AIR & SPACE FORCES
airandspaceforces.com

SELLING SPACE

The Academy and the Space Force Pull Out All the Stops to Inspire Future Guardians. 37

Published by the Air & Space Forces Association

October 2023 $8

ALL THREE F-35 VARIANTS
ENABLES BEYOND BLOCK 4

SUPPORTING 55K JOBS

PRATT & WHITNEY | **F135**
ENGINE CORE UPGRADE

The F135 Engine Core Upgrade (ECU) – directly supporting nearly 55,000 domestic jobs in the United States. The F135 ECU is the proven, faster and more cost-effective option. And it's the only solution that leverages the deep expertise and broad capabilities of RTX. With meaningful capability by the end of the decade, the F135 Engine Core Upgrade is the smart decision for the F-35. **Learn more at prattwhitney.com/F135ECU**

RTX

COLLINS AEROSPACE | PRATT & WHITNEY | RAYTHEON

AIR & SPACE FORCES

October 2023, Vol. 106, No. 10

airandspaceforces.com

Tech. Sgt. Curt Beach

Day breaks at Point Barrow Long Range Radar site, north of Utqiagvik, Alaska. Sites like this one are crucial to the layered defenses needed to better protect the U.S. and Canada from attacks across the Arctic. See "Deterring Arctic Threats," p. 41.

DEPARTMENTS

FEATURES

Steve Boxall

ON THE COVER

Cadets experience zero-gravity weightlessness inside a modified Boeing 727 aircraft as part of Azimuth, a program designed to build interest in space.

Air & Space Forces Magazine (ISSN 0730-6784) October 2023 (Vol. 106, No. 10) is published monthly, except for two double issues in January/February and June/July, by the Air & Space Forces Association, 1501 Langston Blvd, Arlington, VA 22209-1198. Phone (703) 247-5800. Periodical postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** $50 per year; $35 e-Membership; $125 for three-year membership. **Subscription Rate:** $50 per year; $29 per year additional for postage to foreign addresses (except Canada and Mexico, which are $10 per year additional). Regular issues $8 each. USAF Almanac issue $18 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send changes of address to Air & Space Forces Association, 1501 Langston Blvd, Arlington, VA 22209-1198. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air & Space Forces Association.

EDITORIAL

By Tobias Naegele

All Together Now

Three news images from August and September cast a spotlight on the growing challenges to peace to today's post-Globalist age.

The first shows the leaders of the "BRICS"—Brazil, Russia, India, China, and South Africa—holding hands in unity after voting to expand their group by six—including Iran—at their August summit in Johannesburg, South Africa.

The second depicts Russia's Vladimir Putin getting chummy with North Korea's Kim Jong Un in September as they discussed weapons sales and missile and space collaboration in Eastern Russia.

The third shows China's Xi Jinping meeting with Syria's Bashar al-Assad during a state visit to China in September.

One of the United States' greatest strategic assets since the Allied victory in World War II has been our allies and partners around the world. The U.S. had more good partners than its rivals, and that paid off economically, militarily, and technologically for decades. Those partnerships fueled a triumphant and optimistic globalism that shrunk the world in the post-Cold War era and fueled strong economic growth. But that prosperity was uneven. The gaps between haves and have-nots expanded. Almost everywhere, a slow but inexorable distance grew between increasingly wealthy, urban, educated elites and rural, blue-collar farmers and workers betrayed by the offshoring of jobs and decisions that disadvantaged their way of life.

The same divisive factors that led to Brexit in Europe and Donald Trump's surprise victory in the 2016 presidential election also fueled the Yellow Vest protests in Europe and populist political movements from Eastern Europe to South America.

Divisive politics here at home undermine confidence in the United States among our own citizens as well as our allies. Doubts about whether the U.S. will hold to international commitments force allies to hedge their bets.

What makes things more dangerous today are our political divisions at home.

We are now seeing the most dangerous world situation since the 1930s, when the world order that came about at the end of the Cold War is now giving weigh to something more complicated and potentially more dangerous than anything we have seen since the 1930s when the stage was set for World War II. The rise of the Axis Powers—Germany, Italy, and Japan—can be likened today to the joining of the authoritarian leaders of China, Russia, Iran and North Korea.

Since the day he took office as Secretary of the Air Force, Frank Kendall has viewed China and its growing military as the modern-day corollary to the Soviet Union. His clear-eyed, Cold War-informed view of China's military ascendance has reinvigorated Air Force modernization by focusing programmatic development and budget planning on clear operational objectives, seven specific Operational Imperatives defined by the Secretary and promulgated across the force.

Combined with Chief of Staff Gen. Charles Q. Brown Jr.'s admonishment to accelerate change and more recently Chief of Space Operations Gen. B. Chance Saltzman's focus on operationalizing military capability in space, Kendall has infused both urgency and discipline in modernization of an aging and, sadly, rapidly declining force.

Now Kendall is raising the bar again, this time focusing on organization, training, and readiness. At AFA's Air, Space & Cyber Conference, he committed to "re-optimizing" his department to be more agile and responsive for today's world, pressing to make the force more ready and more formidable, and therefore better able to deter conflict in the future—or fight and win if necessary.

Kendall's Operational Imperatives exposed flaws in the department's ability to rapidly develop capabilities, to respond to crises, and to measure its own readiness. As Lt. Gen. James C. Slife, deputy chief of staff for operations and nominated to be the next Vice Chief of Staff of the Air Force, explains it, two decades of optimizing the force for efficiency rendered it ready for the status quo, not peer conflict.

A boxer who spars for just a few minutes daily can still pack a powerful punch, but he's hardly ready for a 15-round championship bout. Likewise, the U.S. Air and Space Forces may still be the most formidable, most capable on Earth, but that doesn't mean they're ready for a knock-down, drag-out war with a peer adversary like China—or even a long, drawn-out fight with a multiparty alliance of rogue nations.

What makes things more dangerous are the political divisions we see at home. Throughout the Cold War, both parties were united by the same underlying policy objectives driving our competition with the Soviet Union. It's not that we didn't have disagreements—we did. The country was hardly united over the Korean or Vietnam Wars. But we did share a common world view about America's place in the world

When President Ronald Reagan dubbed the Soviet Union "the Evil Empire" 40 years ago, he did so while chiding his audience for not appreciating the greater goal of his foreign policy. He was imploring them to avoid "the temptation of blithely declaring yourselves above it all and label both sides equally at fault, to ignore the facts of history and the aggressive impulses of an evil empire, to simply call the arms race a giant misunderstanding and thereby remove yourself from the struggle between right and wrong and good and evil."

In that context, our politics today seems eerily familiar. Congress is divided over whether to continue to provide weapons to Ukraine, with many politicians failing or refusing to recognize that the U.S. commitment to Ukraine directly reflects on U.S. resolve in the Indo-Pacific, where Japan and South Korea, as well as Vietnam, the Philippines, and Taiwan all want desperately to believe they can count on the U.S. to deter and, if necessary, fight China's expansionist agenda.

Meanwhile, China and Russia are testing U.S. capabilities, increasingly probing readiness and response and challenging U.S. aircraft and naval vessels whenever they are in the vicinity of one another.

The frequency of close intercepts of U.S. aircraft by Russian pilots over the Black Sea and Syria and by Chinese pilots over the South China Sea aren't random maneuvers, said Gen. Mark D. Kelly, commander of Air Combat Command, at the Air, Space & Cyber Conference. Rather, they are provocations.

"They want batting practice against the best Air Force in the world," Kelly said. They want to know how we respond to pressure.

China will always be able to build more airplanes and train more pilots. But China's ability to generate an equal quality of training is questionable, and not just in the short term. Independent creative thinking is a hallmark of the American psyche, and anathema to the groupthink of a top-down, single-party system where alternative thinking can actually be a crime.

That brings us back to our current politics. Americans can differ on how best to achieve leadership on the international stage. But let us not risk what happens when we disappear from that stage. Our adversaries want us to fight among ourselves. Too many of us take that to heart.

Two world wars proved exactly how important American leadership is to world peace. When America retreats into itself, the world becomes more dangerous, and Americans end up dying—cleaning up the resulting mess.

America's glory has always been in standing up to tyrants. Let us remain true to our creed.

KPMG

Our purpose is your mission

We help solve today's most complex challenges with solutions for the future.

Visit read.kpmg.us/Defence-Intel

LETTERS

Dress Code

I recently had the opportunity to meet with the Secretary of the Air Force, the honorable Frank Kendall ["Letters: Fatigued" June/July, p. 5]. I briefly encountered his military assistant, a young Air Force officer dressed in Blues. He looked sharp and professional and at a glance at his ribbons and wings on his chest I had a good idea of his career.

As we walked the decorated corridors of the Pentagon I never saw another Class A uniform. Everyone was dressed in camouflage. To know who was Army, Air Force, Navy, or Marine Corps I would have had to know the camouflage patterns of the individual services. Even rank was difficult to observe in many cases, not to mention decorations. I strongly believe that in a headquarters setting there is no need for that kind of attire. Frankly, it looks unprofessional.

Let's face it, none of the staff officers or NCOs serving at a headquarters has a part-time job as fighter/bomber/transport pilot/navigator or loadmasters, which would require them to be on call and to wear such attire. Wearing OCPs or flight suits is fine for the aircrews and maintainers at our combat wings and squadrons. However, headquarters staff officers, nurses and doctors, unless flight surgeons, have no need to look professionally frumpy.

Small things matter, the uniform we wear in public is part of our image and sends a message— something to think about—how we see ourselves and what inspires.

Col. Wolfgang W. E. Samuel, USAF (Ret.)
Fairfax Station, Va.

WRITE TO US

Do you have a comment about a current article in the magazine? Write to "Letters," *Air & Space Forces Magazine*, 1501 Langston Blvd, 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.

After Cambodia

Picking up after the article ["Flying the Last Missions in Cambodia," August, p. 50]: after Aug. 15, 1973, our squadron commander, Lt. Col. Howard "Howie" Pierson, was faced with many disgruntled aviators. Some were grounded because we had logged so many hours before peace broke out that we now exceeded peacetime restrictions. Our OV-10s were grounded for a nose-gear problem, and the fuel crunch of the '70's had started—cutting back the few hours we could get airborne.

Frustration reigned and tempers flared as we sat around staring at each other counting the days remaining on our 'tour of duty' because curtailments were not being approved!

Then, word came down one day for everyone to show up at the wing's briefing room. After having armed guards at the door check our ID cards against a squadron roster, we entered the room. Howie stood at the front next to a flip chart with a blank cover sheet. Directing us to take a seat, he flipped that blank sheet to the back, exposing a map of the region around Saigon. He then stated, "Gentlemen, we are going to be a part of history!" Needless to say, he had everyone's attention.

Howie then informed us a Vietnamese Air Force major, named Hu Chi, was going to overthrow the corrupt government in Saigon and we Forward Air Controllers were going to support that effort. Pointing at the map, he told us the headquarters for this effort was based in the Cu Chi rubber plantation on the outskirts of Saigon. He noted the irony in this location as the VC (Viet Cong) had based many of their operations from there.

It was at this point he revealed the rest

INDEX TO ADVERTISERS

Air & Space Forces Association
1501 Langston Blvd • Arlington, VA 22209-1198

afa.org
Telephone: **703.247.5800**
Toll-free: **800.727.3337**
Fax: **703.247.5853**

AFA's Mission

Our mission is to promote dominant U.S. Air and Space Forces as the foundation of a strong National Defense; to honor and support our Airmen, Guardians, and their Families; and to remember and respect our enduring Heritage.

To accomplish this, we:

- **Educate** the public on the critical need for unrivaled aerospace power and a technically superior workforce to ensure national security.
- **Advocate** for aerospace power, and promote aerospace and STEM education and professional development.
- **Support** readiness for the Total Air and Space Forces, including Active Duty, National Guard, Reserve, civilians, families and members of the Civil Air Patrol.

Contacts

CyberPatriot . . . . . **info@uscyberpatriot.org**
Field Services. . . . . **field@afa.org**
Government Relations. . . . . **grl@afa.org**
Insurance. . . . . **afa.service@mercer.com**
Membership. . . . . **.membership@afa.org**
News Media. . . . . **.communications@afa.org**
StellarXplorers . . . . . **.STLX_info@afa.org**

Magazine
Advertising. . . . . **.sales@afa.org**
Editorial Offices. . . . . **.afmag@afa.org**
Letters to Editor Column. . . . **.letters@afa.org**

Change of Address/Email

In an effort to stay connected with AFA and your local chapter, please update your mailing and email addresses. Change of address requires four weeks' notice.

To update your contact information:

- **Email:** membership@afa.org
- **Visit:** The Members Only area of our website, afa.org
- **Call:** Our Membership Department at 1-800-727-3337

Mail your magazine label, including your first and last name, to our Membership Department at 1501 Langston Blvd., Arlington, VA

of the story, stating it was going to be a tough fight and we would likely suffer losses, but we would all look back with pride on this operation. He concluded by saying that there would come a day when we could tell our grandchildren that we were a part of the "Hu Chi, Cu Chi Coup!"

The room went silent for a few seconds as everyone sat in stunned silence and then people started throwing hats, checklists, pencils, etc., at Howie. He just stood there laughing and said, "Let's go to the club!"

Col. Dale C. Hill,
USAF (Ret.)
Canton, Ga.
and
Capt. Stephen E. Dean,
USAFR (Ret.)
Gilmer, Texas

I enjoy reading most articles about the war in Vietnam, but was somewhat disappointed in the article at subject in the August 2023. First of all, these were not the "Last Missions" in Cambodia for U.S forces.

That occurred some 19 months later. Although the author acknowledged in a small, next to last paragraph the SS Mayaguez incident in April of 1975, he failed to state that they were the actual last OV-10 Bronco combat missions flown in Cambodia at Koh Tang Island, in the Gulf of Thailand, off the coast of Cambodia.

I led the last F-4D Phantom mission in this operation and worked with two "Nail" forward air controllers in Broncos, one was a Major Undorff in command, and based at NKP, in Thailand. These missions were against Khmer Rouge Cambodian forces and resulted in the last 41 names on the Vietnam Veterans Memorial.

Col. Cedric Hunter,
USAF (Ret.)
Burnsville, N.C.

Whose Funds

Being an Air Force retiree (1967-1987) and a member of AFA for 47 years, I read the editorial ["Build an Air Force," August, p. 2] by Tobias Naegele pretty much on autopilot, nodding in agreement for more than half the page until I found myself doing a "double-take."

Naegele states, "The Air Force has tried for years to modernize at its own expense." I might infer a positive intent but the funds he refers to as the Air Force's "own expense" remains public money even though it has been entrusted to the Air Force. American taxpayers are entitled to more respect for their hard-earned tax dollars than his parochial whine for a bigger Air Force slice of taxpayer dollars.

Naegele next states that, "the Pentagon must make a strategic shift in priorities," in order to enlarge the Air Force budget allowance by "$10 billion to $20 billion annually." His petulant "must make" demand for additional Air Force funding highlights exactly why we created the Pentagon: to weigh the needs of all the services so as to develop a combined DOD budget which maximizes the greatest American defense bang for the buck.

The Pentagon has skillfully balanced actual weapons in-hand with state-of-the-art industrial research and capacity to rapidly scale up while at the same time providing sufficient deterrence with minimized maintenance costs.

Naegele then targets a sister service's budget "Cutting the Army by 20,000 troops."

Naegele finally asserts that, "It's been five years since the Air Force last offered a plan to size the force to what it really needs." Anyone who has not lived under a rock for the past decade knows such a thought to be false. Further, he has taken an unprofessional and unfair swipe at current Air Force leadership.

In an age where service interoperability, interdependence and cybersecurity are absolute necessities, it is counterproductive to snipe at the other services.

What is the Space Force, for example, to think of Air Force budgetary self-centeredness? The Air & Space Forces Association represents both services. Does this mean that the Space Force has to agree with Naegele's editorial in support of a larger Air Force budget? And from a perspective much larger than just an interservice budgetary arms race, is it wise to telegraph the fears driving our modernization focus as being focused on China or, any other potential adversary?

It might be more productive to let the Pentagon continue the good job it has been doing without editorially stoking internecine passions or getting undue attention from our adversaries.

Capt. John Facey,
USAF (Ret.)
San Antonio

Recruiting

I am troubled by the problems the military is having with adherence to standards and individual behavior. The downward trend in standards starts at the top and flows down to the basic military members. The purpose of the military is quite simple—prevent wars if possible, and win them if fighting becomes necessary. That requires esprit de corps and unit cohesion.

Men and women join the military for "God and Country" but in war they fight for the guys in the "foxhole" next to them. That requires trust and respect of each other and of their leadership.

Entry in the military used to require a sound mind and a sound body. In basic training the individual was torn down and rebuilt as a member of a fighting unit. This required a focus on the ultimate purpose of the military whether flying a gazillion-dollar airplane or keeping records for those who did. Every job in the military is vital for the success of the whole.

For recruitment "they" say we had to lower standards for hair length and styles, we had to lower standards for visibility of tattoos, we had to lower the physical standards because, ... and on and on. So, you lower standards and expectations and you reap what you have sown.

For this old Airman, the solution is simple: Raise standards and demand excellence. We would be better off with a leaner force of people who wish to be in the military and let those who don't fit find another occupation.

Lt. Col. Ken Rosburg,
USAF (Ret.)
Oro Valley, Ariz.

I am writing about your article regarding the failed recruiting goals. I just retired in January as the Assistant Chief of Staff for Air Force Global Strike Command. I will be blunt: the destruction of meritocracy and focus on diversity, equity, and inclusion is the result of this. It has alienated the primary recruiting pool—family and friends of military members.

When someone is selected for advancement opportunity (in-res school, command, executive, superintendent) based on race, gender, and sexuality to ensure we reflect the U.S. population, that places less qualified and unqualified individuals in these positions. Social media and the digital age means negative impacts at the flight level re-

verberate across the force.

Focus on warfighting and the profession of arms and they will return.

Lt. Col. Michael F. Loos,
USAF (Ret.)
Tucson, Ariz.

Look Again

I have noted a steady series of letters to the Air & Space Forces Magazine and other military-based magazines that are critical of the diversity, equity, and inclusion (DEI) policies of the services. Perhaps it is time to step back and take another look.

To start, I look forward to the Outstanding Airmen recap every year, not just to learn of their achievements, but also to enjoy seeing the diversity of the honorees. For instance, this year they included males, females (and probably some LGBTQ people, who knows?), Black, Caucasian, and some with ethnic backgrounds that included East Asia, South Asia, Eastern Europe, Western Europe, and others.

I have also seen Pacific Islanders among the recipients in the past. I also enjoy the monthly "Faces of the Force" article for the same reason. For instance, this past month included a young female Airman originally from Sri Lanka. I am always so proud of my Air Force for its ability to meld all of these people from different backgrounds into an effective and modern military force. The fact is that without diversity, the Air Force would have a very tough time meeting recruitment goals.

To follow on, "equity" simply means fairness and justice, and I would hope that it applies equally to every person who joins the Air Force and Space Force and, for that matter, any of the services. Same with inclusion. It is important for every service member to feel "included," just like in any organization or athletic team.

DEI is the very foundation of a personnel system dedicated to doing its best for every Airman and Guardian in the force.

Maj. Paul C. Robertson,
USAF (Ret.)
Springfield, Mo.

Outstanding

It was pleasant to read about the 2023 Airman of the Year winners [Sept. pgs. 58-60] and their accomplishments that led to their being recognized. I was most pleased that out of the 12 winners, five were from the Security Forces career field (3POx1).

Even though Security Forces is the largest single Air Force Specialty Code in the Air Force, we often get overlooked as we are not one of the glamorous career fields. Congratulations to all the Airman who received this fantastic honor and to AFA who recognized many years ago the importance of acknowledging our hardworking folks.

SMSgt. Thor Merich,
USAF (Ret.)
Lake Havasu City, Ariz.

Legacy Guardians

The discussions I have seen of the proposed legislation to recognize Air Force Space operators (and other space-related Airmen) all seem to begin with the foundation of Air Force Space Command in 1982.

Air Force Space Operations began with the foundation of what would eventually become the Satellite Test Center and Air Force Satellite Control Facility at Sunnyvale/Onizuka Air Force Station, Calif., in 1958. Strategic Air Command's 4000th Support Group became the first operational satellite control organization in 1962. Ballistic Missile Early Warning Systems became operational in the early 1960s, along with the Missile and Space Defense Centers in the NORAD Combat Operations Center at the Cheyenne Mountain Complex [in Colorado].

Gerard M. Delaney
Huntsville, Ala.

Words That Stick

After reading Retired Lt. Col. James Harvey III's comments ["Verbatim, Attitude is Altitude," August, p. 8] under his picture, I remembered a general meeting that I attended at Andrews Air Force Base, Md., in 1971.

One of the speakers was an African-American, lieutenant colonel who spoke about the three A's to success: Attitude and Aptitude will get you Altitude.

I've never forgotten that phrase and now after seeing the phrase in a "partial" mode, I wonder if this Lt. Col. Harvey was that speaker. Happy 100th birthday, Lieutenant Colonel Harvey III.

SMSgt. Jerry L. Mansfield,
USAF (Ret.)
Gray, Ga.

Leadership Goals

Wow, what a very impressive write up by Col. Art Cole ["Letters: Old-School," September, p. 5]. I fully 100 percent agree with his article and thoughts. The LeMays and Foglemans will never be equaled. My Air Force/Strategic Air Command time was primarily under the LeMay era with a couple exceptions. The leadership/supervision and total management in the upper echelons today in no way meets the requirements of our personnel.

Yes, I know there are no SAC trained people there in our Chiefs of Staffs or even a little down the chain. I have two daughters in the Air Force, one retired, a son retired, two granddaughters, both got out. That all took place after 1990. My son and I keep pretty much up to date by your magazine, thank you.

In the LeMay, Doolittle, area we (all Airman) knew what our mission was and how to accomplish same. Training was an everyday responsibility and we excepted that.

CMSgt. Donald W. Grannan,
USAF (Ret.)
Benbrook, Texas

Warfighter First

["Next-Gen Fighter Engines," September, p. 42] describes how we have ended up with an F-35 engine that produces less range, speed, and electrical power than its main rival, the Chinese J-20. There are two reasons for this.

First, several years ago, the USAF decided not to buy a second engine, because it increased costs. Second, they have rejected use of the Adaptive Engine Transition Program (AETP), for the same reason.

The result is that the F-35 won't be able to compete with the J-20 especially when it is considered that the AETP technology will be stolen by the Chinese Communist Party resulting in an even greater gap in performance.

This is greatly reminiscent of the decision to choose the Rolls-Royce Merlin engine for the P-51 during WWII, although this was the opposite decision. Because the current administration refuses to fund an adequate budget for the Air Force, many lives will be lost—and maybe even the next war itself! The article should have made that clear.

Lt. Col. Robert Sandberg,
USAF (Ret.)
Stony Brook, N.Y.

QUESTIONS & ANSWERS

Anytime, Anywhere Logistics

Gen. Jacqueline Van Ovost, Commander of U.S. Transportation Command.

Mike Tsukamoto/staff

Air Force Gen. Jacqueline D. Van Ovost the commander of U.S. Transportation Command (TRANSCOM), one of the Department of Defense's 11 Combatant Commands. Van Ovost oversees the military's transportation and logistics enterprise, including airlift, aerial refueling, and sealift, using both military and commercial assets. Van Ovost discussed how TRANSCOM is preparing for a future in which its logistics are likely to be contested by an adversary and how the command will support military services' plans for more distributed operations in the Pacific with Pentagon Editor Chris Gordon in an interview in September. This transcript has been edited for space.

Q: How comfortable are you with your ability to do contested logistics in the Pacific right now, and could you supply current American facilities if faced with Chinese interference?

A: Let's just step back and think about how the strategic environment's changed. … We used to say what we did was logistics math. You move items that have a weight, and maybe they're hazardous, and maybe they're people, and you would move them over here, and it's a physics equation. You put them in a ship, it takes this long, plus the offload. You put them in an airplane takes this long, plus the offload. And we call that logistics math. If you ask me how long it will take a Brigade Combat Team moving from here to here, I can tell you. … In contested logistics, we expect that we will be disrupted. Our ability to communicate will be degraded or cut off completely at certain segments. And that is going to likely slow or change the options we have to move this from here to here. So it's no longer straight math. … What we have to do is we have to provide options. My ability to do that planning now is good. I do planning all the time. … If the airplane breaks, we handle that. That's normal friction that we do day to day.

With a persistent adversary who is determined to not let that Brigade Combat Team get to that location, it is going to be nonlinear and harder. … The adversary in the Pacific can reach out a lot farther than they used to be able to. … Our commercial partners, we're probably not going to put them in a highly contested environment. So now I have to go to a location forward as far as possible using commercial capability. And then I have to offload and transload into a military-type capability that has an ability to stay connected through multiple means: resilience, has perhaps an ability to defend itself or has an ability to integrate with fires, with a package that's going to protect it in some way—ISR, electronic warfare, shooters—to get to that last tactical mile. So it's going to take longer and it may take more mechanisms to do that. Doing that at scale concerns me.

Q: How do you prepare analytically? Wargames, for example?

A: We do modeling and simulation, and we have a high-end analytical capability. … For example, we do modeling and simulation for, let's say, delivering fuel in the Indo-Pacific to multiple locations, where we have to think about using commercial to a certain aspect, deep draft, and then using shallow draft to move between the first and second island chains because you can't put a larger tanker there …. When you go into a seaport, it's potentially a target. You just pull up to a berth and then you're pretty much stuck there and you are a target. …. We maybe park the ship in a different area in the ocean and then other ships come up to it and get supplies off of it, and then move out so it's farther away from an area that would most likely be targeted.

And we do that under what we think is a contested situation where maybe we don't have any communications and we simulate what the delays would be—if you didn't have communications or if you couldn't go to this berth and you divert somewhere else, how much longer it takes to get there, thinking in a kinetic fight, you would be able to be targeted at a certain location based on certain weapons and certain probabilities, which the wargames have. ... We do run those simulations over and over to see what's the optimum route if you lost Country X—what's the optimal route to move fuel or people or whatever, and what's the optimal types of assets we would use, commercial [or] military.

Q: So, in the past, you might have two game plans, but now you want to have more?

A: More options. More robust routes and nodes and capacities from our commercial and military total force.

Q: If you want to have more options, do you need more capacity, especially because the existing sealift and airlift fleet is old?

A: The Next-Generation Air-refueling System is going to be sort of the first model where we're going after real credible capacity in a high-end contested environment—which is the connectivity necessary, which is beyond line of sight [communications], more than one capability to be able to transmit, the battlespace awareness necessary for that crew to understand where's red, where's blue, do I have domain superiority right now, can I actually deliver to that location right now or where would I go if I can't deliver into that location. And then an ability on board via either Collaborative Combat Aircraft or onboard systems that can provide defense for the type of weapon I expect to go against in that scenario. … So that's what we're looking for. … And then they'll be part of a fleet that just has to manage the contested logistics with respect to cyber and space, which is ubiquitous. It will happen right from the airport we depart from or the seaport we depart from, or frankly, even from the port, getting on a rail that could be stopped.

Q: So contested logistics is not just about being direct-fires?

A: Let me just say that China is using their economic power as a weapon. … China is also a major maritime power. There's a naval power and maritime power, and they're usually connected. … So they're building their Navy—carriers, destroyers. They're also building up their maritime militia, which is fishing trawlers with equipment on board. … They have 8,000 ships. They're delivering everything to everybody around the globe, including the United States. They're buying up seaport management because they do logistics, they're very good at it. …

They've locked up about 70 or 80 percent of the crane market, which are electronic, which take data about what's being unloaded and offloaded and where it's going. … They're able to see. They have this God's-eye view of what's going on with logistics around the world so they know what a country depends on. They know a certain country depends on this much lithium, this much this resource, this much coal, whatever. And they can do things like intercept that.

Q: How do you address those issues?

A: The one thing that this nation is doing is they are trying to show the implications of what happens when you buy these kinds of systems or you allow China to run your port. … Several European nations have learned from this and are trying to extract themselves from China running part of their port or having software that's running their port. We're a little late to the game on this from a moral standpoint.

Q: How do support distant islands in the Pacific that the U.S. already has access to, such as Tinian, in line with services' future operating concepts?

A: All of the services are about the same. In ACE [Agile Combat Employment], there are hubs and then there are spokes. A hub is more robust and the spokes are more austere. But even in the spokes when we have to rearm, refuel, perhaps repair, they have to have some capability to do that. We need to do things like forward positioning some key spare parts, some fuel. … That is more stuff to more places at a faster time. So there's the balance of how much you want to put there versus how much needs to deliver on time.

Q: A common military problem is having a small thing that you keep adding to until it becomes a rather big thing. How do avoid that?

A: I love my Al Udeid in Qatar because we had a lot of airplanes, a lot of maintenance capability, but, you know, that's not going to work in the Indo-Pacific. We cannot build that up. So I have to have assets that will be able to plug in … globally into the theater and then marry up with assets like C-130s, shallow draft, fast sealift ships that are going to be able to do the onward movement to those places like Tinian.

Q: How far away are we from this world that you just described?

A: I think that there's some more work to do, certainly with forward posture and what's the art of the possible. This is also about the people. They need to have the initiative and recognize they're not always going to get the order. They have to act under mission command, meaning they have to understand the environment and if you're cut off from everybody, what's the best thing you can do right now to continue to move the mission? It's not just about survivability. It's about winning the mission. … We'll need to do that because I know we'll be cut off at some certain points.

Q: What lessons have you been able to draw from Ukraine?

A: We'll start with readiness. … For our work with Ukraine, we have been blessed with a lot of commercial support. About 75 percent of our air sorties and sea vessels are commercial, have been for this support for Ukraine. And so we've been able to balance the organic readiness and keep them going and working on buildups for the high-end fight. … But when I think about what's actually going on inside Ukraine and how Ukrainians have had to keep things on the move because there's only so many entry points into Ukraine for logistics flow—so how do they have to repackage, move things quickly, use deception?

Even when we look at their airfields, they're not going to park a bunch of airplanes next to each other, so that's it's easier to work on and it's easier to refuel. They're constantly moving them around and they're moving around to different airfields. That means that if it's a certain weapons system, you got people here to do that work and you have to have people there to do that work. And that's what we're trying to get with the Air Force, and that's why Multi-Capable Airmen and the work they're doing on ACE is so important. … You're seeing what's going on with the seaside with respect to attacks on the berthing in Odessa and the deliberate destruction of civilian infrastructure. We have to imagine that that's going to occur at any nation in another fight.

Q: Do you need to increase your capabilities and infrastructure in the U.S.?

A: I'm working with NORTHCOM, and I think that [NORTHCOM Commander Air Force Gen. Glen D. VanHerck] would say, yes, we have work to do. … He's very focused on our power projection platforms, to mobilize and to get to the seaport, the rail to get to the seaport, the seaport itself, and the airport. For lots of reasons, we want to make sure that we have power, that we're not cyberattacked ... and I have multiple routes to get to those ports, so if I do lose something like a road or whatever, I can go another way. Protecting that is key, and that's why I worked with the Department of Transportation on their resilience initiatives, the Department of Homeland Security, and NORTHCOM. …

What may work OK in training here over in the United States is not going to work in a highly contested environment. … It is a global perspective I have to take every day and to do that balance because, remember, we are also blocking Chinese aggression in the Middle East and in Africa. ... We don't dump and run. We have a conscious understanding of what integrated deterrence is around the globe, and how I assist the Chairman and the Secretary with that prioritization to ensure people have what they need to do their missions.

VERBATIM

Let Freedom Ring

"If we abandon the core principles of the [U.N. Charter] to appease an aggressor, can any member state in this body feel confident that they are protected?... If we allow Ukraine to be carved up, is the independence of any nation secure? I'd respectfully suggest the answer is no. We must stand up to this naked aggression today and deter other would-be aggressors tomorrow."

—President Joe Biden addressing the United Nations General Assembly encouraging continued support for Ukraine Sept. 19.

Jud McCrehin/staff

B-21 COPYCATS BEWARE

"This program is not a wind-up toy, where you crank the spring on it, you drop the contract off, and come back in 10 years to see: how close to the mark did it end up? We haven't approached it that way. It needs to be actively managed. We need to look for opportunities to go faster, to be better, and we need to seize those opportunities on an ongoing basis. ... For the adversary out there, this comes with a lot of ... hard-earned experience that I don't think anybody's going to copy anytime soon."

—William Bailey, Director and Program Executive Officer, Air Force Rapid Capabilities Office, panel discussion on the B-21 Raider, at AFA's Air, Space & Cyber Conference (ASC23), Sept. 13.

Champagne Corks at the Chinese Embassy

Mike Tsukamoto/staff; Adobe Stock

"There are three entities I worry about with these Senate holds, and first and foremost would be our professional officer corps. ... People who raised their right hand and ... who will take a bullet for the nation, the Constitution, but when it comes to dragging their family through a briar patch and putting 5,000 volts through kids' schools, and spouse employment ... each one has their own individual red line. ... We're on the fringe of losing a generation of champions. Second, ... allies and partners. ...They look to us for a beacon of confidence and competence of a military hitting on all eight cylinders. And I would say, the dynamic we're in right now does not instill confidence. Some of them are interested and vexed. Some of them are downright concerned. ... And third, ... our adversaries. Where our allies and partners look for confidence, our adversaries look for weakness, and they look for fractures, and this situation is ... instilling confidence in our adversaries. If you drive north of the National Cathedral, up Connecticut Avenue, that popping sound you hear is not gunfire. It is champagne corks in the Chinese embassy."

—Gen. Mark D. Kelly, Commander, Air Combat Command, press conference at ASC23, Sept. 14.

Mike Tsukamoto/staff

Is USAF in a Recruiting Crisis?

"I'm not alarmed by [our] situation. We put a lot less resources into recruiting than the other services do, and with a relatively modest increase in resources, I think we could do much better. A lot of recruiting is face-to-face conversations, and the numbers of people you have out on the ground doing things matters."

—Air Force Secretary Frank Kendall, press conference at ASC23, Sept. 11.

Tell a Friend

"[In] 1995, if there were 100 people in the room and I asked how many had a parent who served or is serving, 40 hands would have gone up. I ask that question now ... and about 13 or 14 hands go up. There's nobody in their family that's telling their story. ... Out of that generational disconnection, comes unfamiliarity with what a job in the Air Force entails."

—Brig. Gen. Christopher Amrhein, Commander of the U.S. Air Force Recruiting Service, speaking at ASC23 on Sept. 11.

Much Obliged

"I am concerned about the growing relationship between Russia and Iran and the drones being supplied to Russia. Who would have ever thought that the Russian Federation would need to go to Iran for military capabilities, and yet we're there. That means that Russia actually owes Iran something. I'm concerned about the level of collaboration that might happen."

—Lt. Gen. Alexus G. Grynkewich, the head of U.S. Air Forces Central, during a news conference at the U.S. Embassy in Abu Dhabi on Sept. 24.

Eric Dietrich/USAF

Above and Beyond

"I may have enlisted in military service in 1994, but I had not joined the profession of arms until years later. Becoming a principled public servant helped give me purpose, and an initial four-year contract turned into a lifelong commitment. ... So today after 29 years of service, I stand here to say that ... I [am] still here for one reason, and that is you, the Guardians of the Space Force and your families, and the importance that you hold to our nation."

—Chief Master Sergeant of the Space Force John Bentivegna, speaking at the change of responsibility ceremony, Sept. 15, at Joint Base Andrews, Md.

By John A. Tirpak

'Re-Optimizing' the Air and Space Forces

Air Force Secretary Frank Kendall has ordered a department-wide review of Air Force and Space Force organizations, policies, and procedures to better prepare the forces for potential conflict with China.

Mike Tsukamoto/staff

The urgency of adapting the Air and Space Forces to meet the rapid growth of China's military is driving Secretary Frank Kendall's "re-optimization" of the service, he and other top department leaders said in September.

The expected changes include a return to some Cold War-era hallmarks—like Operational Readiness Inspections and annual large-scale exercises similar to the old "Reforger" series—but not a wholesale return to a Cold War posture, he said.

In an open letter to Airmen and Guardians on Sept. 5, Kendall directed all the major commands, operating agencies, and other Department of the Air Force activities to conduct a four-month review of their organizations, policies and procedures, in search of improvements that will make them more nimble.

Focus areas will be on organization, equipment, personnel readiness, and how the force is supported. The reviews will culminate in an action plan he wants ready by Jan. 1, 2024, and implemented over the course of the coming year. The review isn't intended to shape the fiscal 2025 budget request, coming as it is too late in the process, though it will inform it, officials said; it should have much more influence on the FY26 plan.

Speaking with reporters at AFA's Air, Space & Cyber Conference, Kendall emphasized his objective to re-optimize, not reorganize, the Air Force. He said he's seen the need to refocus building over the past two years.

"It started with the recognition that we didn't have institutions in place that could do some of the activities we started under the Operational Imperatives, for example, or the cross-cutting operational enablers," Kendall's acquisition priorities for the two services. The fact that "we need to create organizations to do work we should have been able to do with existing organizations" highlighted the need for change.

"As I traveled around and got to know the force better, I determined that we were not as deployable as I think we should be, to support our operations plans," he added. "We can do it, of course, but it would require disruption and we're ... not practicing that at the levels that I think we should be."

The goal of the review is to better enable the Air and Space Forces to deter China and to match the forces' practices and procedures to the requirements of the National Defense Strategy.

"We will conduct a major initiative over the next several months to identify and implement the changes needed to meet our pacing challenge," China, Kendall wrote in the letter.

In his keynote speech at the conference, Kendall said it's been clear to him "for over a decade that China is intent on fielding a force that can conduct aggression in the Western Pacific and prevail, even if the United States intervenes." China's efforts are not simply geared to "regional conventional forces," he said, but to "dramatically expanding its nuclear force and military space capabilities." Against this determined effort, "we cannot sustain deterrence by standing still."

Reassessing long-established "habits and structures" is challenging, because change is uncomfortable, but Kendall noted some changes are already well underway, such as the Air Force force generation (AFFORGEN) construct and the "evolving allocation of responsibility across Space Force field commands."

Yet he also questioned whether AFFORGEN can work without changes, and said greater scrutiny of readiness will be necessary.

BACK TO BIG WARGAMES

"We're not evaluating units the way we once did during the Cold War, for their readiness to deploy as a warfighting entity," Kendall told reporters.

"We haven't done anything like ... Reforger ... for a long time," he recalled, referencing the Cold War exercises in which large numbers of stateside USAF aircraft and personnel picked up and deployed rapidly to Europe.

The Mobility Guardian exercise that ran this summer in the Pacific was primarily a mobility exercise, not one that pressed the entire

force. Other large wargames—but not "Cold War" large—include Air Defender 23 in Europe, which was valuable in that it involved the Air National Guard in a large-force, multinational exercise.

"So we need to start changing how we're doing the things to prepare our forces," he said. "We need to have organizations ... that are more easily deployable, and people need to know that they're in an organization, and that they have the job of going and entering into the fight as a unit."

The Air Force hasn't operated that way for years; instead, overseas units are frequently assembled on the fly from multiple, even dozens of commands. "We basically crowdsource" those deployments, he pointed out, sending "small groups or individuals as replacements into the Middle East when we rotate units out, as opposed to having the unit go and serve as a unit."

Kendall wants to return to a more predictable model where units build rapport and work together to accomplish specific missions. "We need to train them that way," he said. And we need to evaluate their ability to do that function."

Kendall said the senior uniformed Air Force leadership has been assembling "Air Task Forces" in "an attempt to address that same sort of a problem for the Middle East, which is a different deployment scenario than something in the Pacific." The first of these was announced Sept. 8, with two assigned to U.S. Central Command and one to U.S. Indo-Pacific Command.

"These are not the final, permanent, deployable units we expect to form, but they are a major step in the right direction," according to Kendall. "We will learn from this experience."

DESIGN FOR DEPLOYMENT

Part of the problem is that support functions needed for a deployment "aren't entirely separable" from the base they come from, because the "command that runs the base" and "the warfighting organization" overlap. Deploying some units as a team would leave a deficit at the home base.

The Agile Combat Employment model—which will see hub-and-spoke, small-unit deployments of aircraft and other capabilities widely dispersed throughout a theater—demands different structures, Kendall said.

"All of our tactical air programs need to be able to operate in [the] Agile Combat Employment concept," Kendall advised, "which means that you don't stick yourself on one base and stay there till you're shot at. You go to other bases, and you move around so that you're hard to target."

To go with that, "we also have to look at the support functions; the idea ... that with a relatively small group of Airmen who are capable of doing more than one job, you can go operate in a more austere fashion off of a secondary field. ... So we want to have the capability to do that," he said.

To make it work, "you need ... power generation, you need security, you need ... support functions, life support, etc. So we want to tailor organizations to have that capability. And while we practice some of these things operationally, up to a point, we really haven't created those organizations, built them into our doctrine and have people who are ready to fall in on them and do those types of missions," Kendall said.

In his letter outlining the review, Kendall said the readiness evaluation will scrutinize "how we create, sustain, and evaluate readiness" across the two services, while the "support" review will range from installations to "mobilizing, demobilizing, providing operational medicine, etc."

The department also needs to scrutinize "the equipping side," and "restoring some of the long-term competitive types of development-focused organizations that we had during the Cold War," Kendall asserted. "I don't necessarily think we need to go back and emulate Cold War structures, but they can be instructive about what we need."

Service officials said privately that there may be some "tweaking" of the organizations that develop and field equipment and supplies. In 1992, Air Force Systems Command—which developed new equipment—and Air Force Logistics Command—which sustained it—were merged to form Air Force Materiel Command in order to have one organization responsible for managing systems from "cradle to grave." Now officials say the service may re-look at that merger, because of the speed required to field new gear and to better support "logistics under fire."

NOT THE USUAL ACQUISITION REFORM

Andrew Hunter, the Air Force's acquisition executive, told reporters speed will be the new priority in how the Air Force develops and buys equipment, superseding cost and performance under the new re-optimization plans.

This will be unlike previous acquisition reforms, Hunter said.

"Where one lays the priority in acquisition reform has shifted over time," he noted. While the priority until recently has been on controlling cost and buying only the minimum of anything necessary to address the peer threat, now "the priority that ... is absolutely foremost" is speed, Hunter said. The review will be "incredibly focused" on rapidly delivering capability to the field.

"We know the capabilities that we have to maintain, develop ... or recapture" to be competitive with China, he said. China has gained advantages in spectrum warfare and certain kinds of munitions. "We will be doing things that are directly tied to achieving those outcomes; organizationally, process, budgetarily ... very focused on those specific goals," Hunter added. The needed outcome is delivering "integrated capabilities through a development pipeline."

Hunter also said it's important that new capabilities have "a home; a place for them to go, and then that they tie into our acquisition strategies and our program approaches," so that there's a mechanism to sustain and upgrade them over time. Examples of new capabilities in need of "a home," senior officials said, include directed energy and Collaborative Combat Aircraft, crucial developments that may not instantly fit into existing portfolios.

"Where do you put those?" asked one official, explaining the challenge. "Is DE a munition? Ammunition? Spectrum warfare? ... Are CCAs fighters? Missiles? ... There are a number of those things that need to be rationalized, and it's not something we can just figure out after the fact."

Though Hunter said the acquisition system can already do a lot of the things that will be needed, the review will look for ways to reduce "friction" in the process, so there's "as little gap as possible between stages of the development process." There's "plenty of work to do to up our game in that area," he said.

The end state of the re-optimization review and implementation strategy "will be a department that is better aligned with being responsive to the basic challenge ... that's the bottom line," Kendall said. "We must ensure that the Air Force and Space Force are optimized to provide integrated deterrence, support campaigning, and ensure enduring advantage."

The department will certainly "learn from our experience" and "we'll iterate" the changes made during the re-optimization, but "the intent here is to do kind of a pulse of major changes that will put us in a much better position ... [better aligned to] the types of threats that are most of concern to us."

The study and review will not stop with the Jan. 1 deadline, Kendall said, suggesting the process will be "a never-ending journey."

But with a focused effort to study the issue now, he said, "I think we can get a big increment closer to something that's more aligned with the problem that we have."

An F-35A Lightning II flown by Maj. Kristin Wolfe, 388th Fighter Wing F-35A Demonstration Team commander, performs a dedication pass during an air show over Kleine Brogel Air Base, Belgium, in September 2023. The F-35 is enveloped in a vapor cone, a visible cloud of condensed water created when an aircraft flies through moist air at high speed.

Staff Sgt. Thomas Barley

An MQ-9 Reaper, piloted by the 556th Test and Evaluation Squadron, fires an Air-to-Ground Missile-114 Hellfire missile over the Nevada Test and Training Range in August 2023. The 556th TES performs all software and physical testing to improve the combat capabilities of the MQ-9 Reaper.

Airman 1st Class Victoria Nuzzi

A Space Force space vehicle launches in a mission called Victus Nox from Vandenberg Space Force Base, Calif., in September 2023. Preparations were completed to launch in 24 hours, with liftoff 27 hours after receipt of launch orders. The record-setting mission is a major advancement for Tactically Responsive Space capabilities.

Airman 1st Class Kadielle Shaw

Collaborative Combat Aircraft would work with manned aircraft such as the F-35, as shown in this artist's conceptual illustration.

USAF's CCA Strategy Takes Shape

Future uncrewed autonomous wingmen for manned fighters will add capability in phases, and reveal themselves over time.

By John A. Tirpak

The autonomous Collaborative Combat Aircraft (CCA) the Air Force is developing to bulk up its combat inventory and complement the capabilities of its crewed fighter force—will be developed in two increments, USAF officials revealed at AFA's Air, Space & Cyber Conference in September.

The first increment seeks to put capability on the ramp as quickly as possible to deter China by multiplying the number of aerial targets its People's Liberation Army Air Forces would have to confront in a potential conflict.

The second aims to deliver more sophisticated aircraft that can take on more challenging missions. While officials kept their descriptions veiled due to the classified nature of the developments, they suggested that both iterations could be variants of the same aircraft. The exact nature of the acquisition strategy for CCA also remains shrouded in secrecy, but acquirers said that after a demonstration and prototype stage involving multiple vendors, they expect at least two contractors to proceed into a final competition.

"What we're trying to get industry to do is to mature technology and be creative," said Air Force Secretary Frank Kendall at a press conference. Contractors will then "demonstrate to us what kind of capabilities they can provide, and [show] why it's cost-effective," he added. "And that's how we're going to be selecting which ones we carry to the next phase of competition."

Kendall, Air Force acquisition executive Andrew Hunter, and Brig. Gen. Dale White, program executive officer for fighters and advanced aircraft, all said that CCA development will involve competition in every aspect, from their artificial intelligence-enabled brains to their planforms, mission packages, and "producibility." Competition will continue as long as possible, they said, without offering a target date for a final request for proposals from industry.

"It's going to be a while before we can have CCAs in large

numbers," Kendall said, "although I expect to have a significant number within the next five years."

In order to achieve "affordable mass," Hunter said CCAs will have to be built on "an entirely different scale" than has been the case for manned fighters in recent decades. "They must be designed from the outset with mass-production in mind," he said.

White, in a press conference, said the initial focus for CCAs "will be on the air dominance piece, the air-to-air capability piece." Specific mission sets will be determined by operators—"the captains" that experiment with the technology and decide how best to employ it. He also quoted Lt. Gen. James C. Slife, nominated for promotion to general and become the Air Force Vice Chief of Staff, as saying autonomous aircraft will eventually provide "other functions inside the Air Force," such as mobility.

Hunter told reporters that the CCA program will leverage the same "advanced mission systems government reference architecture developed through the NGAD [Next Generation Air Dominance] program." That, he added, will enable a more modular open systems architecture with shared capabilities and potentially components across the platforms, drawn "from a wide variety of sources" and able to be upgraded over time.

"That is a key part of our approach to CCA as well," Hunter said.

Kendall has said CCAs are meant to cost only "a fraction" of the cost of an F-35A, which now priced around $80 million a copy. But he rejected language in the House Armed Services Committee's version of the fiscal 2024 defense bill that sought to bracket CCAs in cost categories of $3 million for "expendable" versions, $10 million for "attritable" models, and $25 million for "exquisite" aircraft.

"I don't know where those categories come from, but they're not what we're doing," Kendall said

White said USAF has no specific cost goal for CCAs yet. "There are absolutely some different cost points. But those cost points also represent capability," as well as size, range, and other attributes. The Air Force will seek to trade off these variables to find "the sweet spot" combination, he said.

Kendall, who earlier this year said USAF envisions "two to five" CCAs accompanying each crewed aircraft, said in September that "we'd like to have at least two [per fighter], but more is better: you can get more cost-effectiveness if you can do more."

The challenge he said is that "you've got to have technology that can allow the crewed aircraft to control that number, and do it effectively."

Gen. Mark D. Kelly, who has extended his tour as head of Air Combat Command while the Air Force awaits confirmation of his successor, said at the conference that range is the crucial challenge in the Indo-Pacific region.

"We have a non-trivial range problem," he said. One strategy could be to send crewed fighters "about three-fourths of the way" to the limit of their range and then have CCAs go in closer to look for targets.

"That would be helpful," Kelly said. "It helps with risk. I've got less chance of a 'swimmer' if I have [CCAs] forward and keep the crewed platforms back."

CCAs also help "pay the sensing bill I have," he said. "The more sensors I have forward, the more they can contribute."

One driving factor in the development of CCAs, noted Kelly's Director of Plans, Programs and Requirements, Brig. Gen. Chris Niemi, is the threat of losses.

The Air Force expects to take far more attrition in a conflict with a peer adversary than has been experienced in the decades since the Vietnam War. While he said he'd "love to be able to maintain" the kind of lopsided dominance enjoyed by the F-15, which has a career 104-to-0 kill ratio, "that's just not the threat environment that we see." Kendall also made a point of distinguishing between CCAs and the "Replicator" initiative announced by Deputy Defense Secretary Kathleen Hicks in early September. Replicator calls for mass production of expendable or "attritable" drones.

"Replicator is a completely separate program," Kendall noted. Hicks "has indicated she has some funds at the DOD level" for Replicator, he said, "and she's indicated the Defense Innovation Steering Group will be making decisions about what systems to pursue."

The Air Force has candidates "that we will be offering," Kendall said, and Hicks has suggested to him that "she looks … very positively" on some of them, "but we haven't resolved all that yet."

Hunter told Congress in budget testimony earlier this year that CCAs should be in service in the 2029-2030 time frame, and the Air Force forecasts spending $5.8 billion on them across the five-year future years defense program. Kendall has offered a notional requirement for at least 1,000 CCAs, but the ultimate number could be much higher.

White said that even as the Air Force holds competitions for the various components of the CCA platform, it will eventually choose a single contractor to integrate the selected elements.

"We will always have a continuous competition piece of this, but the government will not be" the integrator, he said.

The goal, he said, is "not to have multiple variants that we have to try to maintain or sustain."

Kendall said he is "absolutely" focused on keeping software for CCAs moving quickly, as software "for decades, has been the thing that slows programs down."

As computers have gotten more powerful and "software languages have gotten more efficient," the military has added "more and more functionality to software, to make products more complicated," Kendall noted.

"One of the things we're going to try to do in CCAs is avoid that tendency: limit the functionality we want to what we really need, to get an advantage and get that fielded. Simplify, simplify, simplify."

For CCAs, "the platform will not be the critical piece," Kendall said. That "will be what we put into it." He's asked the Air Force Scientific Advisory Board to help determine "how much autonomy can we really—with confidence—get into the first increment of the CCAs we field … so we don't undershoot or overshoot, so we go to a reasonable place in terms of what we can actually code and design and test, and have it be reliable."

Unlike crewed fighter makers, where few have the capability to compete, Hunter said the pool of suppliers needed to make CCAs at scale "is pretty robust today … there's a lot of capability out there." The program will allow participation by companies that may be good at software but not platforms, and vice versa, he said.

"That leads us to the feeling that we will be able to make rapid progress on CCA … subject to the caveat that, if there's a big delay in the '24 budget, that's going to slow us down," he said.

COMPETITORS

In the conference exhibit hall, Kratos showed a full-scale model of its XQ-58A Valkyrie that has been used in tests of the Skyborg flight control algorithm, while Blue Force Technologies—now part of Anduril—presented a half-scale version of its "Fury," a stealthy sparring partner for use in wargames.

General Atomics showed off a video of its "Gambit" concept, in which a core fuselage section, replete with engines, avionics, and landing gear, can be adapted within four aerodynamic planforms optimized for different missions: long-endurance sensing, as a munitions platform, as an "aggressor" training adversary, or as a stealthy penetrating intelligence, surveillance, and reconnaissance aircraft.

A Kratos XQ-58A Valkyrie was on display on its launcher at AFA's Air, Space & Cyber Conference in September. The Valkyrie was developed with the Air Force Research Laboratory as a demonstrator.

Mike Tsukamoto/staff

Other vendors promoted small- to medium-size uninhabited craft, software, munitions, and other CCA-enabling capabilities.

Kendall said CCAs must be "militarily meaningful," which Hunter said was a phrase loaded with meaning.

"We're looking very specifically at being able to deter, or, if necessary, execute a conflict in the Indo-Pacific region," he said. That has "a lot of implications in terms of what you have to be able to do. It's a large theater. … A very contested security environment and growing increasingly so by the year. So … a CCA that wasn't optimized for the Indo-Pacific would be substantially less attractive to us … and that has clear implications for requirements."

The Navy is pursuing its own CCAs and White said the Air Force has been working "very, very closely" with its sister service; the two branches expect to coordinate with each other on how CCAs are developed, tested, acquired, fielded, and operated, and have established a common frame of reference for "aircraft architecture, autonomy architecture … comm links … and then, the ground segment."

These "four pillars" of collaboration will ensure the services can fully exploit autonomous aircraft and "allow us to leverage the interoperability we think we need on CCAs, because this is just not a single-service issue," White said.

ACQUISITION, TEST, AND SUSTAINMENT

Air Force Materiel Command leaders said they're already well into the planning stages for acquiring, testing, sustaining, and fielding CCAs.

Brig. Gen. Scott A. Cain, head of Air Force Research Laboratory, said his organization has partnered with the Air Force Life Cycle Management Center and the Air Force Test Center to be ready to move out quickly once CCAs reach the next stage.

AFRL developed the "Skyborg" piloting algorithm—which applies agnostically across CCAs—in just four years, Cain said. Skyborg is now "graduating" its development program and is transitioning to CCAs "to make that program a reality."

"We will … continue to keep connected" with the other developing and sustaining organizations "by, in a lot of cases, literally sitting in the same spaces, working on the same digital thread, and continue to inject technology and to prepare for what that particular program needs in the future," Cain told reporters in a press conference.

"I think that's an exemplar as we look at capability development, and how we're going to continue to do this better and faster, for the Department of the Air Force."

Lt. Gen. Shaun Q. Morris, commander of AFLCMC and program executive officer of the Rapid Sustainment Office, said the preparation for CCAs starts with "having the right workforce."

The personnel needed to successfully execute Kendall's seven operational imperatives—"which are 'no-fail' missions for us"—already exist within AFMC's ranks, Morris said. The experts needed to make CCAs work are not "generally sitting outside the fence line waiting for us to invite them in," he said.

"So we have a pretty robust strategy right now to look at where our experts are that have the ability to do things like CCAs," he said. Also in the planning stage is "How do we realign them internally … and how we hire behind them, bringing … new folks into the organization," followed by "a very deliberate process [regarding] where we place them in the organization, recognizing that they will have less experience, and where can we accept risk in other places to ensure that programs like CCA are successful," he said.

In parallel with the manpower preparation is "making sure we actually have a place for them to go," Morris said. Developing and fielding CCAs will be highly classified and require secure workspaces, as well as secure connections within government and to industry for digital collaboration.

"We currently have a deficiency in secure workspaces," Morris said, and the LCMC is working with Maj. Gen. John J. Allen Jr.'s Installation and Mission Support Center to make sure those workspaces and connections are ready when needed. Secure networking with the Test Center, AFRL "and all our industry partners" is "not an insignificant IT … challenge," Morris said.

The Air Force's test enterprise is already confronting a tidal wave of new programs to evaluate—including the B-21 bomber, the Next-Generation Air Dominance fighter, multiple B-52 upgrades and hypersonic weapons, to name just a few. Maj. Gen. Evan C. Dertien, commander of the Air Force Test Center, said his organization is already busy assigning test ranges and assets to the CCA program, even though "we don't have a CCA to test, yet."

Evaluating the technologies and even tactics that will underwrite CCAs is already well along, he said, thanks to the XQ-58 Valkyrie autonomous platform. The X-62 VISTA aircraft—an F-16D fitted with the Skyborg flight algorithm—is in test, and the Air Force Test Pilot School is helping develop its autonomy, he said.

Dertien described an "upcoming VENOM (Viper Experimen-

tation and Next-gen Operations Mode)" program comprising a half-dozen F-16s that will explore manned-unmanned teaming concepts, technologies, and tactics. That effort will be getting started soon, he said.

Besides helping to mature CCA technologies, the Test Center, will also "mature our workforce to make sure we're ready—in our processes and procedures—to test and develop autonomy, and also when the first CCA arrives on the ramp for testing and capability development, that we're ready to do that."

Lt. Gen. Stacey T. Hawkins, head of the Air Force Sustainment Center, said he recently had a daylong meeting with White "about how to sustain a particular CCA but also other advanced technologies." His efforts will also depend on "posturing our Sustainment Center enterprise to become more digital," as well as on advanced manufacturing technologies—as CCAs are intended to be built in large numbers—and "what's going to be needed as this operational concept develops" so that "we are able to sustain it for the entire life cycle."

Allen, head of the Installations and Mission Support Center, said his organization will start working on CCA basing "when we understand what the CCA will be."

Gen. Duke Z. Richardson, head of Air Force Materiel Command, said AFRL is "identifying" areas of risk in bringing CCAs to fruition, and focusing on areas "where they need some invention."

Congress has warmed to the idea of CCAs, and many members are convinced it will solve the Air Force's capacity and cost problems in one fell swoop. That has some officials concerned that members and staffers are "drunk" on the concept and the hype surrounding it.

"The more we learn about the idea of the CCA and how it can fit into our operational context, the more interesting and appealing it becomes," Kendall said. "There's reason to be excited about it. It offers a lot of really interesting tactical possibilities."

But with that excitement comes sobering challenges. "I share the enthusiasm that the Hill has, up to a point," Kendall said. But until CCAs are fielded at scale, they offer only promise, not proven capability.

"This doesn't get us out of the woods entirely, on long-term affordability, for example," Kendall said. "But it's going to be a much more cost-effective mix once we get the CCAs [and] combine them with our with our crewed aircraft."

Mike Tsukamoto/staff

Brig. Gen. Luke C.G. Cropsey, Integrating Program Executive Officer for Command, Control, Communications, and Battle Management, is leading the department's effort to modernize its Battle Network.

Modernizing the Battle Network

Kendall's vision of operationally relevant C2 comes into focus.

By Greg Hadley

Two years after Air Force Secretary Frank Kendall highlighted his concerns about the Air Force's Advanced Battle Management System (ABMS) at his first AFA Air, Space & Cyber Conference as Secretary, the backbone for how the Department of the Air Force will do command, control, communications and battle management (C3BM) has a new name—the DAF Battle Network—and fresh momentum.

"The modernization of [C3] isn't tomorrow, it's today," said Brig. Gen. Luke C.G. Cropsey, integrating program executive officer for command, control, communications, and battle networks. "We're deploying capability starting now. It will obviously continue to happen in the future. But this isn't something that's five years away. This is today. So we're putting by C3BM chief of architecture and engineering Bryan Tipton, and classified briefings on their conclusions followed in recent months. Now comes the hard part, Cropsey said:

"We're going to drive and we''re going to drive it hard and we're going to drive it in the detail—because otherwise you're going to end up collapsing under your own weight."

Brig. Gen. Daniel C. Clayton, director of the ABMS Cross-Functional Team and the Air Force's operational lead on the DAF Battle Network said the analysis began with the geographic combatant commands, ensuring the analysts understood "what operational problems are they trying to solve." Clayton said.

Clearly articulating specific desired outcomes is critical, added Doug Beck, director of the Defense Innovation Unit, citing historic banking experience from the 1990s and 2000s

Airman 1st Class Sarah Post

The future Department of the Air Force Battle Network is not only for Airmen like Maj. Joe Payne, standing, but also Soldiers, Sailors, Marines, and Guardians.

when the Pentagon sought to unify disparate databases and networks to present a single information system to customers.

"In order to solve that problem, they had to get very, very, very, very clear about the experience that they were trying to create," Beck said.

Operational tests have moved from experiments to exercises, like the Air Force's Northern Edge, to "really [see] how the technology is or is not operationally relevant," said Elaine Bitonti, vice president and general manager for the connected battlespace and emerging capabilities at Collins Aerospace. "And we've gotten some very great feedback. We've had real-time examples of how we can change things or make them different to close operational gaps. And I think it's also allowed the DOD customer to see, is there technology that is ready now that can help make incremental progress towards closing our gap."

Nowhere has that focus on detail, specific outcomes, and collaboration with combatant commands been more clear than with deploying Cloud-Based Command and Control (CBC2) for U.S. Northern Command and North American Aerospace Defense Command. One of the first deliverables under the DAF Battle Network is the ability to aggregate and integrate military and commercial air defense data sources into a common picture to support homeland defense. Cropsey announced it will reach initial operational capability in October.

More will follow. Lockheed Martin's Tactical Operations Center-Light, a lightweight, scalable battle management system that enables tactical C2 elements to quickly relocate and reconnect in a contested environment debuted at Northern Edge this year, said Lockheed Martin's senior operational ABMS lead Tyler VanSant.

"I think we learn the most when we're in the field with the capability on size, weight, and power requirements," VanSant said.

AGILITY AND SCALE

Already, Cropsey said he is thinking about ways to extend CBC2 to other combatant commands, requiring the system to scale up—and do so quickly.

"So much of what we're doing as a department and as a nation will deliver results sometime in the 2030s—but we don't have to the 2030s," said Beck. "We have now, and we have the next few years. And commercial technology in many cases, has the benefit both of speed—because in some cases it's ready right there—and in some cases, there are capabilities ... that are just going to move faster in places that are driven by the relentless needs of billions of consumers and the enterprises that serve them."

To tap into commercial tech, industry experts said the Air Force will have to learn to make do with what's available and make minimal adjustments, rather than requiring a lot of customization.

"We're producing tens of thousands of displays for commercial aircraft, and we would get a bezel change for the military," said Bitonti. "Well, that requires a [modification] to the line, a modification to everything." If the focus instead is on what exists, what can be leveraged, what is absolutely essential operationally, he added, "I think we could leverage a lot more to scale."

Joe Sublousky, SAIC's vice president for joint all-domain command and control, said CBC2 has been a valuable pathfinder to that approach. SAIC is the CBC2 network integrator, working as a go-between for the tech vendors and the Pentagon when requirements and capabilities aren't perfectly matched, he said.

"That relationship that says, 'We need [this], you go figure out how to get it,' we can actually start changing ... those things, because commercial companies, they ultimately want to support and want to work toward a transformational C2 architecture," Sublousky said.

COMBINED

CBC2 also highlighted another major change that must occur for the DAF Battle Network to succeed, experts noted. Because the system supports NORAD, Canadian operators must have access to data that has typically been walled off.

"You think about C2 today, a traditional command and control platform is not even allowed into the fighter-to-fighter net, and that's a U.S.-only network," VanSant pointed out. "So how do we now take all these exquisite targeting things, protect them certainly, to where you wouldn't know where they came from, but then release that not only to Five Eyes, but then to outside of Five Eyes [partners]."

Cropsey and others say this is less a technology hurdle than a policy requirement.

The solution, suggested Sublousky, goes back to the need to focus on specific outcomes. "I would say your requirement for specificity is critical to get to the policy decisions that have to be made," Sublousky said. "It cannot be one, over-the-world, 'I need' blanket policy. There's no such thing as blanket policy. There's no single approach that will solve a secret releasable environment."

Developing the Pentagon's broader efforts to reframe joint all-domain command and control as combined, or CJADC2, is part of that focus. The aim is to make it possible to easily share data across a seamless environment and control who accesses what based on who that user is.

"For a long time, it's been Air Force only. It's not likely to be that way anymore," said Michael "Willy" Andersen, vice president at Boeing's Phantom Works for multi-domain special programs and capabilities. "So you need to plan for that joint fight. That means the architectures have to integrate together. We need to be able to depend on our international allies."

Clayton said the Air Force has been working with traditional intelligence-sharing partners such as the Five Eyes—the United Kingdom, Australia, Canada, and New Zealand—as well as Japan and South Korea and NATO partners. On top of that, he pointed to the need to break down "doctrinal and maybe some parochial service cultures" within the U.S. military.

"We're trying to get after the integrated by design part," he said, echoing a phrase championed by incoming Chairman of the Joint Chiefs of Staff Gen. Charles Q. Brown Jr. when he was still the Air Force Chief. "In order for us to be more interoperable in the future, it starts with architecture and the design today," said Clayton. Systems designed years or decades ago are harder to re-engineer to share and connect later. That's why it' important to thin about "designing an architecture on the front end, so that they could actually be interoperable and connect from the beginning."

ARTIFICIAL INTELLIGENCE

Combining all that information will present other challenges, including the potential for information overload. That's where artificial intelligence can help.

"One thing is clear: machine-to-machine speed, and doing so at the speed of relevance in a highly contested, degraded environment is going to be paramount," said Maj. Gen. John M. Olson, the Space Force lead for ABMS and JADC2. "So data and AI underpin that."

Artificial intelligence "can crunch hundreds of millions of bits of data a second and you can use them to look at historical patterns, this could be weather, this could be enemy patterns of operation," said Mark Brunner, president of PrimerAI's federal division. "So this is where AI takes the workload off of the operator and the analyst."

Actually incorporating AI into the DAF Battle Network will depend on focusing on specific outcomes and tasks, Cropsey said—otherwise it will merely be a buzzword.

"I think if we don't understand AI as trusted tools that we use to get useful things accomplished, then what we end up doing is we end up talking about it in an abstract," Cropsey warned. "From my perspective, it's pretty simple: I have to be able to connect things, I have to be able to expose the data, and I have to be able to exploit it."

That makes trust a central concern, Cropsey said, because without it there is no buy-in from operators and users. And to get to that trust, he's once again going to those "specific, measurable … outcomes" Kendall stressed two years ago.

"I think we have to neck down to a use case to the point where a human brain can look at the results that are coming out of it and say, 'Yeah, I can actually understand where and how I got to this point,' Cropsey said. "And if we don't get specific around what that looks like, I don't know how we can get the trust factor."

Keeping the New Nukes On Schedule

U.S. nuclear modernization has never been conducted on this scale before. Every leg of the triad faces challenges.

By Chris Gordon

The nation's nuclear modernization program is undertaking one of the most ambitious efforts since the Manhattan Project: simultaneously upgrading all three legs of the nuclear triad.

Throughout the U.S., the engineering and construction needed to upgrade America's arsenal of land-based intercontinental ballistic missiles (ICBMs) has been likened to the construction of the interstate highway system. And that is just the missile leg of the nuclear triad.

Also known as the Sentinel missile system, the project is long overdue, given the half-century age of the Minuteman III missiles, silos, and systems that it will replace. Over the next 10 years, the cost of modernizing the U.S. nuclear deterrent will exceed $750 billion, according to the Congressional Budget Office. Replacing the missile systems is among the most challenging projects ever.

Not only is the U.S. arsenal overdue for upgrades, but the threat the U.S. faces is about to enter uncharted territory, with not one but two nuclear peers, with both Russia and China posing major threats, according to senior defense officials speaking at AFA's Air, Space & Cyber Conference in September.

"This is the first time that's ever happened," Undersecretary of Defense for Acquisition and Sustainment William A. LaPlante said. "We must—must—have a credible deterrent."

The Pentagon's 2022 Nuclear Posture Review (NPR) outlined the challenges the U.S. faces as Russia and China have built up their nuclear forces. China, which has so far shut the door on arms control talks, appears intent to have at least 1,000 deliverable nuclear warheads by the end of the decade, the NPR says, supplemented with a nuclear stockpile of 1,500 by 2035, according to other Pentagon projections.

Russia, constrained by the New START treaty limiting both Moscow and Washington to 1,550 strategic nuclear warheads, has signaled its intent to exit the treaty, which expires in February 2026. The treaty does not cover tactical nuclear weapons, and no new arms control talks between the U.S. and Russia are underway

Mike Tsukamoto/staff

Modernizing the nuclear triad is an unprecedented challenge, noted Undersecretary of Defense for Acquisition and Sustainment William LaPlante, who joined the head of U.S. Strategic Command Gen. Anthony Cotton and Air Force Global Strike Command boss Gen. Thomas Bussiere on stage at AFA's Air, Space & Cyber Conference.

This is hardly the world the Obama administration hoped for when the 2010 Nuclear Posture Review was drafted and the goal was to use arms control deals to set progressively lower limits on strategic nuclear warheads in order to gradually reduce the role that nuclear forces play in world affairs.

"There were conversations about, 'OK, this is just one point on a glide path to not having nuclear weapons,'" said Michael R. Shoults, the Air Force's assistant deputy chief of staff for strategic deterrence and nuclear integration, of that document. "That strategic environment completely changed."

"Thankfully, there were enough people who saw the need to continue on with our modernization efforts despite the pressure and the trend to go lower because they knew that the strategic environment was uncertain," Shoults added.

That modernization program, largely conceived during the Obama administration, has been carried forward under Presidents Donald Trump and Joe Biden.

Each administration has dabbled at the edges: The Trump administration opted to develop a low-yield warhead for the Trident II submarine-launched ballistic missile. The Biden administration canceled plans to develop a new nuclear-tipped sea-launched cruise missile (SLCM-N). But overall, the main elements of the program remain the same.

"For the foreseeable future, nuclear weapons will continue to provide unique deterrence effects that no other element of U.S. military power can replace," the Biden administration's Nuclear Posture Review states.

A looming question, which the Biden administration has yet to answer, is whether the U.S. will need to expand its strategic nuclear force beyond 1,550 warheads to respond to the Russian and Chinese nuclear programs. Those countries, the NPR says, have "little interest in reducing their reliance on nuclear weapons" and are pursuing advanced technologies as well as exotic delivery systems.

Russian President Vladimir Putin touts his country's nuclear-capable Poseidon torpedo that could be targeted at Western ports. And China surprised the U.S. by testing a hypersonic fractional orbital bombardment weapons system in 2021 that travels through low-Earth orbit before steering back into the atmosphere to deliver weapons at high speed.

"Our principal competitors continue to expand and diversify their nuclear capabilities, to include novel and destabilizing systems," Biden's NPR says. "By contrast, the United States is focused on the timely replacement of legacy fielded systems that are rapidly approaching their end of service life."

The White House position is that the U.S. does not need a nuclear force that outnumbers the combined total of the Chinese and Russian arsenals in order to deter them.

"Nuclear deterrence isn't just a numbers game," Secretary of Defense Lloyd J. Austin III said last December. "In fact, that sort of thinking can spur a dangerous arms race."

But the White House has also acknowledged that the sort of limits the U.S. can agree to after New START expires will be affected by the size and scale of China's nuclear buildup.

"The threat is different—that's not just hyperbole—and it's even different from five to 10 years ago," LaPlante said. "The nuclear deterrent remains DOD's number one priority mission."

North Korea's steadfast commitment to developing its missile and nuclear program has also prompted Washington to reaffirm its commitment to extended deterrence—covering nations under its nuclear umbrella—to South Korea and Japan.

As America modernizes its nuclear arsenal, it is moving to simultaneously upgrade the full range of its air, land, and sea nuclear capabilities. Carrying out the modernization on schedule is the hard part, according to the head of U.S. Strategic Command (STRATCOM), Air Force Gen. Anthony J. Cotton.

Every day, "the margin thins," Cotton said, to ensure the programs are "as close to on time as we can" so the U.S. does not "develop a gap in abilities and capabilities."

"I'm pretty simple as the STRATCOM commander," he added. "Just deliver me the program of record. I mean, it really is that simple."

Perhaps the most ambitious element of America's simultaneous nuclear modernization effort is the Sentinel ICBM, which is intended to last 70 years and replace hundreds of LGM-30 Minuteman III missiles. The Sentinel is a so-called "modular" design, which the Air Force claims will help make it easier to maintain and upgrade in the future.

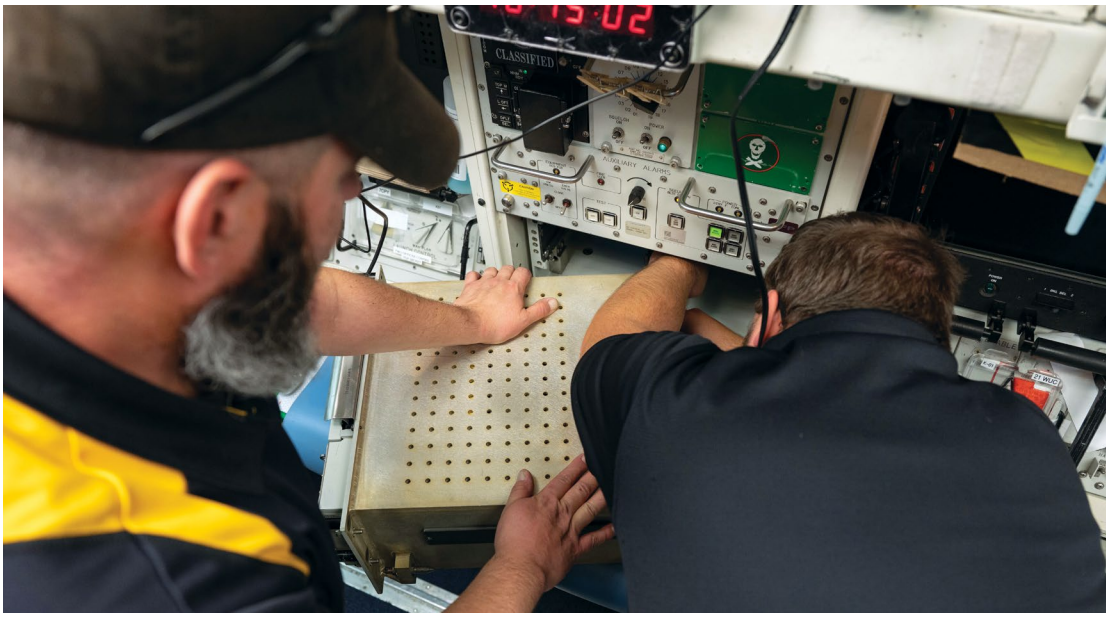
The Minutemen III missiles, which each carry one warhead, were not originally intended to still be in service in 2023. The antiquated launch facilities are a product of the Cold War—and look like it, complete with aging beige consoles in underground Launch Control Centers.

"All three of the legacy platforms have been extended beyond anyone's dream," LaPlante said of the bomber, submarine, and ICBM fleets.

SHOP AFA

SCAN TO SHOP

www.ShopAFA.org



Airman 1st Class Sarah Post

Northrop Grumman field technicians replace an outdated printer in a launch control center with a new one designed to last the remainder of the Minuteman III life cycle at the Kilo-01 Missile Alert Facility near Dix, Neb.

Air Force Global Strike Command, which controls two-thirds of the nation's triad with U.S. bombers and ICBMs under the command of Gen. Thomas A. Bussiere, has found evidence of toxic polychlorinated biphenyls (PCBs) at a small number of missile facilities, uncovered during environmental testing for possible causes of cancer among missileers. PCBs were banned in the U.S. in 1979—a stark reminder of the age of America's land-based missile force and infrastructure.

"There is no backup plan for not having Sentinel," Shoults said.

As vital as the Sentinel program is, keeping it on schedule has not been easy. The GAO has assessed the program is around a year behind schedule and will struggle to meet the Pentagon's September 2030 deadline for initial operational capability (IOC).

To expedite the program, LaPlante has directed an integrated master schedule to better ensure that the missiles, silos, and command and control network are developed on time.

To grapple with troublesome supply chain issues, LaPlante granted permission to purchase some long-lead items now, rather than risk delay by waiting. "I gave them authority to purchase them now," LaPlante said. Similarly, prototype Sentinel launch control centers are under development so the government and its contractors can identify problems "now, earlier, so we can learn the lessons rather than wait."

Air Force Maj. Gen John P. Newberry, program executive officer for strategic systems, said that Sentinel prime contractor Northrop Grumman has been building replica Minuteman III silos and systems to smooth and accelerate the upgrade process.

"Currently, we have 450 launch facilities today in Minuteman," Newberry said. "The intent is to refurbish them—all of them." The U.S. has 400 deployed ICBMs spread across five states—Wyoming, Colorado, Nebraska, North Dakota, and Montana—with another 50 silos kept ready to store missiles if necessary.

Fielding the Sentinel will be a massive civil engineering undertaking. The work on silos and even "utility corridors" needs to take into account the different geography and soil of each of the locations.

"It is a huge challenge," Newberry said. "You think about weather, you think about roads—it is a huge civil engineering challenge. I'm not trying to downplay that. This will be a sizable construction effort."

Maj. Gen. John Allen, head of the Air Force installations and mission support center, said the effort will require the establishment of a "construction task force," which will involve a partnership between the Air Force's Nuclear Weapons Center, Northrop Grumman, and the Army Corps of Engineers.

"It is considerably different than the 30 years that I've been watching construction in the Air Force," Allen said. "It is a big, big deal."

In practical terms, that means that "a missile silo a week," is due to be refurbished and rebuilt until all Minuteman IIIs silos have been updated to Sentinel by the mid-2030s, according to Allen—an assessment echoed by independent experts.

BOMBER MAKEOVER

The bomber leg of the nuclear triad appears to face fewer challenges. The first B-21, which, according to military officials, has already undergone engine runs and is scheduled to fly before the end of 2023, reflects the plan to test the plane as production airframes are being constructed.

"You have to check the validity of your designs, you have to test," said LaPlante. "None of that goes away. But now there's potential for all of that to collapse and collapse in time."

The B-21's predecessor, B-2 Spirit, the stealthy flying wing it is due to replace, achieved initial operational capability roughly eight years after its first flight. The B-21 program is aiming to slash that, and produce at least 100 bombers in about a decade.

The Air Force plans to retire both its 20 remaining B-2s and all its B-1 Lancer bombers, probably before the B-21 is fully operational.

"The processes and the milestones that we're paying attention to in the B-21 program are important, but they're only important because we have an actual operational need to field this exquisite capability," Bussiere said.

The B-21 will carry modernized weapons, with the AGM-181 Long-Range Standoff missile (LRSO), a stealthy missile, replacing the 1980s-era AGM-86B Air-Launched Cruise Missile (ALCM), which LaPlante cited as among the nuclear weapons that has surpassed its original sell-by date.

The service expects to be spending over $1 billion a year to purchase LRSOs by fiscal 2027. The B-2 carries only nuclear gravity bombs, while the B-52 can carry ALCMs. The plan is for LRSO to be integrated into the B-21 and the B-52, which will remain in service until the 2050s, thanks to new engines and

a range of other upgrades, including a new radar and cockpit, that will result in a new B-52J variant.

NUKES BENEATH THE WAVES

The mainstay of the sea-based leg of the triad is the program to build 12 new Columbia-class nuclear ballistic missile submarines to replace the Navy's current fleet of aging Ohio-class strategic submarines. "Boomers" are generally thought to be the most survivable leg of the nuclear triad. The Navy calls the Columbia is its top priority program, but it is struggling with schedule delays due to technical, manpower, and industrial base challenges.

Cotton's predecessor, Adm. Charles "Chas" Richard, advocated for a lower-yield, sea-launched cruise missile, and while Cotton has been less specific, he has floated the prospect of a low-yield, non-ballistic weapon that could be deployed in the Pacific or European theater, which could increase the President's options in case of a crisis.

For now, keeping the existing ICBM, bomber, and ballistic missile submarine programs on pace is the big challenge.

"Produce, produce, produce," Cotton said. "That's going to be key for us as we make the transition to a modernized force."

Mike Tsukamoto/staff

Brig. Gen. Christopher Amrhein, Commander, Air Force Recruiting Service, says every Airman, Guardian, and veteran can be an auxiliary recruiter by standing ready to share their story and to refer interested young people through the command's free Aim High mobile apps, available for both iPhones and Android devices.

Solving the Recruiting Crisis

Air Force lightens recruiters' workloads and eases restrictions to overcome 2023 shortfall.

By David Roza

The Air Force missed its recruiting goal in fiscal 2023 for the first time since 1999 but the Air Force Recruiting Service commander Brig. Gen. Christopher Amrhein says he's bullish on the future, with special emphasis on removing administrative burdens from his recruiters so they can get out and tell the Air Force and Space Force story.

"The administrative workload takes away from the ability to get out and about," Amrhein told reporters at AFA's Air, Space & Cyber Conference. "When we peeled the onion back, it was actually the medical administrative processing piece that was taking most of their time. So that's where we focused our energy and our effort."

Overall, the Air Force missed its goal of 26,877 recruits by about 10 percent, while the Space Force exceeded its goal of 472 enlisted Guardians by 110 percent.

AFRS is hiring about 60 contractors to work in and around Military Entrance Processing Stations to help with the medical accessions paperwork, buying some two or three hours a week back for every recruiter. That may not sound like much, but "when you ask them, 'What does a couple more hours a week give you,' you should see the look on their face," Amrhein said.

The service also wants to streamline the medical records process, which complements a larger revamp of AFRS' IT backbone. The new system is on contract and due to be rolled out over the next two to three years, a gradual process to work out bugs before going fully operational. In the meantime, Amrhein's team is analyzing the most commonly issued medical waivers, such as for one-off eye surgeries, to see if it makes operational sense to "expand" them.

AFRS isn't stopping there. It will add 91 new recruiters who should be in the field between February and June 2024 and expand its force of 16 E-recruiters—retired Air Force recruiters who use virtual platforms to reach a nationwide talent pool—to 21 at the same time.

These manpower and workload changes accompany a range of new incentives for recruits and an effort to reduce barriers to service, summarized below:

- Give qualified applicants an option to retest should they

test positive for marijuana use (That change enabled about 165 Airmen to join in fiscal 2023).

■ Allow small hand and neck tattoos (made in February, the change has allowed nearly 150 Airmen to join so far).

■ Align Air Force body fat composition rules with Defense Department standards (this change, made in February, allowed nearly 700 Airmen to join in fiscal 2023).

■ Streamlined the naturalization process for trainees to become both citizens and Airmen upon graduating Basic Military Training (200 Airmen became citizens through this process in 2023).

■ Reinstate the enlisted college loan repayment program (since making the change in March, more than 200 Airmen have taken part so far).

■ Increased enlistment bonuses. The addition of $32 million helped bring in more than 3,800 future Airmen in fiscal 2023.

■ Offer a quick-ship bonus, for leaving for Basic Training as openings arise, ensuring training spaces aren't wasted. More than 1,400 future Airmen took advantage of fiscal 23.

Without those changes, the Air Force recruiting shortfall would have been much worse, but with them, recruiters enjoyed an "extremely strong" last quarter, Amrhein said. That included building up the Delayed Entry Pool (DEP), adding 3,300 prospective recruits, 600 over goal. The DEP is still smaller than normal, but three times greater than at the start of fiscal 2023.

Amrhein credited recruiters' 2023 successes to "almost a deployed operational battlefield sprint" over the summer, a pace he acknowledged is not sustainable in the long-term. But the sprint's success has him "cautiously optimistic" for fiscal 2024, despite systemic challenges that have 23 percent of incoming recruits receiving waivers under existing rules and an overall propensity to join the military at 10 percent, a historic low.

"Their unfamiliarity with military service and what it really entails means they often rely on the stereotypes and misperceptions they see in TV, movies, or the internet," according to Amrhein.

Changing that perception can't be the job of recruiters alone, he said. Air and Space Force leaders continue to prod Airmen and Guardians—and veterans, as well—to proactively share their stories to promote the personal and professional benefits of military service.

"Every single one of us in this room has an opportunity to share our stories, to reflect on why we serve, and appreciate the richness of being part of this military family," said Chief Master Sergeant of the Air Force JoAnne Bass in a keynote address.

Programs encouraging commanders to open their installations to community visits, foster connections with underrepresented groups, and set up aviation- or STEM-inspiration programs can make a difference, Amrhein noted. Many such efforts faltered after 9/11, as base gates were shuttered, and defenses increased. The result was increased separation from the public. Now bases are opening back up, Amrhein said.

The Air Force has fewer recruiters per new recruit than the other services, and in some cases, recruiters are spread so thin that in rural areas, there may be just two recruiters to service an entire state. But efforts like a recent "Zone Blitz," where Airmen visited remote areas of Alaska in early September, and "Detachment 1," the tactical execution arm of the service's Rated Diversity Improvement initiative to help identify minority Americans to become pilots, combat systems officers, and air battle managers, can make a difference. Even though the exact impact of these efforts can be difficult to quantify, they all contribute to the end goal of finding candidates to join the force.

"The data shows that it takes in excess of 22 touchpoints for someone to go 'Man, I think I'm really considering this,'" Amrhein said. "That could be sitting in a roundtable, talking to somebody in the grocery store, going to an open house, [or] having Det. 1 come to them."

But that can't be left only to recruiters. Every Airman, every Guardian, every civilian employee can contribute to those touchpoints, he said. Simply having the tools in hand—the Air Force's Aim High app, for example, preloaded on one's phone—and the confidence to speak positively about one's military experience can be a force multiplier for the rest of the recruiting force. The app includes the ability to enter a potential recruit's name and email address, ensuring an E-recruiter will reach out to them. And a positive word and example can help shift perceptions and increase interest in the service.

Telling personal stories can and will help inspire the next generation, Amrhein said.

"What was your 'why'? Why did you join the Air Force, and what do you do every day?" he asked. "It's important. Tell your story." For every Airman and Guardian, he said, remember: "You are an influencer just as much as you are a recruiter."

Lt. Gen. Brian Robinson, right, Commander, AETC, administered the Oath of Enlistment to eight new recruits before a crowd of more than 3,000 at AFA's ASC Conference during the Every Airman & Guardian A Recruiter panel discussion. Watching in the background are: Brig. Gen. Christopher Amrhein, Commander, Air Force Recruiting Service, and AFRS Command Chief Master Sgt. Rebecca Arbona.

Mike Tsukamoto/Air & Space Forces Magazine

Mike Tsukamoto/staff

Chief Master Sergeant of the Space Force Roger Towberman completed his historic tour as the first CMSSF ever in September, urging Airmen and Guardians to be true to themselves and build the Space Force of the future.

Towberman, the First CMSSF, Closes Out Historic Tenure

By Unshin Lee Harpley

Roger "Tobey" Towberman might have seemed like an unlikely candidate to become the first Chief Master Sergeant of the Space Force. Never a space operator, he nevertheless was just the second person ever to become a member of the Space Force and its first enlisted Guardian, though at the time the nascent service was still using the makeshift title "space professional" as almost every detail describing the new force was still being worked out.

Not quite four years later, Towberman handed over his title and responsibilities to the new CMSSF, John F. Bentivegna, Sept. 15 at a change of responsibility ceremony at Joint Base Andrews, Md. He had completed a historic tenure, and he offered clear advice to every Guardian serving around the world: "Be who you are."

"You need to be you. You need to remember what you're moving toward, because that is the Space Force we're supposed to have," he said during the ceremony. "And if you let what we did yesterday keep that from you, that's on you. Move toward the meaning that you already know exists."

Towberman was in line to be the first Space Force senior enlisted adviser as soon as the force was established on Dec. 19, 2019. He described the waiting game—would Congress back the new service or not—in a video-recorded "exit interview" posted on YouTube on the eve of his retirement. But he would not officially become the Space Force's top enlisted member until April 3, 2020, when he became the service's second member, after then-Chief of Space Operations Gen. John W. "Jay" Raymond.

His impact was immediate. Towberman bought passion, and optimism, and focus to the role, and in some ways became the service's best spokesman in those early days. Barely three months after the Space Force was born, the COVID-19 pandemic was declared and the global shutdown that followed added unexpected wrinkles to what was already going to be a challenging, unprecedented transition.

"The whole world was in chaos," he recalled, noting "we were wearing three hats" as heads of the Space Force, Air Force Space Command, and U.S. Space Command at the time. "I'll be honest, we would pause sometimes to be present in the details … but most days, it was just a lot of work. What Guardians have pulled off in the past four years is impossible."

By the time Gen. B. Chance Saltzman succeeded Raymond as CSO, Towberman was as much a fixture in the Space Force as his two distinctive—and quite different—bosses. He was the face of the enlisted force, but also of the "anything-is-possible" optimism that came with creating a new service almost from scratch. He floated—not quite successfully—the notion that there need not be much distinction between officers and enlisted members.

"They both gave deference to me, always heard me out, always listened to my crazy ideas," he recalled. "They're both skilled communicators, both skilled team leaders, they've both been awesome."

His inputs were central in defining the culture and character of the nascent force, from its ranks and traditions to personnel policies and its Guardian Ideal. He was the one who unfurled the Space Force flag in the White House, who shared the new Space Force uniform, and who introduced new ranks, new insignia, and the Space Force song, Semper Supra—elements that make a military service unique, that draw it together, and that define its particular identity to others.

It was like a marathon, a nonstop race to get to a goal that Towberman himself would agree has not yet been achieved.

"When you talk about mantras, in my office, in the office of

'We're not coming to work to get things done, we're coming to work to change the world,' Chief Master Sergeant of the Space Force Roger Towberman would tell his staff throughout his tenure as CMSSF.

Mike Tsukamoto/staff

the Chief Master of the Space Force, we say, 'We're not coming to work to get things done, we're coming to work to change the world,'" Towberman said in that final YouTube video.

Creating a new service was indeed a world-changing endeavor, setting off a series of strategic decisions to re-emphasize space among U.S. allies and in realigning the way the military services related to the space domain. As its senior enlisted leader, Towberman welcomed in hundreds of transfers from the Army, Navy, and Marine Corps, along with thousands of former Airmen, and hundreds of new officers and recruits who arrived with no prior military experience. Blending those diverse experiences, cultures, and perspectives into a single force was in many ways his singular mission.

Towberman contributed to the Space Force's first-ever human capital plan, "The Guardian Ideal," a comprehensive strategy that defined the core values and principles the Space Force stands for, including qualities like innovation, adaptability, and resilience.

When it was first shared publicly, Raymond said the heart of the concept "is the commitment between the leader and the led, founded upon our core values."

For Towberman, it was about taking a modern, holistic approach to talent management, incorporating work-life balance, resiliency, training, education and individualized development into the Guardian Ideal.

"Caring for Guardians and their loved ones will never be one thing, but all things," he said at the time. "We exist in an ecosystem and our focus will be to always remember the interconnected and interdependent relationship of those things. The Guardian Ideal matters because Guardians matter. They are the weapon system."

As a champion of enlisted members, he expanded promotion boards to include the junior enlisted ranks and emphasized the value of hard work and commitment. He also advocated for a new kind of military physical fitness program, one that better aligned with the new force and that could take advantage of the service's smaller size. In place of one-size-fits-all fitness requirements,

Towberman helped establish a Holistic Health Assessment initiative, an alternative to the traditional physical fitness test, and the use of wearable monitors. He pressed for a broad spectrum of health indicators such as mental and emotional well-being and contributed to the development of a revised Basic Military Training curriculum unique to new Guardians, championing efforts to develop specialized educational curricula designed to develop expertise in satellite operations, space law, and more.

Finally, as the service's senior enlisted adviser, he offered foundational contributions to the service's new uniforms, ranks, traditions, and even its song, "Semper Supra," which he unveiled at AFA's Air, Space & Cyber Conference a year ago, leading the crowd in its first public sing-along.

Towberman clearly enjoyed the spotlight. At AFA's 2021 Air, Space & Cyber Conference, he joined USAF's rock band, Max Impact, on stage and stunned the crowd as he threw himself into an emotional and effecting performance of the Journey classic, "Don't Stop Believing," covering the entire stage, playing air guitar, as Air Force leaders, their wives, and others present held up cell phones and danced along.

He traveled to Pituffik Space Base, Greenland (at the time it was named Thule Air Base) with TV's Stephen Colbert, and good-humoredly suffered through a comedic interview at the Space Force's northernmost outpost, with a glacier in the background, as Colbert peppered him with follow-up questions to completely straight-faced answers.

"When did the concept of the Space Force begin?" Colbert asked. Towberman answered, citing the 2001 Rumsfeld Commission report's recommendation that a Space Force be considered.

"So, 2001 was literally the beginning of your Space Odyssey," Colbert responded. "What does the Space Force do?"

"We ensure unfettered access and freedom to maneuver in space," Towberman answered, straight-faced.

"Is there some fettering going on that we don't know about?" Colbert asked. "Is there a space war that we don't know about?"

Towberman answered no, trying not to laugh. "Is there a space skirmish?" Towberman paused, laughing. "Ah," said Colbert, as Towberman continued laughing. "That pause speaks volumes."

Towberman's love of performing tracked into Kendall's comments at his retirement. Noting the CMSSF's singing prowess, Kendall said it showed up early and often in Towberman's

performance reports. "It was just fascinating how many times they mentioned him singing the national anthem at various events, and that he was the winner of the Tops in Blue talent competition in Hawaii," Kendall said. "We're not going to hear him sing today. But I wish we could."

At public appearances, Towberman ranged from thoughtful and knowledgeable to openly emotional, easily joking and laughing and generally presenting an emotional transparency rarely seen among senior military leaders.

"He is an incredibly energetic, passionate, and empathetic leader," Kendall said at his retirement ceremony. "Tobey defined what it means to be an enlisted Guardian, and he became the model for enlisted Guardians to follow—today and for the future. We could not have chosen better. He shaped the character, values, and culture of the Space Force. … His contributions have been literally unprecedented and without parallel."

LEGACY IN THE AIR FORCE

Over the course of his 33-year career, Towberman earned the Legion of Merit, Bronze Star, three Meritorious Service Medals, and six Air Medals. Starting as a ground and airborne cryptologic language and intelligence analyst, he accumulated more than 4,500 flying hours as an Airman, first as a linguist specializing in Chinese, and later gaining expertise in the wholly unrelated language of Albanian.

He held enlisted leadership positions at the squadron, group, wing, Numbered Air Force, major command, and combatant command levels, and deployed for numerous operations including Joint Forge, Allied Force, Northern Watch, Southern Watch, Iraqi Freedom, Enduring Freedom, and Unified Protector.

He attended the Senior Noncommissioned Officer Academy and participated in the Chief Master Sergeant Leadership Course.

In 2015, while serving as the Command Chief Master Sergeant for the 25th Air Force, Towberman hosted his first "Ask Me Anything" session on the popular internet forum Reddit, candidly addressing criticism and questions about policies. He continued to join real-time virtual Q&A sessions, responding to jokes from Airmen, and maintained an active presence on social media platforms, using Facebook to commend exceptional units and individuals.

For Towberman, the digital landscape was more than just a public relations tool; it represented a powerful means of engagement. At the 2023 AFA Warfare Symposium, he shared his reasoning for being accessible and visible on social media: "We grew up being taught to go to the DFAC [dining facilities], to go to the dormitories, because that's where young people lived, and you need to go there, and you need to see it, and you need to be with them," Towberman said. "Well, they live in social media now. And we've got to go there, we've got to see it, we've got to be there with them."

As a personable leader, his willingness to embrace the spotlight, whether speaking publicly and passionately or singing with the Air Force Band's Max Impact rock band or appearing on TV fielding off-beat questions from Stephen Colbert, he forged a clear connection with Airmen and Guardians, especially enlisted personnel. He was a champion for enhancing living conditions, training, education, and support systems within the Space Force, and helped shape policies geared toward enhancing the overall well-being of Guardians.

He also bared his soul. At the AFA Warfare Symposium in March he allowed how his boyhood hopes of becoming a rock star faded fast and left him so low he had even stolen food to feed himself. The Air Force enabled him to rise above those early struggles, he said, leaving him a debt he could never repay.

In panel appearances with his wife, Rachel Rush, and other senior leaders at AFA conferences, he openly shared his affection and admiration "for my beautiful wife," and willingly showed vulnerability and self-criticism. In his retirement speech, he addressed Rush directly, saying, with cracking voice, "I wouldn't be anywhere without you. I love you, Rach. Thank you for everything."

BIDDING A FINAL FAREWELL

Kendall said Towberman excelled at every level. "We never found a job that he couldn't do well, so we gave him one that no one had ever done before: To define what it means to be an enlisted Guardian," Kendall said. "And he became the model for all enlisted Guardians to follow, today and tomorrow."

Towberman's legacy includes his contribution to establishing the service's core values, known as the four Cs: Character, Connection, Courage, and Commitment.

But in his departing message to Guardians, he emphasized that his legacy should not be defined by individual accomplishments, but by the Space Force's lasting ability to affect the space domain.

"If the only thing they can write on my tombstone is my duty title, then I didn't do a very good job. So, what I hope is we've done enough to enable the greatness that's inherent in every single Guardian we have, and that they can write the future that's unwritten.

"We can change the world if you just be who you're supposed to be," Towberman said. "The future of your Space Force, it's a book that you will write. And I can't wait to read it."

Senior Airman Zachary, Rufus

F-22 Raptors from the 27th Fighter Squadron and an F-35A Lightning II from the 34th Fighter Generation Squadron came together at the Savannah Air National Guard Base, Ga., for the first William Tell Fighter Competition in nearly 20 years.

AIR

William Tell Fighter Competition Returns

By Greg Hadley and David Roza

The Air Force's revived William Tell Air-to-Air Weapons Meet wrapped up last week, the first edition of the prestigious fighter competition in nearly 20 years—and a select group of Airmen walked away with some trophies.

From Sept. 11-15, William Tell featured some of the best air crews from across the service testing their offensive and defensive skills against simulated enemy aircraft, while ground crews competed in loading weapons, aircraft maintenance, and intelligence operations.

Fourteen different teams and individuals won awards at the meet's closing ceremonies on Sept. 15 at the Air Dominance Center in Savannah, Ga. Air Combat Command identified the wings of the winners but declined to publicly identify individuals, citing operational security.

The team awards included categories for the three types of aircraft competing—F-15, F-22, and F-35—as well as one—the Major Richard I. Bong Fighter Interceptor Trophy—for individual teams that demonstrated the best fighter integration across multiple platforms and systems:

- Major Richard I. Bong Fighter Interceptor Trophy: 3rd Wing (F-22s), 366th Fighter Wing (F-15Es), 388th and 419th Fighter Wings (F-35s)
- Lieutenant Colonel James H. Harvey III Top F-15 Wing Award: 104th Fighter Wing, Barnes Air National Guard Base, Mass.
- Captain Eddie Rickenbacker Top F-22 Wing Award: 1st Fighter Wing, Joint Base Langley-Eustis, Va.
- Brigadier General Robin Olds Top F-35 Wing Award: 158th Fighter Wing, Burlington Air National Guard Base, Vt.
- Colonel Jesse C. Williams Top Intel Tradecraft Wing Award: 1st Fighter Wing, Joint Base Langley-Eustis, Va.
- Big I Task Force Top C2 Wing: 552nd Air Control Wing, Tinker Air Force Base, Okla.
- Chief Master Sergeant Argol "Pete" Lisse Maintenance Team Award: 1st Fighter Wing, Joint Base Langley-Eustis, Va.
- Overall Weapons Load Competition: 104th Fighter Wing, Barnes Air National Guard Base, Mass.

The individual awards recognized the top crew chiefs and pilots from each aircraft type:

- Top F-15 Crew Chief: 366th Fighter Wing, Mountain Home Air Force Base, Idaho
- Top F-22 Crew Chief: 1st Fighter Wing, Joint Base Langley-Eustis, Va.
- Top F-35 Crew Chief: 158th Fighter Wing, Burlington Air National Guard Base, Vt.
- F-15 Superior Performer: 104th Fighter Wing, Barnes Air National Guard Base, Mass.
- F-22 Superior Performer: 3rd Wing, Joint Base Elmendorf-Richardson, Alaska
- F-35 Superior Performer: 158th Fighter Wing, Burlington Air National Guard Base, Vt.

Overall, the 1st Fighter Wing at Joint Base Langley-Eustis, Va., emerged as the big winner from the competition, capturing four trophies.

The 104th Fighter Wing at Barnes Air National Guard Base, Mass., also took home three wins, including the overall weapons load competition, a head-to-head contest against crews with other types of aircraft. That competition took place in front of a large crowd including distinguished visitors on Sept. 14.

DON'T LET THE WING DOWN

Capt. Andrew 'Pañic' Munoz was in a tight spot. The F-15E Strike Eagle pilot and his weapons system operator, Capt. George 'King' Welton, had run out of air-to-air missiles 15 minutes into a simulated battle where they had to defend a lane of airspace against a mix of F-22s, F-16s, and other jets flying adversary 'red air' tactics.

Though the battle was not real, the stakes were high, as Munoz and Welton were representing the entire 4th Fighter Wing in a competition against other fighter units from across the Air Force. If they failed here, it might affect their standings for the rest of the meet.

But then, like an old-fashioned cavalry charge, help arrived in the form of Capts. Noel 'Takeout' Zamot and Sean 'Wolf' Sutedjo, who took off 15 minutes late after swapping jets due to an aircraft malfunction. The fresh crew arrived with a full set of missiles, and while they lacked a data link providing situational awareness of the battle, they worked together with Munoz and Welton to take down the opposing jets and eventually win the scenario.

"We were able to work as a team between the two-ship to use their missiles and provide them with the awareness that they needed in order to target and protect the lane," Munoz told Air & Space Forces Magazine.

The late arrival of Zamot and Sutedjo was just one memorable moment from the William Tell Air-to-Air Weapons Meet, where Air Force fighter crews, maintainers, and intelligence specialists from Virginia to Hawaii gathered at the Air Dominance Center in Savannah, Ga., from Sept. 11-15 to see who was the best in the air-to-air business.

A historic meet, William Tell was held about every two years from 1954 to 1996 but was discontinued with the exception of a 2004 revival to commemorate the contest's 50th anniversary. The Air Force's renewed focus on near-peer conflict in contested airspace was a major reason for bringing the contest back. But after a 19-year hiatus, many pilots today had never heard of William Tell.

"When my squadron commander walked up to me in April and said 'We want to send you to William Tell and we want you to build a team,' I had to say 'What is William Tell?' Munoz said. "Learning the history of William Tell made me realize that this was bigger than myself, bigger than the team."

The meet included one-on-one basic fighter maneuvers (BFM); air combat maneuvering (ACM), where two-ships of 'Blue Air' identified and engaged unfamiliar red air jets; a gunnery contest where participants shot their aircraft cannons at a banner towed by a Learjet; and fighter integration, where participants worked together to defend an airspace against formations of red air.

Meanwhile, maintainers competed to see who could safely load missiles onto an aircraft fastest, while intelligence Airmen conducted mission planning and threat analysis on the ground and air battle managers worked on command and control from overhead. Meet planners warned that competition was the best way to simulate combat stress, but Munoz, who has flown on several deployments, was skeptical at first.

"Fast-forward to being at the step desk before going to fly and I had this pit in my stomach … I don't want to let my team down, I don't want to let the wing down, and I don't want to let myself down really," he recalled. "It made me a believer."

Most of the 4th Fighter Wing contingent came from the 'Chiefs' of the 335th Fighter Squadron, where the goal is to achieve 'the chief standard' of excellence—and for the most part they hit the mark. The team performed well in ACM and BFM, where, despite being the youngest fliers on the team, Zamot and Sutedjo defeated a more experienced crew. They also flew well in the fighter integration event, where the Strike crews showed their expertise in defensive counter-air (DCA). But the 'integration' piece was easier said than done.

"We have great tactics, techniques, and procedures for executing our own DCA, but mixing that in with two different other aircraft was definitely a challenge, especially with the limited amount of time that we had to mission plan for it," Zamot said.

There were two other F-15 units at the meet, the 366th Fighter Wing flying F-15Es from Mountain Home Air Force Base, Idaho, and the 104th Fighter Wing flying F-15Cs from Barnes Air National Guard Base, Mass. The 4th bested the 366th, but the Air Guardsmen claimed the overall top F-15 Wing and Superior Performer award. Though they went back to Seymour Johnson Air Force Base, N.C., empty-handed, the Airmen from the 4th were still proud of their performance.

"I think that we executed to the chief standard when we went down to Savannah," Zamot said. "Every event that we showed up to, we were the premier Strike Eagles down there, and we beat two F-35 squadrons" in the overall scores.

They also stuck together as a team: Zamot said the 4th Fighter Wing maintainers had the loudest group of fans in the building during the weapons load competition, where the 4th defeated the 366th. Competition aside, the meet was also a chance to build connections among Eagle pilots, especially as the older C models retire and the new F-15EX editions come online.

"After the results were released, we had all of the Eagle dudes together and had about a two-and-a-half hour tactics talk, which was awesome," Munoz said. "We got to talk through how we are merging the community together for the future. Those crews will go back to their base and spread the knowledge that we shared."

Air Combat Command, which ran the competition, brought in retired Lt. Col. James Harvey III, a Tuskegee Airman who in 1949 won the first ever trophy in what would later become William Tell. Seeing Harvey there, along with an impressive number of colonels and generals, brought the significance of William Tell to life.

"I hope that we bring it back so that we can continue the legacy of William Tell," Munoz said.

ACC/Facebook

An Airman wears a William Tell 2023 patch at the Air Dominance Center located at the Savannah Air National Guard Base in Savannah, Ga.

Senate Confirms Brown as Chairman of the Joint Chiefs

By Greg Hadley

Mike Tsukamoto/staff

Chief of Staff of the Air Force Gen. Charles Brown Jr., the next Chairman of the Joint Chiefs of Staff, spoke at the Air & Space Forces Association's 2023 Air, Space & Cyber Conference on Sept. 12, at National Harbor, Md.

The Senate confirmed Air Force Gen. Charles Q. Brown Jr. as the next Chairman of the Joint Chiefs of Staff on Sept. 20, clearing the way for Brown to become the first Airman to serve as the nation's top military officer in 19 years.

Brown was approved in a bipartisan 83-11 vote as lawmakers circumvented the legislative hold of Sen. Tommy Tuberville (R-Ala.), just a few days before the term of the current Chairman, Army Gen. Mark A. Milley, was set to end.

It is not immediately clear if Brown will be sworn into his new position before Oct. 1, when Milley's term expires.

Also poised for roll-call votes in the coming days are Gen. Randy George to be the next Chief of Staff of the Army and Gen. Eric Smith to be the next Commandant of the Marine Corps.

For months, hundreds of general and flag officer nominations have been stuck in the Senate. Tuberville's hold prevented them from being approved all at once by voice vote, while Senate Democrats resisted calling up nominees for individual votes.

Tuberville (R-Ala.) placed his hold to protest a Pentagon policy to provide paid leave and travel funds for troops requiring reproductive services, including abortions, who are based in states where those services are not available. The Republican said he would be willing to vote on nominees individually, but Democrats argued doing so would take up too much floor time and encourage more blockades in the future.

On Sept. 20, Senate Majority Leader Sen. Chuck Schumer (D-N.Y.) reversed course and announced he would bring up Brown, George, and Smith for individual votes after Tuberville indicated he would try to bring up Smith's nomination for a vote himself in an unusual procedural motion. Schumer accelerated the Senate's lengthy legislative process to file cloture and vote on Brown in one day, and Tuberville did not object.

Tuberville did, however, vote against Brown's confirmation, as did 10 other Republicans—an unusual occurrence. Nominees to be Chairman have traditionally been confirmed quickly and unanimously by voice vote, though Milley was approved by a 89-1 roll-call vote.

Brown's confirmation ensures the Chairman job will not be filled on an acting basis, something that has only happened once before in 1993. The Army, Navy, and Marine Corps have all been without a Senate-confirmed leader for several weeks.

It remains to be seen if or when the Senate will hold an individual roll-call vote on Gen. David W. Allvin, who has been nominated to succeed Brown as Air Force Chief of Staff. Should lawmakers not do so before Brown is sworn in as Chairman, Allvin will become acting Chief of Staff in addition to his current job as Vice Chief of Staff.

If Allvin is confirmed, his job as Vice Chief would be filled on an acting basis by the most senior officer on the Air Staff until his nominated successor, Lt. Gen. James C. "Jim" Slife, is confirmed.

"I believe the opportunity to be the next Air Force Chief of Staff comes at a very important time in history, and I fully appreciate and embrace the weight of what is at stake," Allvin said. "Our nation is coming to grips with the rapid pace of change that is upon us and with those intending to act against our national interests while aggressively seeking the means to do so. America's national security focus is crucial as we navigate this new global landscape with our allies and partners, especially as opportunities for distraction and confusion are increasingly exploited."

Still, Brown's ascension to Chairman marks a milestone for the Air Force, which has not had a general in the position since Gen. Richard Myers retired in 2005. All told, he is the sixth Airman to be Chairman.

"General Brown is a warrior descended from a proud line of warriors," President Joe Biden stated. "He knows what it means to be in the thick of battle and how to keep your cool when things get hard."

Saltzman Introduces Integrated Mission Details

By David Roza

The Space Force is launching two prototype "Integrated Mission Deltas," a new type of unit meant to bridge the gaps among operations, engineering, and capability development specialists, hoping to deliver maintenance and upgrades to important systems much faster than before.

"In my mind, performance should be optimized around our missions rather than the functions that support them," said Chief of Space Operations Gen. B. Chance Saltzman in his keynote address at AFA's Air, Space & Cyber Conference on Sept. 12. "In other words, we cannot afford to split a mission area's critical activities across organizational seams."

Today, operators in the space, cyber, and intelligence fields fall under Space Operations Command (SpOC), while engineers and program managers fall under Space Systems Command (SSC). That separation can slow the rate at which operators provide feedback to developers and vice versa in order to maintain and improve systems.

"[I]t is essential that all elements of readiness—the people, the training, the equipment, and the sustainment—fall into the same organizational structure and that we create unity of command around those elements at the lowest possible level," Saltzman said.

With the integrated mission delta, those career fields are brought together under a colonel-level composite command team where the commander will represent operations and the deputy commander will represent sustainment, or vice versa.

"The goal there is you have in your command team all the expertise you need to generate those ready forces," an anonymous Space Force official told Air & Space Forces Magazine.

The two integrated mission deltas will cover electronic warfare (EW) and position, navigation, and timing (PNT). The EW integrated mission delta will not be a new unit. Instead, the EW sustainment offices that currently reside in SSC will be realigned to Space Delta 3, the current operational EW Space Delta overseen by SpOC.

The PNT integrated mission delta will be different. Those operators currently share Space Delta 8 with satellite communications operators, but under the new system, PNT operators will have their own delta, a new delta number, and will work alongside PNT sustainers. A Space Force spokesperson emphasized that no relocations or mission changes will occur as a result of the new layout.

"This concept will be thoroughly evaluated and refined before it is considered for implementation across the force," Maj. Tanya Downsworth told Air & Space Forces Magazine. "This initial effort will not involve the physical relocation of personnel and it will not change the core missions of SpOC or SSC; they will remain responsible for balancing Space Force activities and investments across mission sets, including those led by prototype IMDs."

The model the integration mission deltas are based on had great success in the launch arena under SSC, where operators and developers expanded the launch windows for new systems.

"Instead of having a three-hour hold for weather, you would have only a one-hour hold for weather, under the safety guidelines, because the operators are able to work with the people who own the tool and get it upgraded to account for operational needs," the anonymous official said.

The integrated mission deltas are part of Air Force Secretary Frank Kendall's push to reoptimize the Department for an era of great power competition.

"Both of these deltas integrate operations and sustainment, creating unity of command for all aspects of readiness and enhance our abilities to continue to provide world-class space effects in the face of a determined adversary," Saltzman said.

There may be administrative challenges ahead. One challenge is that maintenance and acquisition sometimes bleed together in the space domain. The anonymous official stressed that the integrated mission deltas will not touch acquisition, which falls under SSC.

"There are people who do GPS maintenance activities 60 percent of the time, and the other 40 percent of the time they're working on the next generation of GPS satellites," he said. "That's probably the biggest thing that we have to learn: 'how do we divide the maintenance activities that are done in SSC from the capability, development, acquisition, and next-gen programs.'"

Another possible hurdle is the fact that integrated mission deltas are a fundamentally different model in a military organized by career fields. Though the new model could enhance readiness and increase the command opportunities for Guardians who are not space operators, it could also have growing pains.

"There are no perfect organizational structures," Saltzman said. "The structuring of people to do their jobs will always create seams. The key is to arrange the organization to maximize performance around what matters most and minimize the negative integration effects that seams naturally create."

The integrated mission deltas make up **'Force Generation,'** one of four steps the Space Force is taking to prepare for great power competition. The other three are:

- **Force Design:** Designing the service to be prepared for threats, such as by better integrating commercial space capabilities, fueled by a pending study from the Space Warfighter Analysis Center on architectures needed for success.
- **Force Development:** Investing in exercises, war games, training, and education, such as through the Intermediate and Senior Level Education program hosted by Johns Hopkins University, to foster critical thinking in the service.
- **Force Employment:** Normalizing how the Space Force presents forces by standing up service components to the regional combatant commands. Such components already exist in the Indo-Pacific, Korea, and Central Commands, with new ones coming to Europe and Africa.

FACES OF THE FORCE

Courtesy photo

Space Force **Master Sgt. Phillip Lowery** recently returned to Vandenberg Space Force Base, Calif., after graduating with top honors from the U.S. Marine Corps Staff NCO Academy, Camp Johnson, N.C. "Having experienced more than 16 years of Air Force and Space Force PME, I wanted to take on something new and challenging," said Lowery, the senior enlisted leader of 1st Delta Operations Squadron, Space Delta 1. "I've worked with Marines on and off throughout my career, but this was my first time being fully immersed in their culture."

Airman 1st Class Jonathan Sifuentes

The **18th Force Support Squadron Shogun Inn** lodging facility in Kadena AB, Japan, received the Air Force Innkeeper Award for best lodging of 2023 from the Air Force Innkeeper Award Program. The award recipient is evaluated on customer service, cleanliness, financials, and related support activities, customer comment cards, and in-person guest feedback. Despite the adversities of operating a large-scale lodging operation, the Shogun Inn proves what it takes to maintain a facility of its size with an all-star team. Reynaldo Visico, Shogun Inn assistant lodging manager, said the dedication of his team to be the best was crucial in being honored with the award.

Airman 1st Class Ruben Garibay

Senior Airman Alix Hayes, (left) 377th Medical Group public health technician, received the 20th Air Force Airman of the Year Award for 2022 at Kirtland Air Force Base, N.M., on Aug. 21. "I wasn't looking for any recognition for my work, but I am glad I had the opportunity to represent the group and the wing well," Hayes said. "My parents and grandparents taught me early on about working hard and having good work ethic." Hayes spearheaded the annual "Food Vulnerability Assessment," where she pinpointed 13 vulnerabilities that could have led to potential "food fraud" items sold by external vendors on the base.

Senior Airman William Pugh

Senior Airman David Kiige, a mental health technician with 2nd Medical Group, Barksdale Air Force Base, La., is passionate about building community. Born in Nairobi, Kiige spent most of his childhood in eastern Kenya. Inspired by U.S. forces in his homeland, He joined the U.S. military and decided on a mental health career. "I chose mental health when I had that opportunity in order to learn and understand more about the human brain," Kiige said. Giving back to his homeland, he established a nonprofit for Kenyan women and children fleeing domestic violence and poverty.

Airman 1st Class Sir Wyrick

Tech. Sgt. Nicholas Matyas, 347th Operations Support Squadron flight chief, Moody Air Force Base, Ga., is quite the innovator. He recently became the first Moody recipient of a grant from the ACC Momentum Fund for a filtered water bottle idea. "Essentially it's a normal water bottle" Matyas said. "The difference is this one has a compression filter that's built into the bottom of the bottle. … [Y]ou can use it as a normal water bottle, and in a sticky predicament you can take this water bottle and procure water from a mud puddle or from a faucet of untreated water."

Kisha Foster Johnson/USAF

The 52nd Combat Communications Squadron's Cyber Security section at Robins Air Force Base, Ga., protects Air Force intel 24/7. "We handle network operation servers, provide server maintenance, and establish domains," said **Tech. Sgt. Mathew Myer,** 52nd CBCS NCO in charge of cyber systems operations. "Domain controllers are what we use to validate your identity through the Common Access Card when an employee is trying to log in on the Air Force network computer." These cyber security specialists prevent, detect, and fight cyberattacks and ensure networks are secure.

Courtesy photo

Jessica Jones, 19th Civil Engineering Squadron housing management specialist, Little Rock AFB, Ark., was recognized on the CE "30 Under 30" list in August as part of a group going above and beyond normal duties, making notable impacts in the civil engineer field. She is responsible for ensuring quality of life concerns of base housing residents are met and work orders are addressed. Jones said, "I don't serve in the same way other Airmen do, but I can offer at least this aspect of service by making sure people are in a safe place. The military housing office is an advocate, and we want only the best."

Airman Tiffany Scofield

Col. William J. McCrink III, former 174th Attack Wing commander, retired after 26 years of military service during an Aug. 5, ceremony at Hancock Field Air National Guard Base, N.Y. The 174th Attack Wing flies the MQ-9 Reaper Remotely Piloted Aircraft in combat operations supporting Operation Freedom Sentinel and Operation Inherent Resolve. McCrink previously served as the LRE Detachment Commander of the 174th Operations Group, 108th Attack Squadron Commander, and the 174th Operations Group Commander.

Staff Sgt. Sarah McClanahan/ANG

For the first time in Air National Guard history, a clinical nurse took command as director of the ANG Medical Service Office of the Air Surgeon at the ANG Readiness Center, Joint Base Andrews, Md. Air Force **Col. Linda A. Rohatsch** took command in late 2022. As the director, she shapes the ANG Medical Service and oversees the mission execution of its $60 million annual budget, which enables the mission readiness of the ANG's 108,000 military and civilian personnel. Rohatsch also serves as a primary adviser to the ANG Readiness Center commander and the Director of the ANG.

Tell us who you think we should highlight here. Write to afmag@afa.org.

Steve Boxall

The Air Force Academy's Azimuth summer program offers Air Force, Army, and Navy cadets from academies and ROTC programs exposure to the unique nature of space and related operations and challenges.

Selling the Space Force

How the Air Force Academy and the Space Force are inspiring future Guardians.

By Hope Hodge Seck

June 6, 2022, was a perfect Colorado Springs, Colo., day: sunny and 75, with cotton-ball clouds. Second-year U.S. Air Force Academy (USAFA) Cadet Carleton Liden knew from the moment he woke up that it would be one of the best days of his life.

The dark-haired 19-year-old from Folsom, Calif., ate a carefully planned breakfast of bananas and peanut butter—he'd been told those foods tasted the same coming back up as they did going down—and boarded a bus bound for the flight line at the Colorado Springs Airport. There, he and a cohort of two dozen other cadets donned crisp Navy-colored flight suits emblazoned with an American flag patch on one shoulder and "G-Force One" on the other. Following a familiarization brief, the cadets boarded a Boeing 727 specially modified with padded walls and best known by its vivid nickname: the Vomit Comet. They laid flat on their backs in the seatless cabin and waited as the plane rose to cruising altitude, then entered a steep vertical climb. Near 25,000 feet of altitude, by now under 3 Gs of pressure, the countdown started: "Five, four, three, two, … one."

"Being able to see the mission first-hand—all the different jobs—was very eye-opening for me, … I could then define it for myself."
—USAFA Cadet Carleton Liden

Lift off. The cadets were suddenly floating free, as Earth relinquished its grip. They spun, soared, played with water droplets, and laughed giddily, totally weightless. True to its billing, a "good number" of the cadets lost their breakfast. Zero-G, the private company that operates the parabola flights, says two-thirds of passengers vomit during the experience; (Liden maintains he was among the lucky minority.)

But not even an encore appearance of breakfast dampened the mood aboard G-Force One.

"I don't think I've ever seen somebody throwing up with a smile before," Liden said. "All of the cadets were just radiating pure joy."

In a series of 30-second parabolic maneuvers, which transition from hypergravity to weightlessness in an arc between 25,000 and 28,000 feet, the cadets experienced Martian and lunar microgravity as well as the zero-gravity conditions of space. They also experimented: maneuvering through hula hoops as they floated; setting a gyroscope centrifuge consisting of a bicycle tire mounted on a stick into infinite motion, imitating the giant gyroscopes that stabilize the International Space Station.

For Liden, the greatest marvel was the sensation of movement itself.

"They say that you can't 'swim' [in zero gravity] because there's no resistance in the air," he said. "But you don't really realize what that means until you're just flailing around in place trying to figure out how to get somewhere."

The parabola flight the cadets experienced is about as close as you can get to space without getting on a launch manifest. NASA astronaut and Marine Lt. Col. Jasmin Moghbeli said at a July news conference, prior to commanding the SpaceX Crew-7 flight to the International Space Station, that her parabola flight had been her only experience of weightlessness prior to her six-month space mission. Zero-G's website sports testimonials from Martha Stewart, the late physicist Steven Hawking, and other celebrities who have shelled out nearly $10,000 for a taste of astronaut life. But the sponsor of this particular field trip was the U.S. Space Force, the still-new military service made up predominantly of acquisition and intelligence specialists.

The flight is the crown jewel of the Air Force Academy's new Azimuth program for cadets interested in joining the service. And it appears to be off to a brilliantly successful start: Interest has soared fourfold since the program debuted in summer 2022, when only a little more than 100 cadets expressed interest in competing for the academy's 96 Space Force slots, according to Lt. Col. Adam Wasinger, a leader of the academy's Space Force detachment.

Azimuth's emphasis on space exploration and activities has generated interest well in excess of its participants. Though the earthbound Space Force has at times come under criticism for appealing too strongly to astronaut imagery and aspirations, Azimuth may help the service achieve critical objectives, including creating a unique and attractive culture.

MAKING IT MEANINGFUL

Azimuth parallels several long-standing Air Force Academy summer programs designed to give cadets a taste of possible future military careers. These include the Soaring Program, which gives many cadets their first taste of hands-on flight in twin-seat TG-16A gliders; the Jump Program, the most popular of these, which culminates in solo free-fall parachute jumps after a week of training; and the Special Warfare Orientation Course, which exposes participants to the rigors of combat rescuemen and joint tactical air controllers. Cadets can pick just one, and space is shared with participants from the other service academies and ROTC.

"To participate in Azimuth, they had to give up either Jump or Soar, so we wanted to make it meaningful enough for them," said Space Force 2nd Lt. Zach Szvetecz, who helped design Azimuth's inaugural program as an academy upperclassman.

Szvetecz, who also helped create the academy's i5 national space outreach organization to help inspire youth to pursue future Space Force careers, was given charge of the student-led Azimuth effort. Along with several other rising first-degree cadets, they zoomed in on the disconnect between Space Force and every other military service. U.S. Naval Academy Midshipmen can board surface ships and subs, getting a feel for the equipment they'll someday be operating and maintaining. U.S. Military Academy cadets at West Point get to experience live-fire training and ground maneuver. But Guardians, on the other hand, may never touch the satellites they direct and monitor.

"We wanted a way for people interested in Space Force to [have those experiences], because it is so different," said Space Force 2nd Lt. Jennifer Vandenberg, another Azimuth contributor. The zero-gravity flight was an opportunity for cadets to "get a feel" for space and the forces acting on the satellites they might one day manage, she said.

"We were able to do experiments [on the flight] that we can't test on the ground," she noted. "So that really, I think, put us together in a place where we knew that what we were doing was going to have an impact on other people."

DESIGNING AZIMUTH

As Space Force-bound upperclassmen, the designers were also keenly aware that helping their future service component better define its separate identity can benefit all Guardians. Azimuth joins the satellite-focused Cadet Space Operations Squadron and a rocket-building club called Blue Horizon as space-centric programs at the USAFA. But Azimuth was

By Steve Boxall

Students participate in a parabolic flight on G-Force One, an aircraft that simulates the zero-gravity conditions of space, as part of the USAFA's Space Force-focused Azimuth program in June 2022. During the flights, a highlight of the program, Azimuth participants conducted science experiments and observed the behavior of various objects in space, such as water droplets and Hoberman spheres.

USAFA

Cadets learn about rocket engine design, production, and launch during a two-day intensive training that culminates in a rocket-launching competition where cadets attempt to get their designs to a designated landing site.

always intended to be more comprehensive and holistic than the other efforts, incorporating nearly every aspect of space operations in its program.

"We wanted to make sure we went about the planning process in a way that would create that Space Force culture that we wanted—within the Air Force itself," said Szvetecz.

The resulting two-week program includes tours of Buckley, Schriever, and Peterson Space Force bases, as well as Cheyenne Mountain Space Force Station, all of which are conveniently clustered near the academy in Colorado Springs. Cadets are also exposed to the space-focused work of local defense contractors, including Lockheed Martin Corp. and Sierra Space. The 58 Azimuth cadets, selected from an applicant pool more than three times that size, also learned satellite operations and completed a two-day capstone project on rocket design and launch, concluding with a competition to demonstrate what they'd learned about the physics of space and rocketry.

For Liden, who knew he wanted a career in space operations even before attending Azimuth, the combination of hands-on exposure and classroom instruction proved clarifying. He came out of Azimuth more intrigued with intelligence as a career specialty, having learned about intel collection and processing, and also more certain than before that cyber operations and flight ops were not for him. Prior to Azimuth, he said, the Space Force had seemed opaque; afterward, it was no longer a mystery.

"Because the Space Force is so new, especially at the Air Force Academy, there is almost no educational information on it available to the public, where you can find out what each job does," he said. "Being able to see the mission firsthand—all the different jobs—was definitely very eye-opening for me, because I could then define it for myself."

Now a second-year cadet, Liden returned to Azimuth as part of its cadre of student instructors.

The 2023 Azimuth program expanded into three separate three-week sessions over the summer, with 195 students participating, including cadets from the other service academies and ROTC. New experiences were added, including an electronic warfare simulator. Using a new piece of Space Force technology, the winkingly named Electronic Warfare Operating Kit, or EWOK, cadets were able to manipulate variables such as power and signal feeds and react to network degradations, learning about how EW can impact space operations.

Third-year cadet Jacqueline Kelly, a member of this year's student cadre, said the message drove home the essential but often invisible nature of Space Force work. "If we do our job, and everything goes how it's supposed to go … everybody will just go on and nobody will understand what Space Force did," she said. "But if we fail our job and Space Force doesn't manage to protect the domain that it's protecting, all our GPS abilities will be crippled. Nobody will be able to drop precision-guided bombs. … That was pretty memorable."

Cadets who completed Azimuth this year did not experience the Zero-G flights, due to equipment issues. Instead, Azimuth planners pivoted to Scuba training, allowing cadets to experience neutral buoyancy the way astronauts do at NASA's massive underwater lab in Houston. A dozen feet below the surface, freshly Scuba-certified cadets assembled PVC pipes into a stable structure they could swim through and learned to inflate underwater air-lift bags, manipulating the buoyancy to lift or lower items.

"It mirrored being in a zero-gravity environment to the best of our ability," Kelly said. "Plus, because we were mirroring astronaut training, that just sounds pretty cool."

Whether Space Force introductory activities should reflect astronaut training remains controversial. From its earliest days, critics have looked askance at anything that sought to capitalize on human spaceflight, which, for now at least, is beyond the scope of Space Force operations. USSF's first 30-second recruiting ad opened with a young woman gazing at the stars and later shows her in what appears to be an astronaut helmet. The reality is far different. Roughly half the Space Force workforce is involved in acquisition; many will never touch a satellite control panel, let alone experience weightlessness.

FINDING THE RIGHT GUARDIANS

Unlike the other military services, the relatively tiny Space Force, with fewer than 7,000 personnel billets, has more applicants than available jobs. At less than 4 years old and with even newer entry-level pipelines, having staffed up initially with lateral transfers from the Air Force and other services, the Space Force seeks applicants who understand what it does and who are interested in its core missions. Messaging is critical, said Lawrence Hanser, a senior behavioral scientist at the RAND Corporation. In a study published in June, "Designing a New Framework for the U.S. Space Force Workforce," Hanser and his co-authors called for the Space Force to cultivate a distinct service culture and the personnel framework to sustain it.

Chief of Space Operations Gen. B. Chance Saltzman has said repeatedly that the culture will evolve naturally and cannot be unilaterally imposed from the top down or declared by any individual. But individual leaders can affect culture through their own behavior, directives, training, and mission focus.

To attract and retain Space Force officers, USSF must "be really careful with not making it appear to be something that it's not," Hanser said.

Nonetheless, Hanser said Azimuth does address a need identified in his study: a pre-commissioning, culture-building event that can allow future Guardians to start developing a collective sense of identity. His conviction was deepened when he heard a Space Force general describe how intelligence specialists and satellite operators sat side-by-side on operating floors, close enough to develop an understanding of each other's jobs.

"There are aspects unique to operating in the space domain, the knowledge of which may strengthen all USSF officers in their service," the RAND report states. "To impart and reinforce that knowledge and the ethos associated with it to every USSF officer regardless of technical specialty and projected career path would unify Space Force members and socialize them to the same, shared USSF culture."

Azimuth's third chapter is already in development. Liden said planners hope to involve Star Harbor, a private venture developing a commercially available astronaut training program that anticipates a not-so-distant future in which NASA no longer has an effective monopoly on astronaut production and throughput. USAFA's program, at least for now, will maintain the wonder of space as a critical cultural touchstone for future Guardians.

USAFA/Instagram

Scuba-certified instructors teach the difficulties of weightlessness through scuba diving/neutral buoyancy training in the Academy's Preparatory School pool.

And, at least for a few Space Force hopefuls, the service represents a stepping-stone for bigger space dreams. Liden is one. His space fascination as a child blossomed into astronaut dreams, and ultimately informed his choice to study at the academy.

"While I don't necessarily see myself becoming an astronaut through the Space Force, I see it as pretty much the best path that I could put myself on to get to that goal," he said. "And I think a lot of people are in a similar situation, where they're using Space Force as a way to grow and work their way into the space environment as a whole, to hopefully build connections that will help them into the astronaut program."

Steve Boxall

Guardians may not ever find themselves in space, but understanding what weightlessness is like can help make the unique nature of operations in space more real, and less theoretical.

Deterring Arctic Threats

The United States needs a layered approach to defeat even the idea of an attack from the far north.

Tech. Sgt. Curt Beach

Point Barrow Long Range Radar Site, at Utqiagvik, Alaska, is a Cold War-era radar site deep in the Arctic Circle, composed primarily of infrastructure and equipment dating back to 1957. Intelligence provided by Point Barrow and other strategically located radar stations is a crucial part of North American defense.

By Caitlin Lee and Aidan Poling

Since the dawn of the Cold War, the high north has been seen as an attractive attack vector for long range strike for one simple reason: it provides shortest distance between the United States and Eurasia. Today, the Arctic it is still seen by U.S. adversaries like Russia and China as an appealing attack vector for their missiles and long-range aviation assets given both the Arctic's geography and insufficient monitoring by the United States. The growing Arctic presence of China—a self-proclaimed "near-Arctic state" and custodian of an increasingly robust long-range aviation and missile inventory—reinforces the region's significance as a staging ground for conventional air and cruise missile attacks.

Yet the U.S. ability to detect, track, attribute, and counter attacks coming from the north has significantly diminished since the end of the Cold War, even as America's potential adversaries have prioritized development of missiles of all types over the same three decades. China and Russia have explored options to employ long-range, conventional weapons to deter U.S. leaders without provoking a nuclear response. Chinese doctrine describes precision strikes as a means of "war control" to manage escalation and frame power-projection nodes. Missile warfare is becoming a premier means for Russia to project power; in Ukraine, Russia has launched hundreds of ballistic and cruise missiles, as well as suicide drones, targeting power grids and other critical infrastructure in an attempt to force Kyiv into a settlement.

As the 2022 Missile Defense Review noted, missile threats to the U.S. homeland have "rapidly expanded in quantity, diversity, and sophistication." Modern conventional cruise missiles pose the greatest threat; they are harder to detect, track, target, and intercept than ballistic missiles.

Adversaries have begun to favor cruise missile development over ballistic missiles because they greatly complicate detection and early warning. This is part of a broader missile development trend that favors


MITCHELL INSTITUTE
Policy Paper
Key Points
Bolstering Arctic Domain Awareness to Deter Air & Missile Threats to the Homeland

Caitlin Lee directs the Acquisition and Technology Policy Program at RAND. Aidan Poling is a research analyst with the Mitchell Institute for Aerospace Studies. Download the entire report at *http://MitchellAerospacePower.org.*

increasingly maneuverable designs. Hypersonic cruise missiles, for instance, fly at Mach 5 or faster. While hypersonic missiles produce a greater heat signature and are less maneuverable, their extreme speed produces a considerable advantage. China's fractional orbital bombardment system, or (FOBS), takes this capability to a still more striking level, with a highly maneuverable hypersonic glide missile that is launched into orbit and then re-enters the earth's atmosphere on an unpredictable trajectory.

To date, the U.S. has only mounted a tepid response to these threats. Throughout the post-Cold War period of the 1990s and early 2000s, Arctic defense planning took a backseat to other geopolitical concerns for both the United States and Russia. Following the collapse of the Soviet Union in 1991, the Russian economy imploded, and its Northern Fleet and air assets fell into disrepair. Post-Cold War arms reduction treaties, combined with a major shift in the U.S. military's focus toward operations in the Middle East after Sept. 11, 2001, contributed to DOD reducing its Arctic focus. DOD closed or downsized almost all of its bases in Alaska and significantly shrank other capabilities for defending the northern approach to the United States.

This is reflected by NORAD's continued reliance on the aging North Warning System (NWS), a network of 47 long-range and short-range radars first fielded in the 1980s and equipped with 1970s-era technology.

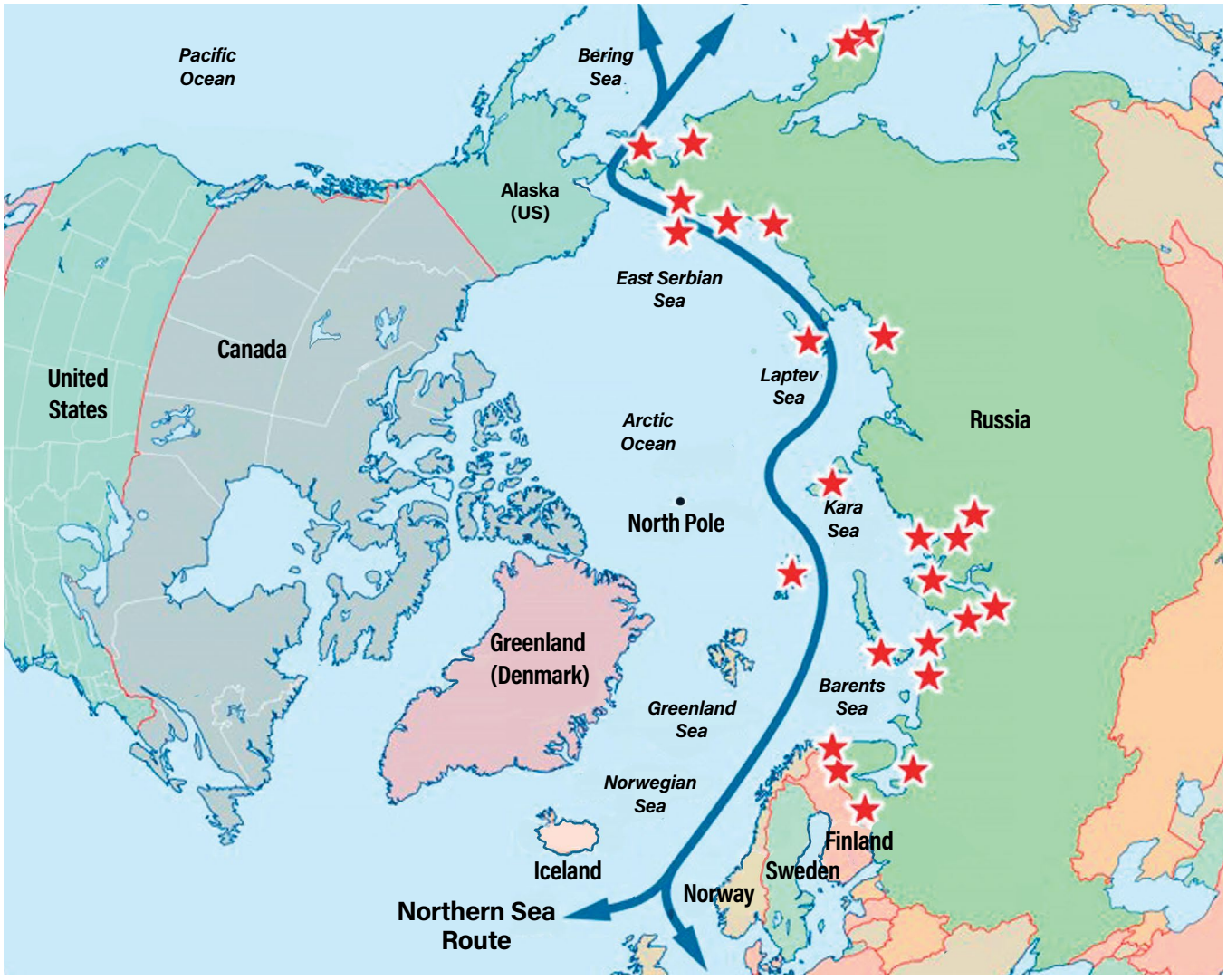
This system was only designed to identify approaching Soviet bombers after launch and flying within radar range. Today, it cannot provide early indications and warning of adversary force posture changes in the Arctic, which could be a prelude to an attack. Nor can the NWS detect air and missile threats launched from inside Russia or bombers, cruise missiles, drones flying too low or too far to be detected by its radar.

As Russia and China develop stealthier cruise missiles and diversify their cruise missile launch options to include land-based, surface, and subsurface platforms, the gaps in the North Warning System's effective radar coverage will continue to increase.

"Imagine a solid fence shrinking to a picket fence," notes Gen. Glen D. VanHerck, head of the North American Aerospace Defense Command and U.S. Northern Command. "And now you have cruise missiles that can get through your capability to detect."

Congested and Contested

This polar map shows the proximity to North America from Russia's north, and the range of Russian military installations with access to the U.S. and Canada from across the Arctic Circle.

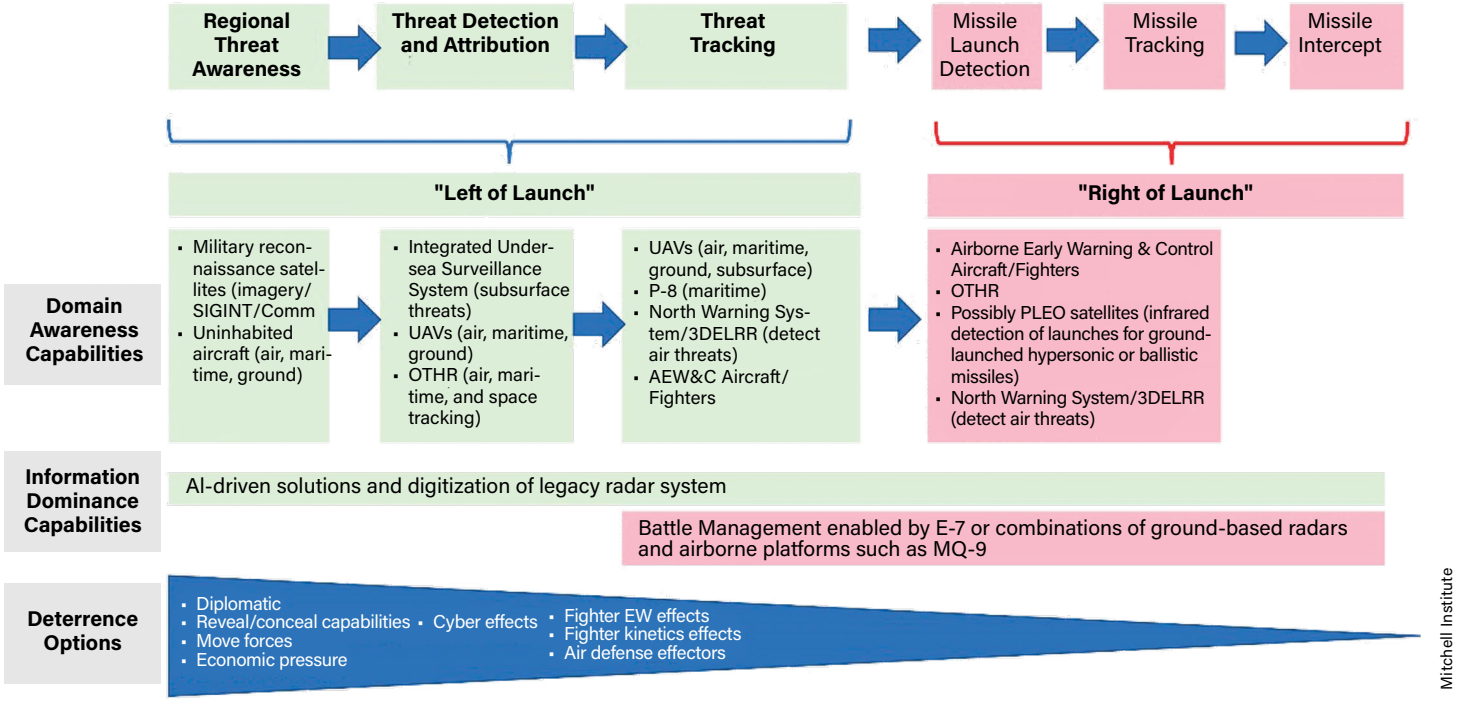


Mitchell Institute

Source: Mitchell Institute based on "The Department of the Air Force Arctic Strategy," U.S. Air Force, July 21, 2020, p. 5, and "Russian Military Moves in the Arctic Worry the U.S. and NATO," Yahoo! News, June 10, 2022.

Layered Missile Defeat

The Mitchell Institute for Aerospace Studies proposes a model for defending North America from attack across or from the Arctic Ocean by means of enhanced domain awareness and more active detection and defense.



Mitchell Institute

The legacy U.S. air and missile defense paradigm, focused as it is on kinetic intercept, remains important and needs to be urgently modernized, but an overreliance on kinetic kill platforms, delivery systems, and weapons alone limits warfighter options.

A network of ground-based radars—including those in the North Warning System—and a small number of fighters on air defense alert at air bases around the country provide today's air defense of the contiguous United States. These fighters are on alert status to rapidly respond to and intercept foreign military aircraft, such as Russian bomber patrols that routinely fly near and occasionally into U.S. airspace. Air Force fighters also intercept unidentified aircraft, aircraft that have strayed from planned flight paths, and aircraft that are not properly communicating with air traffic control.

The small numbers of fighters and the lack of a system of sensors that can detect low-flying targets over long ranges limit the system's effectiveness against modern cruise missiles and other threats. Air defense systems such as Patriot, Terminal High Altitude Area Defense (THAAD), or the National Advanced Surface-to-Air Missile System (NASAMS), which is used to defend the Washington, D.C., National Capital Region, offer some defense against low-volume missile threats, but these low-density, high-demand assets are extremely costly; they cost more per shot than the missiles they defend against, and are ineffective against many types of cruise missile and drone threats.

U.S. defense leaders have gradually adopted a new emphasis over the last decade on a holistic concept called "missile defeat." and then than narrowly focusing on kinetic kill options to deny adversary attacks, missile defeat involves using the entire spectrum of options to prevent and defeat missile threats, from countering proliferation to early indications and warning and, of course, detection, tracking, and intercepting cruise missiles. It also seeks to integrate defensive, offensive, passive, kinetic, and non-kinetic capabilities, such as cyber warfare, directed energy, and electronic attack.

NORAD/NORTHCOM embraces this new emphasis on domain awareness and information dominance. Early detection of a potential threat can open up decision space for U.S. leaders, enabling moves left-of-launch or even left-of-conflict to reduce the risk of an attack in the first place. As VanHerck notes, "If I'm shooting down cruise missiles and ballistic missiles, we've failed in deterrence, and that's not where we want to be." Domain awareness and information dominance likewise remain prerequisites for any actions to defeat missiles right-of-launch—after kinetic or non-kinetic attacks have occurred.

However, the new emphasis on domain awareness and information dominance is not without challenges. VanHerck testified to Congress that the missile defeat approach, which favors detection over tracking and countering, is at risk because of a sheer lack of capabilities in the Arctic. The January 2023 intrusion of a Chinese spy balloon into U.S. airspace by way of northwest Canada caught the nation off-guard and highlighted this severe lack of domain awareness in the Arctic. VanHerck told lawmakers: "We are not organized, trained or equipped to respond in the Arctic."

Another Arctic expert, Ketil Olsen, formerly Norway's military representative in NATO and the European Union, who now heads Andoeya Space, a Norwegian state-controlled company that tests new military and surveillance technologies, called the region "a dark area on the map." The lack of domain awareness prevents the United States from obtaining the early warning and intelligence, surveillance, and reconnaissance (ISR) information necessary to anticipate and take actions to deter air and cruise missile attacks.

A LAYERED APPROACH TO MISSILE DEFEAT

Recognizing the gaps in U.S. northern tier defenses, VanHerck has continued to push for a modern, layered air and

Arsenals of Autocracy

The missiles, launch modes, and ranges of weapons belonging to Russia and China that could be used to threaten the United States.
Red type indicates weapons that have been used in the ongoing Russian war on Ukraine.

Nation of Origin	Missile Name	Launch Mode	Warhead	Range	Targets
Russia	3M-14 Kalibr (SS-N-30A)	Ship and submarine	Conventional and reported nuclear	1,500 - 2,500 km	Ground
Russia	3M-54 Kalibr/Club (SS-N-27 "Sizzler")	Submarine	Conventional	220 - 300 km	Ships
Russia	9M729 (SSC-8)	Ground	Conventional or low yield nuclear	2,500 km	Ground
Russia	Kh-101 / Kh-102	Air	Conventional or low yield nuclear	2,500 - 2,800 km	Ground
Russia	Kh-55 (AS-15 "Kent")	Air	Conventional or low yield nuclear	2,500 km	Ground
Russia	Kh-555	Air	Conventional	3,500 km	Ground
Russia	P-800 Oniks/Yakhont/Bastion (SS-N-26 "Strobile")/3M-55	Air, ship, submarine, and ground	Conventional	300 km	Ship and Ground
Russia	RK-55 Granat (SS-N-21 "Sampson")	Submarine	Conventional	2, 400 km	Ground
Russia	P-15 Termit (SS-N-2 Styx)	Ships	Conventional	30-80 km	Ships
Russia	P-120 Malakhit (SS-N-9 Siren)	Ships	Conventional or low yield nuclear	110 km	Ships
Russia	P-270 Moskit (SS-N-22 Sunburn)	Air, sea, and ground	Conventional or low yield nuclear	120 km	Ships
Russia	P-500 Bazalt (SS-N-12 Sandbox)	Ships and submarine	Conventional or low yield nuclear	550 km	Ships
Russia	P-700 Granit (SS-N-19 Shipwreck)	Ship and submarine	Conventional or low yield nuclear	625 km	Ships
Russia	KH-35 (SS-N-25 Switchblade)	Air, sea, and ground	Conventional	300 km	Ships
Russia	P-1000 Vulkan	Submarine	Conventional	550-700 km	Ships
Russia	*Burevestinik Nuclear Powered Cruise Missile*	Ground	Unknown	Unknown	Ground
Russia	*Tsirkon (Ziricon) Hypersonic Cruise Missile*	Air, submarine, and ground	Unknown	1,000 km	Ships
Russia	9M727	Ground	Conventional	500 km	Ground
Russia	9M728	Ground	Conventional or low yield nuclear	50-2,500 km	Ground
Russia	9M729 (SSC-8)	Ground	Conventional	50-2,500 km	Ground
Russia	Kh-22 (AS-4 Kitchen)	Air	Conventional	460-500 km	Ships and Ground
China	HN 1	Air and ground	Conventional or nuclear	600-650 km	Ground
China	HN 2	Ship, submarine, and ground	Conventional or nuclear	1,400-1,800 km	Ground
China	HN 3	Ship , submarine, and ground	Conventional or nuclear	1,800-3,000 km	Ground
China	CJ-20	Air	Conventional and possibly nuclear	1,500-2,000 km missile + 3,500 H6K combat radius	Ground
China	CJ-10	Ground	Conventional or low yield nuclear	2,000 km	Ground
China	YJ-63	Air	Conventional or low yield nuclear	200 km missile + 3,500 km H6K combat radius	Ground
China	YJ-12	Air	Conventional or low yield nuclear	460 km missle + 3,500 km H6K combat radius	Ship
China	YJ-18 A	Ship	Conventional	540 km	Ship
China	YJ-18 B	Submarine	Conventional	540 km	Ground
China	YJ-18 C	Shipping containers	Conventional	540 km	Ground

Source: Mitchell Institute analysis of sources including "Missiles of the World," CSIS Missile Defense Project; and "Today's Missile Threat," Missile Defense Advocacy Alliance.

cruise missile defense, which involves working with other U.S. combatant commands as well as allies and partners. He has said NORAD/NORTHCOM's missile defeat architecture, known as Homeland Defense Design 2035, will be "vastly different from the way we do it today with fighters, tankers, AWACS, and those kinds of things."

DOD is already investing in certain components of air and missile defense that will improve NORAD's ability to detect, track, attribute, and counter hostile air threats in the Arctic and across its full area of responsibility, but funding for the effort is not coordinated under one portfolio or a strategy for air and cruise missile defense of the homeland. DOD can achieve a more secure future by accelerating these efforts and developing a common vision shared by all the stakeholders in the Arctic.

Analyzing the risks and opportunities in the Arctic, the Mitchell Institute for Aerospace Studies has developed a framework for a layered missile defeat approach in the Arctic, with particular emphasis on left-of-launch detection and tracking.

The first layer is regional threat awareness, consisting of networked sensors operating in multiple domains to provide

DOD and Congress: Next Steps

To create the capabilities needed for this multi-layered defense, Congress and DOD must work together to:

■ **Establish a Joint Capability Technology Demonstration Focused on Cruise Missile Defense of the Homeland.** DOD and Congress should launch a joint capability technology demonstration (JCTD). After acquisition responsibility for cruise missile defense of the homeland moved from the Missile Defense Agency to the U.S. Air Force, a previous JCTD to examine a layered approach to cruise missile defense was scaled down to focus on the National Capital Region. Congress and DOD should fund a broader JCTD to experiment with air, space, surface, and subsurface capabilities that could provide an overlapping, layered cruise missile defense for the Arctic.

■ **Create a Dedicated Fund to Bolster Deterrence in the Arctic.** A new North American Deterrence Initiative focused on increasing investments for cruise missile defeat and bolstering physical military presence in the Arctic would shift awareness left-of-launch and help to reduce overall costs of missile defeat. The Congressional Budget Office assessed that a comprehensive missile defense strategy for the contiguous United States would cost from $75 billion to $465 billion for an architecture with relatively robust funding for right-of-launch defense. Emphasizing left-of-launch capabilities in the Arctic might better bolster deterrence and reduce costs. A second focus of the new fund would be physical infrastructure improvements, including pre-positioned, hardened shelters to store aircraft equipment, spares, and other logistics needs, and modernizing Pituffik Space Base, DOD's northernmost installation (formerly known as Thule Air Base, in Greenland). Expanding the U.S. military's physical presence in the Arctic is another key to bolstering deterrence in the region.

■ **Deepen Ally and Partner Ties to Support Arctic Missile Defeat.** The U.S. Government should strengthen and deepen bilateral and multilateral relationships with Arctic nations to bolster deterrence against air and cruise missile threats in the region. Allies have their own incentives to pursue increased capabilities in the Arctic. Denmark, for example, has already allocated $245 million to improve drone surveillance in the Arctic and is modernizing air surveillance in the Faroe Islands, while Canada is acquiring new drones for Arctic domain awareness. Norway is already working with the United States to launch communications satellite payloads.

early indications and warning of potential threats. Adversaries may show signs of intent by making force posture changes and logistical preparations in the days, weeks, and even months prior to an attack. Today for instance, Russia is building up its military bases in range of Alaska. By tracking activities that could be a prelude to hostilities, U.S. leaders could be better equipped to manage the threat, providing more time and options for the United States to deter or prevent an attack.

ISR satellite assets that can be used to map out activity and detect changes in adversary behavior are one obvious and attractive solution to improve indications and warning in the Arctic. Already, commercial companies and U.S. partners and allies operating satellites with Arctic coverage could help fill current DOD satellite gaps.

In addition, uncrewed aircraft that are operational today—such as the MQ-9 Reaper and RQ-4 Global Hawk—can also contribute to regional threat awareness. The MQ-9 can carry a variety of sensors, including maritime surveillance radar and a signals intelligence payload. The high-altitude, long-duration RQ-4 carries a synthetic aperture radar that can persistently map an adversary's Arctic infrastructure and activities on a persistent basis. They can also be equipped with defensive payloads, such as electronic countermeasures, to help dissuade or prevent adversaries from targeting these assets.

If indications and warnings suggest an adversary is posturing for missile strikes, NORAD/NORTHCOM needs the means to track suspected strike platforms in the threat detection and attribution phase of the framework. Examples might include a Russian bomber taking off from an Arctic base where a ship full of cruise missiles unloaded the week before, or a submarine is thought to be headed toward Canadian waters.

Routine patrols of MQ-9s equipped with maritime surveillance, signals intelligence, and electro-optical/infrared sensors could be valuable in helping to identify the number and type of potential threats. Likewise, crewed P-8 Poseidon maritime patrol and reconnaissance aircraft could augment MQ-9 tracking operations.

Once a specific threat is detected, defenses must maintain tracking custody; at this threat tracking point, strikes are expected, and the goal is to provide target-quality data to kinetic and non-kinetic effectors, which could take action to deter, prevent, or respond to a missile launch.

Initial air, surface, and subsurface threat detection and attribution information could be passed to an over- the-horizon radar (OTHR), which bounces radar energy off the ionosphere to track targets over very long ranges—up to 4,000 nm. An OTHR could pass target location information on to other inhabited and uninhabited aircraft and land-based radars in the North Warning System that can reconfirm the type and number of threats.

If available, airborne early warning and control aircraft could be cued by other sensors to establish a track on airborne threat aircraft and direct fighters or other effectors to the right place at the right time to counter those threats if necessary. If available, fighter aircraft such as F-35A Lightning II jets, with their integrated sensor suites, could help track and intercept missile launch platforms before they could launch their missiles.

In the absence of available inhabited aircraft, however, it is possible that an augmented OTHR and the North Warning System could help maintain custody. Current generation UAVs possess neither the radar capabilities nor the high speeds needed to keep pace with enemy strike aircraft. But UAVs could be deployed to provide overwatch of likely launch vectors, accepting cueing data for threats from OTHR and then using on-board electro-optical and infrared sensors to verify and characterize threat aircraft. Long-duration UAVs could employ their maritime surveillance radar to locate and track potentially hostile ships and could be equipped with sonobuoys to help monitor submarine threats.

Should these left-of-launch actions fail to prevent an adversary from perpetrating a missile strike, detecting and tracking the missile right of launch becomes necessary. The Space Development Agency (SDA) has begun deploying missile-tracking satellites in low-Earth orbit (LEO), which will detect missile launches and be able to track both hypersonic and ballistic missiles powered by engines that burn hot enough to be detected.

Next Steps for the Air & Space Forces

The first step the Department of the Air Force must take is to exploit existing weapon systems and accelerate procurement of new ones to support a missile defeat approach. As the lead acquisition authority for cruise missile defense of the homeland, the Air Force will need to spearhead its own efforts to enhance NORAD/NORTHCOM's emerging cruise missile defeat approach. Four of the most urgent areas the USAF should address include:

■ **Support for the fielding of a new radar capability in the Arctic.** The department is funding four new OTHR to expand coverage in the Arctic, but those systems won't be fully operational until 2031. DOD should provide funds to allow the Air Force to invest the additional $55 million on NORAD's unfunded priority list to accelerate OTHR fielding to 2027 and amplify the capabilities of the North Warning System with an investment of about $211 million to acquire nine NORAD-dedicated advanced mobile Three-Dimensional Expeditionary Long-Range Radars (3DELRR).

■ **Developing a plan for a rotational UAV presence in the Arctic.** With support from Canadian Forces through the NORAD/NORTHCOM chain of command, the Air Force should bolster its UAV posture in the Arctic to support domain awareness. Acting alone or in concert with other radar platforms, the MQ-9 and other UAVs can provide ISR across the layers of a missile defeat strategy. Canada may soon be joining the United States in operating the MQ-9 Reaper, which would provide additional ISR capacity and further deepen the U.S.-Canadian NORAD partnership.

■ **Accelerating the E-7 Wedgetail.** The Air Force is now confronting a major gap in its battle management capabilities as it retires the E-3 AWACS inventory and waits for the new E-7 Wedgetail to come online, with the first two arriving in 2027. The U.S. Congress should support an unfunded $633 million Air Force request to accelerate procurement of the rest of the E-7 Wedgetail inventory. This would allow the Air Force to buy parts in advance to accelerate procurement of the rest of the inventory to four per year.

■ **Preserve legacy fighter capacity.** The Air Force now plans to retire over 600 fighters over the next five years, while acquiring less than half of that number of new fighters. For the homeland defense mission, the Air Force must rely on its current and planned fighter inventory. This means the F-35, F-16, and F-15EX should not become targets for additional force cuts.

■ The Space Force, meanwhile, can continue to enhance and expand its collaboration with the commercial sector to boost satellite capabilities in the Arctic.

■ While the SDA is working to rapidly field new satellite architectures for communications and missile tracking, commercial and scientific satellites may be able to fill in immediate gaps. NORAD/NORTHCOM should build on recent prototyping efforts to test commercial satellite capability in the Arctic to develop a plan to procure commercial satellite services in the Arctic that can fill gaps until SDA constellations are fully online.

For cruise missiles, however, inhabited aircraft, including airborne early warning and control (AEW&C) and fighters with their powerful airborne moving target radars, would be better able to track and vector countermeasures, both kinetic and electronic, to intercept incoming missiles. After this, terminal area defenses would provide the last line of defense.

ESTABLISHING INFORMATION DOMINANCE

Arctic domain awareness and information dominance hinge on the ability to get timely information to decision-makers—that is, both the broad understanding of the operational environment left-of-launch and the tactical information required to make an intercept right-of-launch.

To achieve that dominance, the U.S. must invest to improve several capabilities. Satellite communications are the first requirement, essential for early threat indications and warning because they provide a means to share intelligence with remotely piloted UAVs flying in the farthest regions of the Arctic, control their operations, and pipe their feeds back to decision-makers. Today, satellite communications coverage is sparse in the Arctic, but both OneWeb and SpaceX's Starlink are expanding their network of commercial proliferated LEO communication satellites to improve coverage in the high north. The SDA's ongoing fielding of a satellite communications transport layer in LEO will also provide high-speed data connectivity for U.S. warfighters operating in remote regions worldwide, including in the Arctic.

Connectivity between UAVs and any other aircraft to the space-based transport layer requires the benefits of optical communications technology. Laser communications leverage the highly resilient, satellite proliferated transport layer now being fielded by the SDA. The result is high-speed, flexible, and secure communication links across the air defense network that enables not only force projection abroad, but also homeland defense. Allies and partners can contribute: Norway's Arctic Satellite Broadband Mission (ASBM) will launch two satellites into highly elliptical orbit by 2024, and these will provide improved broadband satellite communications within the Arctic region.

While environmental sensing deep into the Arctic can be facilitated by an all-weather UAV like the MQ-9B, there is a need for a multi-faceted approach to sensing weather that affects air, sea, and land operations in the Arctic. However, the Defense Meteorological Satellite Program (DMSP) is well past its lifetime as a defense-dedicated weather sensor that covers the Arctic in a polar orbit, and the U.S. Space Force is developing its Electro-optical Infrared Weather Satellite Program (EWS), which will ultimately need to be disaggregated as a constellation of satellites that provide both higher performance and resilience against attack by an adversary. While the Space Force is handling the program well, Congress needs to ensure adequate resources are available to keep the program on track.

Artificial intelligence could help get the right information to the right decision-makers at the right time. NORAD and NORTHCOM have conducted global information dominance or (GIDE) experiments to fuse sensor data from a variety of platforms and dramatically reduce the time required to get threat information to decision-makers. Once one sensor picks up a potential threat, AI cross-cues that data with other sensor information to confirm, identify, and attribute the threat. VanHerck said this enables U.S. forces to go from being reactive to proactive.

Battle management platforms, including AEW&C aircraft, can add to tactical information dominance once a threat is incoming.

This overlapping, layered approach to missile defeat in the Arctic can give U.S. leaders more time to proactively shape adversary behavior and manage escalation. Early threat detection buys time to more effectively apply non-kinetic options, including diplomatic, economic, or strategic signaling actions, such as revealing U.S. capabilities or moving U.S. forces.

Maj. Richard Bong in his P-38, with his confirmed kills marked on the side at an airfield in the Pacific during World War II. Bong was America's top World War II ace, having shot down 40 Japanese airplanes.

Credit Where It's Due

How the Air Force awards aerial victory credits has changed over time. It will likely have to change again.

By Daniel L. Haulman

For many decades, the Air Force Historical Research Agency at Maxwell Air Force Base, Ala., has maintained the official aerial victory credits of the United States Air Force and its antecedents, the Air Service and the Army Air Forces, along with all the primary source documentation to confirm them. Victory credit is awarded for the downing of enemy planes in combat by aircrew flying manned aircraft. To gain credit, pilots need not necessarily shoot down the enemy; credit can also be awarded for maneuvering the enemy into the ground or forcing the pilot to bail out. But a witness or gun camera film must verify the loss.

Confirmed kills took place in World War I, World War II, Korea, Vietnam, in Operations Desert Shield/Desert Storm against Iraq, and operations against Serbia in the 1990s. All those credits were achieved in the twentieth century. Through two decades of war in Iraq and Afghanistan in the first two decades of the 20th century, American pilots never had the opportunity to shoot down manned enemy aircraft.

Over the years, the Air Force published separate lists of aerial victory credits for each war. The first, published in 1963, covered aerial victory credits awarded during the Korean War. In 1969, the Air Force published a list of World War I aerial victory credits. In 1974, the Air Force published its list of Vietnam War aerial victory credits. Not until 1978 did the Air Force first publish a complete list of World War II aerial victory credits. In 1988, working with Col. William C. Stancik, I compiled these into a single volume published by the United States Air Force Historical Research Center and Air University Press.

Most American aerial victory credits were achieved by Air Service pilots and Army Air Forces pilots during World War I and World War II.

This list included aerial victory credits that had not been in the earlier compilations. In the 1990s, the Air Force published orders and aerial victory credit lists for those USAF pilots who shot down enemy aircraft over southwest Asia, in the conflict with Iraq, or over the former Yugoslavia, in conflicts with Serbia.

Most American aerial victory credits were achieved by Air Service pilots and Army Air Forces pilots during World War I and World War II.

The criteria for awarding aerial victories varied from war to war. Before the United States entered World War I, the British and the French were already engaged in aerial combat with the Germans, but their policy for awarding aerial victory credits varied. The British awarded each pilot who contributed to the downing of

an enemy aircraft fractional credit. If two British pilots downed one enemy aircraft, each received half a credit. But in France, when two French pilots shot down one enemy aircraft, each received a full credit. Once the United States entered the war, it followed the more generous French system.

Famed U.S. Airman Capt. Edward V. Rickenbacker was the leading U.S. Army Air Service ace in World War I, credited with destroying 26 enemy aircraft. But in some cases, another pilot was also involved in the dogfight. The second highest scoring Air Service ace in World War I was 2nd Lt. Frank Luke, who earned 18 credits, some of them also shared. Many of the enemy aircraft Luke downed were balloons. Balloons would not count, however, in World War II.

The term "ace" originated in France during World War I and came to mean one who shot down at least five enemy aircraft. In some countries, being an ace meant a pilot had shot down at least 10 enemy airplanes.

Some American pilots volunteered with the French Air Service during World War I before the United States entered the war. Many of them served with the Lafayette Escadrille while others flew with the Lafayette Flying Corps. Since they were flying in French units and their aerial victory credits were awarded by the French Air Service, their aerial victories were never counted among Army Air Service aerial victory credits from World War I. After many of them later joined the Air Service, many of them collected American aerial victory credits for operations while flying in American units. Some earned both French and American aerial victory credits.

Largely because the United States entered the war late, in 1917, the war's fourth year, foreign aces shot down more enemy airplanes than the Americans. Manfred von Richthofen was the leading ace of the war, credited with shooting down 80 enemy airplanes. French Capt. Rene Fonck was France's leading ace, with 75 aerial victories. The leading British ace was Maj. Edward Mannock, with 73 kills.

In World War II, the U.S. adopted a system more like Britain's: Two pilots contributing to the downing of an enemy aircraft shared the credit, with each getting one-half. For example, Thomas Lanphier and Rex Barber each received half a credit for shooting down the aircraft bearing Japan's Adm. Isoroku Yamamoto, leader of the Imperial Japanese Navy, because evidence showed both contributed to the demise of the airplane. Calculating victories this way more accurately aligned the number of victory credits with the number of enemy aircraft destroyed.

Army Air Forces Maj. Richard I. Bong, who flew a P-38 in the Pacific, was America's top World War II ace, having shot down 40 Japanese airplanes. Close behind him was another P-38 pilot, Maj. Thomas B. McGuire, who shot down 38. Bong and McGuire knew that they were the leading aces and were engaged in a friendly competition to see who would end up with the most victories against Japanese aircraft. McGuire was shot down, perhaps (some have speculated), because he was so eager to catch up with or surpass Bong. The third-highest scoring Army Air Forces ace during World War II was Lt. Col. Francis S. Gabreski, who shot down 28 enemy aircraft. Gabreski's mastery continued into the Korean War, where he earned credit for 6.5 more kills, finishing his career with 34.5. He was among many American pilots who served in both World War II and Korea and had confirmed kills in both wars.

About 690 Army Air Forces pilots became aces in World War II. Thousands contributed to 15,800 aerial victories during the war. Some 43 Army Air Force pilots downed five planes in a single day, notching five kills in just 24 hours.

The U.S. Navy kept its own list, identifying 380 aces during World War II. The highest-scoring Navy ace during World War II was Cmdr. David McCampbell, who shot down 34 enemy airplanes, including nine in a single day.

Other American aces represented foreign militaries. The "Flying Tigers" were American volunteers who served with the Chinese Air Force early in World War II, just after Pearl Harbor. Led by Claire Lee Chennault, who would eventually become commander of the 14th Air Force, the Flying Tigers tallied 286 aerial victories, all of which were recognized by Chinese rather than American orders. Some 20 Flying Tigers pilots became

AFA Library

America's top World War I ace, Capt. Eddie Rickenbacker, flew a French-built Spad. Rickenbacker was a former auto racing driver who flew to fame, and later fortune, with the well-known Hat in the Ring Aero Squadron.

American Air Museum in Britain

First Lt. Lee "Buddy" Archer, right, and a maintainer, both with the 332nd Fighter Group, 302nd Fighter Squadron, during World War II. With four confirmed aerial victories, Archer came one kill short of earning ace status. Several other possible aerial victories were never independently confirmed.

Deciding Victory Credits

The Air Force Historical Research Agency was charged with keeping the official lists of aerial victory credits that were awarded either by orders or by victory credit board reports, partly because those documents were also stored at the agency. Normally the agency would confirm which credits had already been awarded by a document and did not determine whether or not to award a credit based on other evidence. There is one exception. In the mid-1980s, the USAF appointed an aerial victory credit board composed of agency personnel, of which I was one, to decide whether the aerial victory credit awarded for the destruction of Adm. Isoruku Yamamoto's aircraft was properly split between Thomas Lanphier and Rex Barber. Our committee was ordered not to consider evidence beyond what was originally submitted, and as a result, came to the same conclusion as earlier evaluators. Several years later, however, another board met to reconsider the case, this time adding newly discovered evidence, both from Japanese sources and from wreckage on the island of Bougainville. When the board deadlocked, with some wanting to keep the split credit, and others wanting to credit Barber and not Lanphier, Secretary of the Air Force Donald Rice upheld the original decision. Advocates looking to give Barber the whole credit tried to take the matter in court, where a federal judge ruled Rice acted within his authority and the decision was final.

The Air Force Historical Research Agency has also investigated cases in which a pilot, or someone advocating on his behalf, sought an aerial victory credit not included in official listings. In a few of these cases, historians have managed to uncover an order or an aerial victory credit board report that showed a credit had been awarded, but then overlooked. In those cases, credits could then be added to the official listings. But the agency does not have the authority to award a victory credit, even when there is compelling evidence to support it. All historians can do is furnish the relevant records should Air Force leadership appoint a board to look into the matter. One such case involved Lt. Gen. Charles Cleveland, a former head of Air University, who was awarded a fifth aerial victory credit in Korea by a 2008 review board in Washington, D.C.

Another case involved Tuskegee Airman Lee Archer and a charge that he had been deprived of an aerial victory credit, blocking a Black pilot from becoming an ace. I and other agency historians diligently searched all the primary source documents related to the case, including histories of the 332nd Fighter Group with which Archer served, narrative mission reports of the group, Fifteenth Air Force orders awarding aerial victory credits, and claim statements. We were able to prove that Lee Archer destroyed four enemy aircraft, one on July 18, 1944, and three more on Oct. 12, 1944, and that he received credit for all four. We found no evidence of other enemy planes destroyed or that any of his victories had ever been taken away or reduced. Archer is one of four Tuskegee Airmen to have shot down three enemy aircraft in one day, and one of three to have shot down four enemy aircraft total. No Tuskegee Airmen ever became an ace.

Today, with the increasing use of uncrewed, remotely piloted aircraft, and a coming generation of collaborative combat aircraft, the question of how kills may be credited in the future remains open. Air Force F-15 pilots shot down Iranian drones in June 2017, one on June 8 and another on June 20, but because those aircraft were uninhabited, they did not earn aerial victory credits. Another USAF F-15 pilot is reported to have shot down another Iranian drone in September 2022. By the standards of the 20th century, no credit is deserved. But is it time to review those standards? That is up to Air Force leadership. In my opinion, ground-based pilots who shoot down unmanned enemy aircraft deserve credit, but in a different category from those who risked their lives flying in combat.

USAF

Capt. Joseph McConnell Jr. in the cockpit of his F-86, which shows his 16 kills as red stars. The aircraft was dubbed "Beauteous Butch II," a reference to his wife, Pearl.

aces in Chinese service. Some of the volunteers later joined the U.S. military, including the 23rd Fighter Group of the U.S. Army Air Forces and the U.S. Marine Corps. Gregory "Pappy" Boyington, for example, went on to become the leading U.S. Marine Corps ace, shooting down 28 enemy aircraft.

Other American pilot volunteers served in the Royal Air Force, some of them in Eagle Squadrons set up before the U.S. entered the war. Some 16 of these became aces, their aerial victories awarded by the British. Squadron Leader Lance C. Wade led the pack, with 25. He was among five so-called double aces, credited with shooting down at least 10 each. Many of the American volunteers who had served with the Royal Air Force later served with the U.S. Army Air Forces, in the 8th Air Force and the 4th Fighter Group.

The leading ace of World War II, and the leading ace of all time, was the German pilot Capt. Erich Hartmann, credited with shooting down an incredible 352 enemy airplanes. Most of Hartmann's victims flew for the Soviet Union in Eastern Europe. At the end of the war, the Soviets kept Hartmann a prisoner for over 10 years.

By the World War II standards, Rickenbacker would have had just 24.33 enemy kills, rather than 26, and Luke would have had 15.83, instead of 18.

Bomber gunners in four-engine B-17 Flying Fortresses and B-24 Liberators, and twin-engine B-25s and B-26s, shot down innumerable enemy aircraft, but keeping track was too difficult. Each B-17 or B-24 bomber had at least 10 machine guns and at least six gunners; bomber formations might include many dozens of aircraft. Trying to determine which gunner was responsible for shooting down a particular enemy aircraft was impossible. Very early after the Army Air Forces started counting its World War II aerial victories, it stopped attempting to award aerial victory credits to gunners in bombers, and their victories do not appear in the World War II listings because of the inability to determine who got what.

One exception was that both pilots and gunners aboard P-61 Black Widow night fighter planes received full credit for shooting down enemy aircraft in World War II. Because not all gunners were credited officially, the Air Force never included those who were in official compilations.

Generally, when fighter pilots returned from a mission, they would be debriefed, and intelligence officers would document fighter pilot claims of having shot down enemy airplanes. If those claims were later confirmed by witness statements or by gun camera film, the pilots received credit in official orders or public lists.

U.S. Army Air Forces never centralized those aerial victory counts. It would be years after that USAF historians compiled a single list with standard criteria. For every aerial victory credit, or fractional credit awarded, the historians prepared a data card showing the pilot's name and serial number, unit, theater, and the incident date, along with the name of the other pilot or pilots if the aerial victory was shared, and references to confirming documents, such as an order or victory credit board report. Each line of the completed World War II victory credit list included the same information, except the reference to the confirming document and the name or names of the sharing pilots. There were seven World War II combat theaters: China-Burma-India, Central Pacific, Southwest Pacific, European Theater of Operations, and Mediterranean Theater of Operations, Alaska, and Iceland.

The USAF continued to split credits in the years that followed. Triple ace Capt. Joseph McConnell Jr. led U.S. Air Force aces in the Korean War with 16 enemy shootdowns, followed by a second triple ace, Maj. James Jabara, with 15. Jabara arrived in Korea having already earned 1.5 aerial victory credits in World War II.

Forty USAF pilots earned ace status in the Korean War with five or more shootdowns. Many other USAF pilots in Korea who scored aerial victories gained fame elsewhere, among them Marine Corps pilot Col. John Glenn, who shot down three enemy MiGs while flying F-86s with the Air Force. Glenn would go on to become the first American astronaut to achieve orbital flight and later become a U.S. senator. Air Force pilot

Brig. Gen. Edwin "Buzz" Aldrin shot down two enemy planes during the Korean War and went on to be the second man to set foot on the moon.

During the Korean War, a few aerial victory credits were awarded to B-29 gunners. A typical B-29 bomber formation in that war included only four aircraft, with a maximum of four gunners per airplane, so claims could be verified more easily than in World War II.

In Vietnam, USAF's aerial victory credit criteria changed again. Flying two-seat F-4 Phantom fighters, with the pilot in the front seat and the weapon systems officer (WSO) behind him, responsibility was shared: The pilot flew the plane while his backseater used radar to acquire the enemy target and then lock it in so the pilot could fire his air-to-air missiles accurately. Since shooting down an enemy required the work of both pilot and WSO, Air Force Chief of Staff Gen. John D. Ryan directed that both deserved credit, not just the pilot. But instead of splitting the credit between them, as in World War II, both pilot and WSO received full credit. So, when an F-4 crew shot down one enemy aircraft, two aerial victory credits were awarded. Ryan had a personal connection to the issue: His son, who would follow his father decades later as Chief of Staff, was a WSO in Vietnam. In a sense, Ryan's new policy marked a return to World War I criteria, and like World War I, adding up the total number of aerial victory credits awarded in Vietnam does not equal the number of enemy airplanes destroyed.

Two of the Air Force's three aces in the Vietnam War were WSOs. Flying in F-4D and -E models, they shot down MiG 21 and MiG-19 enemy airplanes, using radar-guided AIM-7 Sparrow and AIM-9 Sidewinder missiles. Capt. Charles B. DeBellevue shot down six enemy airplanes, and Capt. Jeffrey S. Feinstein shot down five. The third ace was Capt. Richard S. Ritchie, who shared most of his aerial victories with DeBellevue, his frequent backseater. Ritchie is credited with downing five enemy MIGs, the last Air Force ace pilot from any conflict.

Two aerial victory credits were awarded in Vietnam to gunners in B-52 bombers. Just as during the Korean War, when a few aerial victory credits had been awarded to B-29 gunners.

POST-VIETNAM ERA

Not until 1991 would USAF pilots shoot down another aircraft. From 1991 to 1993, during Operation Desert Storm and subsequent air patrols, 29 USAF pilots shot down 38 Iraqi aircraft. F-15 pilots shot down 34 of those enemy aircraft, and F-16 and A-10 pilots shot down two each. Among the downed Iraqi aircraft were eight MiG-23s, six MiG-29s, six F-1 Mirages, four Su-22s, three MiG-25s, two MiG-21s, two Su-25s, two helicopters, two MI-8 HIPs, one Su-7, one PC-9, and one IL-76. Iraqi pilots did not shoot down a single USAF airplane in those engagements.

A few years later, in 1994, over the former Yugoslavia in Europe, two USAF pilots shot down four Yugoslavian Galeb airplanes. One F-16C pilot shot three, and another one; both were with the 526th Fighter Squadron of the 86th Fighter Wing. Five years later, in 1999, four USAF fighter pilots, three flying F-15Cs and one flying an F-16CJ, shot down five Serbian MiG-29s with ATM 120 air-to-air missiles.

KILL RATIOS

The kill ratios, or the ratio of aircraft American pilots shot down compared to the number of American aircraft shot down by enemy aircraft, changed with each war. For every six enemy aircraft shot down by USAF pilots during the Korean War, the Air Force lost one. In Vietnam, the ratio was just two kills to every loss. But during the 1990s, USAF pilots shot down 47 enemy Iraqi or Serbian planes without a single loss. Superior training, tactics, and technology made the difference. Indeed, some of those aerial victories were achieved beyond visual range, with documentation by means of digital records showing the trajectory of missiles approaching targeted enemy aircraft miles away, a completely different scenario than the close-in dogfights of World War I and World War II, when pilots not only saw each other's aircraft, but sometimes could even look into the eyes of their opponents.

Daniel L. Haulman *is a former head of the organizational histories branch of the Air Force Historical Research Agency. The author of several books on the Tuskegee Airmen, his "Misconceptions about the Tuskegee Airmen," was published earlier this year. His most recent article for Air & Space Forces Magazine, "The Tuskegee Airmen, Heroes of War and Peace," appeared in the January/February 2023 edition.*

USAF

Capts. Richard "Steve" Ritchie (left) and Charles "Chuck" DeBellevue after a mission in Vietnam. Ritchie and DeBellevue scored four of their MiG victories while flying together.

By Kari Voliva

Recovery, Recruitment, Community:

The Memorial to Memorial Ride Continues

Bikers from the Space Force and Air Force during the ride from Kitty Hawk, N.C., to Arlington. AFA became an official partner of the Air Force Cycling Team's Memorial to Memorial Ride in 2023, lending support to wounded warriors, promoting fitness, and increasing recruitment and retention.

The U.S. Air Force is the only service that can trace its roots to a garage start up—Wilbur and Orville Wright started as two bike makers who made the first successful powered airplane flight in Kitty Hawk, N.C., in 1903. The Air Force Cycling Team celebrated that heritage by riding from the Wright Brothers National Memorial in North Carolina to the Air Force Memorial in Arlington, Va., for the second annual Memorial to Memorial (M2M) Ride, Sept. 7-10, 2023.

Across 330 miles and over 5,650 feet of elevation, 130 cyclists came together to have fun, celebrate heritage, and promote fitness, all while providing support to their wounded fellow service members. The vision for the ride came from former Air Force Chief of Staff Gen. David L. Goldfein, and retired Brig. Gen. Robert "Surf" Beletic, the M2M Ride Director, who believe this event can turn into a key recruitment tool for the Department of the Air Force.

"We think this can turn into a recruiting effort for both the United States Air Force and United States Space Force," said former Chief Master Sergeant of the Air Force Jim Roy, who rode the final day of the M2M ride. "This event runs through the heart of America. To see the people who were cheering us on along the way, that's what General Goldfein is talking about when he says this can be a recruitment event. The spirit that we have as Americans to come out and support events like this—that's the recruiting piece."

The 2023 M2M ride raised more than $15,000 in donations for AFA's Wounded Airmen & Guardians Program. Jim Roy's wife Paula served as AFA's Director of Airmen and Family Programs when that program was formalized 10 years ago. Since then, the program has provided more than $1 million in direct support grants.

"It makes my heart happy that we are supporting our wounded but at the same time helping each other as well as we build relationships," Paula Roy said. "I never would have imagined it would become something like this today. It's amazing."

AFA became an official partner of the Air Force Cycling Team's M2M ride in 2023. The partnership will help the team grow the event and contribute to recruitment and retention of the Air and Space Forces.

Riders start at the Wright Brothers Memorial as individual cyclists,

Over a four-day span, some 130 cyclists representing the Air Force Cycling Team and others in support of wounded Airmen and Guardians celebrated Air Force heritage by riding from the Wright Brothers National Memorial at Kitty Hawk, N.C., to the Air Force Memorial in Arlington, Va.

but arrive at the Air Force Memorial as family. The journey, connections, and stories shared along the way reinforce the Air Force and Space Force cultures. These relationships make the Department of the Air Force stronger.

RIDING FOR RECOVERY

Retired Master Sgt. Tim Williams isn't sure how many years of cycling he has left but he's determined to get as many miles in as possible while he can. Williams suffered a traumatic brain injury, among other injuries, while deployed to Iraq in 2011. It turned his life upside down as he tried to hide his invisible wounds, decline medical treatment, and bury himself in his work to remain in the Air Force.

In 2018, Williams was selected as his squadron's Senior Noncommissioned Officer (SNCO) of the year. Two days later, he received "Do Not Retain" papers from his commander via email without explanation, triggering Williams to contemplate suicide.

"I had a time, a place, and a means that I was going to be gone," he said.

Miraculously, someone from the Air Force Wounded Warrior (AFW2) program reached out to Williams in time, offering him the 'encouragement to begin the medical treatment he needed. Williams finally felt like someone cared—and the fact that it was someone from the Air Force was especially meaningful. But as his invisible wounds began to heal, his other medical issues worsened, including his heart and degenerative muscle conditions.

After being medically retired in 2020, Williams was invited to the Air Force Warrior Games Trials in February 2022. Despite balance challenges caused by his injuries, he was able to return to cycling for the first time on a recumbent bicycle. He went on to compete in the 2022 Warrior Games where he won six medals. This year, Williams returned to riding upright and has already completed more than 4,000 miles.

As part of his continued therapy, Williams received a grant from AFA's Wounded Airmen & Guardians Program to join the 2023 M2M Ride. On the first evening of the ride, Williams shared his story with the other riders.

"I may not be able to be on that bike for another couple of years and that's OK. I may not be around with all the conditions I have going on," he told his fellow cyclists. "As we ride this week, I'm hoping you guys will be part of my recovery. Standing here and telling you about my story, it helps raise awareness about other people, but it also helps my recovery. This is tough. Giving a speech about things that are deep and dark in your life is very tough. Every time I give it, it's just a little bit more toward my recovery. I'll never be fully recovered. I understand that. I understand my conditions are going to gain more momentum, but every one of you is a part of my recovery."

In addition to being a recovery tool, the M2M Ride provided Williams with a network of peer support and camaraderie that he cited as his favorite part of the ride.

"It was an absolute honor to be invited and funded by AFA," Williams said. "My speech was one of the toughest I've done because within this community of riders, they genuinely believe in the purpose of the Wounded Airmen & Guardians Program. Along the ride, it was expressed many times how most Airmen never knew the true impact that these programs have or that they even existed. I hope that my performance proved the power of adaptive sports and how these programs are vital to that success."

Williams' hopes were realized when the ride culminated at the Air Force Memorial on Sept. 10, when he received the M2M's Orville Wright Award, presented goes to the rider who best represented the Air Force over the four-day course and includes an AFA Life Membership.

THE ACCIDENTAL CYCLIST

Staff Sgt. Brittney Westbrook accidentally bought her M2M kit without realizing what it was for. When she joined the Air Force Cycling Team earlier this year, she thought she would be doing casual 10-mile rides with coffee breaks—instead, she found herself doing the first team event at RAGBRI, a seven-day, 530-mile ride across Iowa. That's where she met the team coach, Josh "JJ" Johnson

Bikers at the end of the race pose for a photo at the Air Force Memorial. The Air Force Cycling Team rode from the Wright Brothers National Memorial in Kitty Hawk, N.C., to the Air Force Memorial in Arlington, Va., for the second annual Memorial to Memorial (M2M) Ride, Sept. 7-10, 2023. Across 330 miles and over 5,650 feet of elevation, 130 cyclists came together to have fun, celebrate heritage, and promote fitness, all while providing support to their wounded fellow service members.

and Beletic, the M2M ride Director, who encouraged her to sign up for M2M—especially since she already had the kit.

Westbrook, a member of the Air National Guard who is currently working full-time at the Air Reserve Personnel Center on Buckley Space Force Base, Colo., wasn't sure she was cut out for rides like M2M.

"I'm a personnel specialist working as a reserve retirements technician, so the most amount of fitness I get is a good finger workout from all the typing," she joked. However, after successfully completing the ride, Westbrook said she felt "very accomplished, very excited, a little bit wet, but good." She encourages others to join in and embrace the challenge.

"It's four days of fun. It's four days of love. There's around 130 members and you'll say good morning 130 times. Everyone is just so loving and supportive," she said, adding that Coach Johnson will help develop a training schedule to get riders comfortable with goals.

Beyond the personal physical accomplishment, the M2M Ride allows riders to join a special community. Westbrook called her mom on day three to tell her how supportive and encouraging her fellow cyclists were.

"I didn't grow up with my dad, so it's really nice to have them look out for me and make sure I make it to the finish line each day," she said. "I'd be trudging along, really feeling my legs burning and my energy leaving, and there would be one of my teammates riding up alongside me saying, 'Way to go, Brittney! You're killing it! Keep it up!' I mean, talk about a boost!"

Air & Space Forces President and CEO Lt. Gen. Bruce Wright, right, speaks to Master Sgt. Tim Williams at the Air Force Memorial in Arlington, Va., at the conclusion of the M2M Ride.

FAMILY FIRST

While many riders spoke of the family formed within the Air Force Cycling Team, some families showed up to M2M together. When the Air Force Cycling Team needed a truck driver to transport luggage and supplies between stops, Coach Johnson knew the man for the job—his dad, Steve Johnson. Before JJ joined the Air Force, he visited 34 different states accompanying his dad on his rides. They made a lot of memories during this time and JJ knew this was the perfect fit to make new memories.

For JJ, it's more than just the time spent together.

"I'm the luckiest man in the world to have my dad be able to see the things I do in the military," he said. "I wish everybody who served was able to bring their mom or dad to their bases where they served so they could get involved in their extracurricular activities and see them in their stories. We have so many Airmen, Guardians, Soldiers, Marines, Sailors, and Coast Guard that work hard, but their parents and families don't get to actually see them doing that work. So I tried my best to bring them out so they can see it and it's not just me telling them stories. They can actually visualize the people in my life that have helped me in my military career."

Steve thrives off the positive energy he feels from the riders.

"I was in the Air Force 47 years ago. I never thought I'd be out hanging out with these upbeat people and it's been fantastic," he said.

The team felt the same way about Steve as they awarded him the Wilbur Wright Award for the most outstanding support team member, which included an AFA Life Membership.

Col. Ben Donberg and his father, Bill Donberg, were another father-son team at the M2M Ride. Ben is married to Lt. Col. Jaina Donberg, daughter of AFA President & CEO Lt. Gen. Bruce "Orville" Wright, USAF (Ret.), who joined the family for the last leg of the ride. Bill and his wife Phyllis have embraced the Air Force culture since their son joined.

"We were not a military family until Ben," said Bill. "We've been indoctrinated, introduced, and involved in so much of their lives and their military lives now that it just blows us away. We've been to a lot of events in their lives but nothing compares to what we've experienced the last four days. I am so proud of this organization. The people that are in it. There is no better way than what we did right here. Two reasons we're here. One is to support the wounded warriors and the other is connections. I knew nobody when I came into this. Four days of getting to know people and it will last forever. We'll be back every year."

RIDE WITH US

The Air Force Cycling Team plans to grow the M2M Ride deliberately and strategically. With a 60 percent ridership increase over 2022, the event planners are excited about the huge potential growth. As Airmen and Guardians—past and present—look for ways to be part of something bigger than themselves, the M2M Ride is delivering just that.

If you're interested in joining the community, visit afcycling.com/m2m-ride.

If you'd like to support Air and Space Forces Wounded Warriors like Master Sgt. Tim Williams, make a donation by scanning the QR code.

By Col. Phillip S. Meilinger, USAF (Ret.)

Benjamin Foulois

An Aviator Even Before the Army Had Airplanes.

Benny Foulois was a pioneer of American aviation. He was one of the Army's first pilots and the performer of numerous aerial feats involving altitude and distance records. Foulois would later become Chief of the Air Corps.

He enlisted in the Army and served in the Philippines during the Insurrection. He received a commission and in 1908 transferred to aviation. The following year the Army bought its first airplane, and Foulois was in on the ground floor. He later wrote that he learned to fly by correspondence. Stationed in Texas with one airplane, he would fly a sortie, something would break or go wrong, and he would write to the Wright Brothers in Ohio asking for guidance on how to continue. After one particularly bumpy flight, he invented the seat belt to prevent being thrown from the aircraft.

In 1916 he was commander of the 1st Aero Squadron and part of Brig. Gen. John J. Pershing's "punitive expedition" to capture Mexican bandit Pancho Villa. The squadron's performance was not impressive, as the rudimentary aircraft were frequently broken or lost. It was hardly an auspicious beginning for military aviation.

When the U.S. went to war, Foulois was sent to France as a brigadier general to head the nascent Air Service. Billy Mitchell was already in place. Sparks flew—and the two men quickly learned to despise each other. Foulois thought was Mitchell arrogant and undisciplined, and Mitchell termed Foulois a "carpetbagger" who had forgotten how to fly. Pershing, now commander of the American Expeditionary Force, appointed Maj. Gen. Mason Patrick to run the Air Service and force cooperation. Things smoothed out.

After the Armistice, Foulois returned to the States and reverted to his permanent rank of major. He worked briefly in Versailles, did a stint disposing of surplus material, and testified before Congress advocating the creation of a separate air force. Knowing this irritated his Army superiors, he volunteered to become the air attaché to Berlin. While there he gathered much information from German pilots and engineers that he sent back to Washington.

About the time Billy Mitchell was court-martialed and left the service, Foulois returned to Washington, got back his star, and became an assistant chief of the Air Corps. In 1931, he was promoted to major general and became Chief.

This was an important period. Aviation technology was exploding and new speed and altitude records were constantly being established. Wood and fabric construction gave way to metal, and engine horsepower tripled. Even so, the Air Corps lagged in purchasing new equipment: the land-dominated Army hierarchy was loath to spend much money on airplanes.

Foulois later spoke of this problem: his planners were frustrated; no matter how hard they pushed, the General Staff would not listen. Foulois told them to change the thrust of their proposals and stop using the word "offense;" rather, stress the word "defense" and how new, long-range aircraft could be used to defend American coasts or resupply the Hawaiian Islands. The ploy worked, and things improved. In late 1933 the Air Corps began fielding the Martin B-10 bomber—the first all-metal, cantilever-wing monoplane with retractable landing gear and enclosed cockpit. The B-10 was faster than most existing fighter planes.

In 1934 Foulois was confronted with a major operational challenge.

JB San Antonio

Then-Lt. Benjamin Foulois in Texas, circa 1911. With a team of enlisted men known as his "flying Soldiers," Foulois learned to fly the Army's only airplane, aided by instructions in letters from the Wright brothers.

The airlines had been flying the mail for over a decade, but due to contract irregularities, President Franklin D. Roosevelt abruptly canceled these contracts and ordered the Air Corps to fly the mail. With a can-do spirit, Foulois had responded positively when asked if he could do it. In truth, the service was hardly ready. With 10 days to prepare, the Air Corps quickly discovered that its aircraft were largely obsolescent, ill-equipped with proper instrumentation, and the pilots themselves were not trained adequately in either night or instrument flying conditions.

Things went poorly and crashes were frequent. The press and the President were outraged and demanded changes. Fortunately, the pilots became more experienced and the planes better equipped; moreover, spring arrived and the weather improved. Even so, it was not an impressive performance. The Air Corps had flown only a fraction of the routes, miles, and tonnage of airmail that the airlines had been flying for a decade. Worse, there were 66 crashes with 12 fatalities. Although those flying the mail later argued they had learned a great deal about themselves, flying, and weather phenomena, clearly the adventure had given the Air Corps and Foulois a black eye.

Soon after, Congress investigated Foulois for what were deemed faulty procurement practices. It did not go well, and the committee accused him of "gross misconduct" and "dishonesty." The War Department did not come to his aid. Seeing how things stood, Foulois retired in 1935 "for the good of the service."

DISCOVER MORE: *Foulois wrote very interesting and entertaining memoirs long after retirement,* ***From the Wright Brothers to the Astronauts*** *(McGraw-Hill, 1968), and John F. Shiner wrote an excellent biography,* ***Foulois and the U.S. Army Air Corps*** *(Office of Air Force History, 1983).*

COMMAND THE SKIES

Dignitaries and officials around the world choose Gulfstream for peak performance, secure communications and mission flexibility.

Gulfstream™

A General Dynamics Company