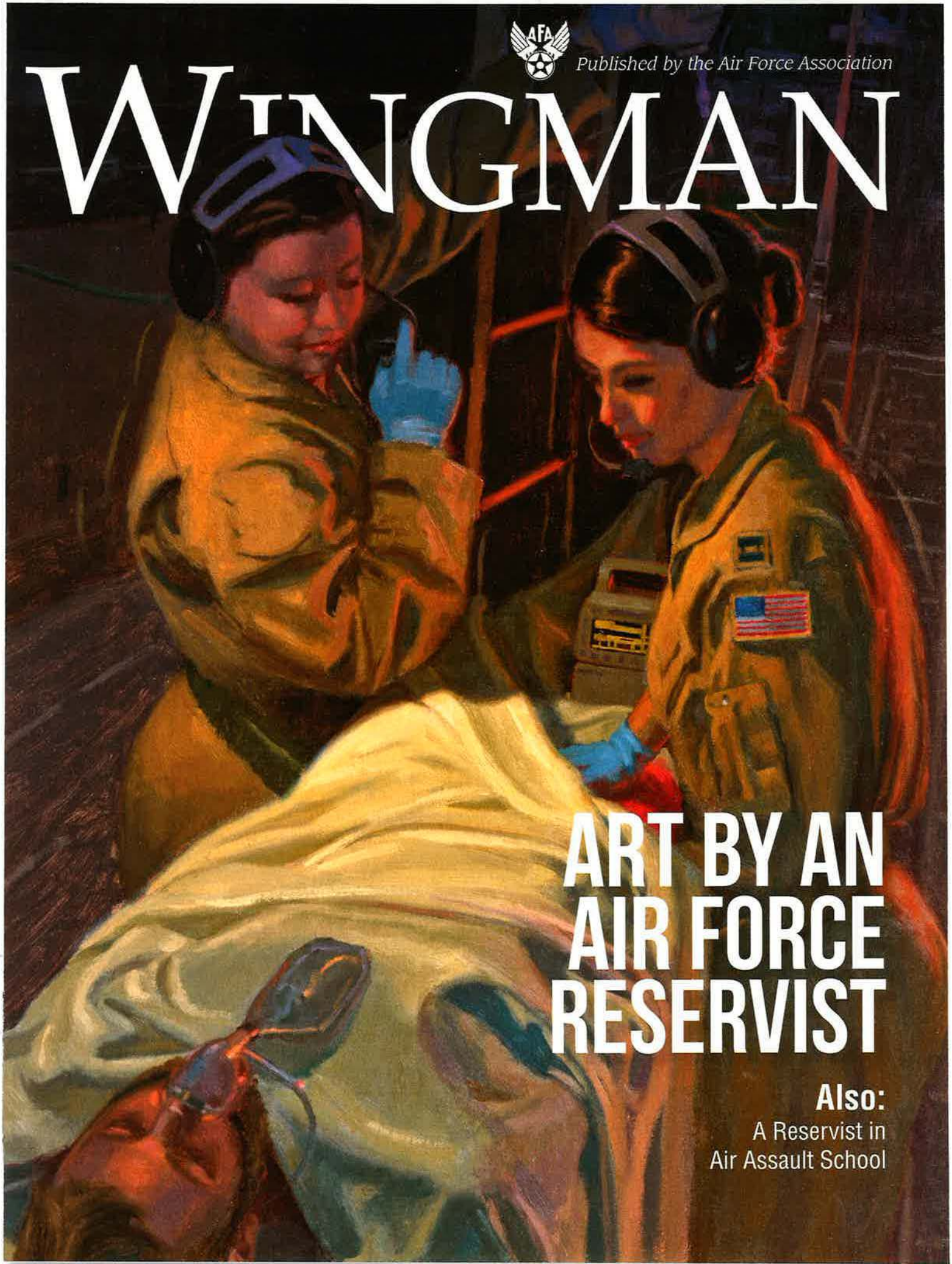
There have been dozens of incidents since Carswell, resulting in large numbers of airplanes damaged by high winds. Though most have been light aircraft and helicopters, wind damage at a base with large airplanes is always a risk. Although LeMay ordered Carswell's B-36s be evacuated anytime high winds were forecast, such evacuations may not prevent damage from microbursts because the most violent are believed to occur in isolated thunderstorms rather than lines of severe storms. In fact, they are often found in seemingly harmless rain showers.

The Carswell storm is unique for the damage it caused to the most important weapons in the US nuclear arsenal. In a matter of minutes, the storm grounded much of SAC's long-range bomber fleet. Fortunately for the US, the Soviet nuclear force did not yet exist. Although the USSR had a nuclear program, only three weapons had yet been tested and none had been deployed. Even if the Soviets had possessed a small arsenal of nuclear weapons, their only "long-range" bomber was a knockoff of the Boeing B-29 and lacked the range to reach targets in the continental US. ✪

Sam McGowan served 12 years in aircraft maintenance and as an aircraft loadmaster. He is a Vietnam veteran, retired corporate pilot, and freelance writer who resides in Missouri City, Texas. His last article for Air Force Magazine, *"Herculean Ordnance," appeared in the April 2016 issue.*

Published by the Air Force Association

WINGMAN



ART BY AN AIR FORCE RESERVIST

Also:
A Reservist in Air Assault School

Photo by Tammy Bevins

By Robert Grimsley

CMSgt. Robert Grimsley likes a challenge. To prepare for this one, he piled on all kinds of full-body workouts—some heavy lifting, for example.

USAF photo by 2nd Lt. Richard Coaxum

GETTING SMOKED

NEARING AGE 50—AND TAKING ON ARMY AIR ASSAULT SCHOOL.

For years I had wanted to attend US Army Air Assault School, a 10-day course on helicopter combat assault operations.

Why? My interest in helicopters goes back to my days as a grunt in the Marine Corps (1984-88), and more recently, I wanted a hard and quick course to challenge myself, something I would be proud to accomplish.

For whatever reason the door to Air Assault School had remained shut. Then in 2014, when I was 48 years old and recently promoted to chief master sergeant in the Air Force Reserve, I applied and was granted a walk-on slot for the school at Fort Benning, Ga.

US Army Forces Command started the Air Assault School at Fort Campbell, Ky., to train soldiers of the 101st Airborne Division. Candidates for the course should be able to run two miles in rough terrain and climb 16 feet up a rope, among other demanding physical requirements. In other words, this was a young man's game, and as a walk-on, I would have to get past Zero Day in order to formally earn a slot.

So I began to train harder than I ever had, to not waste this opportunity. I started doing more aerobic exercises, rucking with a knapsack, doing a lot of pull ups, rope-climbing, and intense full-body workouts.

Arriving at Fort Benning on Dec. 1, 2014, I thought I was well-prepared, but I did not take into account the hills in Georgia and the fact that my body kept breaking down: My muscles cramped, and with hard, nonstop physical activity, I just didn't have the recovery time I guess an old guy needs.

Through sheer determination—and not wanting to let down my family, my airmen, and myself—somehow I made it through Zero Day, completing an obstacle course, hours of physical training, and running two miles in 14 minutes, 28 seconds. More than 50 people failed.

I was offered a slot in Class 002-15.

PASS OR GO HOME

Phase One was aircraft recognition and learning hand and arm signals to guide helicopters. There were many hours in the classroom and the usual PT of running, jumping, squats, rifle PT (brutal on the shoulders), and getting smoked—exercising to the excess.

At the end of each phase came a written and a practical test. If you failed either, you received one retest and that was it: Pass or go home.

Phase One culminated with a six-mile ruck in under 90 minutes, carrying a knapsack loaded with equipment. The whole pack weighed between 35 and 40 pounds. After the march, we were inspected to make sure all our equipment was there. One missing item, no matter how small, and you were out.

MEAL TO MEAL

I completed the ruck with a few minutes to spare, thanks to some young soldiers helping me with encouragement.

I remember coming across the finish line and being spent—I had nothing left. I thought, "There is no way I could have gone another six miles." Yet I knew that the final test in Air Assault School was a 12-mile ruck carrying all my equipment.

So I went back to what I was taught a long time ago: Take it one day at a time or even meal to meal.

We moved on to Phase Two, sling loading: transporting equipment like a Humvee on a sling below a CH-47 Chinook or other rotary wing aircraft.

This is where most people fail Air Assault. The practical test was timed, and we only had a few minutes to inspect five loads and find three discrepancies. About 100 of us flunked that test. We received an hour of retraining and then took a retest. Half of us passed and moved on to Phase Three.

EMPTY BEDS

It was sobering to come back into the barracks at the end of each phase to see more and more empty racks as my classmates failed a portion of Air Assault. I felt bad for them, but was glad to still be there, fighting to earn the Air Assault badge. It really drove home the fact that if I did make it, I earned it. Nothing would be given to me.

THIS WAS A YOUNG MAN'S GAME AND WOULD NOT BE EASY.

Phase Three was a lot of fun: rappeling off a tower and rappeling some 90 feet out of a hovering Black Hawk.

The biggest thing to remember was attention to detail. One wrong hookup and you were out.

Finally came the last test, the 12-mile ruck that had to be done in three hours. It was all that stood between me and completing the school.

There is a sign posted at the training compound at Fort Benning's Air Assault School: "When the will is strong, everything is easy." I kept telling that to myself every step of the 12 miles.

I had blisters. My feet and knees were killing me. I couldn't even bend my legs without cramping. But I completed the ruck with a few minutes to spare and graduated—again, thanks to help and encouragement along the way.

Since then, I have found that if you're air assault-qualified, it opens up a lot of doors—and troops are more at ease talking to me—especially on deployment, where the key word is "joint."

I've helped other Reservists get an Air Assault slot. They have much to gain by stepping outside our career field, and it's a kind of challenge that will motivate them to continue their Reserve career. If a chief nearing 50 can do it, they can, too. ✪

CMSgt. Robert Grimsley, Raven 543, is with the 315th Security Forces Squadron, JB Charleston, S.C. He belongs to the Charleston Chapter and covers police and fleet sales in the southeast for Harley-Davidson. He turned 50 in February.

CHAPTER NEWS

By June L. Kim, Associate Editor

Updates on AFA's activities, outreach, awards, and advocacy.

PAUL REVERE CHAPTER

The Paul Revere Chapter held its annual barbecue for veterans in July. Partnering with Hanscom AFB, Mass., it drew in around 80 veterans and their caregivers, even garnering a visit from a three-star general. Air Force Reserve Maj. Gen. Kimberly A. Crider, mobilization assistant to the undersecretary of the Air Force, stopped by to say hello.

Crider, a New Hampshire resident, said chapter member Ruthie Barnes told her about the barbecue and about Frank Lysik, a World War II Army veteran who was at the Battle of the Bulge. He recently turned 96 years old.

The barbecue was held at the Veterans Community Care Center in Lowell, where Lysik is a resident.

Crider met Lysik and told him, "I came here to see all the vets, and especially to wish you a happy 96th birthday." She thanked him for his service and presented him with her personal general officer coin. Her visit "was a highlight of the day," said Devon Messecar, chapter secretary and VP for communications.

More than a dozen chapter members who work at Hanscom showed up to serve the veterans, said Messecar.

Veterans enjoyed hamburgers, hot dogs, side dishes, and watermelon. The chapter also donated $1,000 worth of gift cards to VCCC for birthday cakes and gifts for veterans, said Chapter President James A. Thurber.

Chapter VP for Veterans Affairs Mike Therrien and Barnes headed up the planning. Food and drinks were provided by the chapter through donations, said Messecar.

Photo by Jamie Thurber

Maj. Gen. Kimberly Crider, mobilization assistant to the undersecretary of the Air Force, stopped by the Paul Revere Chapter barbecue in July and chatted with WWII veteran Frank Lysik.

CHUCK YEAGER CHAPTER

More than 240 AFJROTC cadets flocked to Concord University in Athens, W.Va., in June for Mountaineer Cadet Officer Leadership School, coming from as far west as South Dakota.

Founded by David F. Slaughter, now a Gen. Bruce K. Holloway Chapter (Tenn.) member, the annual week-long leadership training rewarded the cadets with scores of trophies.

Maj. Gen. Jerry P. Martinez made a special appearance and spoke with cadets about their future plans, wrote Chapter President Herman N. Nicely II. Martinez is director of operations at Air Mobility Command at Scott AFB, Ill. He also helped with presenting awards to cadets who won in various categories, said Nicely.

Students hailed from in-state, Virginia, North Carolina, Tennessee, Pennsylvania, and South Dakota.

Students from schools in Tennessee and South Dakota had "heard about MCOLS from other schools that have attended in the past and requested to attend," said Nicely. South Dakota does not have a nearby leadership school, he said, which is why they made the trek.

The Chuck Yeager Chapter provided all the awards.

Retired Lt. Col. Lindy Williams, senior aerospace science instructor at Sullivan South High School in Kingsport, Tenn., led this year's school.

GOLDEN TRIANGLE CHAPTER

The Golden Triangle Chapter (Miss.) awarded high school teacher Susanna Oglesby with an AFA Chapter Teacher of the Year award for her efforts in STEM in August.

Chapter President Richard T. Johnson and Chapter VP for Aerospace Education E. J. Griffis—liaison between the high school and Columbus Air Force Base—joined Oglesby's family and more than 100 students and faculty at New Hope High School in Columbus in surprising her with the award.

Oglesby helped pilot an elementary robotics team last year and even attended the VEX Robotics Competition in April to learn about programs and to expose them at an early age.

"She is one of the most valuable and active teachers" at the school and "her help, guidance, and leadership ... are invaluable," wrote high school principal Matt Smith.

Photo by Tammy Frasher

Susanna Oglesby walks in to her surprise award ceremony at New Hope High School in Columbus, Miss., where Golden Triangle Chapter officials named her as the Chapter Teacher of the Year.

DOD photo by US Army Sgt. James McCann

Vice Chairman of the Joint Chiefs of Staff Gen. Paul Selva congratulates SSgt. Ernest Funue on receiving the Thomas Moorman Scholarship award. Funue's wife, Delphine, is on the right.

LEWIS E. LYLE CHAPTER

The Lewis E. Lyle Chapter recently presented its grades K-8 Teacher of the Year award to Eileen Freeman of St. Joseph's Catholic School in Paris, Ark., "for her outstanding STEM education work," said Chapter President Larry C. Louden. Louden personally made the drive to present Freeman with the award in June. Freeman is a sixth to eighth grade teacher.

In May, her middle school students won first place in two categories and second place in another during a state STEM competition. For one of the categories in which they won first, students built a "car that received a single push and coasted nearly around the track," wrote Freeman.

"It is such an honor to be recognized for the work we do," said Freeman.

Photo by Robin Schluterman

Lewis E. Lyle Chapter's Teacher of the Year Eileen Freeman helps her students at St. Joseph's Catholic School in Paris, Ark., prepare for a robotics competition using LEGO models.

DONALD W. STEELE CHAPTER

When it comes to finding guest speakers, it helps to be by the nation's capital. The Donald W. Steele Sr. Memorial Chapter invited the vice chairman of the joint chiefs of staff to speak at its chapter lunch in August in Arlington, Va.

Gen. Paul J. Selva spoke about the importance of STEM and how DOD is focusing on "leveraging the talent and advances of small nondefense-related businesses to help the military maintain its technology edge," said Chapter VP Christof P. Cordes. Selva acknowledged that today's technological successes are possible because students in the past pursued STEM education.

During the lunch, chapter officials recognized and awarded SSgt. Ernest Funue of the 779th Aeromedical Squadron with a $2,000 Thomas Moorman Scholarship as an outstanding enlisted person. Funue is a junior at Arizona State University studying electrical engineering. He's taking on "a full academic load" while on Active Duty, said Cordes.

Chapter officials also recognized eight scholarship recipients: SrA. Vincent Andrews, Connor DeVore, Noah Faaborg, Kaitlin Forsythe, Rebecca Frank, Tristan Hamrick, MSgt. Jason Logan, and Alexandria Savage.

Reunions

reunions@afa.org

23rd Wg Flying Tigers and American Volunteer Gp, past and present. March 9-11, 2017, in Valdosta, GA. **Contact:** (mcfly@flyingtigerreunion.org) (www.flyingtigerreunion.org).

601st and 615th Aircraft Control & Warning Sqs, Germany. April 24-28, 2017, in Myrtle Beach, SC. **Contact:** Fay Dickey (425-422-5171) (faydickey@gvtel.com).

Navigation cadet class reunion, Ellington AFB, TX (1952-53), May 2017. **Contact:** Charles Stearns (charles.stearns01@comcast.net).

USAF Military Tng Instructor Assn. Oct. 18-21 at JBSA-Lackland, TX. **Contact:** Jay Pavey (828-226-2409) (j.pavey@pdlawnc.com).

By Warren F. Neary

PAINTING AIR FORCE HISTORY

Warren Neary draws on details, facts, and his own artistic interpretations to portray Air Force stories.

I sold my first drawing in fifth grade.

A friend sitting behind me in class paid a dime for it.

So even as a young kid growing up in the Northwest, I was already drawing and painting. Art was my favorite subject in school, and I often drew pictures in class—everything from horses to ICBMs—while not paying much attention to anything else.

I remember drawing fighter jets in middle school with a friend, then asking our peers to decide whose artwork was the best. We were both strong artists, however, and neither one of us would concede to the other.

My parents both had a hand in my development as an artist. My mother provided art supplies and encouragement. My dad served as a missile launch officer in the Air Force for a few years when I was a child. That influenced my art—and my service today.

A FINE ARTS CADET

After high school and a two-year church mission to New Zealand, I pursued an art degree at Utah State University. The school had a strong representational art program in drawing, painting, and illustration. But I'm guessing there weren't many AFROTC cadets like me walking the halls of the fine arts building.

I was commissioned in 1998 as a communications officer and assigned to Whiteman AFB, Mo.

In my spare time I continued to develop my artistic knowledge and skills, painting landscapes and some

About the cover:
In his painting "Bandage 33," artist Warren Neary depicted combat controller TSgt. Zachary Rhyner—who had already earned an Air Force Cross in 2008—receiving life-saving care from Reservists SrA. Amanda Pena and Capt. Adriana Valadez during a medevac in Afghanistan in 2013. Rhyner retired from USAF in 2015.

Right: "Deterrence on Demand" shows AFRC 307th Bomb Wing airmen in a nuclear aircraft generation exercise at Barksdale AFB, La.

Left: "That Others May Live" captures the moment after a helicopter landed to rescue Navy SEAL Marcus Luttrell in Afghanistan. Static electricity between the rotor blades and sand created the green rings.

Right: Neary painted "Defending Freedom—Joint Task Force Guantanamo Bay" during a deployment to Cuba.

Below: "Ghost Over the Highway" is Neary's most recent painting. It shows an AC-130 crew in Desert Storm. This artwork will be exhibited at the Pentagon, outside the Office of the Chief of the Air Force Reserve.

figurative work. My art was displayed at regional galleries.

I learned about the Air Force Art Program and its collection while stationed at Whiteman. The program began in 1950 with art documenting the Air Corps, and in the past it arranged for artists to visit Air Force installations to produce artwork later donated to the service.

I wanted a shot at getting into the Air Force Art Collection, but was told it was for professional-level artists. However, I was determined and in 2000 completed my first historical painting—depicting the missions of Whiteman since World War II—and submitted it to the Air Force Art Program.

PAINTING GUANTANAMO

I was on a deployment from 2002 to 2003 as deputy public affairs officer for Joint Task Force-Guantanamo Bay, Cuba, when I learned that the art program had accepted my painting for the collection. I was delighted.

Toward the end of this deployment, Army Lt. Col. Barry Johnson, the JTF-GTMO public affairs officer, encouraged me to paint the detainee detention operations. Some of the soldiers in our unit became my models for various aspects of this artwork, later accepted into the permanent collection of the US Army Center of Military History.

SPACE ART

I separated from Active Duty after eight years and am now an individual mobilization augmentee—a historian at Air Force Reserve Command headquarters, Robins AFB, Ga. I'm also a civil service historian for the Air Force Network Integration Center at Scott AFB, Ill.

Soon after I became a Reservist, George W. Bradley III, the command historian for Air Force Space Command

COMPOSITION, COLOR, AND LIGHT

The Artist Describes His Creative Process

I draw the composition to capture the main design of the shapes, paying attention to their placement in the whole composition. Like a director, I determine the leading role player and the supporting cast.

I take photos and in many cases ask the model to hold a position while I quickly paint a color and value study. Cameras don't "see" the way we do, they are not selective, and they are void of emotion. So I use these color and value studies along with photos to help develop the final painting.

Painting is about relationships. I can paint the effect of light by establishing the relationship in the value jumps from one element in the painting to another. Through emphasis and subordination, I create focal points for the viewer's eyes to travel through a painting.

at Peterson AFB, Colo., invited me to serve as a history officer and artist for AFSPC. I was working on a master's degree in fine art at San Francisco's Academy of Art University, one of the best representational art programs in the country, and was significantly increasing my skill level. Working as a historian on the AFSPC history staff would be a great opportunity to marry my artist's skills with a public affairs background.

Bradley told me that less than one percent of the art in the Air Force Art Collection depicted the missions of space, so over the course of a few years, I completed a number of paintings highlighting this area. Most were large, multifaceted works.

NOT ALL HARDWARE

Paintings in the art collection also tend to be about hardware and weapon systems; there is a need for more paintings of airmen performing their missions—especially art tied to significant historic events.

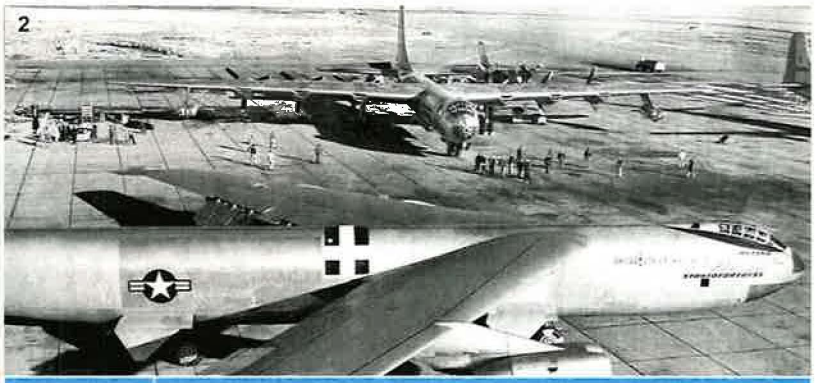
James Malachowski, the Air Force Reserve Command historian, has helped me understand how to tie artifacts, photos, and source documents together.

Once the history staff and I settle on an event to depict, I set to work, researching and talking to members who participated in the mission.

I try to capture details and the facts of a story, and I think about how to portray the idea. Although I'm allowed some artistic freedom and interpretation, I strive to be as faithful as possible to each event.

As a historian I feel lucky to be able to preserve Air Force heritage not only in words but with a brush. ✪

Maj. Warren F. Neary has 25 paintings in the US Air Force Art Collection. He is a member of the Carl Vinson Memorial Chapter in Georgia. In 2015, a Utah art gallery sold one of his landscapes for more than $15,000.



CARSWELL

The Heroics of Horace Carswell

Few Americans can lay claim to a college football national championship ring, a Distinguished Service Cross, *and* a Medal of Honor. In fact, there may have been only one such person: Maj. Horace Seaver Carswell Jr., the B-24 pilot whose name for some 45 years graced a famous Strategic Air Command base in Texas.

Carswell, a superb Fort Worth high school athlete, entered Texas A&M in 1934, but at 160 pounds, was deemed too small for Aggie football. He switched to Texas Christian University, and it proved to be a lucky break. TCU in 1938—his senior year—went undefeated and was crowned champion of the collegiate football ranks. Among his teammates were two famous QBs—Sammy Baugh and Davey O'Brien.

Carswell's true heroics were yet to come. He enlisted in the Air Corps, received a commission, and began flying B-24 bombers. In 1944, he went to China where he linked up with Maj. Gen. Claire L. Chennault's Fourteenth Air Force. Chennault had a small force of B-24s, used often in one-bomber raids on Japanese naval targets.

On Oct. 15, 1944, Carswell and his crew took off on a solo sweep of the South China Sea, where they found a group of Japanese warships. Carswell's B-24, flying through dense anti-aircraft fire, sank a cruiser and incapacitated a destroyer. Carswell received the DSC (it would now be an Air Force Cross) for "personal courage and zealous devotion to duty."

On Oct. 26, Carswell undertook a night mission against a convoy of 12 cargo ships escorted by destroyers. He ran in low and struck a destroyer. On a second low-level pass, the B-24 was hit by enemy fire, which knocked out two of the four engines, damaged a third, and wounded the copilot. He was replaced by another pilot, Lt. James L. O'Neal.

Carswell righted the struggling bomber mere feet above the water and flew west, hoping to reach China for a bailout. When they reached land, the bombardier, Lt. Walter H. Hillier, saw that flak had shredded his parachute. Carswell changed plans, deciding to try to nurse the B-24 over a mountain range and reach a friendly airfield.

Before the Liberator could cross the mountain ridge, a third engine failed. Eight crew members bailed out, but Carswell and O'Neal chose to stay with Hillier and attempt a crash-landing. The crippled bomber didn't make it; it flew into a mountainside and exploded.

Carswell posthumously received the Medal of Honor for his valor that night. The citation read, "With consummate gallantry and intrepidity, Major Carswell gave his life in a supreme effort to save all members of his crew. His sacrifice [was] far beyond that required of him." He was buried at a nearby Catholic mission—the first of six different resting places. He was subsequently reinterred once in China, once in Hawaii, and three times in Fort Worth.

Carswell Air Force Base, so named in 1948, was long the home of SAC heavy bombers and was open until 1994, when USAF passed it to the Navy. Today, it goes by the name Naval Air Station Joint Reserve Base Fort Worth. Several Air Guard and Reserve units are based there. One airstrip is still called "Carswell Field." ✪

HORACE SEAVER CARSWELL JR.

Born: July 18, 1916, Fort Worth, Texas
Died: Oct. 26, 1944 (KIA) Tungchen, China
Colleges: Texas A&M, Texas Christian University
Service: United States Air Corps and Army Air Forces
Era: World War II
Years of Service: 1940-44
Grade: Major
Honors: Medal of Honor, Distinguished Service Cross, Distinguished Flying Cross, Purple Heart, Air Medal
Occupation: US military officer
Famous Friends: Sammy Baugh (two-time All American, NFL Hall of Fame) and Davey O'Brien (Heisman Trophy)

CARSWELL AIR FORCE BASE

State: Texas
Status: Closed (but reopened by Navy)
Opened (by USAAF): 1941
Original Name: Tarrant Field Airdrome
Renamed: Fort Worth Army Airfield (1942);
Renamed: Griffiss AFB (1948);
Renamed: Carswell AFB (1948)
Closed (as full AFB): Sept. 30, 1993
Closed (as Air Reserve Base): Sept. 30, 1994
Reopened (by US Navy): Oct. 1, 1994
Renamed: NAS JRB Fort Worth
Area: 4.1 sq mi / 2,619 acres
Nearest City: Fort Worth
Current Owner: United States Navy
Home of: 301st Fighter Wing (AFRC)
USAF Presence: ANG and AFRC units

1. Horace Carswell. **2.** Carswell AFB, Texas, as a SAC base in 1955. **3.** An F-16 of the 301st Fighter Wing at Carswell.