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AIR FORCE MAGAZINE

CYBER WARRIORS FIGHT AMERICA'S MOST ACTIVE WAR

And they can't say much about it. p. 38

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By Adam J. Hebert, Editor in Chief

A Simple Lesson From 26 Murders in Texas

NOVEMBER 16, 2017—

An oversimplified, straight-line description of how Devin P. Kelley's criminal life reached its apex hinges on a bureaucratic failure. One can reasonably argue that Kelley was able to buy the weapons he used to murder 26 churchgoers in Texas because the Air Force failed to inform the FBI that Kelley was a convicted felon.

USAF knew Kelley was a problem. The service sentenced him to a year of confinement for violently assaulting his wife and stepson and kicked him out of the Air Force. What the service didn't do next may have allowed Kelley to fully realize his violent instincts.

Devin Kelley's brutal rampage is a reminder that USAF must perform routine bureaucratic tasks with the same precision it shows at war.

To its credit, the Air Force has owned this from the beginning. Service spokeswoman Ann Stefanek released a detailed statement Nov. 6, the day after the shooting, explaining, "federal law prohibited [Kelley] from buying or possessing firearms" after his court-martial. Tragically, his domestic violence conviction "was not entered in the National Criminal Information Center database by the Holloman [AFB, N.M.] Office of Special Investigations."

The offenses "should have been reported and that's why we launched a full-scale review of this case and all others like it," said Air Force Secretary Heather Wilson the same week.

Had the Air Force updated this database, Kelley would not have been able to purchase guns from licensed dealers. Instead, his background checks came back clean and Kelley purchased body armor and weapons at least twice. The weapons included the Ruger AR-556 rifle he used to shoot up the First Baptist Church in Sutherland Springs, Texas.

There is no way of knowing what would have later happened had the Air Force properly updated the FBI's no-buy list. Kelley was clearly a very disturbed, chronically violent individual. Still, USAF made a terrible error.

A brief look at Kelley's life from the time he entered the Air Force shows a ticking time bomb. For our purposes, this story can begin in 2010, when Kelley enlisted and underwent training at Lackland and Goodfellow Air Force bases in Texas. In 2011, he was assigned to Holloman AFB, N.M., as a traffic management/logistics readiness airman.

Between April 2011 and April 2012, Kelley on multiple occasions physically attacked his then-wife and infant stepson. Then, in June 2012, police picked him up at an El Paso, Texas, bus station, but not for assault, battery, domestic abuse, or child endangerment.

Why then? According to television station KPRC Houston, the staff at Peak Behavioral Health Services, a mental health institute in Santa Teresa, N.M., had reported him missing after he jumped a fence to escape the facility. The police report said a staffer informed them Kelley had previously been caught sneaking firearms onto Holloman and had threatened to kill some of his superiors. Kelley was soon back in Air Force custody and was convicted of two counts of domestic violence.

In November 2012, his official duty title changed to "Prisoner."

The Air Force does not operate prisons, so Kelley spent a year in "confinement at Naval Consolidated Brig Miramar in California before being released with a bad conduct discharge and reduction in grade to E-1," according to a service release.

Kelley's 12-month conviction was a *de facto* felony, which should have prohibited his later firearms purchases. The Air Force is moving quickly to determine what went wrong with the notification and how widespread this is.

Both the Air Force and Defense Department inspectors general are looking into the incident, as they should.

Nearly half of the worshippers killed in Sutherland, which is near San Antonio and its huge Air Force community, had ties to the service. Twelve victims were "directly connected to the Air Force, either members or though family ties," said Gen. David L. Goldfein, Chief of Staff, at a Nov. 9 briefing.

"We're ensuring that all of our resources are being made available to the families," Goldfein added, including use of the San Antonio Military Medical Center, which "already treated eight victims of the shooting," he said.

At press time, there were still many unanswered questions.

- How did the Air Force miss the critical step of updating the FBI's database?
- How common is this problem within the Air Force and with DOD overall?
- How many unregistered, violent, prior-service felons need records updates?
- What happens in cases where former military criminals now illegally own guns?
- And most important of all: What will USAF do to ensure this sort of mistake never happens again?

SECAF Heather Wilson and Chief of Staff Gen. David Goldfein take questions at the Pentagon Nov. 9, 2017.

Photo: SSgt. Rusty Frank

Letters

One Way Nukes

Thanks to John Lowery for his great article "The One-Way Nuclear Mission" [October/November, p. 104]. Brought back fond memories of my Super Sabre days. I wasn't among the first Victor Alert guys in Europe discussed in Lowery's article but I did sit on the bomb there in late 1965. I had just completed gunnery training at Luke AFB, Ariz. (that included the LABS [low-altitude bombing system]) and was assigned to Myrtle Beach where I was told to quickly study up on a nuclear target and brief the wing commander and DO for certification. I was then off TDY to Incirlik AB, Turkey, arriving in December 1965. We had the newer F-100D symmetrically configured with the bomb on the centerline and 275-gallon fuel tanks on the wing intermediate stations. It was still a one-way mission, and I remember my termination point was some small airstrip out in the middle of nowhere. JFK had the PAL [permissive action link] enable on all the bombs in Europe by then but when we had a practice alert; blew carts to start engines, system checks, comm checks. I'll never forget the first time looking up and seeing a huge fire truck pulling across in front of me. This lieutenant wasn't going anywhere with that bomb.

Col. Mike Sexton,
USAF (Ret.)
Albuquerque, N.M.

In addition to the Victor Alert there was the little known Zulu Alert. C-123s and C-119s TDY from bases in France were on Zero Alert at Bitburg, Spangdahlem, and Ramstein loaded with nuclear cores destined for USAF fighters based in France. President [Charles] de Gaulle would not permit nuclear weapons in France, so if the balloon went up we were to take the cores over there and come back to Germany for a second load. That was the plan but many of us thought that if we got to France successfully, there would be a question like, "What's the heading to Lisbon?"

James D. Carson
Mineral, Va.

I particularly like John Lowery's article on nuclear alert in USAFE. I'll bet I am one of many Phantom pilots feeling a little left out—same with my Aardvark friends—by the omission of these two jets. From the time the Thuds departed until the Eagles and Falcons came on the scene the F-4s and F-111s from Lakenheath, Bentwaters, Upper Heyford, Woodbridge, Bitburg, Hahn, Spangdalem, and Ramstein set the "Q" at home and at Aviano and the Lick. I clearly remember looking at some of the mission folders used by the Huns out of Turkey and their profiles devised before the SA-5, 6, 8, and 11s sprouted across the Warsaw Pact and the Soviet Union. Thankfully we had some better avionics and speed (especially the F-111s). No doubt our survivability was about the same. I remember the intel briefs suggesting not to eat any meat we came upon "close' to the bone, and to stay undercover for at least seven days after the last nuclear detonation. Sure.

Regarding the Hun, it would be very interesting some day to learn more about the "Slick Chick" F-100As that flew the lines in Europe and out of Taiwan by our Nationalist Chinese friends.

Finally, in either 1971 or 1972, I realized things were getting tight when the gold coins were taken out of the Victor Alert survival packs in the squadron safe and sent elsewhere. That was where the rubber met the road on Operation Gold Flow.

Col. Steve Mosier,
USAF (Ret.)
Marietta, Ga.

The article absolutely shocked me. When I was serving with the 81st TFW at RAF Station Bentwaters-Woodbridge as chief of programs and deputy base civil engineer in the time period 1963-67, for this dual base, it was common belief that the 81st, with F-101s, had invented the over-the-shoulder tactical nuclear delivery technique and practiced it in the North Sea. The wing commander and deputy for operations at this time, until they shipped to Thailand and the 81st" virtually recreated itself there as the 8th TFW, was Col. Robin Olds, the wing commander, and Chappie James later promoted to colonel, as vice commander.

The story was that this delivery technique had extended the life of the F-101 with its sole remaining duty being an RF-101 Wing in France. Our third squadron had F-100s at RAF Station Woodbridge, but our nuclear weapon storage was at RAF Station Bentwaters—or, at least I, along with our Ministry of Public Works leaders and craftsmen, were led to believe it was nuclear weapon storage.

This was not the kind of rumor normally passed to a captain civil engineer, accepted as fact, and then reinforced by everyone I knew in the wing. If the pilots were not trained in the F-101s at RAF Station Bentwaters and were not equipped to deliver tactical nuclear weapons in the over-the-shoulder technique as it was even called then, it is one of the giant hoaxes or effective security decoy exercises I ever experienced in my 28 years of service.

If only F-100s and their pilots were trained in this delivery technique, all the maintenance of nuclear weapons storage at Bentwaters and training interchange of pilots between the wing's F-101 and F-100 squadrons was evidently done in very successful secrecy from RAF Station Woodbridge. In my four years there, it is true that I never personally observed validated nuclear weapons in our heavily secured bunkers. My frequent position as "Broken Arrow commander" for nuclear weapon accident exercises at RAF Station Bentwaters does not amuse me at this moment, if the hoax is true.

I take that back, I am not only shocked, but also amused.

Col. William R. Sims,
USAF (Ret.)
San Antonio

WRITE TO US

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 or email us at 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

The article entitled "The One-Way Nuclear Mission" brought to mind the SIOP planning my pilot and I did between the 1967-1968 combat cruises to the Gulf of Tonkin of VA-196 on the *USS Constellation.* Today's young Hornet pilots may not be aware that Naval Air was part of the plan to use strategic nuclear strikes with the A-3, A-4, A-5 (RA-5C photo recce) and the venerable A-6 Intruder, arguably the best nuclear delivery aircraft the US Navy ever fielded.

Our mission was to deliver a single nuclear device about 1,000 miles inland from the Pacific Ocean coast and hopefully make it back at least as far as that same coastal area before ejecting after expending all our fuel, hoping for one of our ships to retrieve us. Even with four drop tanks flying low level for 2,000 miles was an iffy proposition in the old Intruder. If we eject over land ... well, who knows? Flying a practice profile from Whidbey Island, Wash., to the southern California Chocolate Mountains bombing range and conducting loading drills between line periods while on Yankee Station were grim reminders that we may actually have to fly that mission someday.

Phil Waters
Arvada, Colo.

My first enlistment and second NATO rotation from Cannon AFB, N.M., to Incirlik AB, Turkey (October '61 to February '62). Deployed this time as a trained and certified weapons load crew member in addition to my normal duties as a fire control systems mechanic (AFSC 32250B).

I got to spend five weeks of the four-month rotation at the Victor Alert facility where we loaded Mk 28s on the F-100D's centerline station and four AIM9 Sidewinders on the inboard wing stations. Four aircraft were assigned to the Victor Alert facility.

If the order came down to launch these aircraft and to comply with the "two-man concept" that was in effect at the time it was my job to physically 'arm' the bomb on the centerline after the pilot had powered up the aircraft and was preparing to scramble from the Victor Alert facility, a big responsibility for one recently promoted to A1C.

CMSgt. Jerome T. Czeikus,
USAF (Ret.)
Victorville, Calif.

Rolling Thunder

In the October/November issue, the article concerning Rolling Thunder included a photo of the Korat flight line on p. 73. I was there much later, during Linebacker, but am familiar with the various ramps there. If you look closely, you will find only EC-121s and EB-66s on the near ramp. The middle ramp was called the Thai ramp, but we had all 24 of our F-105Gs there, along with some Thai UH-1s when I was there. The far ramp had F-4s and during Linebacker II even had A-7Ds, while AC-130s and C-130Hs occupied spots on the near ramp. The photo shows just seven Thuds and seven UH-1s on the Thai ramp. We had quite a mix of missions and aircraft during Linebacker I and II!

Thanks for a great magazine!

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

Contributor John T. Correll's informative article on Rolling Thunder harkened me back to my active duty days as an Air War College student.

I had selected Rolling Thunder as the topic for my research report and sought ways to make it special.

Luckily I married into a family rich in Air Force history. I had a couple of aces up my sleeve and played both cards in an attempt to add first person perspective to my paper.

My father-in-law was then-Maj. Joseph D. Moore. During Rolling Thunder he was an F-4 pilot and 31st Tactical Fighter Wing tactics officer at Udorn RTAFB, Thailand. He flew with Col. Robin Olds and his legendary Wolfpack.

His father was then-Maj. Gen. Joseph H. Moore, the 2nd Air Division commander and deputy commander for air operations, US Military Assistance Command, Vietnam, and later 7th AF commander. As such he was the senior Air Force advisor to Gen. [William] Westmoreland, the commander of MACV. Moore and Westmoreland were both Eagle Scouts growing up back in Spartanburg, South Carolina, so they enjoyed a great working relationship. "Westy," as his friends knew him, aspired to be a pilot but after graduation from West Point he failed the eye exam.

My Moore interviews collaborated many of the points that Correll makes in his article.

General Moore contended that the Air Force was, "not effective in knocking out the will to fight of the North Vietnamese because we weren't allowed to hit those targets that would have done that."

He noted that, "Targets, number of planes, types of bombs, and times for attacks were all directed by Washington. Weather delays were not allowed nor alternate targets authorized."

Major Moore's observations dovetailed nicely with that of his father. "The limits of our airpower were our civilian masters, who attempted to control every aspect of the combat. "We had the military strength and the capability to bring NVN to its knees at any time, even to the end, had LBJ or later Nixon told us to win."

Major Moore continued, "Most of my ilk in those days came out of the, "Yes Sir, No Sir, No excuse Sir!" mold and were highly disciplined and unabashed patriots. If they had not paid us, we would have paid them to do what we loved to do."

That included officers like Moore's longtime friend, Gen. William Kirk, who passed away earlier this year, and is shown in the photo accompanying Correll's article carrying Colonel Olds off the airfield.

Major Moore highlighted news reports on the predictability of US air strikes. He recalled, "NVN gunners would rise early, do their housecleaning, have breakfast, and then man their guns for the first strikes. They'd then head back to their quarters for their midday meal, do chores or take a nap, and return to their guns for the afternoon go before they shut down for the night."

Sadly both, Lieutenant General Moore and his son Major General Moore, are now deceased but they left lasting marks on the Air Force they loved.

Just for the record, I got a "marginal" on my research paper. Lesson learned—just stick with the school solution!

Col. Bill Malec,
USAF (Ret.)
O'Fallon, Ill.

The October/November issue is the best issue I have read in a long time. It brought back many memories of my tour at Korat RTAFB, Thailand, from March 1972 to April 1973. I flew the EB-66 during that time and participated during the entire Linebacker campaign, including the Bat 21 rescue operation.

I must point out an error in the labeling of photo No. 3 on p. 73. The flight line shown was at one end of the airfield and the photo shows EB-66, EC-121, and one C-130 aircraft; no F-105's are shown. All the "cats and

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dogs" aircraft were based at one end of the airfield and the fighters at the other end. I believe that the C-130 in the photo is an ABCCC model as they were based there also.

Thanks for an outstanding issue.

Lt. Col. John Briggs,
USAF (Ret.)
Green Valley, Ariz.

In photo No. 3 of the Korat flight line on p. 73, the caption states that it shows USAF C-121s and F-105s.

I have to congratulate the USAF camouflage experts for their excellent work of making those F-105s look just like B-66s.

Lt. Col. Addison Thompson,
USAF (Ret.)
Santa Barbara, Calif.

Space Corps

Reading your article "The Space Corps Question," *Air Force Magazine,* October/November, p. 42, I was surprised to see no reference to the Navy and Army. The arguments for greater coherence, improved programmatic and fiscal management, and better esprit de corps for military space could surely be applied to Navy and Army space programs as well as to those of the Air Force. You quote Rep. Mike Rogers (R-Ala.) as saying that his action would put space "on a par with" other combat domains like air and sea. The land domain is notably absent from this list, as are, implicitly, the Army space programs.

There seems to be an inconsistency in Rogers' proposal and your description of it. You quote him as proposing a "Space Corps within the Air Force." You refer to a "potential new branch of the armed forces," but a unit within the Air Force is not a new branch of military service.

You describe the establishment of a new Air Staff position, A11, as a response to the Rogers' initiative. It is interesting that there already exists an Air Force deputy undersecretary for space programs. If space forces are to become a truly joint military element, would the same organizational imperative not apply to the Army Staff, the Navy Staff, the Joint Staff, and the Office of the Secretary of Defense as well?

I respectfully suggest that you get back to Representative Rogers for clarification of these points, the most important of which is: "Why not include the Army and Navy space programs in the new United States Space Force?

Brig. Gen. William L. Shields,
USAF (Ret.)
Tucson, Ariz.

Fall Down, Already

In reference to: "Verbatim: Milley the Myth Slayer," October/November, p. 20:

One of the best things about being retired is being able to speak truth without undue regard for current "climate" or politics. That said, Army Chief, General [Mark A.] Milley's saying, "[It is a myth that] you can win wars from afar ..." well-summarizes the outdated, "dino's fighting in the dirt," linear thinking that's defined all armies, including ours, and, sadly, continues to hold sway in Washington because of "Land/Sea Battle" influence (and budget protecting). Channeling two of our greatest visionaries and strategically most knowledgeable aerospace generals, Billy Mitchell and [Curtis] LeMay, you, sir, are woefully wrong.

The "win the ground" antiquated idea has been factually passé for a long time. Dead, but just won't fall down. Reality changed over the last 70 to 100 years while Armies have been (obviously, still are) looking mostly down and out front to the horizon, NOT up and over this relatively small ball in air and space, with precisely guided drone to ICBM-sized weapons that—used properly—inherently redefine "winning."

Can't win wars from afar? Tell that to Hiroshima and Nagasaki and the nation of Japan. Tell it to Ho Chi Minh after the December '72 "11-Day War." In fact—other than honorably doing, at huge cost of blood and dollars, what it has been asked to by misled national leadership—WHAT, exactly, has the US Army done since World War II in terms of preventing war; failing that, win war at the lowest cost to the United States? Where, sir, have you actually "won" in the big picture, "house-by-house, block-by-block, room-by-room?"

Maj. J. Andrew Clark,
USAF (Ret.)
Murray, Utah

Counting the Minutes

The cover article, "Fuel From the Desert" in the October/November issue, p. 30, got me to thinking, "How much time have I spent on the bottom end of a refueling boom?" Pilots don't actually

break out the time they spend refueling, so I had to make an educated guess.

For a total of 10 years I flew B-47 and B-52 bombers in Strategic Air Command. We flew an average of once a week for at least 45 weeks each year. And we spent 30 minutes practicing refueling on each flight. So, I estimate that I flew about 450 flights during that 10 years and spent about 225 hours on the bottom end of the refueling boom.

I can't speak for the fighter pilots and especially those who use the probe and drogue system. But in the B-47 and B-52, refueling was really very easy. In the B-47, the pilot sat in the front cockpit with the copilot behind him. Pulling up behind the tanker, you simply put his wings in your windshield and kept them centered and level, like flying the attitude gyro. We frequently followed the tanker through turns. The same technique wasn't really applicable in the B-52, but the airplane was so stable that, once in the refueling position, you could hand-fly the airplane with your fingertips.

Anyway, midair refueling was fun. It reminded me of my fighter pilot days when I flew the slot in a diamond formation.

Lt. Col. Alfred J. D'Amario,
USAF (Ret.)
Hudson, Fla.

Your article, "Fuel from the Desert" (October/November, p. 30), was a great read for me. The focus, of course, was on air-to-air refueling and the airmen who are vital to this mission. There was some mention of the maintainers on the flight line giving attention to the aircraft assuring that they are airworthy and ready for the next mission. Also to the airmen who load cargo onto the aircraft. What was missing (oversight) from the article and what is a vital ingredient to the refueling cycle, is the POL base refueling section. The slogan "No Kick-Ass Without Tanker Gas" is certainly true, including the airmen of the base refueling section. I served with the 354th TFW at Myrtle Beach AFB, S.C. (Col. Francis S. Gabreski, wing commander), participated in the TAC/CASF operation to Lebanon and Turkey in 1958 flying over in a C-130, and duty with the 1400 MATS Wing at Keflavik, Iceland. My duties in all operations was flight line refueling support when the aircraft returned to the base. The birds always had to be topped off and ready to go. Those years, we drove to the parked F-100 and F-89 fighters with self-contained refueling units, the F-6, the F-7, and the MK1. Our slogan was "You Call, We Haul." I feel that some mention of the base refueling support would have been appropriate to complete full circle the refueling the flight article. Hopefully, in a future issue, the base refueling airmen, duties, and mission will be featured.

David Ribbe
Nanuet, N.Y.

As an air mobility practitioner (now an analyst), I was gratified by Brian W. Everstine's, "Fuel from the Desert," in the October/November issue [p. 30]. Mr. Everstine writes well and his focus on the essentiality of lifters and refuelers in American air campaigns is spot-on.

There is an issue in the background of Everstine's article that bears more treatment in a future article—modernization.

DOD and the Air Force need to update their tanker force structure and planning paradigms from one inherited from the 1950s to a more flexible concept; one reflecting the basing and operational agilities needed now. In order, the priorities of this paradigm likely will be to:

- Accelerate the KC-46A program, to replace as many geriatric and maintenance-intensive KC-135s with these more capable aircraft as quickly as possible.
- Acquire a fleet component of theater refuelers, optimized for agile operations in regions not endowed with networks of secure first-class airfields. The ability of these aircraft to operate from shorter runways, forward arming and refueling points (FARPs), and off-concrete parking spots would improve their survivability, available tanker capacity, and ability to support operational surges. They also would be essential elements of emerging Air Force operational concepts, such as Agile Combat Employment (ACE). Fortunately, the in-production statuses of drogue-equipped Airbus A400Ms, Lockheed KC-130Js, and Embraer KC-390s, suggests the possibility of an early competition for an aircraft able to download the Air Force's boom-equipped fleet, by supporting Navy, Marine Corps, and allied aircraft.
- Acquire a fleet element of very high-capacity, very long-range tankers, possibly designed for stealth. Perhaps the most important advantage of these aircraft would be their ability to support quick-response, global strike operations from bases located in the homeland or the territories of secure allies.

Clearly, I'm writing ahead of the library of detailed research and policy decisions necessary in the next few years to settle the details of the tanker fleet's future. But, if we are to escape the perils of old-think in a new era, we need to confront the world as it likely will be, not as it once was.

Col. Robert C. Owen,
USAF (Ret.)
Port Orange, Fla.

BEEF Over Band

After reading "Banding Together" (October/November, p. 79), I find myself in agreement with those who question the expense and the need for military bands. The article states the band operation and maintenance funding is $9.7 million, without saying whether that amount includes transportation and lodging when the bands are travelling. Add in the salaries of the band members, housing and subsistence allowances, uniform allowance (how many other AFSC's require an E-5 to have a mess dress uniform?), and per diem, and the cost goes up considerably. I have seen quoted elsewhere a figure of $437 million annually for all the bands and orchestras within the four services in the Department of Defense. There are many places where that money could be used more effectively to support the combat mission and readiness.

I'll give an example based on my own experience. There are upward of 140 Prime BEEF Civil Engineer squadrons in the Air Force Reserve and Air National Guard. These squadrons lack the vehicular heavy equipment they need to do the jobs expected of them when deployed. If they go into a USAF-owned main operating base like Ramstein, Aviano, or Kadena the equipment they need will be there. But if they go to a colocated operating base owned by an ally, such equipment may or may not be available, and if they go to a bare base or an area that has suffered a natural disaster such as the recent one in Puerto Rico, it WON'T be there. Just unloading the airplane when they get to their destination will be a chore, since the cargo pallets will have to be broken down and unloaded by hand. Civil engineer troops will move mountains—literally, if necessary—when asked, however as in any endeavor, they need the right tools.

Picks and shovels are not enough. In my not-so-humble opinion, the three

pieces of equipment that any Prime BEEF team needs are an articulated bucket loader with a conversion kit allowing it to also be used as an all-terrain forklift, a backhoe similar to those used by civilian construction contractors, and an M105 bulldozer the same as those used by Army combat engineers. All three machines are air transportable by C-130, and if purchased in quantity, the cost would be around $1 million per squadron. Assuming the $437 million annual cost of military bands is correct, one-third of that amount would be sufficient to equip every Reserve and Guard Civil Engineer unit.

Bands and orchestras are nice, but not a necessity. Let's put the taxpayers' money where it will best support the mission.

Lt. Col. Rock Desilets,
USAFR (Ret.)
Windsor, Conn.

Stalingrad

This was another superb article by John Correll ["Turning Point at Stalingrad," October/November, p. 98]. The German airlift to Stalingrad failed for a number of reasons. I think one of the underemphasized reasons was the state of the airfields. Earlier in 1942, the Germans made a successful airlift to nearly 100,00 troops surrounded at Demyansk. They averaged 300 tons of supplies per day versus the 117 tons of the Stalingrad operation. The number of aircraft used was about the same in both cases, but a big difference was the condition of the airfields inside the pockets. Demyansk was much further north. The Germans used compressed snow airfields and the weather kept them solid. In Stalingrad, it was different. Sometimes it was freezing and sometimes it thawed. When it thawed there was mud, and this was deadly for aircraft landing. I think a good portion of the Stalingrad aircraft losses can be attributed to this. From Guadacanal to the Berlin Airlift, the US used pierced steel planking (PSP) to combat muddy conditions. It worked. The Germans didn't use PSP and paid the price. What today's Air Force might keep in mind is that the conditioning of forward airfields might be as important as having good transport aircraft. How much thought is being given to this subject? For example, during the Berlin Airlift, the creative people in the Air Force brought in heavy earth moving equipment that would not fit in a C-54 by cutting it into pieces with torches and then welding the pieces back together inside Berlin. Has any thought been given to having heavy earth moving equipment broken into pieces that could be transported by an Osprey and then put back together at the site of a future airfield?

William Thayer
San Diego

Aperture

I could not agree more strongly with Gen. David L. Goldfein's interest in getting more airmen into top regional commands ["Aperture," October/November, p. 12], but wish he had also called for making airmen the head of these commands. Few students of warfare would disagree with the statement that since the invention of the airplane, air forces have played the dominant role in defeating the opposing air force. Nor would they question the fact that beginning in World War II airpower has been the key to defeating the opposing navy. Given the dominant role airpower plays in defeating opposing air forces and navies, most would agree that airmen are best qualified for being in charge of employing airpower in these campaigns.

Given these developments, it is surprising that few Americans seem to be aware that beginning in 1944 US airpower has been the key to the defeat of opposing mechanized armies. While most American soldiers might disagree with this statement, opposing soldiers whether they are German, North Korean, Chinese, North Vietnamese (1972), or Iraqis and who have been on the receiving end of US airpower have little doubt that US airpower played the dominant role in their defeat.

What is most puzzling is that until recently US airmen, with few exceptions like Lt. Gen. O.P. Weyland, have recognized that airpower has revolutionized warfare on land and that airmen should be in charge of these campaigns. Evidence that many airmen have not recognized that this revolution in land warfare has occurred can be seen in their failure to appreciate the key role the Joint Surveillance Target Attack Radar System (JSTARS) plays through its unprecedented ability to detect and target the maneuver of opposing mechanized land forces as was demonstrated in Operation Desert Storm in the Battle of Al Khafji. This failure to appreciate the importance of JSTARS to the revolution in land warfare may be traced to the poor understanding too many airmen have of the vital role vehicular movement plays in the exercise of operational art in land warfare.

Lt. Col. Price T. Bingham,
USAF (Ret.)
Melbourne, Fla.

Supervisor Pressure

The squadron has an ops mission and a morale and welfare mission ["Revitalizing the Squadron," October/November, p. 36]. The CC has to understand the difference. Sometimes he/she has to decide between the two. A key player in [their] decision is the first sergeant. The ops side has to be 100 percent dedicated to the mission. The first sergeant has to be 50 percent mission and 50 percent morale and welfare. Only the first sergeant has "morale and welfare" in his job description. The ops guys can't always provide the morale support that the troops need—enter the first shirt. In my tenure there were some supervisors that consistently needed guidance in this area. There were others that could juggle all the balls. Both types were good mission managers. I didn't win all the battles defending my side. It is essential that the first shirt understand the pressure that the ops supervisors are under. The sequestration caused the problem. The unit organization is sound. Let's not get carried away with using the latest civilian corporate structural objectives to fix a uniquely military problem. Get back to basics —put more money in training first sergeants. The squadron unit has survived for decades. Note: I'm not convinced that all 10-year master sergeants are mature enough to be effective. The first sergeant has to love his job. He won't have many close friends in the unit, but at the end of the day he will know that he has affected lives.

CMSgt. Leon T. Jarrett,
USAF (Ret.)
Surprise, Ariz.

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By John A. Tirpak, Editorial Director

A DETERRING PRICE OF DETERRENCE

Even among jaded defense program watchers, a trillion dollars is still a sobering number. The defense community in Washington was rendered very sober in November when the Congressional Budget Office, in a new report, added up all the nuclear modernization programs now underway in the Navy and Air Force and concluded that pursuing them all will cost about $1.242 trillion, in 2017 dollars. That figure is about 20 percent larger than calculated under the previous administration, the CBO said.

Of that breathtaking figure, modernization costs—buying replacements for today's obsolescent nuclear weapons and the secure communications enterprise for their command and control—will cost about $400 million. The other roughly $800 million represents the expense of operating and sustaining them (and modestly upgrading them) over 30 years, including the Department of Energy costs to maintain an enterprise for building and testing the nuclear warheads themselves.

The CBO is billed as a nonpartisan analysis agency.

The report, "Approaches for Managing the Costs of US Nuclear Forces, 2017 to 2046," offers unusual insight into the dollars attending nuclear weapons, as such numbers have often been kept secret. The $1.2 trillion estimate was predicated on fulfilling the nuclear programs as they were outlined in President Barack Obama's last defense budget. In case President Donald Trump wants to make revisions, the CBO offered a number of ways that sum could be reduced; chiefly by postponing modernization or eliminating some systems entirely, necking down from a nuclear triad to a dyad. But the CBO found few ways to dramatically reduce the overall price tag.

Due to the rising costs of modernization, the CBO warned that the cost of the nuclear weapons enterprise will rise from about $29 billion annually today to about $50 billion a year in the early 2030s, unless huge changes are made to the plan. The CBO dryly observed that, absent new infusions of cash for the nuclear modernization effort, these programs will compete with conventional programs for funds. This pressure on conventional programs would be additive to the prospect of further budget caps or sequestration, which are already depressing readiness and modernization.

The analysts were hard-pressed to find alternatives that could shave even 11 percent off the cost of upgrading and operating the nuclear enterprise, because no matter what, certain fixed costs can't be avoided: The DOE nuclear labs have to be sustained, the command-and-control system is a requirement under any scenario, and logistics support must be maintained whether a system numbers 1,500 units or just 50.

Although CBO offered some scenarios that would save money by deferring modernization, those "savings" merely kick the can into a period beyond the 30 years the CBO looked at, with little net change in cost.

LIST FOR SHOPPING OR CHOPPING

The shopping list is long, as some of the nuclear infrastructure dates back at least to the 1980s, while other elements go all the way back to the 1960s and 1970s. All have been patched up over the years, but both the Navy and Air Force say the life-extension programs will soon reach their limit. The CBO laid out the 11 programs required as:

- The new *Columbia* class of ballistic missile submarine, to replace the 30-year-old *Ohio* class;
- A new silo-based intercontinental ballistic missile to replace the Minuteman III, along with supporting infrastructure and refurbished silos, which the Air Force has collectively dubbed the Ground-Based Strategic Deterrent (GBSD) program;
- The B-21 long-range, penetrating stealth bomber;
- Refurbishment of the Trident D5 submarine-launched ballistic missile;
- A new submarine-launched ballistic missile (SLBM) to eventually replace the D5;
- The Long-Range Standoff (LRSO) weapon, to replace the AGM-86 Air-Launched Cruise Missile deployed on the B-52 bomber;
- Life extension of the B61 nuclear gravity bomb, consolidating several types into the B61-12;
- Life extension of the B61-12 when the time comes, called Next B61;
- Life extension of the W76 and W88 warheads that go on the SLBMs;

A USAF B-2 stealth Spirit bomber drops an inert B61 bomb. The Congressional Budget Office priced out the plan for further life-extension of the B61.

■ Life extension of the W80 warhead to go on the LRSO; and
■ A program to create interoperable warheads that could be used on both ICBMs and SLBMs.

The CBO also noted that the capability to deliver tactical nuclear weapons by fighter aircraft would also be preserved under the existing nuclear modernization plan, requiring the continued development of nuclear bombs of a size and yield suitable for fighter delivery.

Holistically, the CBO pegged the cost of the nuclear submarine leg as the most expensive, at $313 billion over 30 years. Next came bombers, at $266 billion, then the ICBMs, at $149 billion, with another $44 billion for "other nuclear activities." The tactical nuclear delivery system and weapons would cost $25 billion; weapons labs and associated activities would cost $261 billion, and the command and control and early-warning networks would weigh in at $184 billion.

The biggest savings of all the options CBO looked at could be obtained by eliminating the land-based element of the triad, going to a dyad of bombers and nuclear subs. Such a move would save $120 billion, or 10 percent of the overall nuclear modernization bill. Going to a dyad of sub-launched and land-based missiles—eliminating the bomber element—would save $71 billion, or six percent of the total bill.

(Interestingly, the CBO counted all bombers, all the time, as being a charge to the nuclear mission. It noted that taking bombers out of the nuclear mission would still leave a need for the Air Force to buy at least 80 new bombers for conventional purposes. The Air Force has said it needs "at least 100" B-21s).

Getting rid of all nuclear gravity bombs and not bothering to develop any new ones would save $27 billion, or two percent of the overall cost, CBO reckoned. Reducing the triad to 10 ballistic missile subs with missiles and only 300 ICBMs (vice the 400 now deployed) would save $30 billion, or two percent versus the current plan. Canceling the LRSO would save $28 billion, or two percent of the overall nuclear modernization bill.

The study noted that overall costs could, of course, be reduced further if the US chose to unilaterally drop below the warhead and delivery vehicle agreements under the 2010 New START treaty with Russia, but such a move would be at odds with President Trump's stated goal to increase the capability of the nuclear enterprise and modernize its elements.

TO GO FAST, CRASH, AND BURN

After years of hanging managers out to dry if something goes wrong, Air Force leaders must now show acquisition specialists they won't be punished if they try unconventional approaches to speeding the system up ... and fail.

Top USAF uniformed acquisition chief Lt. Gen. Arnold W. Bunch Jr. told an AFA audience in October that service Secretary Heather Wilson is willing to trade some setbacks for speed in getting new systems deployed.

Senior leaders must show the acquisition corps "we mean it" when they encourage innovations that will accelerate the fielding of new hardware and software. Managers have to see at least a few examples where "they won't have their heads handed to them" if they try something innovative and fail, Bunch said. In fact, Wilson has offered to buy the celebratory cake for the first experimental approach that fails, if it nevertheless yields useful lessons about how to go faster, Bunch said.

The service is trying to spread the "culture" of the Rapid Capabilities Office, which is heading up the B-21 program, Bunch noted. The RCO, he said, follows the original Lockheed Martin

Airmen lower an ACLM onto a dolly so it can be loaded onto a B-52 at Barksdale AFB, La.

"Skunk Works" model of using a small group of people with clearly defined goals, the trust of leadership, limited oversight, and a very short reporting chain right to the top of the service. Along with that culture has to be more acceptance of risk, Bunch said. In pursuit of greater speed a "constructive failure" is okay, he said.

Contractors in software have told him that, "'your engineers know exactly what to do [but] your program managers won't do it.' That tells me I've got to go back and re-look at what's my reward system, and how we are measuring people, and how we set programs up."

As an example of how the Air Force is putting its money where its mouth is, Bunch noted that the Long-Range Standoff (LRSO) weapon, the replacement for the 30-year-old Air-Launched Cruise Missile, is getting more funding in the technology, maturation, and risk reduction phase than the new ICBM replacement because of the need to make certain the LRSO is "reliable and available once it gets out to the field." Historically, he said, similar programs don't yield the needed reliability and availability, "so we took a different approach, put a lot more money in the [TMRR] phase" so the LRSO can truly be counted on.

ACCELERATING THE CRH AND THE PGMS

Bunch told the AFA audience the Air Force is hoping to "accelerate" the Combat Rescue Helicopter program and will offer Lockheed Martin's Sikorsky unit incentives to meet or beat program milestones. If they do, he said, "then ... we immediately go into production and buy aircraft at a certain rate."

He also said the Air Force hasn't ruled out "any funding option" in acquiring new engines for the B-52 bomber, suggesting that a lease arrangement is under consideration. Speaking of "alternative" financing, Bunch said it would be a hard sell on Capitol Hill because "you're probably signing people up longer-term for something, and a lot of people are reticent to do that." A decision was expected late in 2017 as to whether to try that approach, he said.

Bunch noted that the Air Force is rapidly expanding production of precision guided munitions, which have been the preferred weapons in the war against ISIS because of the priority of limiting collateral damage. USAF is upping production of the Small Diameter Bomb I from 5,000 to 8,000 units a year, he said.

The Joint Direct Attack Munition is ramping up to 45,000 and could go as high as 55,000 a year, but Bunch said he doesn't want the family of suppliers that provide the bomb bodies, bomb fill, guidance tail kits, and other elements to get out of sync with each other. He asked industry attendees to alert him immediately if they know of any potential obstacle to providing any element of the weapon.

Bunch reported, too, that USAF is coordinating higher production of Hellfire missiles with the Army and Advanced Precision Kill Weapon Systems with the Navy. ✪

Photos: Capt. Christopher Mesnard; A1C Luke Hill

By Jennifer Hlad

AN UNDISCLOSED LOCATION, SOUTHWEST ASIA—

WEEKEND WARRIOR? WRONG ANSWER

The 386th Air Expeditionary Wing is in virtually the same business now that it was at the height of Operation Iraqi Freedom, according to the unit's vice commander.

The wing's passenger terminal is the gateway to the entire US Central Command area of operations—it saw nearly 10,000 passengers in September—and its C-130s are going to most of the same places, Col. Andrew M. Purath explained.

However, he said, things are also "completely different."

Because Operation Inherent Resolve is "a different kind of fight," the demands on the wing have changed, Purath noted.

"It's fast moving. Before, ... duration was more important," he said. Now, because ISIS is constantly moving from one place to another, "we're having to move all that stuff and move all those people pretty dynamically."

The wing is working with more special operations forces than in the past, and in addition to the familiar places in Iraq, its planes have been operating out of a landing zone in Syria "for a while now," he said.

The 386th also has picked up "a more robust MQ-1 and MQ-9 mission than we've ever had before," he said, adding that they made the transition at the end of September from Predators to Reapers.

The MQ-9 is a "larger, more powerful aircraft ... [that] can carry more ordnance" and has upgraded cameras for a better

An MQ-9 Reaper (Block 5) gets a preflight check before a combat flight in support of Operation Inherent Resolve.

picture, explained 1st Lt. Maria, a Reaper pilot with the 386th AEW's 46th Expeditionary Attack Squadron (EATKS).

The changeover went smoothly, with the squadron meeting all of its assigned combat lines, but the maintenance team had to work extremely hard to make that happen, said Lt. Col. Jason, commander of the 46th EATKS.

Purath said the Predators were maintained by contractors, while the Reapers are maintained by uniformed airmen. Those airmen were tasked for the mission at the last minute, Purath said, and met the unassembled MQ-9s here.

"They had about 10 days from start to finish to unpack them, get them put together, get them flight checked," Purath said. "To the point where the wing commander and I, after about four days, kind of told them they needed to go take a nap, because they were working so hard—and working straight through to get to the finish line."

The changeover required getting new crews, as well as new ground support equipment, additional weapons, and ammunition troops, Jason said.

MSgt. Norbert Feist, 386th Expeditionary AMS, has been the crew chief on C-130 No. 1004 for 21 years.

During an October visit, the squadron was also in the process of building new hangers, since the MQ-9s are bigger.

The wing's cargo mission, passenger terminal, and RPAs make it critical to the region, but it has another distinguishing characteristic: the highest concentration of Air Guardsmen and Reserve airmen in the area, Purath said.

"We're almost 55 percent," he said, noting that the large number of Guard and Reserve airmen make for a "fascinating collection of people."

One of those people is MSgt. Norbert Feist, a C-130 crew chief from the Minnesota National Guard, who has been assigned to the same airplane since December 1996. He will have been with the airplane for 23 years by the time he retires.

Feist enlisted in 1987 in the Active Duty Air Force. He lived 10 minutes from the Minneapolis-St. Paul airport in Minnesota growing up, and he loved to watch the airplanes fly overhead—the C-130 was the first he learned to identify—but said that when he joined the Air Force, he "didn't even realize that there was such a thing as the Guard."

He discovered the Guard during an exercise in Korea and was very impressed, he said.

"I was like, 'Holy cow, these guys know what they're doing,'" he recalled. "When you're Active Duty, you think they're just weekend warriors. Wrong answer."

Feist served in the Gulf War but "hated Active Duty," he said, so he decided to get out of the military in 1991. He was on terminal leave, working as a baggage handler for Northwest Airlines, when he decided to join the Guard.

Aircraft 1004 arrived at the unit in October of 1996; Feist was slated to be a crew chief on the airplane from the beginning and was hired full time with the Guard in December 1996. Twelve years ago he became the head crew chief for 1004.

"I got lucky and never had to move," he said with a laugh.

Through the years, Feist has gotten to know every detail of the airplane, from issues with the interphone to the crew door that's always been difficult to close. The right paratroop door "doesn't really pop open quite right," he said, but he and three other crew chiefs have tried to fix it over the years, and no one has been successful yet.

"You catch on," Feist said. "Twenty-one years of it ... you get to know that stuff." ✪

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

Photos: SrA. Damon Kasberg; MSgt. Eric Sharman

By Wilson Brissett, Senior Editor

The War on Terrorism

As of Nov. 13, a total of 46 Americans had died in Operation Freedom's Sentinel in Afghanistan, and 48 Americans had died in Operation Inherent Resolve in Iraq, Syria, and elsewhere.

The total includes 94 troops and four Department of Defense civilians. Of these deaths, 45 were killed in action with the enemy while 49 died in noncombat incidents.

There have been 239 troops wounded in action during OFS and 58 troops in OIR.

An HH-60 Pave Hawk takes off from Bagram Airfield, Afghanistan, Oct. 27.

Maintainers inspect *Spirit of Missouri* prior to its mission to the Pacific region.

B-2 Flies 37-Hour Mission

A B-2 Spirit recently flew a "long-range" mission from Whiteman AFB, Mo., nonstop to an undisclosed area of the Pacific in a show of force in the region. Video posted by US Strategic Command shows a B-2, No. 88-0329 *Spirit of Missouri,* taking off in the dark on Oct. 28 "to conduct a long-range mission to the Pacific Command area of responsibility."

STRATCOM declined to provide any specifics about the B-2's route, other than it landed at Andersen AFB, Guam, for an engine-running crew change. The aircraft then flew back to Whiteman, with the entire mission lasting 37 hours.

"This B-2 mission was part of regular USSTRATCOM bomber operations to maintain a high state of readiness and proficiency and not part of any exercise events," STRATCOM spokesman Maj. Brian Maguire said in a statement.

The B-2 flight occurred the same day Defense Secretary James N. Mattis and Chairman of the Joint Chiefs Gen. Joseph F. Dunford met with senior South Korean military officials on ways to strengthen the military alliance between the two countries and deter North Korean provocation.

F-35s: Deploying on a rotation to the Pacific as part of a command theater security package.

■ Hill F-35As to Deploy to Japan

Twelve F-35As and about 300 airmen from the 34th Fighter Squadron at Hill AFB, Utah, deployed to Kadena AB, Japan, in the first F-35A rotation to the Pacific. The deployment follows the F-35A's appearance at the Seoul International Aerospace & Defense Exhibition, and the deployment of US Marine Corps F-35Bs to MCAS Iwakuni in Japan earlier in 2017.

The six-month deployment is part of a US Pacific Command theater security package, which have been in operation since 2004. It is a "long-planned" deployment, according to the Air Force.

■ NSC Developing Rules of Engagement for Space

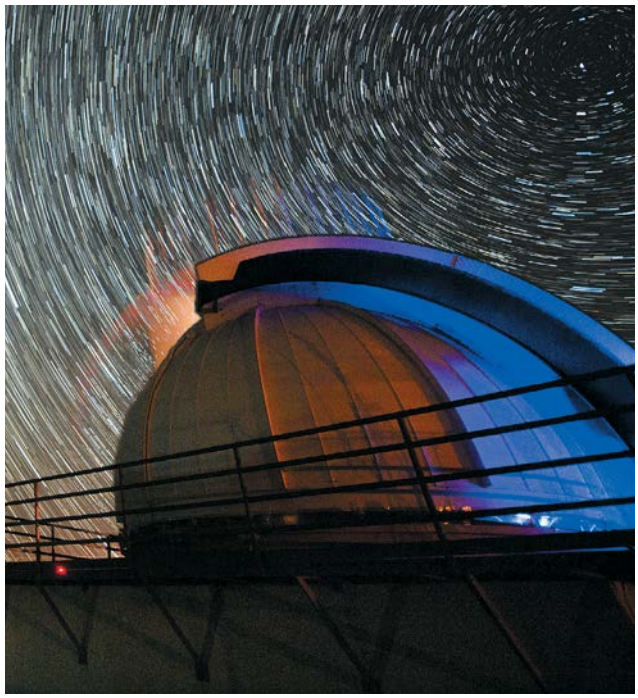
The National Security Council is coordinating a Trump Administration effort to produce a "space strategic framework," National Security Advisor H.R. McMaster said at the first meeting of the reconstituted National Space Council.

The framework will provide "an integrated strategy" to ensure the United States' "vital interests are advanced," and it will "identify specific tasks, the resources, and authorities required" for various operations in the space domain, McMaster said.

Secretary of the Air Force Heather Wilson praised the development.

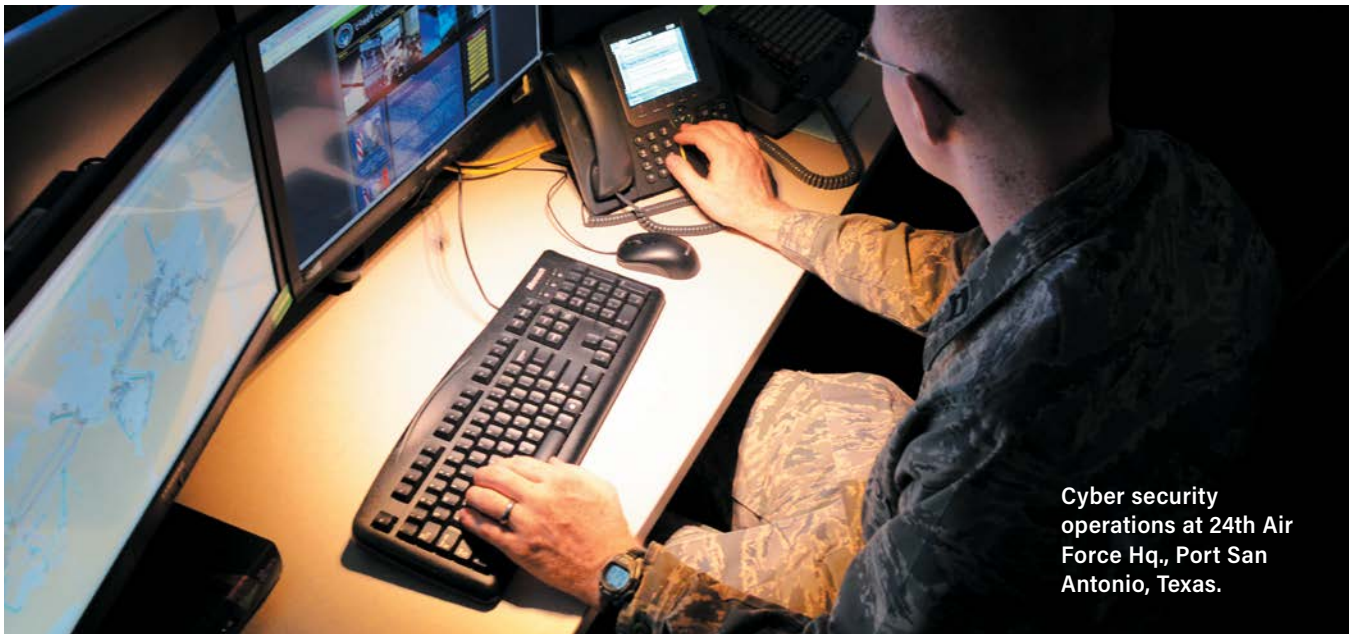
"What we're seeing in space tells me it's time for America to develop some of these policies more fully," Wilson said. Among other matters, the strategic framework will clarify "our rules of engagement in space," she added, including what kinds of adversary behavior should trigger a US response and what the nature of that response should be.

The National Space Council is chaired by Vice President Mike Pence.



A time lapse photograph of star trails above the Ground-Based Electro-Optical Deep Space Surveillance System at White Sands Missile Range, N.M.

Photos: SSgt. Benjamin Gonsier; Taylor Phifer/USAF; SrA. Omari Bernard; TSgt. David Salanitri/Illustration



Cyber security operations at 24th Air Force Hq., Port San Antonio, Texas.

■ Cyber, ISR NAFs Combining, USAF '99 Percent Decided'

The Air Force will almost certainly push together its cyber-focused 24th Air Force with its ISR-focused 25th Air Force, according to the commander of 24th AF.

Twenty-fourth Air Force—also called Air Forces Cyber—fulfills the Air Force's component of US Cyber Command. It stood up in 2009 under Air Force Space Command and is focused mainly on creating cyber warriors and cyber capabilities, as well as maintaining and operating them in blue and red space, offensively and defensively. It often relies on information gleaned by 25th Air Force, whose operation mainly focuses on electronic warfare and intelligence, surveillance, and reconnaissance.

"Right now we've got stovepiped capabilities, which should be integrated to be more effective," said Maj. Gen. Christopher P. Weggeman, the commander of 24th AF. "I think we're 99 percent decided, according to [AFSPC Commander Gen. John W. "Jay" Raymond]."

Weggeman said that bringing the disparate capabilities under one commander is the "the right thing to do."

"That will give the Air Force some special sauce and increased capability," he said, adding his "moniker" for the new group would be "Information Warfare NAF."

Calling the integration a "powerful construct" for the service, Weggeman said it'd be a "long slog" starting in FY18 and it would take "a couple years to conclude." (For more on the cyber force, see "The Cyber Warriors," p. 38.)

■ First Deputy Chief of Staff for Space Confirmed by Senate

The Senate voted to confirm Maj. Gen. David D. Thompson as the first Air Force deputy chief of staff for space and to promote him to the rank of lieutenant general. Thompson is currently the deputy commander of Air Force Space Command at Peterson AFB, Colo., a position he has held since 2015.

AFSPC boss Gen. John W. "Jay" Raymond announced the new A11 position in April, saying it would give the Air Force someone in the Pentagon who would "come to work every day focused on" space power.

In August, Chief of Staff Gen. David L. Goldfein said the new A11 "will be key to ensuring we link combatant commander and service space requirements with our capabilities."

Maj. Gen. David Thompson will pin on a third star and take command as Air Force deputy chief of staff for space.

■ Combat Photographer Awarded Bronze Star With Valor

A combat photographer from JB Andrews, Md., recently received the Bronze Star with Valor Device for his actions during a 2011 battle in Afghanistan. SMSgt. Kevin Wallace, currently the public affairs chief for the 89th Airlift Wing, was deployed as a 4th Infantry Division combat photographer in 2011 when his team was performing a night patrol through villages in the Badghis Province.

The team was detected by enemy forces and ambushed, sparking a firefight that lasted several hours. During the fight, Wallace alternated between engaging the enemy and taking pictures of his teammates. He took more than 400 photographs during the battle, which were then used for operational analysis, battle assessment, intelligence, informational operations, historical records, and public affairs needs.

"Eleven men were out there and 11 men were heroes," Wallace said in a release. "There were men on the outpost providing overwatch who were the heroes. Men on the quick-reaction force providing cover fire during our exfiltration were heroes. I don't think anyone out there was less than a hero that day."

SMSgt. Kevin Wallace, a photojournalist, helps secure a sector in Badghis Province, Afghanistan, during a reconnaissance mission with the Army's 4th Infantry Division in 2011.

Maintainers prep an F-15E before a sortie for Operation Inherent Resolve.

■ US-Backed Fighters Declare Victory Over ISIS in Raqqa

US-backed fighters have taken the city of Raqqa from ISIS, routing the group from its self-proclaimed capital after about four months of operations. The US-led coalition, however, warned that ISIS has not been completely defeated and fighting is likely to continue.

"We see the terrorist group on the verge of a devastating defeat at the hands of our Syrian Democratic Forces partners," said Army Col. Ryan Dillon, Combined Joint Task Force Operation Inherent Resolve spokesman.

The Syrian Democratic Forces are in control of the city of Raqqa, combing it for landmines and sleeper cells, SDF Brig. Gen. Talal Sillo told *The Associated Press.*

The declaration came after heavy fighting and continued US airstrikes on the city, which at its peak, was completely run by ISIS and was the so-called capital of its international operations.

"As far as what happens in Raqqa after ISIS has been cleared and Raqqa is liberated, the Raqqa Civil Council is already established, and they're eager to begin work to restore essential services," Dillon said. "But also very important to note is we must clear the remnants of all the explosives that have been left in Raqqa throughout this battle."

Overall, the coalition estimates about 6,500 ISIS forces remain in Iraq and Syria. The group is "losing its grip" in the region and is effectively isolated, Dillon said.

Numbers

The average amount of money the Department of Defense currently spends in one month on global war operations.

(Source: DOD REPORT, https://fas.org/man/eprint/cow/201706.pdf)

Photos: USAF (1,2); A1C Valentina Lopez; SrA. Joshua Kleinhoz; Andrew Magil/illustrator; USN

EYES IN THE

U-2s and Global Hawks out of Al Dhafra Air Base bring vision to the war on terror.

By Jennifer Hlad

AL DHAFRA AB, UNITED ARAB EMIRATES

Intelligence, surveillance, and reconnaissance, important in any conflict, are mission-critical in an air war like Operation Inherent Resolve.

"We don't hop in a jet, start it up, and go look for something to take out or to bomb," noted Col. Mark S. Robinson, vice commander of the 380th Air Expeditionary Wing. "There is a whole process" that goes into that—and the ISR provided by the 380th is a big piece of the process.

The wing's 99th Expeditionary Reconnaissance Squadron provides ISR through two platforms: the U-2 Dragon Lady and the RQ-4 Global Hawk. Both fly at high altitude, giving them a different perspective than medium- and low-altitude platforms.

Lt. Col. Neal Hinson considers the platforms fundamental for the wars in Southwest Asia. The deputy commander of the 380th Expeditionary Operations Group, Hinson called

Two RQ-4 Global Hawks positioned in a hangar in Southwest Asia. RQ-4s provide communications and intelligence-gathering capabilities for Operation Inherent Resolve.

ISR "the baseline for everything that happens in this theater," adding that the foundation "for just about everything we do in the Air Force" comes from intelligence.

Before targets can be struck, a great deal of attention needs to be paid to it, he explained, and that can't be taken for granted.

"How do you get the pattern of life for the people we're about to kill? How do you figure out if they're the right

Ground crew help a pilot out of the cockpit of a U-2 spyplane at Al Dhafra AB, United Arab Emirates. Dragon Lady aircraft play a vital role in ISR collection in the Middle East.

SKIES

people to kill? How do you figure out the right people you need to save? Well, that is all ISR, and that's what we do; ... We bring that strategic ISR part," he continued.

With the U-2 and the Global Hawk, high altitude is an asset because, the "higher you are, the farther the sensors can see," explained a Lieutenant Colonel named Heather, commander of the 99th ERS. (For security reasons, the Air Force withholds the full names of some deployed airmen.)

High-altitude ISR is the "eyes and brains" of the fight, said 1st Lt. Eddie Nuñez, intelligence officer for the 99th ERS.

"You don't hear much about ISR on the news. You hear, 'A strike was conducted here.' Oh, awesome, but before that strike, high altitude was there, and we did what we did, and then we said, 'You can go ahead and do your thing,' " Nuñez added.

SORTING OUT THE COMBATANTS

The capability is particularly important in Syria, where the airspace is contested, he said.

High-altitude ISR "keeps the peace," Nuñez explained.

"Just knowing where the enemy is at all times" means "we're not shooting each other accidentally," he said. Knowing where friend and foe alike are means "you don't ... drop on the wrong guy."

Robinson said the two high-flying platforms give the 380th AEW the capability "to see, to connect, to listen— ... almost the five senses."

This awareness is crucial not just from the perspective of US forces in the area, but "from a national standpoint," Robinson said.

There's an "insatiable demand for the products that we provide ... because people want to have the ability to make the right decisions," he said, adding that he "can't fault anybody for wanting to know all the facts."

The 380th AEW's manned high-altitude ISR platform is the U-2, an airplane Hinson described as "the most reliable truck."

"We carry any payload to high altitude really fast," said Hinson, who is also a U-2 pilot. "That's what differentiates us from any other platform."

While most new aircraft are completely integrated, the U-2 has empty spaces built in, to enable it to carry a variety of sensors and payloads. Major Cody, a U-2 pilot with the 99th ERS, likened the aircraft to a Mr. Potato Head toy because of its adaptability and all the things that can attach to it.

The U-2 also can power the payloads, which is necessary in the extreme cold of high altitudes.

"Yesterday, for example, I saw minus 84 degrees (Celsius)," he said during a late September interview. "Minus 84 freezes normal gas. It freezes electronics with sophisticated circuitry. They're ruined forever."

Photos: Jennifer Hlad; SrA. Tyler Woodward

Maj. Ryan (last name withheld), a U-2 pilot, climbs into the cockpit for an Operation Inherent Resolve mission. U-2 pilots wear a pressurized space suit during flight to combat the effects of ultra-high altitude flight.

One pilot learned that the hard way when she took her iPod and MacBook Pro up in the plane, and they were completely destroyed, Hinson said. It makes the onboard power "incredibly important."

"You need to have heaters and coolant pumps, and warm-up pumps, and everything else to power the sensors and keep the sensors safe if you're going to work in that kind of extreme environment," he said.

The glider-like U-2 has long, narrow wings and is eager to climb, Hinson said. For takeoff, pilots "almost stand the thing on its tail to keep from overspeeding it, and it just goes," he noted.

Dragon Lady pilots wear a bright yellow four-layer space suit that holds and controls air pressure, and they breathe 100 percent oxygen in their airtight helmets. Missions last up to 12 hours, meaning pilots can't touch their faces to scratch their noses or cover a sneeze for that entire period. They eat food paste squeezed into the helmet through a special valve that keeps it airtight and drink water in much the same way.

About 97 percent of the Earth's atmosphere is below the pilots when they're operating, Hinson said, and while there is some air up there, "we wear the space suit for a reason."

The cockpit is now pressurized to an altitude of 14,000 feet—until recent years, it was higher—but it's still very demanding, physically, to fly the U-2, Hinson said.

STILL HAVEN'T FOUND WHAT I'M LOOKING FOR

Takeoffs and landings are a challenge. The long nose and restricted side view mean pilots have few cues to tell them how far off the ground they are during those phases of flight.

> "HOW DO YOU FIGURE OUT [THE] PEOPLE YOU NEED TO SAVE? WELL, THAT IS ALL ISR."
>
> —Lt. Col. Neal Hinson, deputy commander, 380th Expeditionary Operations Group

Major Cody, identified only by his call sign for security purposes, explained that in landing, pilots need to take the jet down to about two feet off the ground, and then allow it to stall and "wait for the airplane to run out of energy" and settle to the ground.

Pilots train to be able to land the jet on their own, but generally have help from a "mobile"—another U-2 pilot in a sports car racing behind the jet, telling the pilot how far he or she is off the ground. The mobile also assists in steering the jet on the runway, because it doesn't turn easily and has very long wings that are only a few feet off the ground.

The original U-2 was designed in the 1950s—though Hinson points out the models here are all from the 1980s—and the Air Force had discussed retiring it in 2019, but has shelved those plans for now.

Maj. Gen. James F. Martin Jr., the Air Force's deputy assistant secretary for budget, told reporters in May that the Air Force plans "to keep that platform well into the future," and that the 2018 budget included no retirement date for the jet.

"That's a capability that we need and we also need the capacity," he said during a Pentagon press conference.

The U-2 was for a time slated to be replaced by the Global Hawk, but since the U-2 flies much higher and faster than the unmanned aircraft, Martin said the Air Force needs "both to meet the demand for ISR."

Maintainers place "pogo" supports beneath the long, narrow wings of a U-2 Dragon Lady at Al Dhafra AB, UAE.

That demand is so high that there "will never be enough jets to satisfy" it, asserted First Lieutenant Ciara (last name withheld), an RQ-4 pilot with the 99th ERS.

The role of the Global Hawk is "to develop the big picture" long before that picture can be narrowed down to a specific target, she said.

Global Hawk operations are different than those of the U-2. Because the RQ-4 carries no onboard pilot, missions are flown by pilots based in the US, but are launched and landed by pilots at Al Dhafra.

"We do basically the same things any other pilot would do—we just aren't in the actual jet," she said.

The aircraft can run up about 30 hours at a time and has a wingspan of about 130 feet, said SSgt. Tylher Coleman, a Global Hawk crew chief. There are three different types of airframes: the Block 30, the Block 40, and the Battlefield Airborne Communications Node, or BACN, which provides command and control capabilities.

Each does different things, and each is mission-essential, Coleman said.

Block 30s are used mainly for images and signals intelligence, to provide future targets to pursue. Block 40s have a similar imagery mission, but provide ground mobile targeting, she said.

Day and night, there is always an RQ-4 in the air, which keeps the pilots and maintainers very busy, Lieutenant Ciara said.

"If everything goes according to plan, we're pretty busy," but they're even busier when something doesn't go according to plan. Luckily, she said, the maintenance crew is great at flexing with the mission.

"The maintainers spend more time with our jets than we do," she noted. Those fighting ISIS and the Taliban on the ground can't be supported "without … the guys who are on the ground here."

The RQ-4 is a relatively new aircraft and therefore new to the theater, but U-2s have been based here for years. 99th ERS Commander Heather said she first came to the base in 2006 as a captain. She and Hinson were both here in 2007.

HUMBLE BEGINNINGS

Since then, she said, "the mission of the 380th has expanded greatly," and the support side has grown to meet that demand.

"I think the first time I was here, it was a big deal when they started to put rocks and paving stones down for pathways to keep the dust down," she recalled.

An RQ-4 Global Hawk taxis on the runway after a sortie for Opeation Inherent Resolve.

Now, she said, the high-altitude ISR squadron provides information about a wide area, in contrast to MQ-9s, which may get more media attention because of their attack capabilities.

"I think we're … unique, and something we're very proud of is, the stuff that we'll collect is from national-strategic all the way down to very battlefield-tactical type of information. It just depends on the mission and the day," she said. "OIR missions are incredibly dynamic and changing."

While the Air Force does have some "more pinpoint, soda straw" sensors on other aircraft, Heather noted that "it's not a very effective use of those assets if they don't have an idea of where to put that sensor first." The U-2 and Global Hawk provide that.

Not all missions are about enabling strikes. Simply collecting information not intended to enable an attack is also extremely useful.

"I've worked on operations where the effect was entirely non-kinetic, and it was very effective," Hinson said. "We saved deployments, everything else, because of the information that we were able to provide."

The manned and unmanned platforms give the 380th AEW high-demand capability that the commanders lean on heavily. The ISR assets flying out of Al Dhafra allow the airmen to deliver airpower for the combined force air component commander "like no other base in this AOR," asserted wing vice commander Robinson. ✪

Jennifer Hlad is a freelance journalist based in the Middle East. Her most recent article for *Air Force Magazine* was "Out of Africa" in the December 2017 issue.

Photos: SrA. Tyler Woodward; Jennifer Hlad

A satellite image of Al Dhafra AB, UAE. Note the five E-3 AWACS (left) and 12 KC-10 refueling aircraft.

AL DHAFRA AB, UNITED ARAB EMIRATES

All the Missions, All the Time

Until recently, photos of US personnel and aircraft operating from this base had to be labeled as having been taken "at a forward deployed location," and people stationed here had to keep mum about where they were, as required by the host country. Yet USAF has been operating here since the 1991 Gulf War.

This desert base outside Abu Dhabi isn't as big as Al Udeid Air Base in Qatar, but the 3,000 airmen of the 380th Air Expeditionary Wing support all five of the Air Force's core missions, making it what USAF Chief of Staff Gen. David L. Goldfein called "the most diverse wing that we have in the entire Middle East, and in some ways you could say the entire United States Air Force."

The F-22 Raptors of the 27th Expeditionary Fighter Squadron provide air superiority and precision strike, explained Lieutenant Colonel Shell, the squadron commander, who asked to be identified only by his rank and call sign for security reasons.

"The air superiority piece is where we use the sensors on the airplane to sanitize the battlespace and provide pinpoint accuracy of what airplanes are where in the air, above the ground. Precision strike is where we deliver precise air-ground munitions against ISIS targets," he said, adding that the jet carries small diameter bombs, which allow them to be "extra precise" and reduce collateral damage.

Which mission the F-22s fly depends on what is happening with Operation Inherent Resolve at the time, he explained.

"When we first got here, we were 95 percent precision strike. And now we're probably 95 percent air superiority. It just depends on how the fight ebbs and flows," Shell said.

A large part of the wing's activity centers on aerial refueling, and the KC-10s of the 908th Expeditionary Air Refueling Squadron do both midair refueling and cargo missions, providing the global mobility piece of the operation.

This is the only place in the US Central Command area of operations where Extenders are based. The "24/7 air refueling capability we provide enables coalition combat aircraft to prosecute targets and conduct missions that would otherwise be impossible," said Lieutenant Colonel Alex (last name withheld for security purposes), 908th EARS commander, in an October 2017 release.

Meanwhile, the 99th Expeditionary Reconnaissance Squadron provides intelligence, surveillance, and reconnaissance through U-2s and RQ-4s; AWACS capabilities; and EQ-4 Global Hawks—having Battlefield Airborne Communications Node capability—to users throughout Central Command.

The base is also the home of "Kingpin," responsible for control and execution of the air battle over Iraq, Syria, and Afghanistan, to "point the shooter toward the threat," explained Lt. Col. Neal Hinson, deputy commander of the 380th Expeditionary Operations Group.

Having all five core missions here makes the wing unique, Hinson said, but leaders said they also work to make sure all the airmen feel connected to those missions, no matter their job.

"When you can connect an airman to … a core mission, you win. When you connect them with two, or three, or four, or all five? You win big time," said Col. Mark S. Robinson, vice commander of the 380th Air Expeditionary Wing and a KC-10 pilot.

"We make sure the airmen understand that whether you're fixing an air conditioner, or … you're loading a box of food that's going in the [dining facility], or you are working on a construction project, or you are overseeing fuel delivery, etc., we make that connection to the mission," he added.

"The fuels airman is not just refueling the KC-10," Robinson noted. That fuel "could end up in a number of different platforms, flying in a number of different locations, and ending up in a number of different coalition jets."

In terms of the impact of one airman, "that's pretty important," he said.

Col. Dee Jay Katzer, commander of the wing's mission support group, said the airmen of the group support all five missions with their functions, which include the dining facilities, lodging, air-conditioning, the fitness center and pool, security, and the largest fuel bladder farm in the Department of Defense.

Though many airmen may take support functions for granted, Katzer pointed out that air-conditioning, to cite just one example, can quickly become mission-critical in the Middle Eastern heat.

The wing supports Operation Inherent Resolve, Operation Freedom's Sentinel in Afghanistan, and Operation Resolute Support. But the primary line of effort is OIR, Robinson said, and the wing's platforms are critical to that fight.

"This war cannot be fought without the assets that we have here," he said.

Photo: Google Maps

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THE OA-X AND AIR FORCE ACQUISITION

By Brian W. Everstine, Pentagon Editor

Can the Light Attack Experiment serve as a model for speeding up USAF acquisition?

HOLLOMAN AFB, N.M.—The Air Force will soon test drive commercially developed light attack aircraft, dropping real weapons in real-world combat missions before deciding if it wants—or can afford—to buy the aircraft. The light attack aircraft evaluation is partially an experiment in whether USAF can effectively deliver ordnance in low-threat areas with less sophisticated aircraft. It is also a test to see whether the service can get needed capability more quickly, working with industry to drive down the costs and time lines of acquisition.

"Our adversaries are modernizing faster than we are, and it's up to the United States Air Force to drive innovation," service Secretary Heather Wilson said in August at Holloman AFB, N.M. "We have to think about things in new ways and identify new capabilities faster than we've done in the past."

New authorizations for rapid development culminated in the Light Attack Experiment (OA-X) here. Four commercially developed, off-the-shelf aircraft flew for months in the New Mexico desert to see if they could meet Air Force requirements for light attack: flying close air support (CAS) missions in permissive environments.

If deemed successful, some of those aircraft could be deployed to the Middle East next year to fly actual combat missions even before USAF decides if there's a place for an OA-X in its budget.

"Where that experiment ends is anybody's guess," Air Force Chief of

> "IT'S UP TO THE UNITED STATES AIR FORCE TO DRIVE INNOVATION."
>
> —Secretary of the Air Force Heather Wilson

Left: An A-29 is one of the light attack aircraft candidates. Here: Air Force Secretary Heather Wilson (center) listens to a briefing about another, the AT-802, at Holloman AFB, N.M.

Staff Gen. David L. Goldfein said at AFA's Air, Space & Cyber Conference in September. USAF would like to get a capability with "very little to no research and development costs," that's "very affordable to operate," and create a program the service could "entice" partners and allies to join.

The push for the Light Attack Experiment has arisen from hard experience in 27 years of combat operations. The service has been flying CAS missions in the US Central Command theater with high-end, expensive-to-operate systems like F-15E Strike Eagles, F-16s, and even B-1B bombers, while facing practically no threat from enemy air defenses.

Heavily employing its limited assets in this way has taxed USAF's ability to keep its fighter pilots trained and ready for a demanding aerial fight against a near-peer.

At the same time, budget pressures pushed the Air Force to consolidate its force structure around capabilities able to confront the worst-case threat. It reacted by moving to retire the A-10, which has flown much of the CAS mission in Iraq and Afghanistan, because the Warthog is not deemed to be survivable against the sorts of advanced air defenses airmen would see in a possible war against an adversary like Russia or China.

Service officials decided to look at whether the CAS mission could be accomplished more cost effectively than with the 35-year-old A-10 or high-end supersonic jets.

In 2016, Congress came through with new budgetary guidance calling on the Air Force to have some money set aside for new research focused on rapid acquisition.

That authorization—expanded in the 2017 defense authorization bill—came as USAF created its Strategic Development Planning and Experimentation Office under Air Force Materiel Command.

On March 8, 2017, Goldfein tasked this office to take advantage of the new, limited funding to set up the experiment and answer the question of whether off-the-shelf airplanes could effectively perform the CAS mission in a low-threat battlespace.

"When we took a look across our portfolio, we looked at the light attack as a way to actually do what Congress intended," Goldfein said in September. As USAF expands its "sharable

Photos: Ethan Wagner/USAF; A1C Alexis Docherty

network," there's an opportunity to "look at new ways of doing business," with the OA-X, he said.

By last August, and with a budget of just $6 million, the Air Force assembled four candidates on the Holloman ramp. They included:

- The Sierra Nevada/Embraer A-29 Super Tucano, already operational with multiple countries, including the Afghan Air Force;
- Textron AirLand's Scorpion multirole jet, once offered for USAF's T-X trainer program;
- The AT-802, a militarized crop duster offered by Air Tractor and L-3 Communications; and
- The Hawker Beechcraft AT-6B, an upgraded version of the T-6 Texan II USAF operates as a primary trainer.

During the live fly, the third candidate, the Scorpion (background), and other Light Attack Experiment aircraft flew with inert guided munitions.

USAF Chief of Staff Gen. David Goldfein—in the AT-6's cockpit—flew the aircraft during the OA-X open house in August.

DON'T CALL IT A CONTEST

During an open house in August before an audience of scores of senior Air Force officials, industry representatives, and media, Goldfein made a memorable entrance by flying in the AT-6B himself, landing, and then taxiing up to the bleachers before speeches from Holloman leaders.

Although the aircraft came to fly and be evaluated, Air Force officials maintained that this not a competition or a fly-off.

"An experiment. That's what this is," Wilson insisted. "We're trying to learn things."

Holloman officials set aside a hangar on the north end of the base's flight line to serve as headquarters for experiment operations. Air Force pilots—not private test pilots—evaluated the aircraft.

The assessment team comprised 16 total aircrew: 12 pilots and four combat systems officers, 10 of them test school graduates. They came from backgrounds including A-10s, F-15Es, F-16s, F-22s, and B-52s, according to Lt. Col. Robert Odom, deputy commander of the 704th Test Group at Holloman, who spoke at the open house.

On the maintenance side were two military crew chiefs, two weapons loaders, and two ammo troops. Thirteen USAF engineers evaluated the aircraft, focusing on aerodynamics and human factors. Six Air Force joint terminal attack controllers coordinated the test missions.

The team was tasked with determining the military utility of the aircraft, Odom said. They were to collect 584 data points across eight operational missions. Each aircraft flew eight surface attack missions: six daytime and two at night. Tasks performed included interdiction and complex close air support.

The aircraft flew with inert weapons, including .50 caliber rounds, laser guided munitions, and unguided dumb bombs.

Throughout the first 100 flights, there were only three sorties lost due to minor maintenance issues.

Before the Holloman phase wrapped up in September, the last event was a simulated mission at an "austere location," Odom said. Airmen only had the tools that they would see at a forward operating base, this time staging at Cannon AFB, N.M. They had to refuel and reload the aircraft, before launching for strikes at the White Sands Missile Range.

At the end of the Holloman phase, the Air Force pilots and test officials evaluated the aircraft's characteristics, including visibility and handling, sensor packages, data links, and weapon compatibility, among others. They produced a report on each aircraft. It was submitted to senior Air Force leadership in September. This report was "fruitful" and provided "insightful data," Air Force spokesman Col. Patrick Ryder said in early October.

Air Force leaders are contemplating how to proceed to the next phase of evaluation—actual combat testing—Gen. Mike Holmes, commander of Air Combat Command, said at the AFA conference.

The Holloman exercises showed that

Besides evaluating commercially developed light aircraft—like this A-29—for CAS, the OA-X program will help determine if USAF can speed up acquisition.

the four entrants can drop weapons accurately, Holmes said, and now the service is determining if "we can integrate that into the system that provides air for US forces" in the Middle East.

Notionally, the combat demonstration will occur sometime in 2018, Holmes said, but there are complications. The Air Force is trying to figure out how to pay for the flights, if the aircraft would be purchased or leased, and if the companies are even willing to proceed. These decisions would possibly be made by December, Ryder said. After the combat evaluation is finished, the service would again determine how the aircraft fared and if an acquisition process should begin.

ACC has identified squadrons and pilots that could be tasked with flying the aircraft, though this is all predecisional planning, Ryder said, and no personnel have been assigned to the task.

ECHOES OF VIETNAM

The OA-X experiment harkens back to similar programs during the Vietnam War. In 1965, the Air Force evaluated the combat use of F-5 fighters, intended for export, over five months.

In 1967 USAF began Operation Combat Dragon to evaluate the A-37 Dragonfly—a souped-up version of the T-37 trainer—for ground support and against enemy supply movements in South Vietnam. The operation logged more than 4,000 sorties without a combat loss at the end of the testing period.

In 2015, upgraded OV-10G Broncos—modernized versions of the light attack aircraft used extensively in Vietnam—deployed to fight as part of Operation Inherent Resolve against ISIS in Iraq and Syria. The aircraft's six-month deployment was dubbed Combat Dragon II and tested how the aircraft could "find, fix, and finish" targets and improve "coordination between aircrew and ground commanders," US Central Command officials told *Air Force Magazine* at the time. Following the deployment, CENTCOM produced a report, not yet released, for the Pentagon's Joint Requirements Oversight Council.

Lessons learned on that deployment are helping Air Force planners look at how to judge the data obtained from the summer tests at Holloman.

Holmes made news as well by revealing the four-airplane evaluation at Holloman includes consideration of using the aircraft for other missions such as a "light" intelligence, surveillance, and reconnaissance system.

Textron's Scorpion has the payload space and cooling capability that could be used to carry sensors, finding targets for less cost than the Air Force's "flagship, high-altitude" ISR systems such as U-2s and RQ-4 Global Hawks, Holmes noted.

"We wouldn't restrict it to that airplane—it would be another experiment—but something like the capability that airplane brings," he said.

The Light Attack Experiment is also being eyed as a way to work more closely with the Air Force's industrial partners.

"Industry is learning a lot about their airframes and how we think about things," Wilson said at the Holloman event. "The Air Force used to do a lot of things that way in the '50s and '60s, and we are getting back toward that partnership mode."

While innovation is in the "DNA" of the Air Force, "sometimes, maybe at some points in our history, we have lost that," she said.

USAF is moving toward a number of other, smaller collaborations with industry. In November the Air Force and US Special Operations Command's start-up innovation program SOFWERX planned an event called ThunderDrone. This competition was to pit small drones against each other, flying and fighting as a way to prove new unmanned capabilities, such as drone swarming, in what SOFWERX called a "drone test range" in Florida. Academia and industry were invited, with the goal of determining the "last drone standing," Wilson said.

FASTER, FASTER

The Air Force can't rely on the typically slow process of sending out requirements, doing analyses, spending years figuring out what it wants, and taking 10 years to develop that technology, Wilson said.

"You have to innovate faster; you have to engage industry and the private sector to maintain that edge," she explained. This extends far beyond the Light Attack Experiment and has sparked a year-long, servicewide review of USAF's science and technology strategy. The Air Force Research Laboratory, the lead on the study, will travel to a least a dozen research centers to develop a new strategy and look at ways to partner with academia and industry.

Wilson highlighted the Light Attack Experiment as a step in this process, a precursor to how future needs could be addressed to "get capabilities to airmen who need them today and can't wait two to three years for the normal acquisition process."

In new programs such as the Light Attack Experiment, the service can't be afraid to fail, Wilson said. Failure offers an opportunity to learn and apply those lessons to future development and acquisition. At times, a failure could be worth celebrating.

"When we have the first experiment really fail, and we learn from it, I'm buying the cake," Wilson said. "One of the things we need to get back to as a service is what I call 'productive failure,' where you try something [and] you learn from it." ✪

Photos: Brian Everstine/Staff

Exiting the

At long last, the F-35 strike fighter is set to complete development.

By John A. Tirpak, Editorial Director

The F-35 Lightning II's development program is finally coming to a close, nearly 17 years after the Lockheed Martin design was selected as the Joint Strike Fighter, and almost six years after the program was restructured due to delays and cost growth. Aircraft in the baseline, or "3F" configuration, will be handed over to the Operational Test community in the next few months to verify that everything works as intended.

Under the restructure plan, initial operational test and evaluation (IOT&E) was supposed to have begun around July 2017, which means the development program will probably wrap up between six and eight months late. That reflects estimates made by top Pentagon leaders—such as former Undersecretary of Defense Frank Kendall—in mid-2016, but is better than estimates made by the Defense operational test and evaluation community that same year. DOT&E forecast that operational testing might be delayed until late 2018 or even early 2019.

There is "nothing major," preventing the F-35 from entering the home stretch of its basic development, Joint Program Office director Vice Adm. Mathias Winter told *Air Force Magazine* in a September interview.

"We have the resources" in the Fiscal 2017 and 2018 defense budgets to complete development, Winter said, adding that he expected airworthiness flight testing of all three variants, in the 3F configuration, to conclude in December 2017. Development will have cost $55 billion, in then-year dollars, by the time it is done.

F-35 Joint Program Office officials say if new discoveries require an extension of System Development and Demonstration (the official name of the development effort), $100 million has been earmarked by Congress to come out of the first batch of money for future upgrades to cover the shortfall.

Flight testing of the Air Force version, the F-35A, was already complete last summer, while flight testing of the F-35B—the short takeoff, vertical landing variant used by the Marine Corps—was in September only a few "ski jump" test flights from completion, he said. Testing the F-35C carrier-compatible version was several "high-altitude, high-mach" test flights from concluding, but those flights are heavily dependent on good weather, Winter said.

Conditions at both Edwards AFB, Calif., and NAS Patuxent River, Md., deteriorate in the winter, making weather "probably our biggest inhibitor" of completing the flight sciences phase of development, he said.

While IOT&E depends on handing testers 23 jets in the 3F configuration, Winter's predecessor, retired Lt. Gen. Christopher Bogdan, told Congress last year an arrangement was being struck with DOT&E to begin testing with fewer jets, adding more as they become available. Earlier-version F-35s, flying with the 2B or 3i software and/or processors, have to be modified to the latest and "final baseline" configuration. The 23 jets comprise six each of the A,B, and C variants from the Air Force, Marine Corps and Navy, while three more will be B models from Britain and two others will be Dutch F-35A models.

So what happens after the jets are handed off? The test community will put them through their paces, matching them against the no-fail requirements set by the services in all the mission areas the F-35 must perform. These include air-to-ground attack, air-to-air combat, suppression of enemy air defenses, electronic warfare,

Pattern

Left: An F-35 in flight over Edwards AFB, Calif. The colorful markings on the bombs and the "spots" help calibrate cameras recording this flutter test. Above: A weapons crew loads a live GBU-12 into an F-35 at Eglin AFB, Fla.

electronic attack, close air support, and ancillary missions related to intelligence, surveillance and reconnaissance. If all goes well, and no substantive deficiencies are found, the F-35 can proceed to full-rate production in the 3F configuration.

Planning is well underway for follow-on development. Driven by changes in the threat, the new effort—at this point known broadly as Block 4—will continuously add new weapons, software, electronic warfare capabilities, sensors, and maintenance updates. The Government Accountability Office, however, recommended in April that the Pentagon hold off on Block 4, against the possibility that something serious may yet be discovered in testing. That in turn would delay ramping up to full production rates and the fielding of the Navy's F-35C, the GAO said. The program office, responding to the GAO, rejected that suggestion, saying the evolving threat demands that Block 4 work begin without "undue delay" to ensure there are no US or partner nation "critical … capability gaps."

It is worth noting that the Marine Corps went operational with its initial F-35Bs in 2015 and the Air Force with F-35As in 2016, but with a less-than-all-up operating system and weapons suite. The Navy is due to declare initial operational capability in 2018, with the 3F version of software and weapons suite.

The Air Force and Marine Corps units flying the F-35 have given it rave reviews, and both services have deployed their F-35s operationally. The major gripes reported by operational squadrons so far have mainly to do with spare parts availability. The joint program office has acknowledged that issue, saying vendors are making parts for several block configurations of the F-35 at the same time.

As the majority of jets are upgraded to the 3F baseline, fewer versions of parts will be needed, more of the baseline types can be made, and the issue should be mitigated, the JPO has said.

Weapons accuracy—often a sticking

Photos: Darin Russell/Lockheed Martin; SSgt. Peter Thompson

point in test schedules—was completed in October. Thanks to greater availability of tankers for flight test support, the basic weapons suite was down to only one box to check off: the Joint Standoff Weapon, a stealthy glide bomb. Nothing had been removed from the weapon testing program except a cluster bomb that was subject to an international treaty.

What will be handed over to the Pentagon's initial operational test and evaluation community will be a "warfighting capability," Winter said. The aircraft will be in the 3F configuration, flying with 3F software version 6.3. Developmental test units have already been flying with version 6.2, Winter said, "so they have awareness, understanding" of what's in it. Also required are fully stocked mission data files (MDF) which populate the F-35's computers with up-to-date information on threats around the world, and the facility that develops those files will also be scrutinized by OT&E.

Simulators are also part of the IOT&E evaluation, to ensure that they accurately replicate the aircraft's performance as it has been verified in flight test.

Finally, the operational testers will scrutinize the latest version of the Autonomic Logistics Information System, or ALIS, that tracks aircraft by tail number, schedules the change-out of consumable parts, and actually communicates with the aircraft's computers—such that the jet can tell the maintenance system of problems developing or faults that occurred on a mission. That way, maintainers know what to fix the moment the fighter comes to a full stop on the ramp. ALIS version 3.0 was to be available for operational test in December, Winter said.

To save time and keep on schedule, "we want to use the simulator to reduce the amount of test points we have to fly" and get IOT&E underway as soon as possible, Winter said, adding that the idea is that if the airplane's performance matches certain data points in the flight envelope, it's not necessary to fly all the data points in between.

Reminded that this approach was one of the ways the F-35 program got into trouble in the mid-2000s, Winter said he couldn't comment on program decisions "back before my time," but said IOT&E "is still making a decision and looking at the validity" of the shortcut.

The production line at Lockheed Martin's Fort Worth, Texas, facility. Joint Program Office Director Vice Adm. Mathias Winter says there is nothing major preventing the F-35 from entering the development home stretch.

Winters said his conversations with the Pentagon's Director of Operational Test and Evaluation, David H. Duma, tell him that the organization "has taken a more reasonable approach" to clearing the 3F than that of predecessors. Although "they're ... sticklers and they're pushing," the DOT&E looks "at the value of where we are, and the maturity of where we are, and so we have a very good working relationship with IOT&E now."

The IOT&E program should last "roughly a year," Winter said, and the exact test plan was to have been nailed down in November.

Under Bogdan, the Block 4 program was notionally slated to deliver capability upgrades in increments of two years each: hardware and weapons alternating with software. Winter said, "That's unexecutable."

"There's too much scope in each of these. Can't do it," Winter said. He explained that the F-35 must progress along a number of fronts at once, and because they all work together—operational flight program, mission data files, ALIS, new weapons, new processors, etc.—increments can't really be looked at in pieces.

He said he would bring an updated Block 4 schedule to his boss—Air Force acting acquisition chief Darlene Costello—at "the end of October."

Will the updates come at intervals longer than two years?

"We will meet the warfighter requirements for the capability ... based on the threat," Winter asserted. The JPO is studying the "technical flowdown to determine the most effective and efficient cadence of delivery" of each element of Block 4. Assuming Costello approval, he expected to take this updated plan to the Defense Acquisition Board for its blessing in November.

Winter noted that although the Air Force has backed off its plan to build 80 F-35s per year for at least the next five years, that doesn't reflect anything going on in development.

Changes to quantities—the Air Force stopping at 60 per year, while the Marine Corps is accelerating from 46 to 60 across the future years defense plan—is "budget driven, not capacity or warfighter requirement driven." The services certified to Congress last summer that they are sticking to their planned purchase numbers: 1,763 F-35As for the Air Force, 353 F-35Bs for the Marine Corps, and "340 [C models] split between the Navy and Marine Corps," Winter noted. "We're committed to the program of record," he insisted, adding that the program is on the verge of a large surge in production.

"We'll go from 60 airplanes to 160 airplanes [per year] over these next five years," he said, adding "expanding and stretching the supplier base, we will go from 240 airplanes in the field today to almost 1,000 aircraft in the field in five years ... while bringing the rapid capability enhancements of Block 4." ✪

Photo: Alexander Groves/Lockheed Martin

Secretary of the Air Force Heather Wilson pins the Air Force Cross on SSgt. Richard Hunter at Hurlburt Field, Fla., on Oct. 17.

DANGER-CLOSE ESCAPE

SSgt. Richard Hunter called in short-range air attacks to help a special operations team escape a harrowing ambush. For that, he earned an Air Force Cross.

By Wilson Brissett, Senior Editor

On Nov. 2, 2016, SSgt. Richard Hunter was on the hunt for a senior Taliban leader in northern Kunduz province, Afghanistan. The 55-man special operations team he was part of was tasked with locating a "high-value target," Hunter said, with orders to capture or kill.

What had begun to look like an uneventful mission quickly transformed into a harrowing escape when the team was ambushed by enemy fighters. Over eight hours of intense fighting, Hunter held the enemy at bay with small-arms fire, directed multiple danger-close precision airstrikes, carried wounded comrades to safety, and saved the lives of many members of his team.

That team was made up of a 13-member Army Special Forces detachment and more than 40 Afghan commandos. They were inserted by CH-47 helicopters around 11:00 p.m. local time. The first sign to Hunter that something might be amiss was on approach to their insertion spot, when they noticed their landing fields were flooded in about 12 to 24 inches of water. "They'd either irrigated the fields, or they knew we were coming so they tried to limit where we could land," Hunter said.

SSgt. Richard Hunter in an undisclosed location in Southwest Asia. Hunter was awarded the Air Force Cross for his gallantry and bravery during a November 2016 ambush in Kunduz Province, Afghanistan.

Next, the terrain they encountered on the way into the village was "not quite what we thought" it was going to be based on intelligence reports, Hunter said in a conference call with reporters. They encountered a "40- to 60-foot little cliff face," he said, and "we had to s-curve up the thing." After reaching the top, the team trudged through the muck and arrived at the village to undertake what was "a pretty standard mission for our team," Hunter said.

They received a volley of "pretty normal probing fire" upon approach, but they "dispatched that" and moved on.

After searching the entire village, the team had "one last compound" to check before calling it a night. The structure was enclosed behind a large metal gate about 12 feet tall. As the team prepared to "blow it up" and enter the compound, a hand grenade came sailing over the gate. That's when Hunter knew they had found the target.

In no time, Hunter said, the team realized it had walked into an ambush. Fire was pouring on the team from "270 degrees, all around us."

The entire team was "all contained inside one alleyway with only one opening at one end," Maj. Alexander Hill, 4th Special Operations Squadron, told reporters on a conference call. Hill was piloting an AC-130 gunship overhead that night. The well-planned Taliban assault amounted to "a massive ambush where people were firing down on them from two-plus story compounds and buildings as they tried to withdraw down that alleyway," Hill said.

Hunter was in the middle of it all, returning ground fire on the enemy and directing airstrikes against Taliban positions as he identified them.

"Within the first two minutes of the ambush we had approximately 20 casualties," Hunter told reporters. He positioned himself closest to the enemy in order to better direct danger-close strikes and give his team a chance to make it out alive.

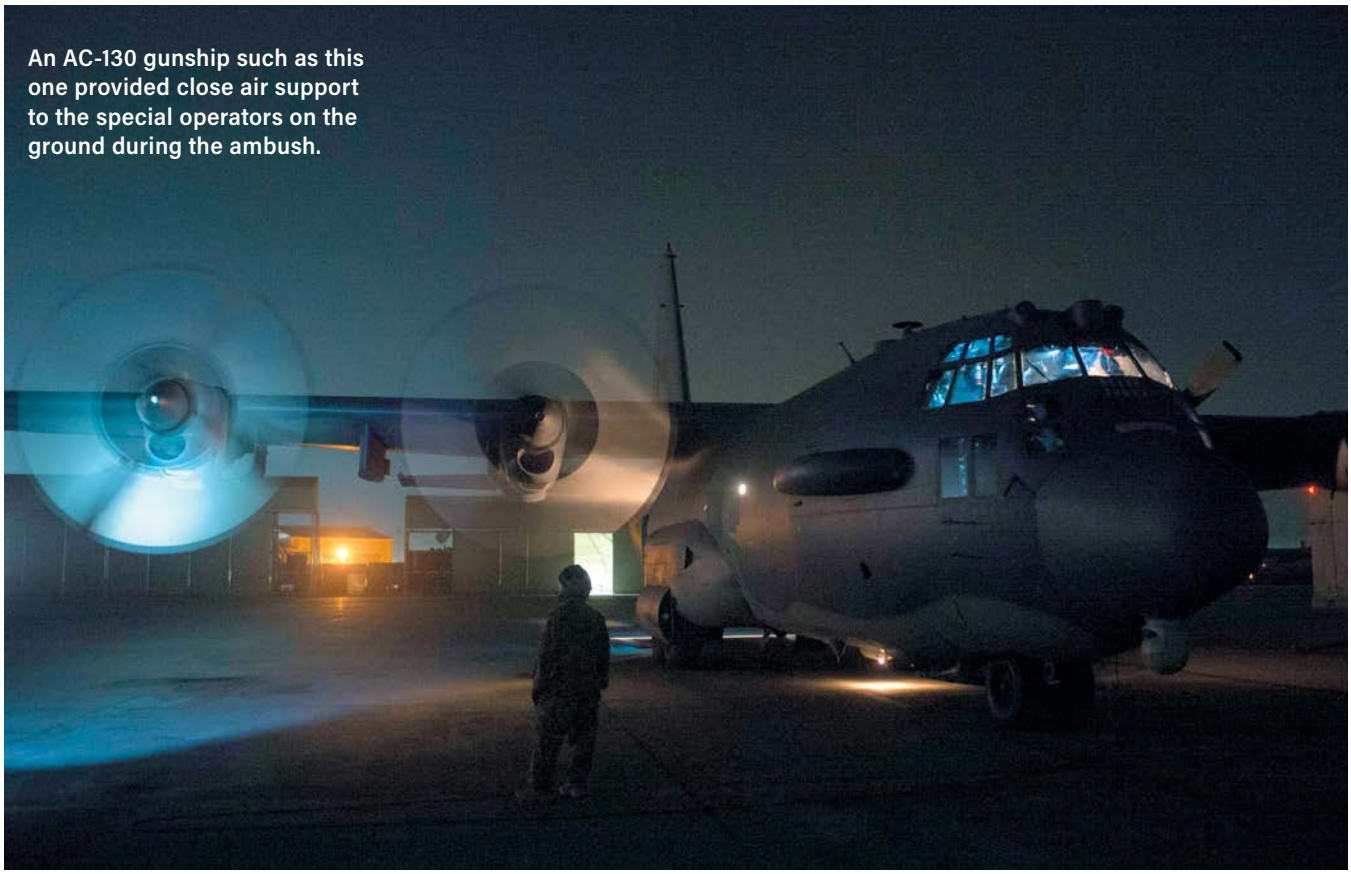
For special operations teams in Afghanistan, "shooting danger-close isn't out of the ordinary," Hill said, describing attacks against targets so close to friendlies that fratricide is a concern. "We train continuously to be able to employ our weapons as close as we ended up having to this night." But the number of strikes and their duration was extraordinary. "Typically … it'll be a few rounds, [and] the target either runs away from the friendlies or we've destroyed the target," Hill said.

But on Nov. 2, beating off the ambush required "107 minutes of danger-close" without interruption.

Hunter agreed. "It's not irregular to have danger-close scenarios, but to have that type of danger-close engagements for that duration, I've never heard of it." The strikes were so close to Hunter, Hill said, that "I'm pretty sure we concussed him a few times."

While directing strikes landing on

Photos: SrA. Ryan Conroy; USAF Special Operations Command



An AC-130 gunship such as this one provided close air support to the special operators on the ground during the ambush.

enemy positions as close as 12 meters away from himself, Hunter led his teammates in dragging wounded comrades down the alleyway to a casualty collection point in another compound. At one point he heard a cry for help and left the safety of the compound again, entering direct enemy machine gun fire to retrieve another wounded team member, and drag him to safety.

Meanwhile, "insurgents just continue to pour on in waves," said Hill. His AC-130 fired for so long that they ran out of point-detonated 105 mm rounds. They had airburst rounds remaining, but those are typically reserved for targets "400-500 meters away from friendlies," Hill said. Nonetheless, they knew they had to use them.

"We pretty much told SSgt. Hunter to put his head down, and we fired one round closer than … anyone's ever fired an airburst round."

And it did the trick, finally quieting down the enemy on the east side of the ground team.

Over the eight-hour assault, Hunter directed AC-130 and AH-64 aircraft in delivering 1,787 munitions. Defense Department officials say his actions saved 57 lives and helped kill 27 enemies.

By 7:45 a.m. the next morning, Hunter and his team were carried out of the village on the same CH-47s they rode in on.

"Integration is key to everything we do," Hunter told reporters. "We train for the chaos scenario all the time," so "when this situation happens, it's no surprise."

What he remembers most from that night is how, even with "so much chaos happening on the ground, … at no point did I ever fear for my life." That's because "overhead we've got this gunship just raining all sorts of hate and taking care of us completely."

On Oct. 17, 2017, Hunter received the Air Force Cross, the highest honor the Air Force awards for valor in combat, during a ceremony at Hurlburt Field, Fla., home base for his 23rd Special Tactics Squadron. Secretary of the Air Force Heather A. Wilson presented the award.

At the same ceremony, Wilson also presented five Distinguished Flying Cross Medals and four Air Medals with Valor to nine other special operations airmen for their actions during the same battle.

Hill received a Distinguished Flying Cross, as did Maj. Aaron Hall, SSgt. Freddie Coffee, SSgt. Cody M. H. Flora, and SrA. Jonathon Russell.

Receiving the Air Medals were: First Lt. Zachary Hanley, SSgt. Alexander Skidgel, SSgt. William Cody, and SrA. Raymond Bourne.

Wilson praised all the honorees for how they "responded with extraordinary courage over and over and over again." She said the actions of Hunter and his teammates that night show that "special operations is the force that we call when we need the absolute best."

At the ceremony, Wilson also honored the memory of two soldiers: Maj. Andrew Byers and Sgt. 1st Class Ryan Gloyer. The two men were assigned to the Army's 10th Special Forces Group (Airborne) at Ft. Carson, Colo., and they were both killed in the firefight.

As to the Air Force Cross, Hunter said he was "humbled to be even considered for this," in large part because "most guys in my career field would have done the same thing."

In many ways, Hill added, "what this points toward is thousands of gunship missions that go on every day and every night around the world and have gone on for decades."

It is clear, however, that this particular mission could have ended much more tragically if not for Hunter, who put his own life at risk under heavy fire in order to save the lives of those serving alongside him. ✪

Photo: TSgt. Jason Robertson

SCREENSHOT

11.07.2017

Air Force One departs Yokota AB, Japan, Nov. 7, 2017. President Donald Trump was in Japan for three days as part of a 12-day tour of the region.

Photo: Yasuo Osakabe/USAF

THE ARCTIC HEATS UP

In the high north, things are cold no more.

By Jason Sherman

With little press attention, a team of senior-level Air Force officials—including 15 general officers from the Air Staff and major commands—visited the Arctic in September, hitching a ride with USAF's specialist polar aviation unit, the 109th Airlift Wing of the New York Air National Guard. The 109th AW performs resupply missions to USAF and scientific outposts at both ends of the Earth, flying ski-equipped LC-130s.

"We went up there to see what has changed in the Arctic and what threats and what other people are doing" there, said Lt. Gen. Mark C. Nowland, Air Force deputy chief of staff for operations.

Nowland said, "There are economic opportunities and our opponents are doing things in the Arctic. So how do we respond to it? What do we do? What should we do?"

The trip, dubbed the Air Force Arctic Security Expedition, ran from Sept. 7-13 across Alaska, Canada, and Greenland. Eleven of the generals on the expedition had "limited- to no-experience in the Arctic," said Lt. Gen. Kenneth S. Wilsbach, head of 11th Air Force at JB Elmendorf–Richardson (JBER), Alaska. He led the group across "The Last Frontier" state, including stops at Eielson Air Force Base, Clear Air Force Station, and Long-Range Radar Site Point Barrow.

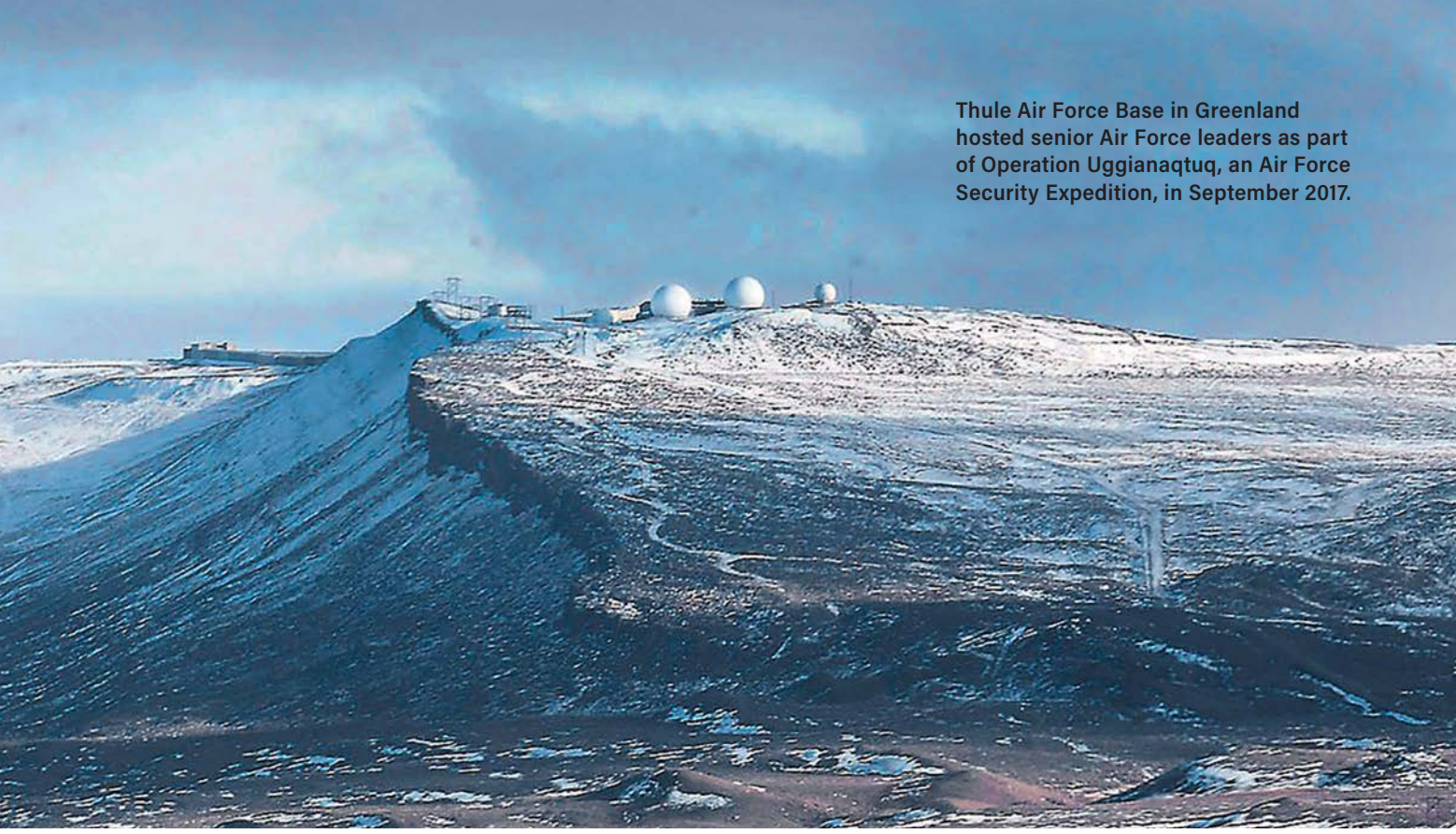
Lt. Gen. Kenneth Wilsbach (left) and Gen. Ellen Pawlikowski eye cold-weather gear at Eielson AFB, Alaska.

Wilsbach, who is also the commander of US Northern Command's Alaskan Command, said there were a few things about the region that he most wanted to impress upon his colleagues.

First, the US is an Arctic nation, with much of Alaska above the Arctic Circle.

Second, the Arctic is vast and remote: "I wanted them to see how big it was," Wilsbach said.

Finally, the three-star wanted the senior Air Force brass to witness for themselves the warming conditions in the Arctic. "There is a lot of controversy about climate change, but what we see in the Arctic is, it is happening. We're seeing it predominantly with sea-ice melt, permafrost melt, and erosion— and we showed them all of that."



Thule Air Force Base in Greenland hosted senior Air Force leaders as part of Operation Uggianaqtuq, an Air Force Security Expedition, in September 2017.

The receding sea ice is bringing increased human activity into the region, as large swaths of what had previously been pack ice—inaccessible to all but specially equipped icebreaker vessels—has become open-seas navigable for much of the year.

"We're seeing transit in the Arctic, we're seeing tourism, we're seeing the beginning of competition for resources like gas, oil, and fish," said Wilsbach. He emphasized how important it is to be sensitive to the original Alaska populations and use any opportunity to learn from them.

He also highlighted the formidable challenges the Air Force faces in Arctic operations, and the difficulty of maintaining high-technology systems in extremely cold conditions.

After Alaska, the group visited Thule Air Base in Greenland, the northernmost US military post in the world, to view missile defense and space situational awareness operations. The expedition hopped a short flight north to Canadian Forces Station Alert, a small post on an ice runway fewer than 100 miles from the North Pole, and then to Ilulissat, Greenland, to meet with senior Danish defense officials. The visit to Ilulissat included time with Maj. Gen. Kim Jesper Jorgensen, head of Denmark's Joint Arctic Command.

"I think we learned a lot, and it was an amazing trip," said Gen. Ellen M. Pawlikowski, commander of Air Force Materiel Command, the most senior officer on the trip.

A glacier near Ilulissat, Greenland, highlights climate challenges.

"Now we have to take all this (and) put it together," Nowland said.

USAF'S ARCTIC STRATEGY

Specifically, the service is drafting a first-ever Air Force Arctic Strategy, which could set the stage for new requirements and capabilities for operations in the highest latitudes of the Northern Hemisphere. Service officials say the document will be "nested" in higher-level US government strategies. These include:

- The 2013 National Strategy for the Arctic Region, which proclaims that the US seeks an Arctic that is stable and free of conflict.
- The 2013 Defense Department Arctic Strategy, which sets as the desired end state a "secure and stable region where US national interests are safeguarded [and] the US homeland is protected."
- A 2016 update of the DOD Arctic Strategy, which affirmed the 2013 desired end state, but added, "nations work cooperatively to address challenges."

"We're clearly nested under the DOD Arctic Strategy and we're operating in accordance with that strategy today," Nowland said. "But, how do we respond to the changing situation? We need to look at the gaps of what we observed, what are we doing now, what do the plans say we have to do now, what are the gaps between the changing conditions, what are the concepts of operation that could fill those gaps."

While the Air Force has a long history of operating in the Arctic—during the Cold War, for example, B-52s were dispersed to ice runways in Greenland—the service, until now, has not articulated a strategy for operating in

Photos: TSgt. Dan DeCook (1,3); SSgt. Jerilyn Quintanilla

the region, even as the Navy and Coast Guard have followed the DOD lead.

Still, USAF maintains dedicated Arctic aviation capabilities, including two Air National Guard units. The first is the 109th, based at Stratton Air National Guard Base in Schenectady, NY, which is capable of deploying forces on LC-130s directly onto open snow and ice with little to no infrastructure or support. The unit, which has classified missions, conducts year-round peacetime operations supporting the National Science Foundation in Greenland and Antarctica.

The second group of Guard arctic specialists are in Alaska at JBER, with squadrons that operate HC-130 transports and HH-60 helicopters.

(*Air Force Magzine* showed its readers what it takes to compact snow into an Antarctica runway in the September issue on page 60.)

Raven Camp, near Kangerlussuaq, Greenland, is used to train aircrews of LC-130 "Skibirds" to operate on skiways.

STATE OF THE ART

Major Air Force capabilities in Alaska include a C-17 airlift unit, C-130 squadrons, a tanker squadron—and, notably, an F-22A squadron at JBER near Anchorage. The service plans to bolster that fighter power by also basing two F-35 Joint Strike Fighter squadrons at Eielson AFB, located mid-state near Fairbanks, by 2022. That will give Alaska bragging rights to having more advanced fighters than any other location, according to Wilsbach.

"I know one thing, Alaska is important to us," Nowland said. "We're responding. We're going to have over 100 fifth-generation aircraft up there. Alaska is a critical enabler. The Air Force is already in support of the DOD Arctic Strategy in putting some of our greatest technology up there."

Indeed, going by resources dedicated, the Air Force is the major US military player in the Arctic. In FY17, the Pentagon estimated $6 billion earmarked for Arctic-unique capabilities—excluding spending on strategic capabilities, such as ballistic missile submarines. According to a June 2016 DOD Report to Congress on Resourcing the Arctic Strategy, USAF controlled the bulk of that allocation —$4.3 billion—including $650 million for Research, Development, Test and Evaluation (RDT&E) and $1.1 billion for procurement of Arctic-unique capabilities. Another $2.2 billion was allocated for Air Force Arctic operations and maintenance and $375 million for military personnel.

Key research and development projects include work to identify capabilities needed to provide long-range, wide-area surveillance in the northern approaches; modernizing the Northern Warning System to improve surveillance and protection for the Arctic; funding to develop a follow-on to the Milstar satellite communications system to provide secure connections in the Arctic; and upgrades for the E-3 Airborne Warning and Control System for improved capability in the Arctic, according to the DOD report.

As the ice cover recedes, resources that were once inaccessible and locked beneath it are coming within reach. A 2009 US Geological Survey estimated that about 30 percent of the world's undiscovered gas and 13 percent of its undiscovered oil is likely to be found north of the Arctic Circle.

At the same time, Canada, Denmark, Norway, and Russia are all making seabed claims based on the extended continental shelves beyond their exclusive economic zones. Those claims, based on the United Nations Law of the Sea Convention, set the stage for potential territorial disputes.

The receding ice also opens up new ocean transit routes for commerce and tourism. For example, in August, the *Christophe de Margerie,* a Russian tanker on its maiden voyage, made the northern passage without an icebreaker escort for the first time. It carried liquefied natural gas from Norway to South Korea in just 19 days, a trip that was an estimated 30 percent faster than the conventional southern route via the Suez Canal, according to press reports. In 2016, the cruise ship *Crystal Serenity* sailed a new route, from western Alaska to New York across the Arctic Ocean.

While defense experts don't gauge the near-term probability of Arctic conflict as very high, concerns are rising about competing claims in the region.

China, which doesn't even have any territory in the region, has asserted rights to the Arctic and is building icebreakers to facilitate transit there.

In 2010, then-Rear Adm. Yin Zhin advised China's political leaders not to fall behind on Arctic Ocean exploration. "China must play an indispensable role in Arctic exploration as we have one-fifth of the world's population," Zhin said, according to multiple English-language press reports citing the official China News Service.

Russia—which in 2007 symbolically staked a claim to the fossil fuel reserves in the Arctic by deploying submarines to plant a flag at the seabed more than two miles beneath the North Pole—is also flexing military muscle in the region. (The word "arctic" is derived from a Greek word meaning "near the bear, northern" a reference to the constellation Ursa Major and the North star.)

Since 2012, Russia's plans for military modernization in the Arctic have expanded, with a focus on maritime and air capability and the ambition to permanently deploy forces along Russia's entire Arctic Coast from Murmansk to Chukotka, according to Katarzyna Zysk, Russian military expert and associate professor at the Norwegian Defence University College.

"Russia has an asymmetric power advantage compared to other Arctic nations' military presence in the Arctic," Zysk said in an interview. "I think the other Arctic nations have a lot to do to catch up."

In the last few years, according to Sen. Dan Sullivan (R-Alaska), a member of the Armed Services Committee, the Russian buildup includes four new Arctic brigade combat teams, a new Arctic command, 14 new operational airfields (with a goal of 50 by 2020), 16 deepwater ports, and 40 icebreakers with 11 more in development; some nuclear powered.

"So ... something serious is going

on in the Arctic," Sullivan said Jan. 24, 2017, at the Center for Strategic and International Studies.

Wilsbach is keeping a close eye on Russia and believes that most of its military beefing-up could be explained by Moscow protecting legitimate interests. Russia draws an estimated 20 percent of its gross domestic product from its Arctic resources.

"Right now, I'm not overly concerned for two reasons," Wilsbach said. "I know it is part of their overall Arctic buildup. We have a corresponding defensive capability to counter that should—and I don't think this is going to happen—should they intend to use it. I'm not concerned yet. At the same time, as we go forward in time, I encourage people to keep an eye on that. And ask the 'What's-that-for?' question. And 'Why are you building this capability?' "

Wilsbach sees one Russian capability being developed in the Arctic that clearly is not defensive. "Amphibious arctic-capable units. Amphibious operations are clearly for inserting troops and taking territory," he said.

John L. Conway III, a retired Air Force colonel and intelligence officer who studied the Arctic for years, said the near-term focus for the Air Force in the region will likely be on plugging capability gaps. "I don't think warfighting, expect perhaps aerial intrusion, is an issue right now," Conway said. "I think we need to see and communicate and then worry about learning how to shoot up there."

That could augur for an Air Force Arctic Strategy that details service-specific capability shortfalls along the lines of those outlined in the DOD strategy. They include the challenge to maneuver, employ, and sustain forces in extreme cold weather clothing; aging surface mobility platforms; ice, permafrost, and extreme weather conditions; limited navigation aids; inadequately mapped terrain; and command and control of forces that are challenged by limited satellite and terrestrial communications above 65 degrees north latitude.

Members of the Russian Northern Fleet have displayed increased presence in the Arctic.

While the Navy and Coast Guard have already outlined Arctic roadmaps and strategies, the Air Force was not "present" in these documents, according to Conway, referred to only as "sister service air transport."

"Nature abhors a vacuum," Conway said. "We've got to have a strategy."

The Air Staff's Nowland said, as he and his colleagues traveled around the Arctic in September, they were struck by the immense distances between destinations, making an implicit case for airpower that must be made explicit as the Air Force crafts a new strategy.

"The Arctic trip showed us the same thing we have in the Asia-Pacific Theater, that is: time-distance problems," Nowland said. "There is inherent requirement for air capability in the Arctic." ✪

Jason Sherman is senior correspondent for InsideDefense.com. His last article for *Air Force Magazine*, "The Services Meet the Warlords," appeared in the September 2008 issue.

Antarctic Operations, Half a World Away

A little white-out erases everything, and this was about the worst-case scenario for landing in extreme polar conditions that an Air Force pilot could imagine. After crossing the designated "point of safe return" on the eight-hour flight over the ocean from Christchurch, New Zealand, to Antarctica, weather reports at the destination—McMurdo Station—grew progressively worse.

By the time Lt. Col. Steve Yandik and his co-pilot, Maj. Justin Garren, approached Williams Field on the frozen continent that day—Jan. 19, 2015—the view outside the cockpit of their LC-130 was so thick with blowing snow they couldn't see a thing except white. It was as if they were flying their ski-equipped military cargo plane inside a gigantic ping-pong ball.

Low on fuel after the long flight, Yandik—one of the US military's most experienced pilots flying on ice and snow, and a full-time farmer from Livingston, NY—recognized the very hazardous situation he and his crew faced: "We were basically flying blind," he said.

Yandik called for executing an emergency procedure: He steered the aircraft into the wind over a large, pie-shaped area surveyed to be smooth and free of obstructions, dialed back the power in the four turboprop engines, set a very low descent rate, and reduced elevation until the aircraft made contact with the surface. THUMP. The aircraft hit the ice and skipped up, airborne again. Eventually, it settled again.

"I couldn't see anything, even after I landed," Yandik said. It was "nerve-wracking . . . trying to slow the airplane down, keep the wings level, keep the nose tracking in the right position."

The safe landing was a testament to the skills of the crew as well as the expertise that the New York Air National Guard's 109th Airlift Wing has cultivated through 40 years operating in Greenland and Antarctica. The 109th Airlift Wing is the only unit in the world that flies ski-equipped LC-130 aircraft—a niche capability to operate in the most extreme cold conditions. It's just the sort of cold-weather capability USAF leaders—with an eye on Russia's military buildup in the Arctic—are now having to make a higher priority.

Photos: SMSgt. Willie Gizara/ANG; Russian Federation Ministry of Defense

THE CYBER WARRIORS

The challenge: USAF must build a highly skilled force it can't say much about, to perform missions it can't really discuss.

First Lt. Victoria Rathbone (c) trains a pair of Civil Air Patrol cadets at JBSA-Lackland, Texas.

By Gideon Grudo,
Digital Platforms Editor

The US military is at constant war in cyberspace, fending off thousands of attacks and intrusions every hour by relentless foes seeking to exploit the slightest flaw in America's defenses.

The daunting challenge for those in charge: Run a well-funded,-organized, -equipped, and -manned cyber force while keeping largely silent about the nature of the battle.

Cyber warriors are "constantly engaged in a fight with multiple adversaries," said Maj. Gen. Christopher P. Weggeman, head of 24th Air Force, USAF's component of US Cyber Command. "If you want to put on that superman cape and jersey and fight for your country, believe it or not, the most active warriors out there right now are the cyber warriors."

What they do, though, must necessarily remain secret, so as not to tip off the enemy about what the cyber force knows, what it can do, and what it is doing. This presents a challenge to both recruiting and funding: The American people and lawmakers are largely unaware of who cyber warriors are, what it takes to train them, what it is they do, and what their challenges are.

Twenty-fourth Air Force—known as Air Forces Cyber—holds the reins for USAF's responsibility in the three-part cyber mission set established by the Department of Defense. They are :

- Defend the US against cyber attacks of significant consequence.
- Secure, operate, and defend DOD's networks and mission systems.
- Support combatant commanders around the globe, delivering to them all-domain, integrated cyber effects.

Thus, it's not cyberwar USAF is waging, but rather "cyber *in* war."

These specialized warriors operate in, through, and from the cyber domain, helping the service fly, fight, and win, Weggeman told *Air Force Magazine* in an interview. While he thinks the service and Congress are coming closer to grasping this general philosophy, the public, he said, is probably not.

Cyberspace is a place, a domain—like air, land, or sea—Weggeman emphasized.

Unlike what is portrayed in movies—where troops at consoles fight video game-like battles in cyberspace, USAF's digital warriors are "just one more weapon in an all-domain, integrated arsenal of effects in a whole-of-nation campaign," he said.

There are 133 teams comprising the Cyber Mission Force, apportioned along the three guidelines set by DOD:

- 21 counter cyber teams operate in red space—the non-US government-controlled cyber realm—to defend the nation.
- 44 cyber strike teams operate in red space to support combatant commanders.
- 68 cyber hunter teams operate in blue space to defend DOD's own cyber infrastructure.

More than 6,000 military, civilian, and industry cyber warriors make up this force. Of those, USAF alone puts forward more than 1,700 airmen, comprising 39 teams, again broken down by mission:

- 12 national mission teams for the Cyber National Mission Force
- 13 combat mission teams for US Strategic Command and US European Command.
- 14 cyber protection teams for USAF and US Cyber Command.

Twenty-fourth Air Force supplies more than a thousand Active Duty airmen for these missions. Twenty-fifth

Photos/Illustrations: Jessica Turner/USAF; SSgt. Alexandre Montes

Cyber warriors watch their monitors in April 2016 at US Cyber Command facilities in Port San Antonio, Texas.

Air Force—with a focus on intelligence, surveillance, and reconnaissance—provides 700 Active Duty airmen. Another 500 airmen come from the Guard and Reserve.

TRIBAL WARFARE

There are four "tribes" in the cyber domain, Weggeman explained.

First is the senior leadership, providing administrative oversight and guidance.

Next are the cyber warriors who build, operate, and maintain networks in the cyber domain.

Third are the cyber warriors who conduct operations in, from, and through the cyber domain.

Finally, there are the consumers of cyber—the operators in other domains who nonetheless depend on the cyber infrastructure to do what they do.

In 24th Air Force, Weggeman touts six lines of effort: build, operate, secure, defend, extend, and engage, or as he sums it up, "BOSDEE."

Each line requires a specialized and dedicated skill set and its own kind of Air Force cyber warrior.

SMSgt. Eric Von Holdt is a "grandfathered" cyber warrior, a specialist from before that term came into vogue.

He was in the right place at the right time when the Air Force created an enlisted track for the specialty. He "came into it because of the position I was in, and the job I was doing, and the skills I'd learned to get to that job," he said in an interview.

He "grew up" in the Air Force as a traditional intel troop, climbing the ropes of digital network analysis, developing solutions in the information technology and networking domains. Today, he's a cyber warrior with the 33rd Network Warfare Squadron, based at JBSA-Lackland, Texas.

The squadron monitors cyber systems throughout the service, from servicewide networks to individual ones. It looks for "bad things" cyber warriors are trained to find—such as code that shouldn't be there or protocols taking place that shouldn't—and wipes them out. That's the "detect and respond" part.

Prevention is "reactive," which Von Holdt explained means "looking for the things we don't know about yet," such as monitoring reports of new threats around the world, learning about them, and putting measures in place to block them.

He considers himself a natural fit for the mission, having a desire to figure out how things work, to build what doesn't exist, and to seek solutions.

"If something is broken, I'm generally not okay with it being broken. I want to figure out why it's broken and see if there's a better way forward so it doesn't break again," Von Holdt said. "That, somehow, brought me to where I am."

For airmen who can't handle chronic change, the cyber domain will be a poor fit, Von Holdt said.

"This is a very stressful environment. Unlike in your physical domains, the rules are constantly changing," he said, adding that this can be "aggravating." Airmen in this field "have to be flexible."

Being a leader in this domain presents similar headaches, said Capt. Mark Griffin of the 90th Cyberspace Operations Squadron at Lackland. Because there's no precedent for some problems, there's "lots of trailblazing going on."

Frequently, "We have something that we know needs to be done and nobody who knows the right way of doing it," Griffin said. "There's a lot of creativity and challenge," but sometimes friction "comes along with that 'building the plane in flight,' so to speak."

For the last 18 months, Griffin's been helping with the day-to-day operations of the 90th COS, developing cyber capabilities where they're needed.

Cyber protection experts at Scott AFB, Ill., run through an exercise to validate their abilities to locate, defend, and counter attacks.

Griffin wants cyber warriors to be more comfortable in their digital skins, more prepared to spot bad code.

"The more cyber-savvy people we have at all the varying levels, doing different jobs from acquisitions to operations to intelligence," Griffin said, "the better we're going to be at this."

Von Holdt said the human cyber warriors are "the craziest, smartest nerds I have ever met in my life. They just astound me, coming up with the craziest solutions."

FLEXIBILITY IS KEY

As cyber technology improves, cyber warriors must stretch themselves and their equipment to cope with unknown unknowns; threats that attend the introduction of new material. Threats have to be imagined, solutions thought up, and the means to deliver them obtained in order to pre-empt new kinds of attacks.

"It's constantly staying on top of 'What new risks did that introduce?' or 'What new things do we have to defend against?' " Von Holdt said, adding he's certainly not expecting the service to suddenly triple the amount of airmen dedicated to cyber.

To survive an increasing demand for the mission with fewer resources, Von Holdt turned to efficiency, modernization, and increased agility.

Griffin sees the same challenge but through a different lens.

"Everybody wants to do the right thing, and people are realizing that we really need outcomes in cyber," he said. "It's easy for a general to say 'We need to adopt more agile processes'—but then to see that executed successfully several levels downward for different mission sets, that's definitely more of a challenge."

While the acquisition community is working to become more agile, that very same advancement looms over the shoulders of the cyber community. Every solution could mean a new risk, creating a vicious and unrelenting cycle. That causes stress, and unremitting stress affects retention.

"My personal experience is that people don't leave because of money," Griffin said. "The biggest reason that I hear is that people want to make a positive difference but they feel like they have difficulty doing so."

Those not involved in the mission may not value the cyber warriors as much as airmen fighting in other domains because they just can't see the results.

Writing in *Air & Space Power Journal,* Weggeman claimed some troops "scoff" at cyber warriors because they "don't pull triggers, drop bombs, or invade enemy strongholds." But he also acknowledged the Air Force itself has painted all cyber warriors with a single brush, losing a sense of the varied contributions.

"We've over-homogenized our own cyber tribe. We have to get back into blocking and tackling," he said. "To the point of 'No one sees it. We're not seen, we're not heard, we're almost invisible.' "

The Air Force is working on it. Toward the end of 2017, Weggeman expects a team comprising 24th Air Force, the Air Staff, and its Chief Information Officer to begin pushing a new set of career paths to get the cyber force into the "modern maneuver-and-effects-centric" focus.

If everyone in the Air Force "is told and believes they're a 'cyberspace operator' " in which the service attempts to "teach everything to everyone ... you're diluting their technical competency and you're relegating yourself to this state of perpetual amateurism," Weggeman said. Navy SEALs "go to SEAL training for a reason," he noted. "It's different."

BETTER WAY TO BUILD A FORCE

Finding the right people takes hard work and more than a little luck.

When Von Holdt was operating in the pre-Cyber Command days, war was less emphasized.

The cyber force was rapidly evolving and the Air Force was figuring it out as it went along. Jobs were handed over to those who could do them. Despite never having gone to tech school, Von Holdt became a cyber warrior and has since taught courses and helped develop new warriors.

"The old mindset was, 'Is email working? Okay, our job is done,' " Von Holdt said. "Now it's: 'Is email safe and secure?' That's probably more important than if it's working."

One of the responsibilities of 24th Air Force is to build the new cyber warriors.

Lt. Col. Angela Waters is the 39th Information Operations Squadron commander. Her job is simple: Take airmen from Air Education and Training Command who did "really well" on their initial cyber skills course and turn them into cyber warriors.

In Fiscal 2017, Air Force Space Command—which oversees Air Forces Cyber—tasked Waters with creating 1,500 cyber warriors. In FY18, AFSPC wants 1,600 in the pipeline. This is the goal, not necessarily the actual throughput, Waters pointed out.

"We try to get as many students through the pipelines as we possibly can," Waters said in an interview. "For the most part, we fill every seat in every class."

The schoolhouse runs 18 different courses, focused on two types of operations: information and cyber.

More than 100 airmen are studying at any given moment between a main campus at Hurlburt Field, Fla., and a squadron detachment at Lackland. Assuming they pass every course, an aspiring cyber warrior will get a little over four months of training at this level.

Photos: USAF; A1C Daniel Garcia

Maj. Gen. Chris Weggeman, 24th Air Force Commander, breaks down "BOSDEE" during a 24th Air Force Community Open House April 6, 2017, at Port San Antonio, Texas.

Waters said one of her biggest challenges is the slow pace of change at the 39th itself despite the high tempo and evolving need for bodies.

"We need to grow," she said, but the field is already growing faster than it ever has, and it's hard to keep up.

Von Holdt argued that good cyber warriors aren't created in the classroom. While cyber training in USAF has come a long way, he said, it's really aptitude more than knowledge that determines the value of a cyber warrior. The cyber force needs tactically competent airmen to connect two disparate pieces of information and figure out what's going on, he explained. If someone is lost once the mission deviates from a checklist, they're not very useful in today's cyber domain.

"It's trial by fire. You find the people that you think are going to be good, you give them all the training you can, and then you sit them down and have them go to work," he said. "Sometimes people excel at that. Other times, it's just not the job for them. And that's not any fault of their own, at all."

Expertise is in writing and reading code, a set of inflexible zeros and ones whose executed functions are binary: yes or no. Despite the differences, their work can have the same effect as that of, say, combat pilots.

Cyber warriors have to have the same ethos as any other fighters, said Weggeman, an F-16 fighter pilot for 25 years. "It's immutable." The difference is, instead of bombs and missiles, cyber warriors throw code at the enemy. That can be a problem, because while pilots can measure what they do—targets destroyed—cyber warriors can't necessarily see the results of their actions. It's even harder to offer them praise, because the Air Force can't share their achievements publicly. That would give the adversary clues as to vulnerabilities, the threats USAF takes most seriously, and the steps used to confront them.

Neither Von Holdt, Griffin, Waters, nor Weggeman could offer much in the way of concrete examples describing what they do or how they do it. The words they're compelled to use—when they can say anything at all—are thick and technical.

For example, Griffin's 90th COS was tasked recently with presenting a red team in a cyber threat emulation. Deadlines approached quickly and Griffin, stuck between the need to deliver this capability and many others, found his squadron stretched thin. This was a situation requiring some innovation.

"I'm a make-it-happen kind of guy," he said, explaining that he immediately turned to leadership, to whom he described the situation, normal procedure, and why it wouldn't work on this occasion.

"Here's the facts, here's the operational reality," he related, saying he told leadership, " 'I need you to waiver some policy or make the case upward so we can get [an] exception to make the mission happen.' "

On this occasion, it worked. But how can the Air Force reward Griffin for thinking outside the box in this episode or recognize his cyber warriors for creativity and increasing efficiency without exposing holes in the 90th's capabilities?

The service is working toward better recognition of its cyber warriors. That will always be difficult in this domain because, considering the classified nature of cyber operations, the people getting recognized have to be brought into a Sensitive Compartmented Information Facility (SCIF)—a space specially protected from electronic eavesdropping of many kinds—and we "give them an award that doesn't exist and that they can never wear," Weggeman observed.

Recognizing his airmen who contribute and get the mission done is crucial, Weggeman insisted, describing it as "universal to the success of any service culture."

He added, "I'm working on that." ✪

Photo: SSgt. Marissa Tucker

Infographic

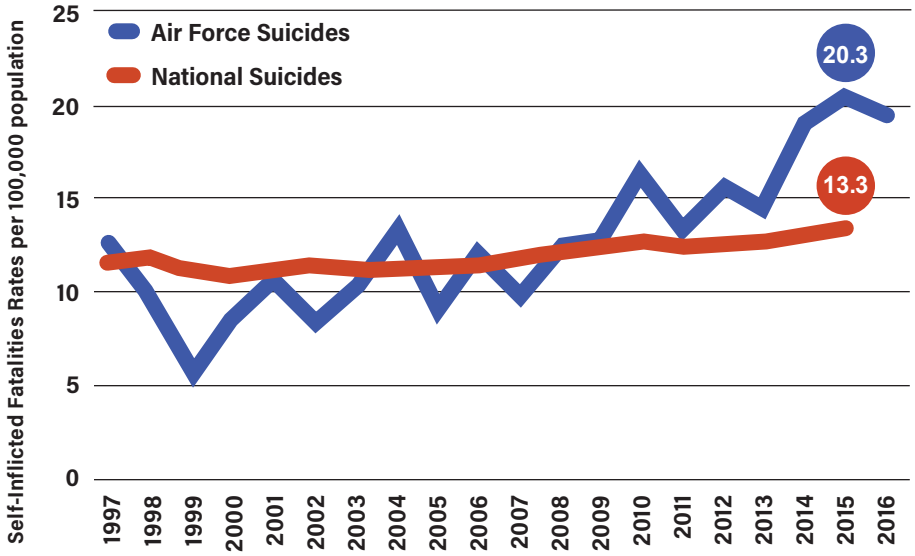
If you're having suicidal thoughts or are otherwise wanting to talk to someone, you can call the National Suicide Prevention Lifeline (https://goo.gl/1QFCzu) at 1-800-273-8255 or chat with someone 24/7 (https://goo.gl/eMkOGI).

USAF Suicide Numbers: Bad—and Trending UP

By **Gideon Grudo,** Digital Platforms Editor

In 2015, airmen committed suicide at a rate of more than 20 per 100,000 population. Put another way, more than one in 5,000 airmen took their lives in a single year. This was the leading cause of death for airmen, the highest rate of the past 20 years, and the overall trend is rising. Not only is USAF's suicide rate tragically high, the recent rates dwarf the national averages.

Suicide Rates in USAF



20 Years of Suicides in the Air Force

From Jan. 1 to Sept. 30, 2017, 44 Active Duty airmen committed suicide. This rate of 14.1 per 100,000 doesn't reflect a full calendar year, and therefore we did not include it in the chart below.

Year	Suicides
1997	45
1998	34
1999	20
2000	30
2001	36
2002	29
2003	38
2004	49
2005	31
2006	42
2007	34
2008	40
2009	41
2010	54
2011	43
2012	51
2013	48
2014	62
2015	63
2016	61

Photo illustration: A1C Devin Boyer

READY TO FIGHT TONIGHT

A-10s and F-16s from Osan AB, South Korea, perform an "Elephant Walk" during Exercise Beverly Herd 16-01 in 2016. For USAF airmen based on the Korean Peninsula, the phrase "Ready To Fight Tonight" is not just a motto, it's a way of life.

Photo: SrA. Dillan Bamman

In the rapidly changing Pacific Theater, the Air Force is determined to maintain the competitive advantage.

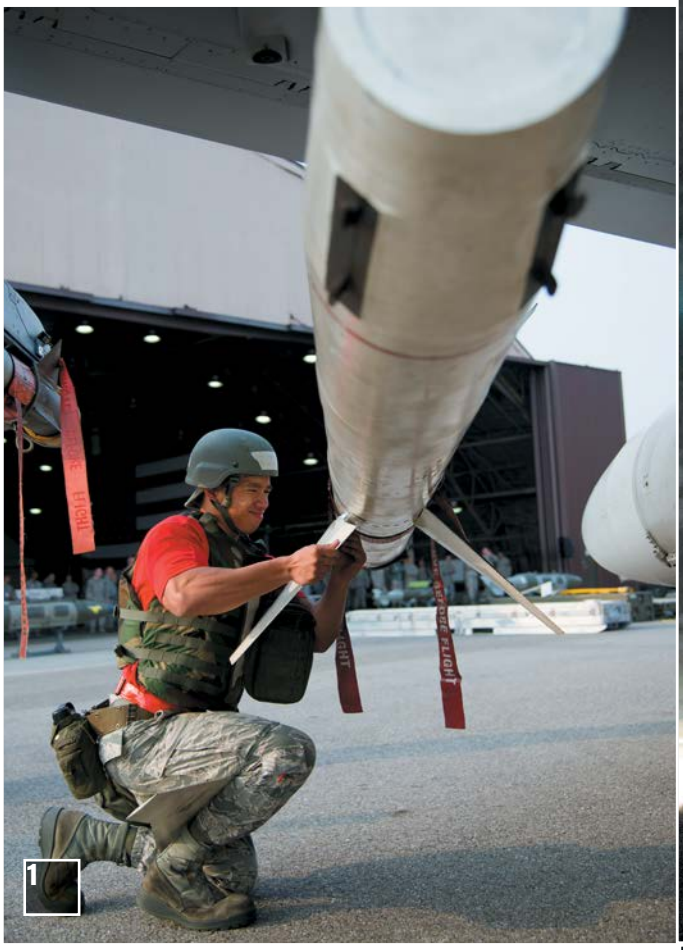
By Amy McCullough, News Editor

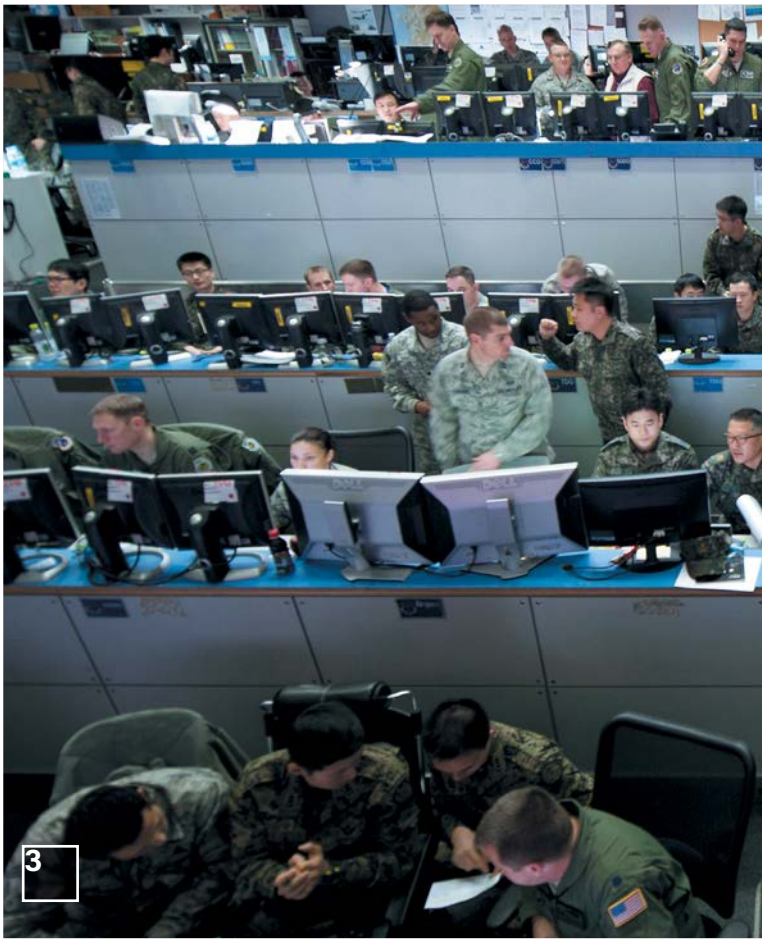
North Korean officials in late September accused the United States of declaring war on their country and said they have the right to shoot down US bombers operating in international airspace.

The comments followed a series of tweets from President Donald J. Trump, which said if the North Korean regime "echoes thoughts of Little Rocket Man they won't be around much longer!"

The escalated rhetoric comes as North Korea ramps up its nuclear and ballistic missile testing. In mid-September, North Korea launched an intercontinental ballistic missile, and its 1,200-mile course took it over Japan. Just two weeks earlier, North Korea had conducted its sixth—and most powerful—nuclear test, claiming it now had the capability to mount a hydrogen bomb on a long-range missile.

"While we are prepared to respond to a wide range of growing threats, our most pressing concerns are the most recent actions taken by North Korea" which "seeks to test in-theater an intercontinental ballistic missile capable of threatening the US homeland," said Pacific Air Forces Commander Gen. Terrence J. O'Shaughnessy in a recent video address to airmen. "Our President has stated we cannot allow this to happen. In response to this challenge, all options are on the table."





Those options inevitably will include US airmen assigned to Osan Air Base and Kunsan Air Base in South Korea, as well as the F-16s, A-10s, and U-2 Dragon Lady aircraft based on the peninsula where the phrase "Ready to Fight Tonight" is not just a motto, it's a way of life.

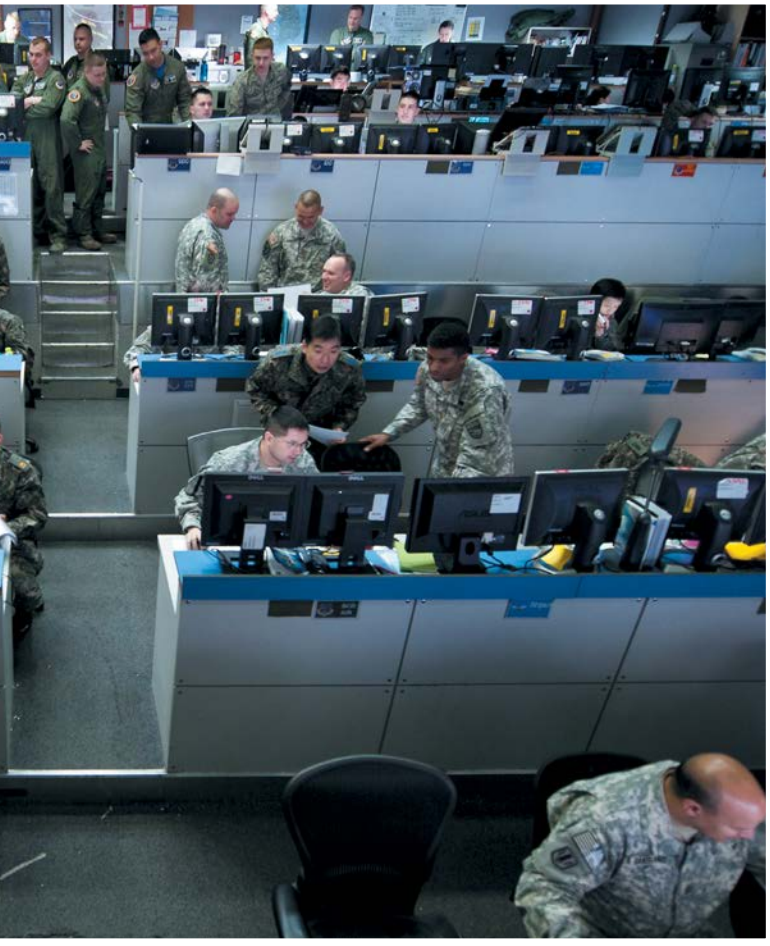
In the event of a crisis, the US, South Korea, and 15 other nations could conduct some 2,000 sorties per day. US forces will comprise roughly 60 percent of the available iron, but the Republic of Korea Air Force will execute roughly 80 percent of the air tasking order, 7th Air Forces officials told *Air Force Magazine*. Sending states are nations that, along with the US, committed to sending forces in 1953 when the armistice agreement was signed, to defend South Korea.

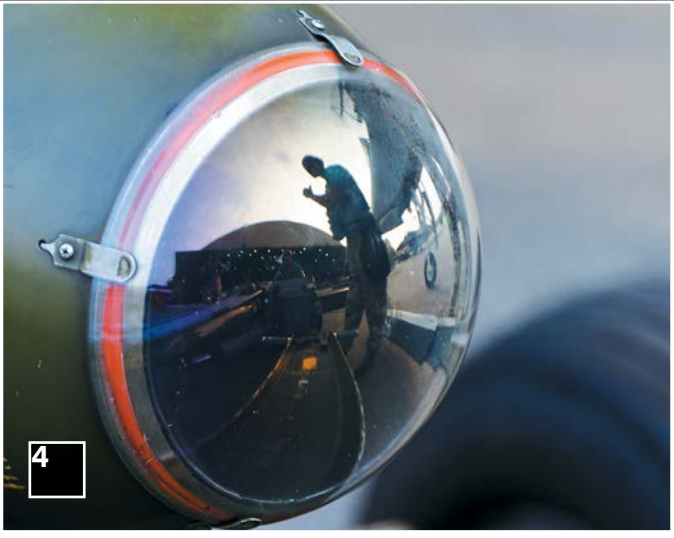
"This effort will require coordinated and integrated airpower in a congested and contested battlespace," said 7th Air Force officials.

That's why airmen based in South Korea are always on exercise. In fact, there are more than 30 exercises a year conducted on the peninsula. The annual Ulchi Freedom Guardian (UFG) and Key Resolve are two of the Defense Department's largest exercises.

UFG is a computer-assisted exercise focused on defending South Korea from an attack from the North. This year's iteration ran from Aug. 21-31. About 17,500 US service members participated, as well as seven sending nations, comprising Australia, Canada, Columbia, Denmark, New Zealand, the Netherlands, and the United Kingdom.

Key Resolve is an annual command and control exercise





1/ A1C Zackary Lau, 36th Aircraft Maintenance Unit, Osan AB, South Korea, adjusts an AGM-88 High-speed Anti-Radiation Missile. The missile homes in on electronic transmissions coming from surface-to-air radar systems. 2/A 25th Fighter Squadron A-10 at Osan AB gets a final check before takeoff in 2017. The aircraft carries a formidable 30 mm cannon, a weapon that would be lethal against attacking armored columns. 3/ South Korean and US forces work together at the Korean Air and Space Operations Center during an exercise at Osan Air Base. 4/ SSgt. Kyle Dixon, 25th Aircraft Maintenance Unit, loads an AGM-65 Maverick air-to-ground missile at Osan. The weapon can be used against a wide range of stationary or mobile targets.

Photos: SSgt. Jonathan Steffen; SrA. Victor Caputo (2,4); A1C Omari Bernard

conducted across South Korea. In 2017, about 12,800 US forces and 10,000 South Korean military personnel participated, as well as dozens of augmentation forces and multinational representatives from Australia, Canada, Denmark, France, and Great Britain. Key Resolve enables US, South Korean, and allied troops to work side-by-side just as they would during wartime operations.

In 2013, 7th Air Force conducted a comprehensive review of all wargames held in Korea and concluded that individually the exercises such as UFG and Key Resolve provided a lot of value, but the Air Force needed something that linked the strategic drills to the more tactical. Exercise Vigilant Ace was the answer. First launched in 2015, Vigilant Ace specifically exercises the pre-position air tasking order that simulates the first few days of conflict on the peninsula. It includes 24/7 flying operations and demonstrates the United States' "capability to maximize our regional forces and generate combat power with little to no notice," according to 7th Air Force.

"Key Resolve and Ulchi Freedom Guardian exercise the strategic level, whereas the tactical level is all simulated," said Lt. Col. David Villa, 7th AF inspector general, and exercise planner, in a November 2015 Osan release. "The other types of exercises we typically do are tactical level exercises where the wing executes the flying but there's no higher level command and control or strategic level involvement above the wing. So this exercise is unique in that it bridges the gap and is specifically focused on exercising the strategic to operational to tactical level linkages."

In his video address to airmen, O'Shaughnessy said the command is working with Chief of Staff Gen. David L. Goldfein and the commander of US Pacific Command to identify areas to further improve readiness in case a military response becomes necessary. The theater is rapidly changing, he noted, and the Air Force is determined to maintain its competitive advantage.

"Our task is not easy. We stand on the border of democracy and tyranny, between freedom and oppression. Our hope is for peace on the peninsula from our mere presence, but ultimately, I know that you're ready, and if called upon to practice our craft, may God have mercy on the Wolf Pack's prey," said Col. David G. Shoemaker when he assumed command of the 8th Fighter Wing at Kunsan in May 2017. ✪

1/ SSgt. Zachary Zenk, 51st Aircraft Maintenance Squadron, checks an A-10 during a first-ever no-notice exercise at Osan AB in 2017. The 51st Fighter Wing was tested on its ability to "Fight Tonight." 2/ A 36th Fighter Squadron F-16, front, flies with a USMC F-35B, left, and a Republic of Korea F-15K Slam Eagle during a 2017 show of force flight south of the DMZ. 3/ SSgt. Joshua Anderson, 51st AMS, inspects the engine of an A-10 at Osan. 4/ SSgt. Sean Douglas, left, and SrA. Kirkie Hampton review the Airman's Manual during a chemical attack medical exercise at Osan. 5/ An 8th Fighter Wing F-16 from Kunsan AB takes off. 6/ Airmen from the 8th FW practice putting on chemical warfare equipment. 7/ Capt. Jacob Houder preflights a Kunsan F-16 during a Beverly Pack 17-1 exercise.

Photos: A1C Gwendalyn Smith; SSgt. Alex Fox Echols III; TSgt. Travis Edwards; TSgt. Ashley Tyler; SrA. Colville McFee (5,6,7)

1

4

1/ SrA. Matthew McDonough practices decontamination procedures at Kunsan AB. North Korea posesses a lethal arsenal of chemical weapons. 2/ TSgt. Freeman Gleaves, 8th Civil Engineering Squadron, Kunsan, practices repairing a damaged runway. 3/ A1C Reagan Bounner and SSgt. Benjamin Callesen carry an AIM 9X Sidewinder air-to-air missile during a no-notice exercise at Kunsan. 4/ A1C Trevin Wharton defends Kunsan during Beverly Pack 18-1. 5/ An F-16 from the 115th Fighter Wing, Wisconsin Air National Guard, spools up for Beverly Pack 17-3 at Kunsan in 2017. The deployment to Kunsan allows US units to train in the Pacific Theater and also demonstrates USAF's commitment to regional security on the Korean Peninsula.

Photos: SrA. Dustin King; SrA. Colville McFee; SrA. Michael Hunsaker; SSgt. Victoria Taylor; 2nd Lt. Brittany Curry

verbatim@afa.org
By Robert S. Dudney

Hairy Trigger

"North Korean officers are trained to press their [retaliatory strike] button without any further instructions from the general command if anything happens on their side. We have to remember that tens of millions of South Korean population are living 70 to 80 kilometers away from this military demarcation line."**—North Korean defector Thae Yong Ho, former deputy chief of mission in London, House Foreign Affairs Committee Committee, Nov. 1.**

Where's the Nation?

"The Air Force as currently constituted is too small to do what the nation expects of it. In 1991, when the US went to war to drive Saddam Hussein out of Kuwait, the Air Force had 134 fighter squadrons, which typically have 18 to 24 aircraft each. Today, the Air Force has only 55 fighter squadrons, and 1,500 fewer pilots than it needs. We have been doing too much, with too little, for too long. … We worry … about the effect on our airmen. … They are the best our nation has and are committed to its defense. The nation must commit to them."**—Secretary of the Air Force Heather Wilson and Gen. David L. Goldfein, USAF Chief of Staff, op-ed in *Wall Street Journal,* Sept. 11.**

Deterrence 101

"I've questioned the [US strategic nuclear] triad. I cannot solve the deterrent problem reducing it from a triad [to a dyad or monad]. If I want to send the most compelling message, I have been persuaded that the triad in its framework is the right way to go. You want the enemy to look at it and say, 'This is impossible to take out in a first strike, and the retaliation is such that we don't want to do it.' That's how a deterrent works."**—Secretary of Defense James N. Mattis, remarks on visit to Minot AFB, N.D., Sept. 13.**

Refighting the War

"For those who avoided the [Vietnam-era] draft and the danger, there is often a quiet guilt. I have witnessed it many times. They dodge the inevitable question: How did you manage to get out of it? Hasty marriage? Graduate school? A trick knee? Men in this category do not invite conversation about that time in their lives, any more than combat veterans discuss the horrendous things they witnessed in the war zone. Only those who came of age after the draft turned into a lottery, the ones with high, untouchable numbers, or those who arrived after the Army went voluntary escaped the moral dilemma of serving or resisting or malingering."**—James Reston Jr., author and former Army officer (who did not serve in Vietnam) op-ed in *Los Angeles Times,* Sept. 3.**

We'll Show You 'Tactical'

"I think the term [tactical nuclear weapon] … is actually a very dangerous term to use, because I think every nuclear weapon that is employed is strategic. … To call it a tactical weapon brings the possibility that there could be a nuclear weapon employed on a battlefield for a tactical effect. It's not a tactical effect, and if somebody deploys what is a nonstrategic nuclear weapon or a tactical nuclear weapon, the United States will respond strategically, not tactically, because they have now crossed a line—a line that hasn't been crossed since 1945."**—USAF Gen. John E. Hyten, head of US Strategic Command, remarks to reporters on Sept. 14.**

Earth to Pandora

"Lethal autonomous weapons threaten to become the third revolution in warfare. Once developed, they will permit armed conflict to be fought at a scale greater than ever and at timescales faster than humans can comprehend. These can be weapons of terror, weapons that despots and terrorists use against innocent populations, and weapons hacked to behave in undesirable ways. We do not have long to act. Once this Pandora's Box is opened, it will be hard to close."**—Open letter from heads of robotics and artificial intelligence enterprises, Aug. 21.**

Outside the Lines

"We are going to have to figure out a way to produce [military] pilots that is outside the resource capacity of the United States Air Force. … We are asking for … a comprehensive approach by the nation to get at how to produce the number of pilots we need for our country. That could be a national pilot training academy that is partially funded by airlines and industry and the military. … We have to build a construct, as a nation, on how we're going to get at producing the number of pilots we need long-term."**—USAF Lt. Gen. Daryl L. Roberson, Air Education and Training Command, airforcetimes.com, Sept. 20.**

Throwing It All Away

"Force or the credible threat of force are best used the instant a threat is detected. Civilized people, however, tend to place actual force far down the list—after engagement, negotiations, incentives, embargoes, etc., which do not work when a country is genuinely on the warpath. … North Korea could have been stopped in 1994 by military threats or even strike operations against their nuclear facilities. Instead, we wasted time heedlessly and profligately. We weren't even serious. … Now the new situation has ratcheted into place. South Korea and Japan will likely become full nuclear powers. The existing East Asian arms race will pass through India to the western borders of Russia, thus menacing Europe. No solution exists any more, except a balance of terror."**—Arthur Waldron, foreign affairs expert, University of Pennsylvania, FPRI.org, Sept. 18.**

Of Time and the Mustang

"To manage the risks associated with emerging 'cyber-contested environments' the US will face in the future, we must radically transform a litany of decades-old policies, processes, and business practices. … While a P-51 [Mustang fighter] would have been impossible to stop through cyber attack, a vastly more capable F-35 is so dependent upon software and IT-enabled support equipment that it could prove less effective in certain scenarios than the Mustang."**—Retired Lt. Gen. William J. Bender, former USAF chief information officer, Mitchell Institute for Aerospace Studies paper, Aug. 30.**

Baltic Exposure

"I wish to be as clear and direct as our findings allow me to be: NATO is not postured or prepared to defend its most exposed and vulnerable member states—the Baltic republics of Estonia, Latvia and Lithuania—against a Russian attack."**—David Shlapak, co-author of a 2016 RAND study on deterring Russia in eastern Europe, quoted in militarytimes.com, Sept. 13.**

GALLERY METAL PRINT

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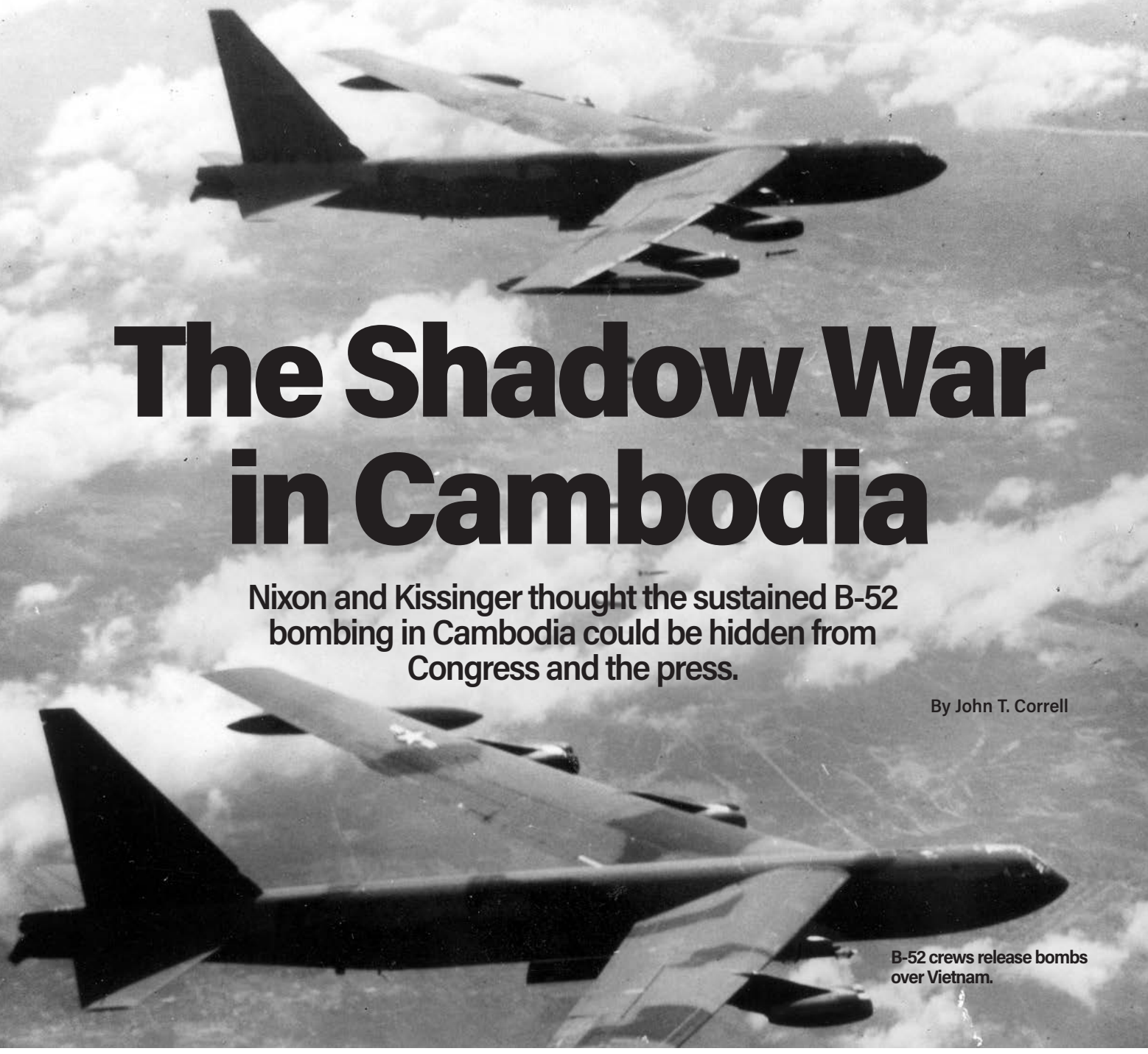


The Shadow War in Cambodia

Nixon and Kissinger thought the sustained B-52 bombing in Cambodia could be hidden from Congress and the press.

By John T. Correll

B-52 crews release bombs over Vietnam.

Cambodia in 1969 was neutral in name only. The Geneva Conference on Indochina in 1964 had declared it to be a nonaligned nation and the official designation was still in effect.

However, Cambodia's Prince Norodom Sihanouk, believing Hanoi would win the Vietnam War, had broken off relations with the United States in 1965. He permitted the North Vietnamese and the Viet Cong to use staging bases in Cambodia for operations in South Vietnam.

The Cambodian border with South Vietnam ran for 706 miles from the central highlands to the Mekong Delta. Along that stretch were at least 15 sanctuary bases, one of them in the "Parrot's Beak," which hooked into Vietnam only 33 miles from Saigon.

In addition, supplies moved unimpeded along the road from "Sihanoukville"—the port of Kompong Som on the Cambodian coast—to the North Vietnamese base camps.

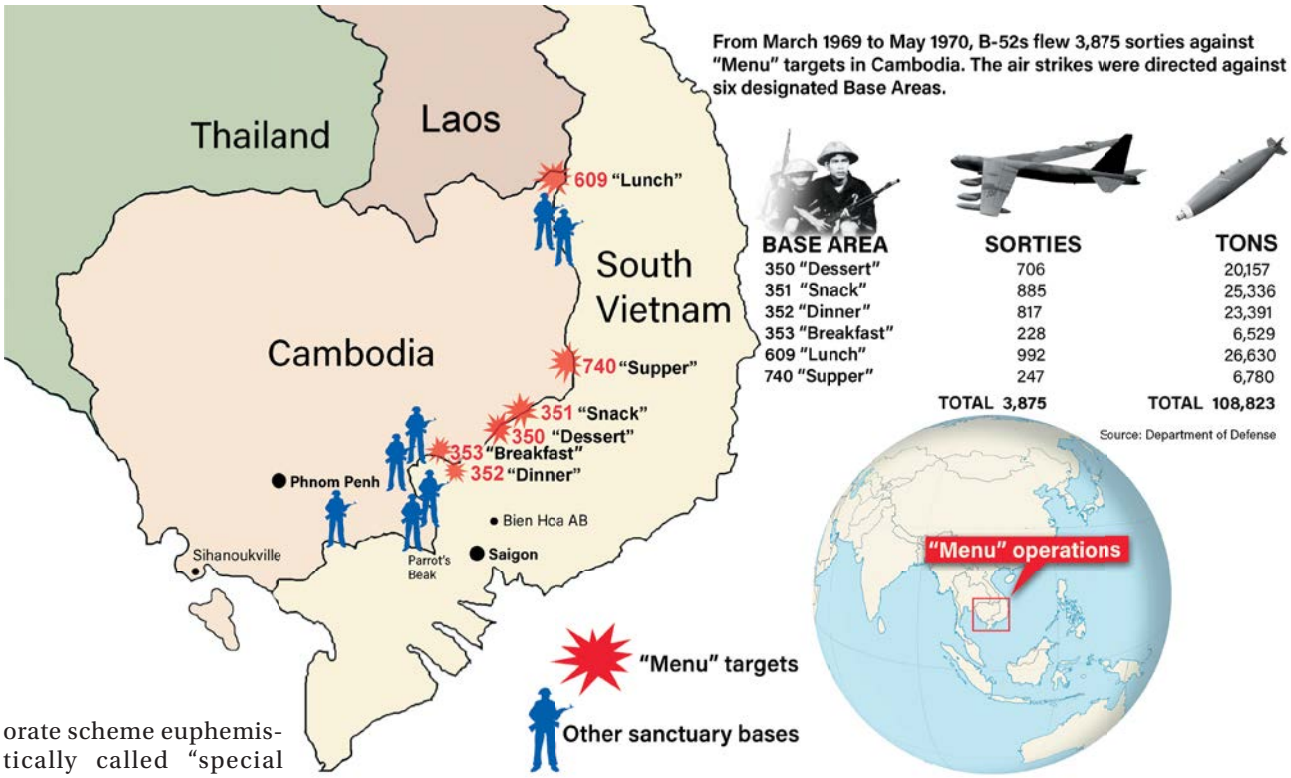
The US command in Vietnam had for some time wanted to eliminate the Cambodian sanctuaries, but President Lyndon B. Johnson, unwilling to commit either to winning the war or getting out, would not permit it. His successor, Richard M. Nixon, was of a different mind.

On March 15, 1969, Nixon authorized the bombing of the Cambodian bases, insisting that it be done in secret. The North Vietnamese and the Cambodians would know as soon as the bombs fell, of course, but Nixon and his national security advisor, Henry Kissinger, hoped to keep it away from Congress and the press.

Between March 1969 and May 1970, B-52 bombers flew 3,875 missions against targets in Cambodia. This was known only to a limited number of Americans in the field and in Washington, D.C.

The North Vietnamese were in no position to complain because they denied being in Cambodia.

Secrecy was maintained by an elab-



orate scheme euphemistically called "special security and reporting procedures." Missions were briefed and launched as strikes against targets in South Vietnam but the B-52s were redirected in flight to different targets nearby in Cambodia.

Records of the actual strikes were destroyed. The entries in falsified reports were for the original targets in South Vietnam. Selected officials were kept abreast of actual events through "back-channel" communications.

Operations in Cambodia moved into the open with a major "incursion" by US and South Vietnamese ground forces in 1970, but the secret B-52 missions—dubbed Operation Menu—did not become public knowledge until revealed in the course of dramatic hearings in the Senate in July 1973.

President Richard Nixon points out North Vietnamese sanctuaries along the Cambodian border during a televised speech announcing the Cambodian incursion in 1970.

THE SANCTUARIES

Sihanouk was having doubts about his bargain with the North Vietnamese and the Viet Cong, who brought in more than 300,000 troops, took over several of the northern provinces, and drove out most of the Cambodians.

Mindful of the historic threat of domination from Vietnam, the slippery Sihanouk hedged his bets. In 1968, he all but invited an American attack.

"We don't want any Vietnamese in Cambodia," he told a US emissary. "We will be very glad if you solve our problem. We are not opposed to hot pursuit in uninhabited areas. ... I want you to force the Viet Cong to leave Cambodia. In unpopulated areas, where there are not Cambodians—in such precise cases, I would shut my eyes."

Nixon came to office inclined to take action. According to Kissinger, President-elect Nixon sent him a note before the inauguration asking for a report on Cambodia and "what, if anything, we are doing to destroy the buildup there?"

In February 1969, Gen. Creighton W. Abrams at Military Assistance Command Vietnam renewed his request for bombing the Cambodia sanctuaries. US Ambassador Ellsworth Bunker supported the proposal but Secretary of State William P. Rogers and Secretary of Defense Melvin R. Laird had objections.

"They feared the fury of Congress and the media if I expanded the war into Cambodia," Nixon said in his memoirs. That was not exactly the case. What Laird opposed was the secrecy, not the bombing. "I was all for hitting those targets in Cambodia, but I wanted it public," Laird said.

As Kissinger told it later, the secrecy was supposed to be temporary. "The

Photos: USAF; Mike Tsukamoto/Staff; Jack Kightlinger/White House

A B-52 amid a sea of munitions bound for targets in Southeast Asia.

Photo: USAF

original intention had been to acknowledge the first strike when Cambodia or North Vietnam reacted, which we firmly anticipated," Kissinger said. "But Hanoi did not protest, and Sihanouk not only did not object, he treated the bombing as something that did not concern him because it occurred in areas totally occupied by North Vietnamese troops."

Nevertheless, the administration went to exceptional lengths over the next three years to keep the operation hidden.

SECRET ORDERS

The Pentagon sent a Joint Staff officer with deep experience in B-52s to discuss the options with Kissinger, and the outlines of a plan emerged.

Regular "Arc Light" missions, flown by B-52s from Guam against targets in South Vietnam, could be used as cover for strikes in Cambodia. Once they were airborne, the crews could receive new target directions.

The strikes would be controlled from the ground by the Combat Skyspot radar bombing system, which would guide the B-52s across the border to the exact location at which to drop their bombs.

Kissinger suggested the B-52 crews not be informed of their real destinations, but was told that the pilots and navigators, who had their own instruments aboard, would know when they were in Cambodia.

The list of those regarded as having a "need to know" was short. At Nixon's direction, Kissinger briefed a handful of leaders in Congress. In the Pentagon, only the Secretary of Defense, the Joint Chiefs of Staff, and a few others were in the loop. The Secretary of the Air Force and the Vice Chief of Staff were not told.

At Strategic Air Command, the commander in chief and one operations planner knew, as did a minimum number of people at US Pacific Command and at MACV and 7th Air Force in Saigon.

At Andersen Air Force Base on Guam, the commander of the SAC air division personally briefed B-52 pilots and navigators flying the missions, but others on the crews were not informed. All of the missions would be conducted at night.

A key point in the chain was the Combat Skyspot radar station at Bien Hoa Air Base in Vietnam, manned by SAC personnel but under the operational control of 7th Air Force. In 1969, the supervisor of the radar crews at Bien Hoa was Maj. Hal Knight.

On the afternoon before a mission, a special courier brought the new targets to Knight in a plain manila envelope. His radar crews prepared the computations and computer input tapes and later that night, transmitted the target coordinates to the B-52s.

After the strike, Knight collected and burned every scrap of paper with the actual strike locations. The post-strike report was filled in with the coordinates of the original cover targets in South Vietnam.

As Army Gen. Bruce Palmer Jr., commander of Field Force II in Vietnam, said later in his book, *The 25-Year War,* this system "placed the military in an impossible position, having literally to lie publicly about a perfectly legitimate wartime operation. It had nothing to do with keeping the operations secret

USAF UH-1P helicopters along the Sihanouk Trail, which was used by Communist forces to move supplies from the port of Kompog Som to Vietnam.

from the enemy, who had to know all about them, nor did the decision have anything to do with enhancing the safety of the combat aircrews making the attack."

MENU

The first strike was March 18, 1969, when 48 B-52s were diverted to the "Fish Hook" area of Cambodia, which juts into Vietnam just above Tay Ninh. The code name for the target was "Breakfast," an insider's reference to a key breakfast meeting in the Pentagon in February at which fundamentals of the plan were laid down.

The overall program was called Operation Menu. The targets were six of the sanctuary base areas, labeled "Breakfast," "Snack," "Lunch," "Dinner," "Supper," and "Dessert." Palmer declared the code names to be "tasteless."

As the Department of Defense explained later, each mission was "flown in such a way that the Menu aircraft on its final run would pass over or near the target in South Vietnam and release its bombs on the enemy in the Menu sanctuary target area."

What Kissinger described in his memoirs as "the double bookkeeping the Pentagon had devised" was necessary to keep track of logistics data on hours and missions flown, which determined fuel and munitions required and the forecast for the number of spare parts to be ordered.

Security was not airtight. A sketchy article by William M. Beecher in *The New York Times* May 9 reported that, "American B-52 bombers in recent weeks have raided several Viet Cong and North Vietnamese supply dumps and base camps in Cambodia for the first time, according to Nixon administration sources, but Cambodia has not made any protest."

At Kissinger's request, the FBI placed wiretaps on 17 White House and Pentagon officials, but no leakers were caught.

INCURSION

Operations moved into the open May 1, 1970, with an "incursion" into Cambodia by 15,000 US and South Vietnamese ground troops to destroy North Vietnamese and Viet Cong bases.

The incursion was welcomed by the new regime in Cambodia headed by Lon Nol, who had overthrown Sihanouk. He told the North Vietnamese to leave the country, and closed the port of Sihanoukville to them. Sihanouk fled to China and solidified his ties to North Vietnam.

In announcing the incursion on television, Nixon said that, "For the past five years neither the United States nor South Vietnam has moved against these enemy sanctuaries because we did not wish to violate the territory of a neutral nation."

Operation Menu overlapped with the incursion for a few weeks, then gave way to non-secret strikes by US bombers and fighter-bombers, which continued after the incursion ended in June.

A massive wave of protests against the incursion by politicians, the press, and students followed. In December 1970, the Cooper-Church Amendment to the defense appropriations bill prohibited all use of US ground troops in Laos or Cambodia.

Among those bothered by developing events was Hal Knight, the Combat Skyspot officer from Bien Hoa, who was no longer in the Air Force. His misgivings about the falsified reports led to two bad effectiveness ratings. He was passed over for promotion and resigned.

In December 1972, Knight wrote to Sen. William Proxmire (D-Wis.), a noted critic of the Pentagon, about the secret bombings. Proxmire forwarded the letter to Sen. Harold Hughes (D-Iowa), a member of the Senate Armed Services Committee and a leading opponent of the conduct of the war. Hughes bided his time in making use of the information.

Air operations in Cambodia continued after the cease-fire in Vietnam in January 1973. The administration held that the bombing was necessary to force

Photos: USAF

A B-52 releases munitions during an Arc Light mission.

Hanoi to agree to a parallel cease-fire in Cambodia, as called for in the Vietnam accords.

In March 1973, the Senate Armed Services Committee asked the Department of Defense for records of air operations in Cambodia. The ensuing report did not mention any B-52 attacks before May 1970.

DISCOVERY

In the summer of 1973, the Senate challenge to air strikes in Cambodia reached the boiling point. Nixon, weakened by the expanding Watergate scandal and faced with a cutoff of funds by Congress, agreed June 30 to end the bombing of Cambodia by Aug. 15 unless he got congressional approval.

On July 12, Gen. George S. Brown—who in 1969 had been commander of 7th Air Force—came before the Senate Armed Services Committee for confirmation as USAF Chief of Staff.

Senator Hughes asked him if there had been air strikes in Cambodia prior to May 1970. Brown immediately asked the committee to go into executive session, where he said the bombing had indeed taken place.

Knight was called to testify. On July 16, Secretary of Defense James R. Schlesinger acknowledged that B-52s had secretly bombed Cambodia in 1969 and 1970. The Pentagon said "the destruction of documents and other procedures outlined by Mr. Knight had been authorized at higher levels."

Laird, by then out of office, said that he had approved "a separate reporting procedure" but that he "did not authorize any falsification of records" and had not known about the burning of files or reports.

Kissinger told *The New York Times* that the White House had "neither ordered nor was aware of any falsification of records," which he thought was "deplorable."

Gen. Earle G. Wheeler, who had been Chairman of the Joint Chiefs of Staff during the Menu bombing, said that Nixon personally demanded the tightest security measures possible for the operation.

The military had devised the mechanics of the dual-reporting system, Wheeler said, but there was no "intent to deceive," which would be the basis for any charge of falsification under military law. Key individuals in the chain of command knew the truth about what was going on.

A Pentagon report to Congress in August laid out the facts and figures of the operation and said that, "everyone in the reporting chain received and reported that information for which he had a need to know. Those who had no need to know about Menu could not perceive a difference between Menu and any other sorties."

FINAL CURTAIN(S)

B-52s and other US aircraft flew missions in Cambodia up to the Aug. 15 deadline. Their efforts are generally credited with strengthening the position of the Lon Nol government and buying it a little more time.

The House Judiciary Committee in July 1974 declined to include the falsification of records in its proposed articles of impeachment against Nixon, despite some clamor that it do so.

Concurrent with the North Vietnamese invasion and the fall of South Vietnam in 1975, the Communist Khmer Rouge insurgents captured Phnom Penh, overthrew Lon Nol, and changed the name of the country to Kampuchea. Between two and three million Cambodians died in the reign of terror that followed.

Sihanouk came back along with the Khmer Rouge, who made him titular president, then put him under house arrest after a falling out. He was rescued when Vietnam ousted the Khmer Rouge in 1979. Even so, he defended the Khmer Rouge in remarks at the United Nations, saying the country's real enemy was Vietnam.

In 1993, Sihanouk was restored as king, a title he had abdicated in 1955 in a ploy to gain greater political advantage as prime minister. He retained a figurehead monarchy for the rest of his life but no longer exercised any real power. Since 1997, the country has been in the firm control of the Cambodia People's Party, which evolved from the Khmer Rouge. ✪

John Correll was editor in chief of *Air Force Magazine* for 18 years and is now a contributor. His most recent article, "The Neutron Bomb," appeared in the December 2017 issue.

Photo: USAF

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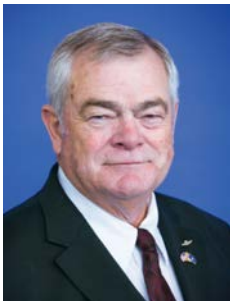

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Habu's Last Hurrah

It was a record-setter.

By Ed Yeilding
Painting by Mike Machat

Congress voted in late 1989 to retire the SR-71 Blackbird. Soon thereafter, the Smithsonian Institution requested one of the triple-sonic reconnaissance aircraft for display.

Reconnaissance System Officer Joseph "J. T." Vida and I had been flying test missions at Palmdale, Calif., primarily with tail No. 972.

We were thrilled to be chosen to be that Blackbird's crew for a historic retirement flight, March 6, 1990, delivering it to Dulles Arpt., Va., outside Washington, D.C.

At the same time, we felt sad the fleet was being retired and that this would be our last Blackbird flight. We knew that any of the SR-71 crews had the expertise to fly this record flight, so we were determined to represent well the men and women who designed, maintained, supported, and flew the Blackbird during its reconnaissance service in the Cold War.

RUNNING START

After takeoff from Palmdale at 4:30 a.m., J. T. and I refueled with KC-135s over the Pacific, then lit the afterburners for a 200-mile running start. We crossed the West Coast, accelerating through Mach 2.5 as planned, because fuel was tight. Minutes later we reached our flight manual cruise limit of Mach 3.3.

We streaked faster than a rifle bullet across the US, reaching an altitude of 83,000 feet and setting an aircraft coast-to-coast record of 67 minutes, 54 seconds.

We set three other speed records—all to bring attention to the SR-71 and its 25 years of service.

The SR-71—nicknamed "Habu" after an Okinawan viper—was briefly reactivated but retired for the final time in 1999. No. 972 is now displayed at the Smithsonian's Udvar-Hazy Center near Dulles, where it continues to inspire pride.

THIS THING IS SLOW

Two days after our record-setting delivery flight, J. T. and I sat in a United Airlines 767 for our nonstop flight back to California.

After takeoff, we were moved up to First Class, as recognition for our role in history. That was the first time I had ever been a First Class passenger. The service was nice, and J. T. and I enjoyed answering questions, signing autographs, and handing out SR-71 pins.

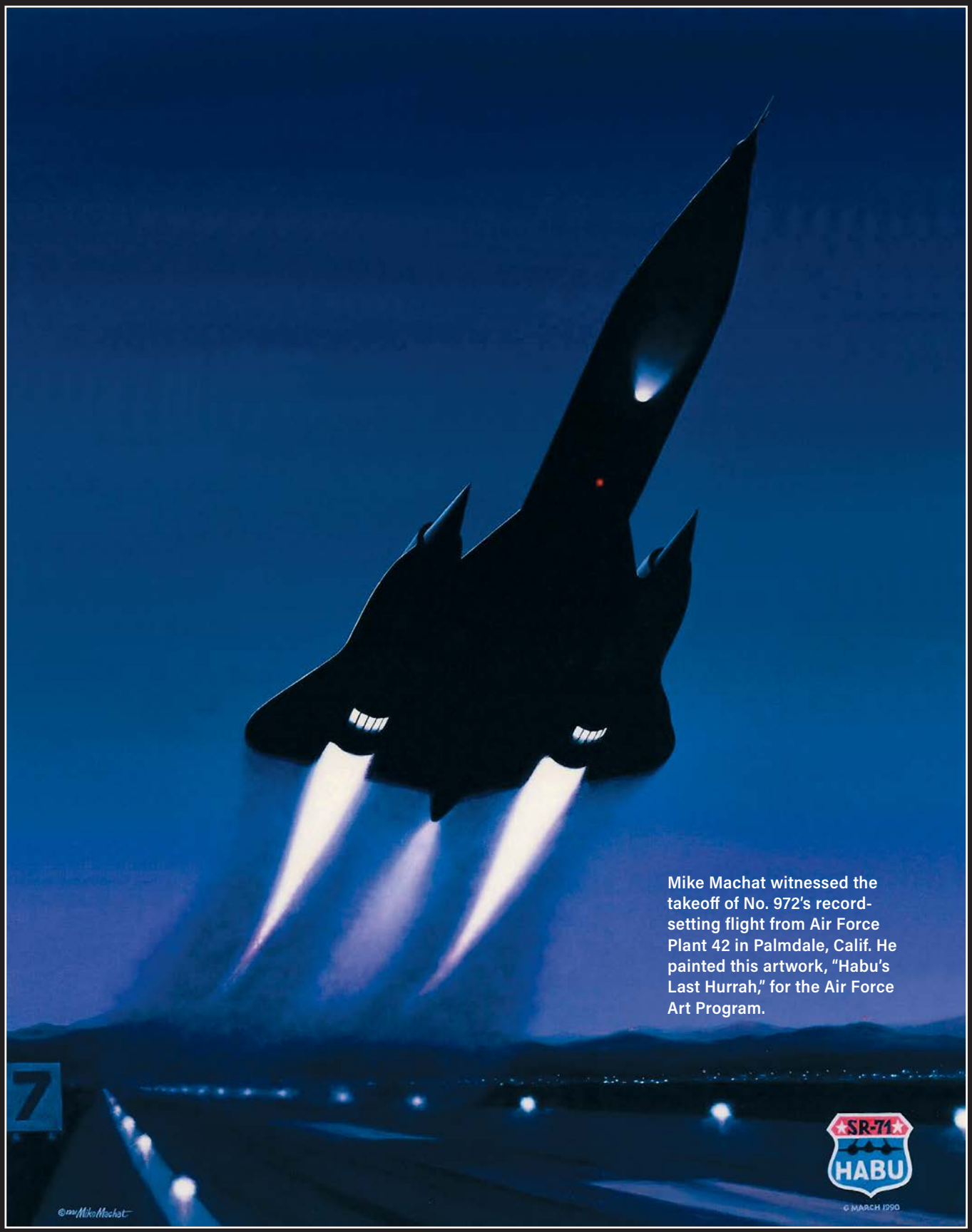
The United 767 return was a good flight and all, but gosh, it took five hours to fly back to California. ✪

Lt. Col. R. Edward Yeilding, USAF (Ret.), is a member of the Tennessee Valley Chapter in Alabama. **Mike Machat** is an aviation artist and member of California's Gen. Doolittle Los Angeles Area Chapter. His latest book is *Painting Aviation's Legends.*

BLACKBIRD'S MARCH 6, 1990, SPEED RECORDS

Erroneous times and speeds for this flight often appear in print and on the internet. These are the official numbers established by the National Aeronautic Association, printed in their record book, decimals rounded.—Ed Yeilding

Record	Time	Miles	Average Speed
Coast to coast	67 min., 54 sec.	2,404	2,125 mph
Los Angeles to Washington, D.C.	64 min., 20 sec.	2,300	2,145 mph
Kansas City, Mo., to Washington, D.C.	25 min., 59 sec.	942	2,176 mph
St. Louis to Cincinnati	8 min., 32 sec.	311	2,190 mph



Mike Machat witnessed the takeoff of No. 972's record-setting flight from Air Force Plant 42 in Palmdale, Calif. He painted this artwork, "Habu's Last Hurrah," for the Air Force Art Program.

CLARK

Wings Over Hawaii

Had history taken a logical course, there never would have been a Clark Field in the Philippines. It would have been built in Hawaii. Sometimes, though, history isn't logical.

Take the case of Harold Melville Clark, born in St. Paul, Minn., to a family of deep military traditions. Clark's own father, Charles, fought Spanish forces in the Philippine Islands in the Spanish-American War of 1898. At war's end, however, he did not go back home. He stayed to seek his fortune.

Successful business ventures brought him wealth and prestige. In 1904 he moved his entire family to Manila. Harold graduated from American High School in 1910 and returned to the States.

In 1913, the younger Clark entered the Army and was commissioned a second lieutenant of cavalry. Clark was restless, however, and he soon sought a transfer into the Aviation Section of the Signal Corps, formed in 1914.

Clark's request was granted, and in 1916 he began flight training at North Island Flying School in San Diego. He received a rating of Junior Military Aviator in 1917. Clark joined the pioneering 1st Aero Squadron in Texas. He flew missions from Columbus, N.M., Kelley Field, Texas, and Fort Sill, Okla.

It was in Hawaii that Clark made his mark. On March 13, 1917, 6th Aero Squadron arrived at Fort Kamehameha under the command of Capt. John Brooks. Clark was part of the 6th and soon became its commander and chief aviation officer of the Hawaii Department.

In Hawaii, Clark focused intently on learning all he could about its unpredictable and trecherous winds. On March 15, 1918, he flew round trip between Fort Kamehemeha and Molokai, about 110 miles over open ocean—the first inter-island flight in Hawaii.

On May 9, 1918, Clark and his mechanic, Sgt. Robert Gray, chalked up another historic flight. They flew from Fort Kamehameha to Maui and then on to the "Big Island" of Hawaii. There, Clark crashed in dense fog. Two days later, the two aviators walked out of the jungle unhurt, having completed the first three-island flight in Hawaii.

At the time, Clark's accomplishments seemed miraculous.

Clark was recalled to the US and took command of a pursuit wing. He was reassigned to Panama, where his career—and life—ended. He died May 2, 1919, in a seaplane crash in the Miraflores Locks, Panama Canal Zone. He was buried in Arlington National Cemetery.

The Army designated a part of Fort Stotsenberg, near Manila, for aviation usage. In September 1919, it was named "Clark Field." The reason isn't obvious, given that Clark was far more closely associated with Hawaii than he was with the Philippines.

For decades, Clark Field (later, Clark Air Base) was the nation's largest and most famous overseas air facility. It played a vital role as a USAF fighter base in the Korean and Vietnam Wars. The eruption of nearby Mount Pinatubo and Filipino nationalism forced the US to withdraw all of its forces in 1991. Today, it is the site of Clark International Airport.

1/ Harold Melville Clark. 2/ An F-4 Phantom from Clark AB, Philippines. 3/ An HH-60G Pave Hawk takes off from Clark in 2016. 4/ Clark AB in 1989. This aerial shot shows F-4s, a C-141, and C-130s.

HAROLD MELVILLE CLARK

Born: Oct. 4, 1890, St. Paul, Minn.
Died: May 2, 1919, Panama Canal Zone, US Territory
Education: American High School, Manila, Philippines
Service: US Army, US Army Signal Corps (Aviation), US Army Air Service
Occupation: US Military Officer
Main Era: World War I
Years Active: 1913-19
Combat: None
Final Grade: Major

CLARK AIR BASE

Nation: Republic of the Philippines
Nearest City: Manila
Area of Main Base: 14.3 sq mi/9,152 acres
Status: Open (Filipino control)
Opened: (as Ft. Stotsenburg) Sept. 1, 1903
Renamed: (Clark Field) Sept. 1, 1919
Renamed by Japan: (Mabalacat Field) Jan. 10, 1942
Renamed by US: (Clark Field) Jan. 30, 1945
Renamed Clark Air Base: May 1949
Closed by USAF: Nov. 21, 1991
Current Owner: Republic of the Philippines
Former Owners: US Army, USAAC, Pacific Air Forces

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