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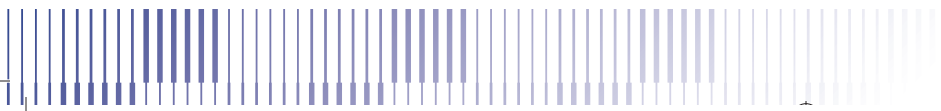
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An artist's illustration depicts a fictional encounter between a U.S. Space Force satellite and a Chinese military satellite. See "Space Order of Battle: Beyond Domain Awareness," p. 44.

ON THE COVER



Tom Demerly/ANG

An A-10C Thunderbolt II aircraft is parked on the flight line during a winter storm at Selfridge Air National Guard Base, Mich., Jan. 11, 2024.

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An Unfulfilled Offset Strategy

The United States long ago gave up on having the world's largest Army, Navy, or Air Force, in favor of having capabilities so advanced that numerical advantage wouldn't matter. This so-called offset strategy leveraged superior technology, training, and strategy as force multipliers to make up for the disadvantages of a smaller force.

The First Offset came about under President Dwight D. Eisenhower. Recognizing that the U.S. could never match the Soviet Union division for division on the ground, Ike determined that the threat of nuclear annihilation could make up for America's lack of military mass.

Eight years after the dropping of the first atomic bomb over Hiroshima in August 1945, Eisenhower put a personal twist on his staff's dueling strategy offerings: He would brandish the threat of a nuclear counterstrike to deter a conventional war with Russia.

In "Ike's Bluff: President Eisenhower's Secret Battle to Save the World," Evan Thomas argues that Eisenhower, ardent poker player that he was, used the nuclear specter as a foil. Just as he'd used Gen. George Patton's "Ghost Army" to deceive Germany into thinking Allied forces would invade Europe at Pas de Calais, rather than the beaches of Normandy, Ike's plausible nuclear threat was sufficient to ward off the Soviet menace.

This was "a maximum deterrent at a bearable cost," said his Secretary of State, John Foster Dulles, in 1953. "A potential aggressor must know that he cannot always prescribe battle conditions that suit him."

By the 1970s, however, The Soviet Union caught up to and then surpassed the U.S. in nuclear forces. Enter the Second Offset, by which the United States would overcome superior Soviet mass through technological superiority in space, precision-guided weapons, stealth aircraft, remote early warning, and lightning-fast global communications.

Just a few years later, President Ronald Reagan raised the stakes further with the promise of a nuclear shield that would neutralize Russia's nuclear threat. Dubbed "Star Wars" by a skeptical media, the Strategic Defense Initiative was the coup de grâce on a destabilizing strategy, threatening to render Russia's vast nuclear arsenal impotent against U.S. defenses.

Like the First Offset, which survived four presidential transfers of power, the Second Offset held steady from the Nixon administration through Presidents Ford, Carter, Reagan, and George H.W. Bush. Not only did it help bankrupt the Soviet empire, but it ushered in a new age of warfare, delivering a devastatingly lopsided victory over Iraq in the first Gulf War.

Yet in the absence of a rival superpower in the 1990s, and with the miscalculations of the post-9/11 counterinsurgency campaigns, the successive administrations, the Pentagon, and Congress managed to squander America's technological edge.

By then China was rapidly building up military strength, having tailored its army, navy, air force, and missile force to neutralize American military advantages. This should not have surprised anyone. The Chinese made their intentions clear in their military journals and in public speeches: to supplant the U.S. as the world's greatest military, economic, and technological power, China followed a reasoned and predictable strategy. Yet in spite of all that, China caught America asleep at the switch.

Thus was born the Third Offset Strategy in 2014. Then-Secretary of Defense Ash Carter and his Deputy, Robert Work effectively updated the Second Offset, but fell short of the budgetary steps

needed to make it stick. As a Rand history noted in 2021, the Third Offset successfully shifted national defense strategy from a focus on counterinsurgency to one closely attuned to China's military modernization—as evidenced by the 2018 and 2022 National Defense Strategies. But did not result in a fundamental change in the U.S. military itself.

The reason for that is clear: Unlike the previous offsets, the third failed to strategically realign defense investment.

At heart, each offset was an economic choice. For Eisenhower, it was more cost-effective to acquire nuclear weapons than maintaining standing forces on the scale of World War II. For Ronald Reagan, investing in stealth and space and missile defense imposed greater costs on Russia than building more tanks.

From 1946 to 1950, the Army consumed 45 percent of the U.S. military budget, compared to 31 percent for the Air Force and 35 percent for the Navy.

But with the advent of the First Offset, the proportions shifted dramatically. Between 1951 and 1961, the Air Force share grew to 42 percent compared to 28 percent each for the Army and Navy. The Air Force remained over 40 percent through 1965 and consumed a larger share than the Army through 1985. From then on, the Air Force budget has been smaller than the Army's and/or the Navy's every year with the sole exception of 2007.

Indeed, the underspending on the Department of the Air Force's Air & Space portfolio is even worse than it appears: About a quarter of the department's budget is siphoned off annually to intelligence agencies—the so-called pass-through that obscures how the nation's national security funds are invested.

The next President must reorient the nation's defense priorities toward air and space.


For the Third Offset Strategy to achieve its objectives, the next President must reorient the nation's defense priorities toward strategic investment in the air and space domains, where American technological prowess can best be leveraged to counter Chinese advantages in scale.

Through the First and Second Offsets, American investment followed strategic priorities. Yet, 10 year after the Third Offset was introduced, The Pentagon has yet to put its money where its strategy points: the Air & Space Forces.

It is in these domains—and also in cyberspace and the crucial electromagnetic spectrum—where American technological ingenuity and industrial might can overcome China's greater force structure and copycat technical prowess.

Air Force Secretary Frank Kendall, a product of the Second Offset Strategy and the Pentagon's acquisition chief at the dawn of the Third Offset, returned to the Pentagon three years ago with a laser-eye focus on prioritizing exactly the kinds of capabilities needed to deter and defeat the Chinese juggernaut. Everything he's done, from his Seven Operational Imperatives to Re-optimizing for Great Power Competition, aligns with the Third Offset.

What he has not been able to accomplish—what only a strong-willed President and clear-eyed Defense Secretary can achieve—is the necessary parsing of the defense budget to favor the effects-based advantages of investment in air and space capabilities.

The United States cannot compete with China on volume—not in people, not in ships, and not in airplanes, either. To be competitive, we must field superior capability in the domains that will be most decisive in any conflict. That requires a disproportionate investment in the Air & Space Forces. 

Accelerating Innovation: The Imperative of Continuous ATO

Software is a critical component of modern military operations, enabling everything from communications to advanced weapons systems. In this rapidly evolving landscape, the Department of Defense (DoD) faces the daunting task of balancing rapid software deployment with rigorous security requirements. Staying current requires agile development practices that continuously integrate and deliver high-quality software with reduced risk.

An Authority to Operate (ATO) authorizes the deployment of a software solution that meets both specific operational needs and prescribed cybersecurity requirements. However, traditional ATO processes lack the speed and adequate security necessary to address changes in technology and emerging threats. The waiting period for an ATO and its associated assessments hampers the swift deployment of critical software capabilities, a delay that can be detrimental, especially in the dynamic and high-stakes environment of the battlefield.

Enter Continuous Authority to Operate (cATO)—a dynamic approach to continuous software delivery, leveraging the continuous application of the structured, but adaptable National Institute of Standards and Technology's (NIST) Risk Management Framework (RMF). Unlike periodic reauthorization requirements for traditional ATOs, cATO allows for ongoing authorization based on continuous monitoring of security controls. Once a system achieves its initial authorization, it can continuously release new capabilities as long as it maintains compliance with approved security standards. Constant monitoring mitigates compliance drift and enhances cybersecurity.

CATO IMPLEMENTATION

Implementing cATO requires aligning RMF application with Agile and DevOps software development lifecycles without compromising compliance or sacrificing speed. When done correctly, cATO is about authorizing the system - it is not a waiver or shortcut to compliance. The method reduces risk by addressing requirements at every step of the software development lifecycle.



U.S. Air Force Tech. Sgt. Urich Garcia, 45th Security Forces Squadron supra coder, writes code in an application, April 25, 2022, at Patrick Space Force Base, Fla. Supra coders are Airmen and Guardians who perform duties developing, managing, and designing software for the United States Space Force.

Airman 1st Class Samuel Becker

Notably, the inputs that result in secure and authorized outputs for a trustworthy and transparent environment are the right people, policies/processes, and technologies.

Leaders must foster a security culture, eliminate bureaucratic barriers, and recruit the right technical talent. They must make room to “shift left” by cutting low-value tasks and removing backlogs, allowing development teams to integrate security into their workflows. To significantly reduce delays, programs should hire at least one dedicated technical assessor to work directly with the Security Controls Assessor and Authorizing Official. Additionally, open lines of communication between security, development, and operations teams are imperative to synchronize the latest mission requirements.

The implementation of cATO offers numerous advantages with potential to fundamentally transform the DoD's approach to software development and deployment. Ongoing authorizations are the most effective way for the DOD to streamline software delivery and ensure a future where bad things happen because of bad software. Start your cATO journey with Rise8's comprehensive cATO Playbook with 23 plays to help you successfully implement cATO. Visit playbook.rise8.us to learn more.



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Well-Oiled Machine

What a great story you had on "Inside the CAOC" [March/April, p. 29]. As a now-retired Airman from the 122nd Fighter Wing, Indiana Air National Guard, Baer Field, Ind., the article brought back many good memories. I spent 30 days there at Al Udeid Air Base, Qatar, in late 1998.

As I recall there were nine of us young Airmen. Some were also from our sister unit down at Terre Haute, Ind.—the 181st Fighter Wing. The large part of our group were auto mechanics from both units. Our first job was to get fire trucks cleaned up and working again so Al Udeid had proper fire protection when runways opened.

Their runways were still being built, and it was a very bare base in November 1998. As there were no quarters on the base, we were put up in one of the two Sheraton Hotels in Downtown Doha, the capital city.

I was the supply guy who kept the parts coming in from outside sources. Some came in from or through Doha International Airport, and we had a local supplier who ran an auto parts business. He got us tools from the U.K. and Pirelli Tires from Italy. Besides those fire trucks, there were approximately 400 wheeled vehicles stored at Al Udeid at the conclusion of the Gulf War with Saddam Hussein in the early 1990s. Our fellows were the first men to work in the brand-new Motor Pool building. It was big and beautiful.

I was a traditional with the Air Guard, or a "weekender." Back home my full-time job was with the Indiana-Michigan Power Co., in Fort Wayne. What an experience to be in a foreign culture for the 30 days! I learned a lot. Memories I will never forget.

MSgt. Tim B. Donovan,
 USAF (Ret.)
 Fort Wayne, Ind.

Small Field of View

My thanks to letter writer Dennis Trynosky ["Honored to Serve," May/June p. 6], who brought to my attention an article on medical disqualifications that I'd previously overlooked.

The article brought to mind a number of DQ experiences that I'd been aware of during my time in the Air Force family.

The first was as an enlisted squadron training administrator assigned to an F-4 aircraft generation squadron with a large number of trainees to monitor. A young female Airman apprentice bomb loader had finished all her upgrade training course work on time and performed her daily duties on the flight line for months. Fortunately/unfortunately, depending on your persuasion, to complete her training and be fully qualified she had to demonstrate she could lift a weight (let's say 50 pounds) to a certain level above the ground.

For whatever reason, she was unable to perform the task and was later cross-trained into an office job where she excelled.

While working on a Majcom's air traffic control (ATC) staff we received a medical waiver package on an air traffic control officer for review. The officer had been determined to be color blind, a medical disqualifier for ATC.

The case was unique in that the officer was already fully qualified and serving in the career field before the issue came to light. As the functional, we recommended approval of his "common sense" waiver and sent it along to the command flight surgeon.

The waiver was subsequently denied and the officer was cross-trained. He thrived in his new career field, and I believe later retired a colonel.

After retirement I became aware of a situation involving a first-term male six-year enlistee in the ATC career field. The

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.

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Airman completed tech school, all the required on-the-job training at his next base, and was certified as a controller.

Time passed, the controller performed satisfactorily day-to-day in his ATC facility and was assigned to a mobility slot. Then "he" decided to transition to "she," and was disqualified from ATC by the flight surgeon because of the medications taken during transition.

The Airman ended up performing non-ATC duties around the squadron and another controller took the deployment slot.

Medical disqualifications can be a two-edged sword that cuts both ways, depending on the inclination of the candidate.

One renowned American was scorned by politicians and media alike when it came to light that bone spurs had kept him out of military service after college in the late 1960s. With that in mind, I shudder to think what politicians could do to correct this problem.

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

Air Force Standards 2.0

When the March/April edition of Air & Space Forces Magazine arrived, I did my usual thing. I grabbed a big cup of freshly made coffee, curled up in my favorite chair and read it. I looked forward to the March/April edition because I knew there would be plenty of letters discussing Airman Hayden Perez's letter, "Compromising Standards" [January/February, p. 5]. I wasn't disappointed.

In the '70s I saw firsthand the constant battle among Airmen trying to maintain civilian grooming standards while they were in uniform on Active duty.

The use of "Dippity-Do" and other hair styling products of the day were the way to hide the length of your hair—but wasn't foolproof. I thought it humorous most of the time, and I was more focused on learning my Air Force Specialty Code (AFSC) and staying out of trouble.

One of the things I did notice was the inconsistent enforcement of the standards that led to conflicts among supervisors, managers, and senior commanders. Usually this was settled pretty quickly with decisive decision-making and the power of the pen in the forms of Letters of Counseling, Letters of Reprimand, fines and, for

repeat offenders, a discharge from Active service.

The Air Force is a Profession of Arms, not a job, and the focus of any Airman must be to hone his/her skills so they are the best in their AFSC so they can fight and win when called upon. Airmen must also maintain their image as an ambassador for the military to the people of our country who expect the best of them in times of war and peace, to include projecting the image of a clean-cut warrior.

Back in those days, I would ask my peers why they were so intent on looking like their civilian counterparts and by and large it was so they would fit in with the locals.

My next question was why were you in the Air Force if you wanted to be/look like a civilian. The responses usually revolved around money, GI benefits, etc., but rarely was there any mention of the Air Force mission, goals, requirements, and serving their country. There is no difference between then and now.

If you want to be a civilian, stay in the civilian community, and if you want to be part of the finest Air Force in the world, embrace the program and its requirements and move on. Maj. Ken Stallings' comments were spot on regarding why we have grooming standards: the requirements of combat, chem. gear, hygiene in the field, and the potential for Airmen who can't/won't embrace the established standards as candidates for civilian employment.

I read Col. Don Parden's three anecdotes and chuckled with each one and was a little angry too. In each of those cases the issues should have been addressed by leadership, either privately or in general during appropriate forums, i.e., commander's call.

I had the occasion to have a commander call me into his office to spread the word about customs and courtesies when he was around. He told me that when he was driving in his staff car people didn't salute, when he walked into a squadron ready room no one called the place to attention, and finally he said folks were getting a little scruffy. I asked him why he didn't stop and address these issues when they happened. He said that wasn't his style.

I didn't know that being a commander was a style. You lead from the top-down. I did what a good SNCO does. I had a roll call for all three shifts in my squadron and reminded them about their responsibilities and encouraged

them not to be one of the Airmen this commander was talking about. I also briefed the chiefs group about my meeting, and the word hit the streets about consequences for not following customs and courtesies.

The commander saw me a couple of weeks later and thanked me for turning things around. I reminded him that as the wing king he could have fixed all of this by hammering these individuals and their commanders when the issues happened and let the rumor mill take care of the rest.

I hope Airman Perez will read the responses to his letter in your magazine and understand that hair, sideburns, and earrings won't protect you in combat or win wars. It will be your technical skills, tenacity, dedication, and attention to customs and courtesies that will carry the day. If not, I hope he will be the best at his job until it comes time for him to separate, then he can return to civilian status and wear whatever he wants to.

If you want to attract more qualified people, make the changes that will make the Air Force more attractive. Increase the pay, benefits, and incentives to get the right people to investigate the Air Force as a career. Make sure the housing they live in is well taken care of so they don't have to worry about their families when deployed and make sure that the future platforms and equipment they are given are safe and fully operational before they are fielded.

Hopefully Air Force/civilian leadership at all levels will quit letting the tail wag the dog and implement policies that don't create confusion or cater to a culture that doesn't belong in uniform and make the necessary investments to attract highly skilled and patriotic individuals who want to serve their country.

CMSgt. John P. Fedarko,
USAF (Ret.)
Xenia, Ohio

Peace Was Our Profession

I have to say I was gratified to see a salute, ever how brief, to the Strategic Air Command ["World: Leaders Roll Out Big Changes for Air Force & Space Force," March/April 2024, p. 15]. As one who spent four years helping to get the B-47s in the air as a ground maintainer; and four more after re-enlistment and re-training helping to get the B-52s back on the ground as an air traffic control radar technician, I remember

the alerts and the 24- to 36-hour shifts.

People today probably don't realize that in those days we had bases all over the states and also worldwide with planes in the air 365/24/7, and we kept a lid on the evil empire. That's peace! And it was our profession!

Peter Hansen
Torrance, Calif.

Home Is ...

When you grow up in the Air Force you know your whole life that your idea of "home" is different than everyone else's. While growing up we know that we will never have a childhood house, or elementary school teachers who will one day come to our graduation parties and our weddings.

So when we hear the dreaded question, "Where are you from?" we understand that there's a language barrier and that their real question is, "Where's home?"

So, we give our knee-jerk answers that we're "kinda from everywhere kinda from nowhere," or we "grew up in the Air Force," or maybe that we're not from anywhere. But secretly we all know that that's not true.

Every Air Force brat silently knows that we do come from somewhere. We have a home. When we feel our bones rattle from an F-15 flying overhead, we feel as if we had walked out of our childhood home and heard the familiar song of the birds we'd woken up to hearing our whole lives.

No matter the country we live in, when we get to base it feels like extended family is there to welcome us home. But there's a language barrier. So we say we're not from anywhere, and contently go back home to our extended families and our songbirds.

Then we leave home. And we feel like we empathize with every graduating high school student who leaves home. We feel a love and pride for how we grew up and the home we came from. We grow and learn and live. We build our own lives and our own families with spouses on the other side of the language barrier.

Somewhere along the way we forget what home feels like.

But we'll be reminded. Sooner or later, we'll all hear our songbirds fly overhead and they'll make us remember. We'll feel the engines rattle our hearts—tugging—as if pulling us to follow them home. And then, never fully understanding until that very

moment, we'll all stand with the same realization. ... We can't go home.

Elizabeth Cruz
Richland Hills, Texas

History Lessons

Thank you for the very honest and frank editorial ["A Lesson Learned," p. 2] you presented in the 2024 Almanac issue.

You laid out a historical perspective of the fabric of our nation. From the failure in Vietnam, to the very successful Powell Doctrine and victory in Kuwait, to the "deer in the headlights" debacle in Iraq and Afghanistan, to where we are today.

With a feckless and impotent approach in Ukraine, and the devastating turn of events between a morally upstanding Israel facing evil victory by Hamas, a nation that has lost its moral compass will wind up in the dustbin of history.

Welcome to the USA of 2024, unless we show the intestinal fortitude needed to turn this country around.

Col. John R. Strifert,
USAF (Ret.)
Exeter, N.H.

Second Thoughts

This particular issue about retiring 32 older F-22s which are deemed not combat ready has been eating at me since I first heard of it about a year ago ["World: Our Incredible, Shrinking Air Force," May/June 2024, p. 14].

My question is, who is responsible for letting these valuable national assets get to this point? As it is they were already a low-density asset thanks to Bob Gates. I mean the Thunderbirds' F-16s are considered combat-capable and can be readied in a matter of hours for combat.

Why wasn't the entire F-22 fleet maintained combat ready? Either someone is playing "chicken" or the Air Force is like a spoiled child with an old car passed down from his parents and is letting these F-22s rot until he gets the latest and greatest on the street. This is ludicrous!

SMSgt. Robert Mienscow Jr.,
USAF (Ret.)
Woodstock, Ga.

Educate, Develop, Train

This letter is submitted solely for the entertainment of the AFA audience. It is in reference to the March/April 2024

"Editorial: Change and Shortchanged" [p.2].

I must confess to a hardy chuckle when I read about the newly named Airman Development Command. I was assigned to HQ Air Training Command when it was dubbed Air Education and Training Command. We all just rolled our eyes and kept going without much notice.

Airman Development Command must have been developed by some overpriced consultant or a crafty staff officer. Surely, the stars at the head of the table when this one was approved were asleep.

Operational and organizational changes are essential in the very changing threat environment. Maintaining the history of the ever-evolving Air Force is also very important. The tag Airman Development Command does not seem to fit or enhance either of these categories.

It does appear to create a great deal of work and expense for the sign installers throughout the command. It also seems to continue the lack of acknowledgement of the ever-growing female representation within the command.

Col. Frank Arnemann,
USAF (Ret.)
Metairie, La.

Loyal Reader

I joined the Air Force in 1961 and right away found out that the AFA magazine was a great publication.

I became a lifetime member in the '80s (I think). Then, I retired in 1989.

Your magazine has been the source of a great many hours of pleasure—keeping up with all that is going on.

Keep up the great work.

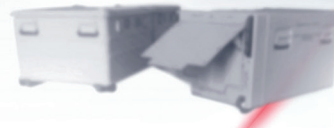
CMSgt. Jim Lavender,
USAF (Ret.)
Gainesville, Ga

Correction:

The May/June 2024 Almanac issue left out the Department of the Air Force Officer breakdown by Specialty Code. The complete DAF Specialty Code breakdown appears on pp. 50-51 of this issue.

The Armament Test Decisive Advantage

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Creating Dilemmas

Air Combat Command's Gen. Kenneth S. Wilsbach last winter went from commanding Pacific Air Forces to heading ACC. This conversation is adapted from a conversation with the dean of the Mitchell Institute for Aerospace Studies, retired Lt. Gen. David A. Deptula. It has been edited for length and clarity.

Q: What's on ACC's plate these days?

A: We're going to continue to create dilemmas for China. And there's a lot that goes into that.

So the first question you have to ask yourself is, 'Why do we even need to have dilemmas for China?' And for me, it's clear. They stated what their goals are, especially with respect to Taiwan, and they believe it's in their national survival's interests to get control of Taiwan.

We would like to deter that, of course. We believe that there's stability in the region at the moment. There's a lot of opportunities for all countries to thrive with that stability, and if China were to pick violence, we all would lose those benefits and the stability in the region. And so we at Air Combat Command would like to develop some dilemmas, so that every day Xi Jinping wakes up and he says, 'Not today.'

Q: What are you doing to create dilemmas for China and others?

A: One of the things that I say a lot is 'we're going to take care of Airmen,' but oftentimes people think that means we're going to do things for them. That's not what I'm talking about. What I'm talking about is coaching them like a sports team coach. ... That's what I'm talking about with taking care of Airmen; making them strong, making them resilient. Because if we do end up having to have this fight, the American people are going to expect for the Airmen of this country to do some horrifically difficult things. And if they're not resilient, and if they're not strong, they won't be able to do it. So we're going to plan on doing hard things together and we're going to give opportunities to fail. And then leaders are going to coach and mentor.

The other thing that we need to pay attention to with respect to creating dilemmas is readiness. And one of the things that we say is that the mission of the Air Force is to fly, fight, and win anytime, anywhere. Well, you have to fly often to be ready to be able to win. I've advised that fighter pilots as a rule probably ought to fly about three times a week. Those reps and sets give you the opportunity to be proficient and to improve every single day, so that over the course of time, you're prepared to do any mission that you would be called to do.

Now one thing that's helping us with that is in about the last 15 or 20 years, our simulators have gotten really good. And sometimes the best training that you get is in the simulator. You still need to get airborne, there's value in actually flying the aircraft. And so we're going to emphasize a mix of high-end simulator training and day-to-day training.

And what you're going to see is some very large exercises as well. There's the standard Red Flags that we all know, there's a fairly new exercise we've been doing for a few years called Bamboo Eagle, which is incorporated at the end of Red Flag now. And there's multiple other very large exercises that we intend to do over the next few years that will continue to improve readiness.



Mike Tsukamoto/staff

"You have to fly often to be ready and able to win," says Air Combat Command boss Gen. Kenneth Wilsbach.

Agile combat employment (ACE) is going to continue to be an aspect of our training. It should be foundational and what I've directed all the wing commanders in Air Combat Command to do is to incorporate agile combat employment in your day-to-day training. And so that doesn't mean that you're doing agile combat employment with the entire unit every single day. But there's aspects of every wing that do parts and pieces of agile combat employment, so that we make it muscle memory and when you get sent to the Pacific or when you get sent to the Middle East or Europe, you can certainly execute and you'll be good at it.

Q: Do you foresee any significant changes in how readiness is going to be improved and assessed in the future?

A: Yes and yes. I think that sustainment of the aircraft is foundational. And so we as a service need to commit to aircraft that are ready to fly every day. That requires an immense amount of resources to make sure that our very old fleet can be maintained, and we have to commit to that. And I think our service secretary has done that. He's beefed up some of our funding for weapons systems sustainment, which I think is incredibly important.

Our maintainers are working incredibly hard to generate those airframes so that they're ready to fly. You need reps and sets to be ready. Furthermore, you need the training scenarios, and so they should be a building block approach. You do the basics and you expand on those with your day-to-day training, and then those expand into getting out to 1, 2, 3 Level exercises where you're continuously building the blocks that get you to theater and operational level employment as a part of the training cycle.

I've asked our inspector general to revamp the way that we do inspections. So it's much like "Back to the Future." The inspection inspects you on what the Air Force expects you to be able to do in accordance with your doc statement. So there's no excuses, and a lot of them are going to be no-notice inspections, and we're going to get out there and we're going to say, "Hey, you're having an inspection today." You generate, you deploy, you employ, and you redeploy, and that's what you're going to get inspected on.

Then beyond the inspections, during these very large exercises, we will be able to assess in a much clearer form: Are we ready to be able to employ operationally at the theater level? Because we are going to do exercises that are big enough to assess that.

Q: The reduced numbers of Air Force aircraft are impeding the ability to absorb new pilots into flying units, and low sortie rates compound the issue. Can this be resolved?

A: Aircraft availability [is the key], so the ones that you have on the ramp can fly, [so] you don't have to 'maintenance cancel' your sortie, so the sortie that you scheduled, you actually fly. That's part one.

Part two is maybe more enterprisewide, but be very cautious about what you decide to divest. And that really speaks to the absorption. You're going to make a new pilot, but then once you've made them, they have to go somewhere and fly something. And so that's important that they have a cockpit to go to. And so capacity, especially of your fighter force, there has to be a cockpit to go to. And if you divest them, even though you're making more pilots, that's not good because they have wings but they have nothing to fly and they don't continue to improve their craft.

Q: One of the hallmarks of Air Force combat capability is to bring the fight to the adversary and operate inside their defended airspace. There's a discussion these days questioning the importance of sustaining a stand-in force. What's your view?

A: We need a mix of both. I think there's a lot of misunderstanding of what it means to be an inside or an outside force. The definition over time has changed, so 20 or 30 years ago, maybe more— 50 years ago, there only was inside force, because if you weren't an inside force, you weren't creating an effect. In other words, you had to overfly the target to bomb it.

And then with the advent of weapons that you didn't have to overfly the target—you could stand off and shoot and still hit the target—developed an outside force. And you also had the ability to be an inside force because you had stealth capability and you could fly about the battlespace inside of the enemy's weapons engagement zones, but they couldn't find you. That distance is moving out over time. And so where it used to be you had to overfly the target, then maybe it was 20 or 30 miles. It's not long from now where it could be several hundred miles that you're going to be an inside force.

So the question that you have to ask yourself when you're having this internal discussion is, what are you actually trying to do? And so you can achieve your objectives from inside or outside depending on the weapons that you have. If you want to risk putting a human on the inside, you have to make that risk decision. But what if you could achieve the same objective and never put a human at risk? That might be better, especially with our American values, and so it is a mix, and it's also a balance of the weapons that you can put on your platform. So you may want an aircraft that can operate inside of the weapons engagement zone and shoot. But you also likely want aircraft that don't need to go inside but can shoot from outside and still achieve the effects that you're looking for.

Q: Why is munitions modernization so important right now?

A: One of the things that I'm convinced of is that the nation that figures out how to do the long-range kill chain first and more effectively is the nation that's going to have a great advantage for years to come. How far is the long-range kill chain? It's at least on the other side of the horizon, which is at least 600 miles.

What I'm talking about is a weapon that's launched from a platform, and the platform probably can't see—because the Earth is in the way—the target. But because of all the sensors that you have, you can get the jet to a launch basket, shoot the weapon, and then the weapon gets updates while it's in flight,

and even if the target is moving, we have enough sensors to determine where the target is when the weapon gets there and we can guide it in for the kill.

That is extremely hard to do right now, but we're working on it. We're pretty close. You need that long-range weapon. But the first thing you need is the network that supports knowing where the target is and then being able to data link the information of where that target is to the weapon while it's in flight, and then of course data linking the information to the shooter aircraft, so they know when they're in the shoot basket to launch that weapon.

Some of the weapons that we're talking about are Joint-Air-to-Surface Missiles and Long-Range Anti-Ship Missiles. We've got the Hypersonic Attack Cruise Missile coming up. And then also building that network is something that we're diligently working on.

Q: You're the overarching provider of combat airpower to all the combatant commands. There are concerns about running out of airpower capacity before combatant command demand is met. Where do we stand on that front today?


A: I'm not sure that we'll ever not have that dilemma. Airpower is a desired capability that everybody wants. Because it's asymmetric, with a little bit of airpower, you can create a lot of effects. So I'm not sure that we'll ever overdeliver to the combatant commanders, but the point that you make about capacity is important for us to remember, because for many years now, the Air Force has been attempting to achieve more missions than we actually have the capacity for. We've heard multiple senior leaders in the Air Force say that very thing: the nation has more missions for the United States Air Force than the Air Force has forces. We have to keep that in mind as we move forward as a nation, and we have to ask ourselves what we want to spend our resources on.

Q: Where is Air Combat Command with regard to Agile Combat Employment?

A: The idea behind ACE is to continuously expand the ACE envelope. And what I mean by that is, we're never going to be there. In other words, we're not going to arrive and be done with ACE development. We're going to continue to make ourselves better.

If you've read the book "Infinite Game" by Simon Sinek, it's a great book that talks about never being finished with the game. It always continues as long as you're still in the game, versus a finite game like a football game, where at the end, when the time runs out, whoever has the most points wins.

That's what ACE is. We need to continue to get better and better at ACE. And so some of the difficult things about ACE are logistics. When you disperse out to those island airfields, how do you get fuel and weapons and parts and water out there in a contested environment? Well, one of the ways you do that is you pre-position it. We've been repositioning things in the Pacific for a couple of years. We need to continue to do that with continued resources.

When you get out of those small airfields, you don't have enough people to do every job, and so that's why we're training Airmen to do multiple jobs when they get out there so that we don't have an Airman that can do [only] one thing. One Airman can do many things. And so we've been doing that for a few years. You also don't have the same type of leadership that we've been accustomed to. So what you end up with is very young NCOs and very young officers at some of those spoke locations, and you put them in charge. We've been training them how to do that and giving them opportunities to improve their craft. 

By John A. Tirpak



Senior Airman Shellmar Rivera Rosado

The F-22 Raptor, shown here taking off from Joint Base Elmendorf-Richardson, Alaska, in July, has been the Air Force's lead air dominance fighter for the past 20 years. A replacement is planned, but not yet chosen, yet leaders have pushed to retire some older Raptor models.

Rethinking Next-Gen Air Dominance

The Air Force in recent years placed a \$20 billion bet on the Next-Generation Air Dominance (NGAD) “family of systems” to ensure control of the air in a future conflict—a core mission increasingly challenged by Chinese fifth-generation fighters and ground-based air defenses.

Now leaders seem to be hedging, with senior service leaders indicating concern over NGAD's costs and raising questions about the future of U.S. air dominance.

Any change to NGAD's scope or timing would force a complete rethinking of the Air Force's “4+1” fighter force design introduced in 2020. That plan's four lead aircraft included F-35s, F-15EXs, F-16s, and NGAD—and notably left out the F-22, which would have faded from the fleet by the late 2020s.

Now, with NGAD potentially delayed or worse, the F-22 seems more likely to remain in the inventory well beyond 2030.

Chief of Staff Gen. David W. Allvin answered haltingly when asked at an AFA event if NGAD's budget was secure. NGAD is among the “choices” USAF is facing “across the landscape,” Allvin said. Those decisions will “probably play out in the next couple of years or by this '26 [program objective memoranda] cycle.”

At a group interview the following day Allvin elaborated: “We're looking at a lot of very difficult options that we have to consider,” he said. NGAD “deliberations are still underway. ... There has been no decision made.”

Inflation, spending caps imposed by the Fiscal Responsibility Act, and rising military pay are all taking their toll on future Air Force budgets. With billions already committed to purchasing F-35 fighters, B-21 bombers, KC-46 tankers, and T-7 trainers—not to mention

the Sentinel ICBM, which is now \$40 billion over budget—NGAD is among the few large-scale programs that can be cut or delayed right now. Moving it from research and development into procurement only adds to that budget pain, and does little to the short-term “fight tonight” readiness that also demands more funding.

“We cannot pursue a lot of eggs in one basket, and then find the threat has advanced,” Allvin said. That suggests the Air Force may fear NGAD should be better attuned to collaborating with other USAF capabilities than originally envisioned.

Air Force Secretary Frank Kendall, seeking to quell concerns about NGAD's future, told Defense News in June that the NGAD “family-of-systems concept ... is alive and well.” But he acknowledged that service leaders are “looking at the NGAD platform design concept to see if it's the right concept or not.”

More to the point, leaders are asking whether “we can do something that's less expensive and do some trade-offs there.” For example, he said, while he's “confident” there will be an NGAD aircraft, he's only “reasonably confident” it will be crewed. The NGAD needs more substantive analysis.

The expected unit cost of NGAD's central platform—a crewed, extremely low-observable combat aircraft—will cost in the “multiple hundreds of millions” of dollars each, Kendall has said in the past. Acquiring 200 aircraft at that cost could push the program cost to close to \$100 billion.

Far less costly are the autonomous Collaborative Combat Aircraft (CCA)—uncrewed jets developed to operate in conjunction with manned fighters to provide affordable mass. As many as six CCAs could be controlled by a single manned platform—and at the relative

bargain price of around \$27 million a copy.

A network of sensors and communications relays needed to support the Air Force's long-range kill chain is thought to round out the NGAD family of systems.

Kendall told Defense News that NGAD must be "optimized to work with CCAs," which have developed rapidly at a point when NGAD was already well along in its development. He suggested NGAD's design may have to be adjusted both to bring down its eye-watering unit cost and to better work with CCAs.

"Scale matters, numbers matter, and so does time," Kendall said, indicating an NGAD contract is still to be awarded this year, as planned.

Competitors for that contract appear to be Boeing and Lockheed Martin; Northrop Grumman said last year it won't bid on the program, although it did receive an NGAD engine integration contract. Northrop has said it may pursue a Navy advanced fighter contract.

NGAD AND THE F-22

Whatever happens with NGAD will likely impact the future of the F-22 Raptor, which is currently planned to end its service life by around 2030.

The Air Force has twice asked Congress for permission to retire its oldest F-22s, but was rebuffed both times. Air Combat Command's 32 Block 20 Raptors—jets that were never upgraded to today's combat configuration—are among the most costly noncombat-rated aircraft in the inventory, USAF leaders have said.

In July, ACC Commander Gen. Kenneth S. Wilsbach said he too opposes divesting those aircraft. Speaking at an AFA Mitchell Institute for Aerospace Studies event, Wilsbach argued for keeping the F-22s.

First, no NGAD contract has yet been awarded, he said, so technically, "there is no" F-22 replacement yet. He also said the Block 20 F-22s still have combat value, even if they're not updated to the current Raptor fleet configuration.

"I'm in favor of keeping the Block 20s," he said. "They give us a lot of training value, and even if we had to—in an emergency—use [them] in a combat situation, they're very capable."

Air Force planners have argued they need to redirect the manpower, operations, and maintenance savings to NGAD. Upgrading the Block 20s to the current fleet configuration would be expensive: \$50 million or more per tail, according to Kendall.

That is costly, but less expensive than new F-35s or F-15EXs, and those production lines are already at maximum output. The Block 20s offer stealthy capacity at a time when the Air Force's overall inventory is shrinking, advocates say. Opponents counter that such funds would be better invested in keeping new programs on track.

ACC's Wilsbach called the F-22 a "fantastic aircraft" that the Air Force is still upgrading, "as we speak." Among the pending improvements: a highly sensitive infrared search and track system to spot adversaries with low radar cross sections; stealthy fuel tanks to extend the F-22's range; and a new, long-range missile that is expected to help the Raptor regain the "first shot, first kill" advantage it had when new.

In all, USAF is investing \$7 billion to develop and field those upgrades, making the timing of their introduction puzzling if the service really intends on retiring the aircraft in the late 2020s, just two years shy of its sunset.

Taken together with Wilsbach's defense of the F-22, it seems likely the Raptor will remain a while longer.

SECRETARY JAMES WEIGHS IN

Meanwhile, former Air Force Secretary Deborah Lee James is among those pressing to keep NGAD on track. In a June 26 op-ed in Defense News, she argued that Congress and the administration should "fund the Air Force to ensure the continuity" of NGAD, and urged the Air Force to "explore alternative design and acquisition

strategies to significantly reduce the cost of NGAD and expedite [its] ... delivery."

James acknowledged that the litany of extra expenses facing the Air Force is long and "there's not enough money to pay for all of it." But China is "ruthlessly advancing its NGAD equivalent and does not appear to be slowing down due to budgetary concerns," she wrote. Given China's aggressive moves in and around the South China Sea, the NGAD must be a top priority, according to James.

"The 2030s will be upon us in an instant, so we can't afford to delay NGAD," James wrote. "Doing so would mean risking loss in a future conflict."

James championed a concept first offered by former Air Force acquisition executive Will Roper, who said creating a new "Century Series," modelled after the F-100 to F-106 series jets of the 1960s, would accelerate innovation. "This approach would involve less expensive and quicker-to-produce fighters with iterative designs that could change every few years if necessary," she wrote. She urged "out-of-the-box thinking" to find the funds needed for NGAD.

SEARCHING FOR A BACK STORY

Why did Allvin raise questions about NGAD now? Retired Lt. Gen. David Deptula, dean of AFA's Mitchell Institute for Aerospace Studies, noted that the entire Air Force budget is under pressure and NGAD is "not the only major mission priority of the Air Force that is in crisis mode."

USAF's two-decades-long procurement holiday means the service must modernize its intelligence, surveillance and reconnaissance fleet, tanker fleet, trainer fleet, and command and control fleet at the same time as it updates fighters, bombers, and ICBMs. The only solution is more funding, Deptula argued.

Following 9/11 and for the next two decades, it made sense that the Army enjoy the lion's share of funding among the services, Deptula said, because the wars in Afghanistan and Iraq were ground-intensive conflicts. Air Force modernization moved to the back burner then. But now the Air Force is older and smaller than any time in its history, and rebuilding air superiority and combat capacity should be a national priority.

"We're no longer in Iraq or Afghanistan," Deptula said. "It's time to shift the resources to make the Air Force whole again."


It's possible service leaders are speaking out to highlight the risks they see in failing to invest sufficiently to have a credible deterrent. But that's because the Air Force finds itself "in an untenable position," with all the long-deferred modernization bills "coming due at the same time."

This is the question Deptula asked: "What kind of Air Force do you want?"

Air Force officials have said privately that giving up on NGAD would mean giving up on a stand-in force able to penetrate enemy air defenses and attack targets directly. A purely stand-off force would demand huge volumes of high-cost, long-range missiles launched well outside enemy air defenses.

That won't work, Deptula said. "You need to be able to do both. You cannot win a conflict of any type with a purely stand-off force," he said. "There are simply too many aimpoints to deal with."

That leaves U.S. leaders with few options. One is to increase resources for the Air Force; the other is to "reassess the National Security Strategy," reducing expectations of the Air Force that remains, Deptula said. "I seriously doubt any administration or Congress would lessen the demands of our global approach."

Pentagon and congressional decision-makers should rethink their approach to military investment, and focus on "greatest effect per dollar invested," Deptula said. Doing so would argue strongly for NGAD, he believes. Because, he said, "there's no way to win without the ability to achieve air and space superiority." 



Lt. Col. Michael Pacini took his F-16C vertical on his final flight as commander of the 416th Flight Test Squadron while flying the Sidewinder Low Level Route near Mount Whitney, Calif., in June. Sporting a 50th Anniversary Fighting Falcon tail flash, his single-engine, single-seat Viper is among more than 700 F-16s still in the active inventory. In all, the Air Force acquired 2,231 Fighting Falcons between 1979 and 2005. Today's fleet averages 33 years old, according to the Air Force—two years younger than the average USAF officer.



A fighter formation showing off the A-10 Warthog, two F-16 Fighting Falcons, an F-35A Lightning II, and an F-22 Raptor assembled in June during Exercise Sentry Aloha 24-2 over Hawaii. Today's fighter fleet is the oldest and smallest in Air Force history. The A-10s average 43, the F-16s 33, and the F-22s are almost out of their teens, at an average 19 years old. Among these, only the F-35A is still in production, its fleet averaging under 6 years of age. The Air Force owns more than 400 Lightning IIs among the 1,000 built thus far.



A B-1B Lancer assigned to the 37th Expeditionary Bomb Squadron from Ellsworth Air Force Base, S.D., takes off from Andersen Air Force Base, Guam, in June, exposing its bomb bay doors and four F101-GE-102 engines. The BONE can fly over 7,400 miles—far enough in perfect conditions to make the round trip from Guam to the South China Sea without refueling.



Airmen with the 388th Munitions Squadron and 4th Fighter Generation Squadron ran through a rapid maintenance and refueling drill at Kadena Air Base, Japan, last February. It now costs about \$6.6 million annually to fly and maintain each Lightning II.

F-35As: Ready Half the Time

By John A. Tirpak

The F-35A mission capable (MC) rate for fiscal 2023 was 51.9 percent, with the Air Force blaming spare parts availability for the decline from the previous year's figure of 56 percent.

Mission capable rates measure the percentage of time an aircraft is able to perform at least one of its core missions.

The new figures match those published in an April audit of F-35 sustainment costs from the Government Accountability Office. In that report, the GAO said the F-35A's mission capable rate peaked in 2020 at 71.4 percent, then declined to 68.8 percent in 2021, 56 percent in 2022, and 51.9 percent in 2023, as the Air Force brought on more jets at the rate of about 40 per year. The GAO quoted the Air Force's "minimum performance target" MC rate for the F-35A at 80 percent, and its "objective performance target" as 90 percent.

In the audit, the GAO noted that "none of the variants of the aircraft (i.e., the F-35A, F-35B, and F-35C) are meeting availability goals," but allowed that the services "have made progress in meeting their affordability targets (i.e., the amount of money they project they can afford to spend per aircraft per year for operating the aircraft). ... This is due in part to the reduction in planned flight hours, and because the Air Force increased the amount of money it projects it can afford to spend" on its F-35As.

The GAO report states the Air Force now expects to pay \$6.6 million annually per tail to operate and sustain the F-35A, a roughly 34 percent increase over the figure it cited in June 2023 of \$4.1 million per airplane. The service also told the watchdog

agency it would continue to operate the F-35 about 12 years longer than originally planned but fly each aircraft less often. The service expects to fly each F-35A about 187 hours per year, versus the original plan of 230 hours per year.

While the Air Force has in previous years stated an MC goal rate of between 75 and 80 percent for most its aircraft types, it has abandoned that practice, a service spokesperson said.

"The Air Force does not have an overall [MC] goal or standard," she said.

Mission capable rate "goals' are specific to the wing/unit flying the aircraft, derived from either syllabus sortie requirements [training] or home-station training and real-world operation requirements [ops bases]," she added.

The service has said the way it measures mission capable rates has changed in recent years, with more focus on readiness of aircraft either already deployed or about to deploy and less on stateside aircraft. The spokesperson reiterated that stance, claiming MC rates "do not equate to Air Force readiness rates."

"They are just one component assessed at the unit level to help determine how ready a squadron is to meet the threat," the spokesperson said. Instead, the service measures readiness "by how well the Air Force can carry out its missions, which requires more than mission-capable aircraft. It also requires trained and ready aircrew, maintainers and other Airmen, as well as enough spare parts and resources."

The Air Force declined to offer explanations for significant declines in mission capable rates for various fleets, such as the C-5 Galaxy, B-1 Lancer, and other platforms where huge resource investments in maintainability and reliability have not paid off in aircraft availability. Overall, MC rates for most Air Force fleets—44 of 64 types—declined in fiscal 2023 over 2022. ★

Airman 1st Class Jonathan Sifuentes

No More Ops & Maintenance Groups

By Greg Hadley

The Air Force is eliminating group-level Operations and Maintenance commands, streamlining the makeup of squadrons and wings, Chief of Staff Gen. David W. Allvin said June 14, revealing the latest twist in the drive to more effectively project combat power.

Dozens of such commands, usually led by colonels, exist today across the Air Force. But as Allvin oversees the “re-optimization” of Air Force combat power for great power competition, leaders’ group-level commands don’t have a place in a structure where wings could deploy as a unit, then disperse squadrons or smaller units in a “hub-and-spoke” agile combat employment scheme.

“We’re talking about having a doctrine of mission command that means empowering at the lowest competent level, giving left and right limits—commander’s intent—and letting them leverage their initiative,” Allvin said. “Those squadrons need to be able to exercise that. And sometimes, if there’s another level of command between the squadron commander and the wing command, the group command might be helping them out too much.

“If you’re a group commander, what do you want to be when you grow up? A wing commander. How do you do that? Well, you make sure your squadrons are all the best. So maybe you might be helping them out and succeeding and not letting them fail forward in training.”

The colonels who previously commanded groups will instead move to wing staffs, where they will focus on “the operational warfighting and joint warfighting functions,” Allvin said. The aim is to help them become better joint leaders, something Allvin believes is necessary for the Air Force to take a leading role in the future of warfare.

“I think it’s our responsibility not only to be good participants in the joint force, but I also think the Air Force should start having maybe perhaps a greater leadership role,” he said.

The change is not a small one, Allvin acknowledged, and will require the service to revamp some of its processes. Officers’ career paths may have to change, and professional military education will have to shift to emphasize the operational level for wing commanders and their staff.

Doing so, though, will help align the Air Force better with the other services, Allvin predicted. It will also make sense for the service’s new combat wings, the “unit of action” leaders first unveiled in February as part of their “Re-Optimization for Great Power Competition.”

At the AFA Warfare Symposium, officials said they will break down all of the Air Force’s operational wings into three categories:

■ **Deployable Combat Wings (DCW):** Complete units that can deploy together, with their own native command and control, mission, and support elements.

■ **In-Place Combat Wings (ICW):** Complete units with command, mission, and support elements that fight from their home station.

■ **Combat Generation Wings (CGW):** Units that provide force elements to Deployable Combat Wings, whether those



Air Force Chief of Staff Gen. David Allvin spoke at an AFA Warfighters in Action talk with AFA President and CEO Lt. Gen. Burt Field, USAF (Ret.), in June.

Mike Tsukamoto/staff

elements entail command and control, mission, or service support elements.

The goal, leaders explained at the time, is to move away from the current system where Airmen are pulled from dozens of different units to fill out one expeditionary wing, only meeting

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and working together once they arrive in theater. Eventually, entire wings will train and deploy as one unit. The service is taking a phased approach to get there, first introducing Expeditionary Air Base teams pulled from a smaller group of bases, and now planning to move to Air Task Forces, which will pull forces from only two or three bases.

The locations of the first six Air Task Forces were announced in May and are scheduled to start deploying in late 2025 and early 2026. The timeline for implementing combat wings is “pretty dynamic right now,” Allvin told reporters, but the goal is to have enough in place ready to go when the Air Task Forces start to wrap up—sometime around the fall of 2026.

Like the Air Task Forces, some of the first combat wings will deploy to the U.S. Central Command area of responsibility. But make no mistake, Allvin said, they are not designed for the typical CENTCOM structure of large central bases from which all airpower is generated.

“We’re optimizing for the pacing challenge. So this construct is best suited for going over and doing deterrence exercises or actually having to go over and employ Agile Combat Employment against the pacing challenge of China,” Allvin said June 13 at an AFA Warfighters in Action event.


A central tenet of Agile Combat Employment is dispersing smaller teams to operate from remote or austere airfields—and Allvin told reporters that it makes sense for the combat wing’s staff to act as the hub while squadrons go to the spokes.

“If we’re going to actually expect these wings to go and be able to do these maneuver functions in the hub-and-spoke locations, then we need them to have a different set of specialties,” Allvin said. That drove the decision to fold group commanders into the wing staffs.

Deployable Combat Wings will be the principal “units of action” presented to combatant commands, but not every wing will be designated as such. Some will be Combat Generation Wings, which might lack the command and control functions of a combat wing, but provide plug-and-play combat capability to those wings that can deploy as a unit. Allvin said USAF leaders are still determining how much combat airpower each Deployable Combat Wing will need.

Still other wings will deploy in place. These could include any wing that can operate globally from its home station, including bomber and cyber units, among others.

“We don’t want to have a Deployable Combat Wing that’s got two airplanes in it just because we’ve got to spread them around,” Allvin said. “So finding the right number of platforms around which you can do the command element and then the sustainment element is going to be key, but it starts off with, what are the requirements? And then what are we resourced to do?”

Service leaders plan to make a decision on how many Deployable Combat Wings they’ll start with by this fall, Allvin told *Air & Space Forces Magazine*. 

Air Force Aims for 24 Deployable Combat Wings

By Greg Hadley

The Air Force plans to field 24 Deployable Combat Wings to meet its rotational demands and provide a cushion for times of crisis, Lt. Gen. Adrian L. Spain, deputy chief of staff for operations, said June 18.

Combat Wings replace squadrons as the “units of action” that the Air Force presents to combatant commanders when forces are needed. Deployable Combat Wings will include command, sustainment, and mission layers, and can either pick up and deploy as an entire unit, or add or exchange mission elements depending on a combatant command’s needs at the time.

Getting to 24 DCWs won’t happen overnight. Chief of Staff Gen. David W. Allvin said June 14 that his staff is still developing the road map that will enable combat wings to be the operable deployable elements by late 2026.

“I think the number that we’re shooting for right now is 24,” Spain said. “We think 16 Active-duty and eight from the Reserve Components.”

How many the Air Force can field may not equate to need, however.

“The number that we can generate and the number that we need is absolutely what we’re talking about,” Spain said. “How many do we think we can actually generate with current resources? And how many do we need, not only to meet the current rotational requirements that we know we’re going to have or we’re likely to continue to have ... but to give us some margin for combat credible and capable units of action beyond just the rotational part?”

Two dozen Deployable Combat Wings would allow the



Dirk Voortmans

Pilots assigned to the 480th Fighter Squadron walk on the flight line during Astral Knight 24 at NATO Air Base Geilenkirchen, Germany, in May. Astral Knight 24 enhances combat readiness among participating allies and partner nations.

Air Force to maintain six wings each in the four phases of the Air Force force generation cycle: Prepare, Ready, Available to Commit, and Reset. Regular rotations would draw from the Available to Commit group, but in times of war, forces could be committed while in the Ready, or “certified” phase, as well.

“You have a bench in the certified phase that you might want to take some risk on depending on what’s going on in the world and forward deploy them,” Spain said. “That would be in the worst case: an existential fight that’s coming up and we’re willing to take that risk. You wouldn’t do that for day-to-day operations. But you do have [a Ready capability] and they’re three-quarters of the way through that cycle and largely prepared to go.”

Rotational demand and availability would not be spread equally among the Active and Reserve Components, how-

ever. Drawn from both the Air National Guard and Air Force Reserve, the eight Reserve Component DCWs will have different deploy-to-dwell ratios, meaning more time home between deployments, and they may not be quite as fully equipped to deploy on their own.

No Deployable Combat Wing will deploy with “more than about four mission force elements,” Spain said. Typically, those elements have been equated with squadrons, and Spain said the reality is that in most cases a dozen aircraft would make up a force element for fighters.

Equipping those fully will be key to making units fully combat ready.

“Historically, in order to get to the deployable element, we kind of raided the follow-on force’s kit, in order to make sure the first 12 got out the door sufficiently,” Spain said. The Air Force would prefer not to have to do that, however, and

this year’s unfunded priorities list included \$612 million to bolster nine new elements, in the hope that Congress will buy out that deficit.

The exact makeup of the Deployable Combat Wings’ force elements may vary, but Spain said the wings will be designed to be modular enough that the command and support elements can take on other kinds of capabilities than whatever is their native force element.

“Where we are going to need to train the command echelon is to be able to receive forces of any type, because it’s probably going to be rare that the mission element that you have at your base is exactly what the crisis demands,” Spain said. “But I may need a command echelon and sustainment echelon ... so they may go and the force elements may go either to a different place or not deployed at all, because I need F-16s versus F-22s at this time.” ★

SPACE

Mission Deltas Align Space, Cyber, Intel

By Greg Hadley

When the Space Force first unveiled its Integrated Mission Delta (IMD) concept in September 2023, leaders emphasized how the concept would unite operations and sustainment under one roof, accelerating upgrades and fixes. But nearly a year later, the head of Space Operations Command says the new design better aligns space, cyber, and intelligence units and their people.

SpOC boss Lt. Gen. David N. Miller Jr. said the new deltas fill a “gap” that existed within SpOC in the way deltas were initially constructed.

“We didn’t integrate in that [original] formation all of the elements that we think are principle focus areas for the presentation of forces,” he said. “We focused on the space squadrons. We didn’t integrate into those deltas the [intelligence, surveillance, and reconnaissance] squadron or detachment or the cyber unit.”

At the same time, SpOC is changing how it presents that spacepower. The new Space Force Generation Model defines periods of focus, so that units and the Guardians assigned to them get a break from day-to-day operations to train, regenerate readiness through high-end training and exercises, and then stand ready for full-time operational duty.

That high-end training—part of the six-week “Ready” phase—is the key to improving, Miller said

To meet the threat, Miller added, deltas will train together across a mission area, focusing less on specific systems and more on how to accomplish an objective.

“The task is to improve it now based off the capabilities we have and rapidly spiral in as much capability as we can get,” Miller said.

The establishment of Space Forces-Space (S4S) last December as the organization responsible for presenting forces



Space Operations Command boss Lt. Gen. David “Rock” Miller Jr., left, spoke with retired Gen. Kevin Chilton, USAF, at the Mitchell Institute for Aerospace Studies in July.

Amy Hudson/staff

to U.S. Space Command, enabled SpOC to better focus its efforts. Prior to S4S standing up, SpOC was pulled in two directions, presenting forces to SPACECOM and training Guardians to support all the other combatant commands. Now that the duties are split, Space Operations Command can better focus on how “to provide that spacepower to all the combatant commands, not just U.S. Space Command,” Miller said.

“I was just at Buckley last week visiting Delta 4, which has the missile warning and tracking mission area,” Miller said. “The commander there is a guy named Col. Bobby Schmitt. He now trains, it’s not just SBIRS training ... he’s training across the formation, across their ground-based radars, to track things like hypersonic vehicles better, to focus on potential fractional orbital bombardment system capabilities like the PRC had been building, better. So he’s training as a mission area.”

Following that, Miller added, deltas will train for “planning across formations,” figuring out ways for different units to support each other and emulating how the joint force would operate in a fight.

Flightline Armament Test – All Platforms, All Weapons, One Solution

Today's armament maintainers are tasked with performing flightline (O-Level) maintenance with an assortment of legacy test sets that greatly limit the ability to quickly and efficiently verify armament system readiness, diagnose failures, and ultimately return the aircraft to full mission capable (FMC) status. Legacy test sets are typically utilized on only a single aircraft,


O-Level Test Set Replacement Matrix		
Platform	Legacy Armament Test Set(s)	Next Gen Armament Test Set
F-15C / E / EX	-198, -199	 <p>MTS-3060A SmartCan™</p>
F-16	5060, SST, FIST (ALE-50)	
F-22	COLT, SWAT	
A10	MSLTS, Stray Voltage Test Set, PATS 70A	
F-35	WRAP, Stray Voltage Test Set	
B-2	COLT	
B-52	Mustang	
MQ-9	AMW-103	
All	A/C Countermeasure Dispenser Test Set	

Table 1. O-Level Test Set Replacement Matrix

or perform a single function supporting multiple aircraft, resulting in increased training and logistics challenges, and longer than necessary test and repair times. This not only impacts armament maintainer effectiveness, but limits the realization of Agile Combat Employment (ACE) and the development of Multi-Mission Airmen.

The need for a universal armament test solution, one that is easy to use, portable and rugged, with rapid test and setup times, and common across all platforms and weapons, has become readily apparent and increasingly in demand on the flightline. Working closely with armament maintainers from across the global, both DOD and ally, Marvin Test Solutions (MTS) identified key functionality and capabilities essential to supporting legacy, current, and future generation platforms and weapons systems. The outcome of this effort resulted in the widely deployed and combat proven MTS-3060A SmartCan™ Universal Armament Test Set.

The handheld MTS-3060A SmartCan is capable of testing all Alternate Mission Equipment (AME) and Normally Installed Equipment (NIE) including pylons, launchers, bomb racks, guns, and POD interfaces, as well as supporting 4th, 5th, and 6th generation weapons systems. A standard SmartCan kit, with all associated cables and adaptors contained in a single carry case, can replace the flightline test capabilities of over a dozen test sets across USAF fighters and UASs. It can also support a broader implementation to include bombers and surface-to-air defensive systems as needed. See Table 1 for additional details.

All fielded aircraft, manned and unmanned, rotary and fixed wing, can be loaded onto a single SmartCan, eliminating the traditional deployment model of using multiple aircraft-specific armament test sets on the flightline. Test results and measurement variances for each weapon are displayed real-time for review, analysis, and fault-isolation. Additionally, test log files can easily be moved or copied via the removable SD card for printing and analysis, supporting

emerging predictive maintenance initiatives.

Unlike legacy handheld test sets that are only capable of performing stray voltage and continuity tests, the SmartCan implements functional MIL-STD-1760 testing to ensure armament systems are ready to support Smart weapons, before they are loaded. Coupled with munitions emulation communication channels supporting all existing weapons protocols, it provides a full system test for all legacy and Smart weapons. It performs both pre-load and functional checkouts through weapons emulation, the simultaneous testing of multiple squib signals, and implements a unique cross-fire algorithm to deliver a comprehensive test process superior to other all O-Level armament test sets in service today.

The rugged design, ergonomic layout, and small footprint (~4 lbs.) enables field operation anywhere in the world, making it the ultimate tool for flightline armament test. It is designed and qualified to operate under extreme environmental conditions, meeting MIL-PRF-28800F Class 1, MIL-STD-810C and MIL-STD-461F requirements. Battery operation further enhances field usability; (6) AA batteries and an innovative power management system enables over (40) hours of test time without the need to replace the batteries.

Test setup and execution times are also significantly improved, and the results are striking! F-16 setup times are reduced from 45 minutes to just 4 minutes, representing an impressive 91% decrease. Similarly, test execution times for a pylon utilizing MIL-STD-1760 and a LAU-129, tested for both AIM-120 and AIM-9X, saw substantial reductions from 20 minutes to 3 minutes (85% reduction), and from 35 minutes to 4 minutes (89% reduction) respectively. See Table 2 for additional details.

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	Test Time (min)		SETUP (MIN)	WEIGHT (LBS)
	PYLON WITH MIL-STD-1760 UMBILICAL	LAU-129 WITH AIM-120 AND AIM-9		
MTS-3060A SMARTCAN	3	4	4	4.2
CURRENT F-16 TEST SET	20	35	45	>80
EFFICIENCY IMPROVEMENT W/ MTS-3060A SMARTCAN	85%	89%	91%	95%

Table 2. F-16 Setup / Test Time Comparison

Unlike legacy handheld test sets that are only capable of performing stray voltage and continuity tests, the SmartCan implements functional MIL-STD-1760 testing to ensure armament systems are ready to support Smart weapons, before they are loaded. Coupled with munitions emulation communication channels supporting all existing weapons protocols, it provides a full system test for all legacy and Smart weapons. It performs both pre-load and functional checkouts through weapons emulation, the simultaneous testing of multiple squib signals, and implements a unique cross-fire algorithm to deliver a comprehensive test process superior to other all O-Level armament test sets in service today.

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To make that happen, SpOC had to synchronize the Force Generation Model across units, a process that culminated July 1.

“Every unit went in together, they trained together, they were prepared together,” Miller said.

The integrated mission deltas include those elements and have produced better results, Miller said, citing an example: “We had an anomaly on one of our newer birds that we had launched in PNT,” Miller said. “And because [commander] Col. Andrew Menschner had the ISR unit to actually focus on the threat right then, and the capability to work the sustainment and fixes to that, he was able to fix something in hours that might have taken days in the past.”

Now commanders have a “clearer picture of the mission need,” he said, as well as the capabilities to defend their assets in space and cyberspace.

The Space Force has just two integrated mission deltas right now. One focuses on GPS, while the other focuses on electronic warfare. But soon two more IMDs will be formed. The head of Space Systems Command, Lt. Gen. Philip A. Garrant, said in May that two missile warning and space

domain awareness IMDs will stand up this summer, and more could be coming. Miller said that SpOC’s aim is that “over the next year, we will complete the transition of all the deltas that need to be integrated mission deltas into IMDs.”

Yet not all SpOC deltas will become IMDs. Deltas focused on ISR and cyber won’t make the shift.

“In missions where we are providing capability as part of the combat force, either presented or sustained, where we need to integrate those three mission capabilities of space, cyber, and ISR, I think you’ll see those as potential candidates for integrated mission deltas,” Miller said. As for Delta 6, SpOC’s cyber delta, and Delta 7, the ISR delta, “I’m not sure that those need to be integrated mission deltas.”

They could still see changes in structure, however, Miller said. “For example, our targeting squadron: As a programmer I was the one who laid in the requirements to build that squadron. I know that I don’t have enough capability there to meet all the needs of the combatant commanders. I think there’s growth in some of those missions in particular, I just don’t know that they need to be integrated mission deltas.”



RUSSIA - UKRAINE

Russian Jamming Wreaks Havoc

By Shaun Waterman

Amid unprecedented amounts of electronic warfare in Russia’s war on Ukraine, there is no doubt that the Russians are jamming GPS and other satellite-based navigation systems around the Baltic Sea. Earlier this year, the interference forced the closure of a major civilian airport after flights had to be diverted en route.

“We know that Russia has been jamming GPS signals,” Estonian Minister of Foreign Affairs Margus Tsahkna said, explaining why Tartu, the country’s second largest airport, had to close. The jamming has affected not just Estonia, but parts of neighboring Latvia and Lithuania, sites in Finland and Sweden across the Baltic

Sea, and as far afield as Poland and Germany, according to publicly reported data from commercial aircraft.

It is also pretty clear how Russia is doing the jamming, which involves simply broadcasting a more powerful signal on the same frequency used for GPS. Since the real GPS signals come from satellites 12,500 miles above the Earth’s surface, they are easily drowned out by much closer terrestrial broadcasts. According to experts, technical inferences from public data sources bear out Tsahkna’s claim that the jamming is coming from three ground-based locations in Russian territory, including the port enclave of Kaliningrad, sandwiched on the Baltic coast between Latvia and Poland.

But when it comes to the question of why the jamming is happening, things become fuzzier.



Russian Ministry of Defense

Russia’s Pole-21E electronic countermeasures systems are designed to radiate energy in attempts to confuse cruise missiles, guided bombs, and other satellite-guided systems.

Is it just spillover from Russian air defense and force protection measures—jamming GPS so Ukrainian drones can’t use it to find their Russian targets? Or is it something more deliberate, targeted at GPS in noncombatant countries?

The answer matters because how America’s European allies respond to Russian provocations like GPS jamming is likely to shape whether or how the Ukraine conflict spreads.

GPS interference for civilian users as a spillover effect from jamming operations in active combat zones has been endemic in parts of the Middle East for more than a decade. And experts agree that such jamming is generally lawful under the Geneva Conventions, even when it impacts commercial air traffic. Deliberate, albeit nonkinetic, attacks on the civilian infrastructure of noncombatant nations would be a different matter, and likely illegal under international law.

MORE AMBIGUOUS

“This attack on GPS is part of a hybrid action to disrupt our lives and to break all kinds of international agreements,” Estonia’s Tsahkna said, definitively linking the GPS jamming to cyberattacks, mysterious fires at warehouses and shipyards, and the other elements of Russia’s “gray zone” warfare campaign identified by European leaders. He said the campaign was designed to punish NATO member nations for supporting and aiding Ukraine without triggering the Article 5 threshold that would invoke military action by the alliance.

Officials from Sweden and Lithuania have also publicly called out the jamming as a hybrid attack, noting Russia has a history of expertise in electronic warfare techniques like GPS jamming.

But others aren’t quite so sure.

Technical data from civilian flight safety agencies in the region, including Estonia’s own, paint a more ambiguous picture.

Europe’s nongovernmental Center of Excellence for Countering Hybrid Threats (known as the Hybrid CoE) in Helsinki, concluded that the jamming is more likely a spillover impact from Russian efforts to prevent GPS-guided drone attacks on its own forces and key installations like power stations.

“The danger to civil aviation is real and serious,” said Tapio Pyysalo, head of international relations at the Hybrid CoE, “but the way we define hybrid threats is that it’s something with a strategic intent behind it actually trying to hurt the target. That’s not what we’re seeing here.”

Finnish government officials told Air & Space Forces Magazine that their analysis of technical data reached the same conclusion.

A senior NATO commander echoed the Hybrid CoE characterization. “Look at the number of flights whose GPS systems are now being affected by basically careless Russian jamming activity,” said British Air Marshal Johnny Stringer, the deputy commander of NATO’s Allied Air Command. He accused Moscow of being reckless about the collateral damage it was causing through electronic warfare operations.

“The Russians have a very different perspective on how to set the bar in using these kinds of offensive operations in the electromagnetic environment, than quite rightly, we would hold ourselves to,” Stringer said.

The Estonian Embassy in Washington, D.C., referred Air & Space Forces Magazine to the Consumer Protection and Technical Regulatory Authority, a civilian agency in the capital city Tallinn that regulates radio communications and the use of radio spectrum.

In an emailed statement, Oliver Gailan, head of the Electronic Communications Department at the agency, didn’t directly answer questions about whether the jamming was a spillover effect or a deliberate attack, but he did confirm that there appeared to be no interference at ground level, so smartphone location-based services, and other technologies like ATMs that rely on GPS, and other Global Navigation Satellite Systems continued to work fine.

Gailan said the interference was a violation of Russia’s obligations under the International Telecommunications Union (ITU) treaty, of which it is a signatory. “Estonia has already made a formal notification to the ITU,” he said.

The spokesperson for the Russian Embassy in Washington, D.C., did not immediately respond to an email requesting comment.

‘CHALLENGE’ TO AIRLINE SAFETY

There has been no official impact assessment, but the Rus-

sian jamming affects an average of 350 commercial flights per day, according to a tally compiled from open-source data by a pseudonymous researcher on Twitter, whose work has been cited by the British Ministry of Defense.

There are fallback navigational techniques, and Tartu airport reopened last month after GPS-alternative technology was installed there. But the alternatives to GPS lack its accuracy and convenience, and jamming it “poses significant challenges to aviation safety,” according to the European Union Aviation Safety Agency (EASA).

Nonetheless, because GPS is being used in combat by Ukrainian forces, it is “overwhelmingly likely” that it is a legal target for Russia, explained retired Marine Corps Lt. Col. Kurt Sanger, a career military lawyer who finished his service in November 2022 as the deputy judge advocate general for U.S. Cyber Command.

The Geneva Conventions generally require combatants to weigh whether the impact on noncombatants of a military strike or other operation will be greater than is warranted by the military advantage gained from it—the so-called proportionality test. The GPS jamming seen in the Baltic has not caused any direct loss of life or destruction of property, Sanger said, so even though the economic costs might be severe, it is hard to see how it would fail such a test.

However, he added, the U.S. does hold itself to a higher standard than that set by international law in planning cyber operations. “As a prudential matter, and as a matter of DOD regulation, we had to consider more than just the casualties and property destruction international law requires,” he said of his time at CYBERCOM.

DISTINCTION WITHOUT A DIFFERENCE

Veteran former officials on both sides of the Atlantic expressed a degree of impatience with the debate about the exact reason for the jamming.

“Typical Russian plausible deniability BS,” said one former senior U.S. defense official. The official, who asked for anonymity to preserve business relationships while speaking candidly, argued that the spillover vs. hybrid debate was a distinction without a difference.

The spillover effects enable Russia to study how NATO countries respond to a GPS blackout, while allowing them a fig leaf of plausible deniability in the court of public opinion, this official said. Tartu is Estonia’s second largest airport. “That’s like Boston or LAX closing for a month, and we’re arguing about what it might mean that they didn’t also shut down the ATMs,” the official said.

In fact, the absence of interference on the ground is most likely a product of physics—a side effect of the way that ground-based jamming signals propagate outward from their source. “Think of it like a speaker or a flashlight pointing upward,” said Mike McLaughlin, a retired U.S. Navy intelligence officer who worked on GPS jamming. “The waves heading straight up vertically don’t encounter interference. The closer you get to the ground, the more likely the [jamming] signal will be blocked by terrain like hills or mountains.”

Retired Col. Aapo Cederberg, who held senior security positions in the Finnish civilian government and is now in the private sector, said the uncertainty was an effect of the nature of gray zone tactics.

“If you know the principles and modus operandi of the Russian hybrid warfare doctrine you can make an evaluation. Many intelligence services have been clear that this is a hybrid operation,” he said.

Russian hybrid warfare operations always included a cognitive, or information war aspect, Cederberg explained, adding that Moscow might be deliberately creating open source data points (like the absence of interference at ground level) which cast doubt on the purpose or cause of the jamming.

“Russians are always doing their hybrid operations in a way that creates a fog of uncertainty,” he said. That informational uncertainty attached to gray zone activities puts the role of political leadership front and center in determining

the response, said Pyysalo, from the Hybrid Center of Excellence—including the question of whether and when to attribute hybrid activity.

“That’s what makes attribution such a political decision,” he said. “With often inconclusive information, you actually have to be able to say that it was this state behind this act, although we’re not absolutely sure.”

Additional reporting provided by Pentagon Editor Chris Gordon.

PERSONNEL

USSF Adjusts Space Readiness Model

By Greg Hadley

The Space Force is reforming the way it presents teams of Guardians to combatant commanders, announcing July 1 that it will synchronize the “commit” phase of the Space Force Generation Model.

Under SPAFORGEN, as the model is known, the Space Force cycles units through three phases: prepare, ready, and commit. Each defines a period of focus, so that units and the Guardians assigned to them get a break from day-to-day operations to train, regenerate readiness through high-end training and exercises, and then stand ready for full-time operational duty.

But over the nearly two years the model has been in place, the cycles have not been in sync from one unit to the next. Now that’s changing, with Space Operations Command taking a more consistent approach to rotating units in and out of phases all at once, regardless of mission area.

“Aligning the timing of these phases for all units across our command helps us ensure combat-credible force elements and warrior leaders across our formations are postured and ready for employment,” SpOC boss Lt. Gen. David N. Miller Jr. said in a statement.

Chief of Space Operations Gen. B. Chance Saltzman said the shift is another way the Space Force is “solidifying how the Space Force presents forces is an important way we are “optimizing for great power competition.”

“Form must follow function,” Saltzman added. “Our force presentation must reflect that every mission we perform requires expertise in intelligence, cyberspace operations, space system operations, engineering, and sustainment.”

The move goes hand in hand with the Space Force decision announced earlier this year that “combat squadrons” would be the “units of action” the Space Force presents to combatant commanders. Space Force “combat detachments” are deployable units and will follow SPAFORGEN as well.

Brig. Gen. Devin Pepper, vice commander of Space Operations Command, has described an “eight-crew model” in which five crews from a unit are in the “commit” phase at any given time, while the other three are in either the prepare or ready phases.

Unlike the Air Force Force Generation Model, which cycles through four six-month phases, the SPAFORGEN cycles are uneven, and spread over a five-month cycle time:



1st Lt. Charles Rivezzo

Space Operations Command is trying to synchronize the operational cycles of its combat squadrons to ensure units are ready and effective, said SpOC commander Lt. Gen. David Miller.

- Commit lasts 105 days
- Prepare runs 21 days
- Ready lasts 42 days

Most Space Force operations are conducted at home station, which is why the cycles can be tighter. Leaders say the phases of SPAFORGEN are more about creating high-end readiness and a predictable rhythm for Guardians.

“Day-to-day space operations do not prepare Guardians for the challenges they will face in a high-intensity combat environment,” Saltzman wrote in a letter to Guardians in April. “Balancing operations with readiness requires a different approach than the ‘all-in, all-the-time’ construct we used before.”

The prepare phase will include “training, positional upgrades and professional military education,” as well as planned leave, SpOC noted in a release. The ready phase will include advanced training and exercises, as well as “validations” for squadrons to work on their advanced skills. The commit phase will include time on console, conducting everyday space operations.

This shift in focus makes SPAFORGEN “the most drastic change accompanying the establishment of the Space Force” yet, Saltzman said. But it will take time, he added, to work out the kinks and “resource and normalize” the process.

Sentinel ICBM Survives Pentagon Review as Costs Jump 81%

By John A. Tirpak

The cost overrun on the Air Force's LGM-35A Sentinel intercontinental ballistic missile is more than twice what was anticipated early this year—81 percent compared to 37 percent—but Pentagon acquisition and sustainment chief William LaPlante has certified that the program must continue, the Department of Defense announced July 8.

The Pentagon also indicated the program will be delayed at least three years, instead of the two previously predicted, and the Air Force alone seemingly must bear the cost of the overrun.

If the program was to continue as it had been previously structured, it would cost \$140.9 billion, LaPlante said in a press conference to announce the results of a six-month, statutorily mandated review of the Sentinel he conducted after the Air Force revealed it was in breach of the Nunn-McCurdy Act in January.

The Nunn-McCurdy Act requires the Pentagon to inform lawmakers if a program incurs a cost or schedule overrun of more than 15 percent. Any breach over 15 percent is considered "significant," while a breach of 30 percent is considered "critical." For critical breaches, the Secretary of Defense must either cancel the program or certify it to continue as necessary for national security. A Pentagon official said the certification function was

delegated by Defense Secretary Lloyd J. Austin III to LaPlante.

The Sentinel program will be "reasonably modified," LaPlante said, to take out some of the cost overage, but Air Force acquisition chief Andrew Hunter said the final cost will still be similar to the new estimate for the existing program.

"Along with this certification to Congress, I am rescinding the program's Milestone B and directing the Air Force to come back to me with a plan to restructure the program," LaPlante said. "Preserving schedule will be a key consideration during this restructuring, but a delay of several years is currently estimated." He offered no more specific prediction of the delay.

It will take about 18 months to two years to restructure, Hunter said, but work on Sentinel will continue in the meantime.

Northrop Grumman is the prime contractor for designing, developing, integrating, and testing the Sentinel missile, as well as the basing infrastructure that goes with it.

LaPlante said he certified the program is necessary and should continue because it is:

- Essential to national security;
- There are no alternative programs that can achieve the requirement at less cost;
- The director of Cost Assessment and Program Evaluation agrees that the new costs estimates are reasonable;
- The program is "a higher priority than programs whose fund-



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ing must be reduced to accommodate the growth in cost;” and

■ The program’s management structure is adequate to manage and control the program acquisition unit cost.

Asked about alternatives considered, LaPlante said the review team examined “about four to five different options,” including extending the aging Minuteman III missiles until 2070, “hybrid options of different ground facilities, mobile versus fixed,” and others.

In every case, either the cost was “prohibitive” versus restructuring the Sentinel “or it didn’t meet the operational requirements that the warfighter had levied on us,” he said.

As for the “root cause” of the problem and whether the program should have advanced to the engineering and manufacturing development phase in 2020, LaPlante said, “it’s clear, certainly for the ground segment, that ... the department was not at a Preliminary Design Review—PDR—level of maturity at the Milestone B, which was in September of 2020.” The plan for the “ground segment” and “launch element” was lacking key information because building a new ICBM is something the Pentagon hasn’t done in 50 years, he said.

“The knowledge that we have today is much better than [we had] even four years ago,” LaPlante asserted.

“It is important to note that this certification does not indicate business as usual,” he added. “The program will be restructured to address the root causes of the breach and ensure an appropriate management structure is in place to control costs.” He said there are “reasons” for the cost growth but “no excuses.”

“We fully appreciate the magnitude of the cost, but we also understand the risks of not modernizing our nuclear forces and of not addressing the very real threats we confront,” LaPlante said.

Hunter indicated the Air Force will be solely responsible for finding the roughly \$45.3 billion in additional funds the Sentinel will require, but said the overages will not start kicking in for another five budget years. That means the Air Force has time to restructure its budget to adjust for the ICBM’s higher cost, he said.

Asked what might be cut to pay for the Sentinel, Hunter said, “our current cost profile does not suggest that any of the cost growth in the Sentinel program will be realized over the course of the next five years or so—inside the Future Years Defense Program” and it will be “a decision far down the road to decide what trade-offs we’re going to need to make in order to be able to continue to pursue the Sentinel program.”

Those decisions won’t be made until the program reaches the Milestone B decision again, he added.

Hunter also said the cost growth on Sentinel is all still projected at this point.

“So this is future cost growth that we’re projecting and estimating,” he said. “And the reason why we now know about this projected cost growth is because we’ve dramatically accelerated the maturity of the design of the ground segment. That’s where the vast majority of this cost growth resides and is being driven by.”

While Sentinel is being restructured, “we’ll do what it takes to sustain Minuteman III to meet warfighter requirements,” Hunter said.

LaPlante noted that the plan that was reviewed is not the one which will govern the Sentinel from here on out.

“What is going forward in this certification is not that plan, but a modification of that plan, with some changes made to the launch facility to make it more cost effective, as well as less complex,” and to adjust the schedule.

He explained that the baseline launch facility “had a size and a complexity that when we looked at it carefully ... could be scaled back.” By reducing the size and complexity, “it also reduces the timeline of doing the transition between the existing system—

Minuteman III—and the new system. So both of those were where the changes being recommended for the modification are.”

When the program is overhauled, Hunter said, “we will bring a new program baseline to Dr. LaPlante for approval, and those numbers may vary slightly from the numbers that we’re discussing today, but that’ll be the new program baseline, and we expect that process to take on the order of 18 to 24 months to complete.”

The Air Force has already taken “proactive steps” to correct the program while the review has been underway, Hunter said.

“Last fall, the Department of the Air Force established a Nuclear Oversight Committee, which is co-chaired by the most senior leaders of the Department of the Air Force,” he said. The committee is responsible for providing oversight of the Air Force’s nuclear enterprise, “including strategic bombers, land-based ICBMs, and nuclear command and control.” The Department of the Air Force also established “a dedicated program executive officer, or PEO, for ICBMs, and are in the process of elevating the commander of the Air Force nuclear weapons center to a three-star,” up from a two-star billet, and “established the Nuclear System Center”

These steps “demonstrate our dedication to bringing the critically important Sentinel program to full mission capability,” he said.

Air Force Vice Chief of Staff Gen. James C. Slife said the ICBM leg of the nuclear triad is essential to complementing the air- and sea-based legs “amid an increasingly complex and dynamic security environment, which for the first time includes the People’s Republic of China as a major nuclear armed power and strategic competitor.”

The land leg’s “geographic dispersal creates targeting problems for our adversaries,” Slife said. “Transitioning from the Minuteman III to the Sentinel system through a restructure program is the best way to continue providing these capabilities.” He said the Air Force will “continue working closely with the Department of Defense and other stakeholders to mitigate risk and minimize gaps as we field modernized systems for the future.” The service will continue to “sustain and defend the Minuteman III as [we] have for more than 50 years, while we field a new Sentinel ICBM weapon system.”

The Sentinel is a massive program to replace the Minuteman III ICBM deterrent force. It will replace 400 missiles in silos, plus additional missiles for spares and test, and radically overhaul the silos themselves, as well as the launch capsules, communication systems, utilities, and civil engineering for the ICBM enterprise.

The Air Force “fully supports the decision to restructure the Sentinel program and is committed to restructuring in a manner that provides robust nuclear deterrent into the future, promotes the most effective acquisition of this critical capability that controls cost, and delivers weapons system on a schedule that ensures our ability to sustain the nuclear deterrent,” Hunter said.

The Department of the Air Force’s leaders are “acutely aware that we can and must do more to improve program management and oversight of this vital project. We do not take lightly the once-in-a-generation responsibility to modernize the ground leg of the nuclear triad, and are mindful of the scope and scale of this undertaking, which is unprecedented in contemporary times.”

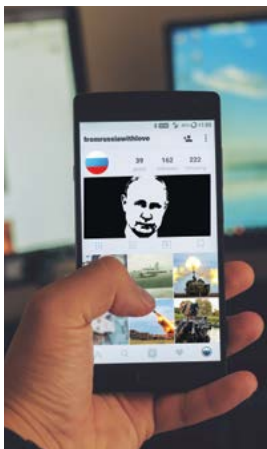
LaPlante emphasized that the Sentinel is “a historic, multigenerational program to modernize this nation’s nuclear posture. The Nunn-McCurdy review we just completed was of the highest priority. It was detailed, comprehensive, and objective. We’ve identified the root causes of the increased costs, and we are already working to ... move forward. But most importantly, we believe we are on the right path, moving together and forward, and despite the historic scale and complexity, we can do this. We know we have to get this right, and we will.”



Every Airman A Warfighter

"We cannot put any more Airmen at risk than we absolutely must, which means we must pull all the capability out of every single Airman that we put into harm's way, and we have to unconstrain them from the functional stovepipes that we grow them in today."

—**Chief Master Sgt. of the Air Force David A. Flosi**, on the need for "mission-ready Airmen" in a near-peer conflict.



Mike Tsukamoto/staff; Ukraine Ministry of Defense; Pixabay

Scare Tactics

"Russia is currently waging two wars. ... One is a kinetic, conventional war in Ukraine. The other is a hybrid war in Europe and the West with the aim of influencing the tone of public discourse to in some way shake our sense of security."

—**Finland's President Alexander Stubb** at a foreign policy forum in Helsinki, noting Russia's attempts to provoke and destabilize citizens [June 14].

You Can't Do All the Things, All the Time

"As a service, over time, we have taken a position, since the 2010 time frame, that we're going to take the maximum amount of acceptable risk in current force structure ... in order to get to the future faster; to bring advanced capabilities as quickly as we can. That aggregated risk, over time, is catching up with us, and this bathtub that we're going into ... with the fighter force, was planned. So we knew that this was coming, and it was deemed acceptable. ... We believe that it was still the right thing to do. ... It's still a pretty sizable fighter force. ... It can do all the things some of the time, and it can do some of the things all the time, but it can't do all the things all the time."

—**Lt. Gen. Adrian Spain**, Deputy Chief of Staff for Operations, on AFA's "Air & Space Warfighters in Action" webinar, June 18.



Vilkass/Pixabay

GO FASTER

"Washington has yet to shift significant resources—or to adapt business processes—to harness commercial solutions at scale or speed. A host of persistent problems, such as the Pentagon's 'outdated' research and development model ... a shrinking industrial base, long acquisition timelines, an insufficient understanding of emerging technology, and a bureaucracy seemingly designed to stifle speed and innovation ... means that while American companies 'demonstrate technological prowess,' such innovation 'serves little use in deterring conflict' unless the Pentagon can put new technology into the hands of warfighters at a faster pace."

—**Leon E. Panetta** and **Mike Gallagher**, commentary "The Pentagon Can't Wait to Innovate" [The Wall Street Journal, July 10].

NOT SO FAST

"'Built to last' is a tremendous 20th-century bumper sticker, but the assumption was: Whatever you had was relevant as long as it lasted. I'm not sure that's relevant anymore. So that's why we aren't building in a sustainment structure. Ten years after this, I'm hoping the technology will make it so that CCA won't be as relevant, but it might be adaptable, and that's what we're building into modularity and adaptability."

—**Air Force Chief of Staff Gen. David W. Allvin** at an AFA event on June 13 on why designing for sustainment may not make sense for new unmanned systems.

SO EASY, EVEN I CAN DO IT



Tech. Sgt. Nick Wilson

"What I found in the simulator was, it took me about five or 10 minutes to get the hang of it, and then it became second nature. It was very intuitive, and there was enough automation and artificial intelligence in the software of the CCAs that you could basically give them an assignment, and they could go do it. ... I was flying an aircraft that I'm not qualified in, and I quickly learned how to fly the aircraft that I was in and control the CCAs, and it was not that difficult. ... And you can concentrate on flying your own aircraft, monitoring what the CCAs are doing, and make sure that they're achieving the objectives or give them new guidance as you go along. So it's not unlike having additional wingmen [except] they are automated, so that they do what you tell them to do."

—**Gen. Kenneth Wilsbach**, commander of Air Combat Command, on how easy it is to add control of Collaborative Combat Aircraft to a fighter pilot's cockpit workload, Mitchell Institute webinar, July 10.



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Around the World in 45 Hours

A Journey of Time, Space, and Collaboration.



Airman 1st Class Gavin Hameed

A 350th Air Refueling Squadron KC-135R Stratotanker refuels a KC-46A Pegasus over the U.K., July 1, 2024, during a 45-hour Maximum Endurance Operation, called Project Magellan, launching June 29 flying westward, nonstop, around the world.

By David Roza

A KC-46 touched down at McConnell Air Force Base, Kan., on July 1 after a record 45-hour nonstop flight around the world. The mission, called Project Magellan, saw the two crews aboard test their limits as they refueled Air Force jets around the planet.

“Air refueling is a very specific process: you have to be at a point at a certain time,” Col. Brent Toth, aircraft commander and head of the 22nd Operations Group at McConnell, told *Air & Space Forces Magazine*. “And we did that four times all around the world without missing a beat.”

Project Magellan is the latest maximum endurance operation (MEO), the term for long-haul missions, meant to test Airmen as transport and tanker crews under Air Mobility Command prepare to carry the rest of the military’s troops and equipment across the vast distances of the Pacific in a possible conflict with China.

“In an era of great power competition, crews need the ability to operate longer than they have in the past, and Project Magellan is the next step in getting

“This just wasn't about taking off and landing somewhere else. ... We did complex missions in each part of the world.”

—Commander 22nd Operations Group, Col. Brent Toth

AMC crews experience in the game-changing new construct that is MEO,” said Capt. Cody Donahue, 22nd Operations Group executive officer, who took part in the flight and played a key role planning it, in a press release.

The idea for Project Magellan first came to tanker crews at McConnell about two years ago, but the team had to work fast over to get ready once the coordination with units around the world finally took shape.

“Once that came together, we had to move out very quickly,” Toth said. “The sprint for the last 30 days has been pretty hard, but we had a fantastic planning team.”

At the end of the sprint was the mission itself, which broke new ground for the KC-46. In 2019, a McConnell crew first flew a Pegasus around the world, but that trip included six stops and overnight stays. Project Magellan marked the first time the new tanker flew around the globe nonstop.

Besides the length of the flight, the MEO also stood out for carrying just two basic crews. Normally, three Air Force pilots can fly as an augmented crew for up to 24 hours, but Air Mobility Command

now wants crews of four pilots to fly up to 48 hours to prepare for future conflicts, Donahue explained.

When the KC-46 took off from McConnell at about 4 p.m. on June 29, it carried just four pilots, two refueling boom operators, two flying crew chiefs to oversee the health of the airplane, and a flight surgeon to oversee the health of the crew.

The next 45 hours saw Magellan take gas from another KC-46 off the coast of California; give gas to a C-17 transport jet training near Hawaii; and take on more gas from two other McConnell-based KC-46s as they approached Guam.

Over the Middle East, the thirsty Pegasus received more fuel from a pair of KC-135 tankers flying out of Al Udeid Air Base, Qatar, where one crew was from McConnell and the other was from the Utah Air National Guard. The Magellan crew went on to refuel two F-15E Strike Eagles flying a combat sortie over Iraq, then meet two KC-135s for more gas over England: one from McConnell and one from RAF Mildenhall. The McConnell tankers had been pre-positioned around the world to support the MEO.

The KC-46 enjoyed a hero's welcome back over the continental U.S., where the jet met up with another McConnell-based KC-46 and the two refueled three B-2 stealth bombers from Whiteman Air Force Base, Mo., then offloaded fuel onto another McConnell Pegasus with Brig. Gen. Gerald Donohue, AMC's director of operations for strategic deterrence and nuclear integration, onboard as an observer.

When they finally landed back at McConnell at around 1 p.m. on July 1, Magellan had taken on 454,000 pounds of gas—about the weight of two blue whales—over the course of four refuelings from seven different tankers, and contributed to a combat sortie and a training exercise.

"This wasn't just taking off and landing someplace," Toth said. "We did complex missions in each part of the world."

Part of what enabled such a long string of midair meet-



22nd ARW photo

Two 22nd Air Refueling Wing pilots tested the capabilities and endurance of the KC-46 as well as their teamwork as a crew during the Maximum Endurance Flight.

ings was a suite of systems allowing beyond-line-of-sight communications among the Magellan crew, planning teams at McConnell, and crews around the world. Tactical data networks such as Link 16 allowed them to track and communicate with receiving aircraft hundreds of miles away to find out what direction they were traveling, how much fuel they needed, and other factors which normally would not be communicable until the aircraft were much closer within radio contact.

"We knew more about what was happening on this flight than I've known on most of the flights that I've been part of throughout my career," Toth said. "So even though it was



22nd ARW photo

The sun shines on clouds outside of a KC-46A Pegasus and also on the progress made and human performance lessons learned during Project Magellan.



Airman Paula Arce

The Project Magellan crew poses in front of a KC-46A at McConnell Air Force Base, Kan., July 1, 2024. The aircraft executed the first nonstop, KC-46 circumnavigation endurance flight, allowing the crew to gain experience in Maximum Endurance Operations.

more complex than anything I've ever done, I felt like I was more notified than I've ever been before."

While Link 16 is already widely available in other parts of the Air Force such as Air Combat Command, Air Mobility Command is still getting up to speed in terms of connectivity. Last year, AMC boss Gen. Mike Minihan set a goal to connect 25 percent of the tanker and transport fleet with beyond-line-of-sight communications by 2025.

The relatively new KC-46 has more modern communication equipment compared to its older siblings in the mobility fleet such as the KC-135 and the C-130, but flying between four combatant commands and quickly syncing with each one on the same flight is an achievement in its own right, Toth and Donahue explained.

"We always talk about air refueling being a sort of force multiplier, well, same thing with this tactical data link," Donahue said. "Now you are talking about two force multipliers on one platform, so you're exponentially multiplying your force."

Besides solid communications, Magellan also benefited from years of research in human performance. Flying an aircraft is a tiring task, and Air Mobility Command wants to use the latest science in sleep and nutrition to keep crews as well-rested as possible on long sorties.

At first, the two Magellan crews took 10-hour shifts, but over time those shrank to between six and seven hours. When not at work, crews slept on bunks in a rest area that was kept dark throughout the flight. Other Airmen have said the KC-46 is a more comfortable experience than past refueling tankers.

"I was able to get five or six hours of sleep multiple times with a sleep mask and noise-canceling headphones or ear-plugs," Donahue said. "It's really not too bad, and it allowed us to just keep this sustained operation with only four pilots flying 45 hours."

To prepare for the flight, the first crew tried to go to bed at around 4 a.m. and sleep until noon about three days prior to takeoff, while the second crew went to bed at 4 in the

afternoon and woke up at midnight.

"It was pretty amazing how quickly we were able to adjust to that new timeline," Donahue said.

It also helped that one crew member made cookies using the galley onboard, and another, instructor pilot Capt. Daison Batangan, brought a birthday cake to celebrate turning 31 years old midflight. By the time they were back over the U.S., the crew members were feeling the effects of a very long day, but they still safely accomplished what Toth described as one of the most complex operations he's seen near McConnell in a long time.

"Meeting up with another tanker for a midmission join-up and then doing formation aerial refueling against three B-2s, it was pretty fantastic," he said.

"I'd fly 45 hours just to refuel B-2s any day of the week," Donahue added.

When they landed back at McConnell, the crew had experienced just one sunrise and one sunset on their long westbound flight, "so even though it's been 45 hours, we've really experienced only one solar day," Toth said. "So that is a bit of a mind trip."

Even more than a test, the colonel thinks Project Magellan demonstrated AMC's ability to reach anywhere on Earth.

"Taking off from the [continental U.S.], refueling a C-17 over the Pacific and a combat sortie over Iraq, and coming back to support global strike aircraft showcases that we really can provide air refueling and support global reach anytime, anywhere," he said.

The complete crew list included Col. Brent Toth, aircraft commander; Capt. Cody Donahue, instructor pilot; Capt. Daison Batangan, instructor pilot; Capt. T.J. Buckley, instructor plot; Master Sgt. Jonathan Lauterbach instructor, boom operator; Master Sgt. Patrick Murray, instructor boom operator; Capt. Jacob Heyrend, flight surgeon; Staff Sgt. Alejandro Melendez, flying crew chief; and Staff Sgt. Dustin Shaffer, flying crew chief. ★



FACES OF THE FORCE



2nd Lt. Benjamin Williams

Senior Airman Dalton Chambers with the 71st Rescue Generation Squadron at Moody Air Force Base, Ga., saved the life of a gunshot victim. While on leave working at his family's racetrack, Chambers responded quickly to a gunshot sound and found a man with a serious leg wound. Utilizing his Tactical Combat Casualty Care (TCCC) training, he stabilized the victim and controlled bleeding. "The training I received kicked in, and I just did what needed to be done to save his life," said Chambers. This wasn't the first time Chambers had acted promptly to save someone; he assisted a fellow Airman suffering from heatstroke during a physical training session while on duty.



Staff Sgt. James Fritz

Tech. Sgt. Dakota Luknis, an aeromedical evacuation technician with the 911th Aeromedical Evacuation Squadron and ER nurse in Warren, Ohio, rescued a family from a house fire in Kent, Ohio. Luknis received an urgent call from a friend about a nearby house fire. He hurried to the site, and discovered flames engulfing a house. Despite the smoke and chaos, Luknis and his friends guided the trapped family to safety, encouraging them to jump from the roof to escape the spreading fire. They successfully caught two adults and two children who jumped. "Luknis has a high sense of integrity and an innate willingness to help others," said Lt. Col. Adam Foster, director of operations for the 911th AES.



Elliott Budd/Courtesy photo

Staff Sgt. Rockwood Bullard, an explosive ordnance disposal technician with the 434th Civil Engineer Squadron, dedicated over 270 hours to mentoring a local youth robotics team in Indiana. Bullard had previously participated in FIRST Robotics program (a nonprofit organization that mentors children through robotics) when he was in high school, and mentored students after graduating. He resumed after joining the Air Force Reserve, volunteering as a mechanical mentor for Kokomo High School's robotics team with about 20 students. Bullard guided the team through machine shop tasks and techniques. The team placed 11th out of 75 teams at the state level, and 33rd in their division at the global championship sponsored by the DAF in Houston.



Staff Sgt. Michael Ward

Master Sgt. Patrick Pineda is the first enlisted Guardian to teach at the U.S. Air Force Academy, with a decade of experience as an intelligence analyst in both the Air Force and Space Force. His recent master's degree in strategic intelligence directed his path to academia. Pineda's course focuses on joint force doctrine, strategic theory and service branch roles, providing cadets with insights into national security operations and U.S. government power execution across conflict spectrums. "We strive for cadets to understand that the world that we are entering is not the same as the last 20 years," said Pineda.



Airman 1stClass Spencer Contreras/USSF

First Lt. Natalie Nicks of the 645th Cyberspace Squadron led her team, the Mississippi Panthers, to win the 2024 Women's National Football Conference (WNFC) Championship. In her second season as an outside receiver, Nicks contributed 195 yards on 11 catches, three touchdowns, and led the league with two non-kick conversions. Nicks joined the WNFC two years ago. During the 2024 season, she overcame the challenge of training remotely while stationed at Patrick Space Force Base, Fla. As an Active-duty officer, she advises her peers to pursue passions outside of work, adding that balancing the two keeps her sharp. "Being the senior team member in sports has influenced my career and given me a teamwork mindset," said Nicks.



Senior Airman Raya Feltner

Senior Airman Spencer Sciarone of the 31st Force Support Squadron has launched a run club in Italy, inviting fellow Airmen and local folks to run together. What initially began as his personal quest to broaden connections while being deployed overseas, has now evolved into Bodhi Bean's Run Club at Aviano Air Base, Italy, named after Sciarone's 1-year-old son. The club offers a fresh way to meet people and encourages running with intention. For Sciarone, running is a vital routine that helps him process thoughts and emotions. "Running has been instrumental in helping me overcome various challenges in my life," said Sciarone.



Tech. Sgt. Darby Arnold/ANG

Senior Master Sgt. Alejandra Rosales, an operations superintendent from the 147th Combat Communications Squadron, San Diego, was selected as the Air National Guard's 2024 Outstanding Senior Noncommissioned Officer of the Year. In addition to her steadfast 19-year career as an Airman, Rosales provided mission-critical support to the forward-staging base in Bahir Dar, Ethiopia, during Operation Oaken Soundstage. The mission enabled the successful evacuation of 87 people, including 72 U.S. diplomats, from the U.S. Embassy in Khartoum amid a conflict in Sudan. She recalled that the mission demanded full engagement in a joint mindset and collaboration.



Sgt. Jessica Avallone

Staff Sgt. Michael Ryan Pribhdas, a flight and operational medical technician with the 99th Expeditionary Reconnaissance Squadron, has embarked on a determined journey toward the Nurse Enlisted Commissioning Program (NECP). Pribhdas has always dreamed of becoming a nurse. When he first applied for the NECP program in 2022, he did not make the cut. The next year, he applied again, only to learn he again failed. But he persevered, and the third time was the charm; in his 10th year of service, he was finally accepted to the BSN program at the University of Nevada. "Never give up on your dreams and goals, it's never too late to start," said Pribhdas.

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

Weather Ops: The Air Force's Next Great Weapon?

How to Make the Weather Work For You.



Airman Lauren Torres

A KC-46 Pegasus aircraft sits on the flight line during a storm at Altus Air Force Base, Okla., in April 30. Lightning filled the sky over Altus and created a luminous display of colors over the aircraft.

By David Roza

Sun Tzu, the great warrior-philosopher of the sixth century B.C., famously wrote: “Know thy enemy, know yourself; your victory will never be endangered.” Less familiar, but no less important are the thoughts that followed: “Know the ground, know the weather; your victory will then be total.”

Col. Patrick Williams, director of weather at Air Force Headquarters, is all about total victory if ever the U.S. finds itself in a conflict with China or Russia. Knowing the weather, and how to use it to U.S. advantage, will be a key to doing so. First, though, weather has to return to a central place—in operations and strategic planning.

“The way weather is used today, we’re an obstacle,” Williams told *Air & Space Forces Magazine*. “Before the pilot takes off, we’ll tell them what conditions they’ll see, which impacts how much fuel they need, how many bombs they can carry, and how to get back safely. [But] we can do so much more than that.”

The Airmen who specialize in weather are much

“We can purposely force the adversary into situations ... where they have to pick between a bad choice and a worse choice.”

—Col. Patrick Williams, director of weather at Air Force Headquarters

more than just a weather app; properly employed, they can help commanders predict and influence adversary behavior.

“We can purposely force the adversary into situations that they don’t want to be in where they have to pick between a bad choice and a worse choice,” Williams explained.

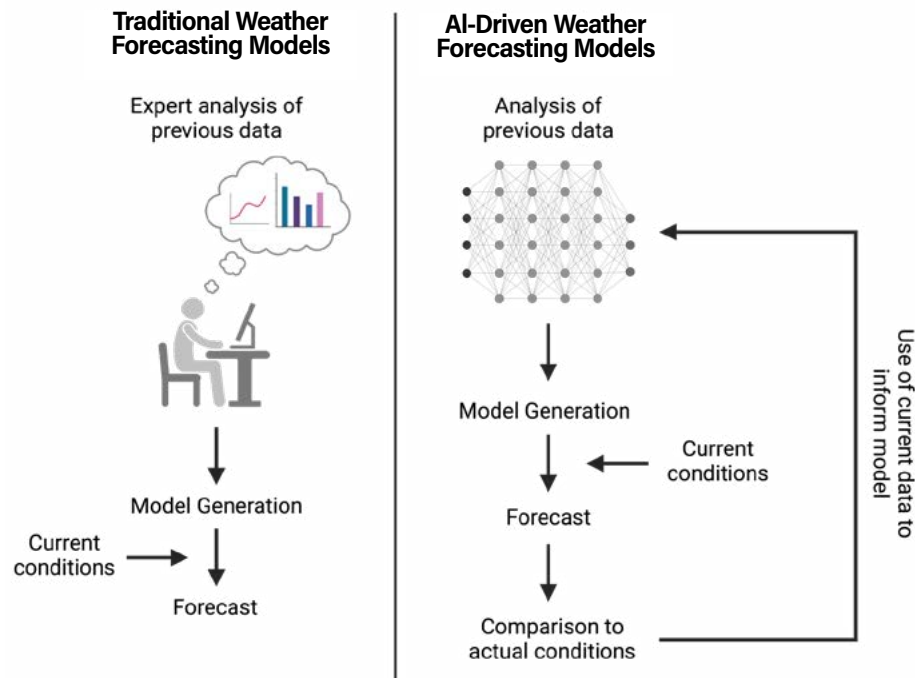
Consider stormfronts, for example. Most air forces hangar their aircraft in the face of dangerous storms to protect them from hail, lightning, and wind-tossed debris. U.S. bombers could chase that storm through enemy territory and attack enemy airfields while the planes are grounded.

“Now you’ve created an extra dilemma for the adversary,” Williams said. “Every time a stormfront comes through, they have to decide: Do I hangar my aircraft and create a nice, big target, or do I leave them out to the elements and take that chance?”

Targeting rings are another example. Surface-to-air weapons often use radar to detect threats out to a given range around them; that range expands or contracts based on atmospheric conditions. The right forecast can reveal gaps where threat rings may not overlap for a period of time.

Traditional vs. Artificial Weather Models

While the traditional numerical methods spend a lot of time and computational power on the physical details, the hybrid model streamlines this, making the whole process quicker and more efficient with its AI-driven learned physics module.



Source: Harvard University

“Now I’ve determined a time frame, an ingress point and possibly an egress point so our aircraft can get back to safety,” Williams said.

Space weather offers a third example: The sun can have a significant impact on communication and navigation. Because an electromagnetic attack can cause similar effects to solar flares, getting the two to coincide can leave adversaries confused as to the cause of a satellite communications blackout.

Of course, accurate forecasting can also alert friendly forces that solar flares might throw off GPS guidance—and by how much—or identify when supply routes are socked in by snow.

But unless the Airmen who study weather and environmental sciences are inside the planning cells, the insights they can provide won’t be fully understood by planners.

“Take them out of execution, out of tactical, and place them in the planning cells and the exercise cells, back in the traditional roles that we haven’t really done the past 20 years,” Williams said.

FLY THE UNFRIENDLY SKIES

The wars in Iraq and Afghanistan took place under desert skies that were usually clear of enemy resistance, rain, sleet, hail, snow, and the like. That won’t be the case if war broke out in overcast and rainy Eastern Europe, or in the typhoon-prone South China Sea.

In World War II, it took more than two years for the U.S. and Britain to achieve air superiority over Germany once the U.S. joined the war, and overcast, stormy weather proved a major impediment for much of that time. In a conflict with China, nonstop air superiority may not be possible, but U.S. strategy requires asserting air dominance at specific times and places.

Col. Bradley Stebbins, former commander of the 557th Weather Wing at Offutt Air Force Base, Neb., said weather can be leveraged to help achieve such “pulses” of air superiority.

“If you establish such a pulse of air superiority over a partic-

ular location in order to create an effect or meet the intent of the combatant commander, it might all be for naught if the weather doesn’t allow you to complete the objectives,” Stebbins told *Air & Space Forces Magazine* in June, before transitioning to become associate dean at the College of International and Security Studies at the George C. Marshall European Center for Security Studies.

Proactive weather planning requires re-familiarizing commanders with the decisive role weather can play in warfare. Stebbins pointed out the recent 80th anniversary of D-Day, revisiting when Gen. Dwight D. Eisenhower delayed the invasion a day to await a break in the storm. The German army, relying on less-capable forecasting tools, did not see that break coming.

“Combatant commanders, component commanders, and on down intuitively understand that the environment impacts them,” Stebbins said. “But do they know how decisive it can be?”

That’s not clear. The military likes to say it trains as it fights. But Williams said bad weather typically throws a wrench into exercise plans.

“The easy button is ‘we’re going to go do something else because the weather’s in the way,’” he said. “What we’re advocating is: You can still get that training done to an extent, but now you’re actually prepared against real-world weather events. Just because the weather is there, the war does not end, so how do you use the weather to your advantage?”

WICKED WEATHER

Weather forecasting has long been intertwined with computing power: The more powerful the computer, the more complex and accurate the prediction model. In fact, the headquarters building for the 557th Weather Wing was purpose-built around the powerful data center in its basement. Rising computer power and automation in the form of artificial intelligence and machine learning (AI/ML) should enable Airmen to devote more brainpower to answering more difficult questions than the baseline mechanics of weather prediction.

“They hone their tradecraft by developing forecasts: talking to pilots, doing those tactical-level skills,” Stebbins explained. “But their most valuable contribution is applying critical thinking from an environmental perspective to a wicked problem.”

Indeed, two Harvard University researchers wrote in a March blog post that as AI advances and data pools grow larger, meteorologists may “one day be able to forecast weather with even greater precision, finer resolution, and over longer time horizons.”

In the military, that could mean calculating the effects of El Niño on a future area of operation, for example. But as the speed of warfare increases, commanders must make decisions faster, which means weather Airmen will have to start coding solutions.

“I tell Airmen this, and they say, ‘Sir, I don’t know how to code,’” Stebbins said. “And I say, ‘You’re not necessarily going to need to know how to code expertly because the generative AI tools that you keep hearing about: OpenAI’s ChatGPT, for

Staff Sgt. Logan Hillesheim, a crew chief assigned to the Ohio Air National Guard's 180th Fighter Wing, services a liquid oxygen bottle during inclement weather while participating in Northern Lightning at Volk Field in Camp Douglas, Wis., in 2023.



Airman 1st Class Sarah Stalder-Lundgren/ANG

example, will produce code.”

Weather Airmen will need to understand coding well enough to employ secure generative AI tools to create solutions for commanders. For example, a tool might automatically alert leaders when the crosswinds are too strong for enemy aircraft to launch from a particular location, offering insight at speeds that would not be possible otherwise.

AI/ML could also empower weather Airmen who find themselves cut off from larger networks due to the nature of an operation or to enemy jamming. The Air Force's Agile Combat Employment strategy relies on Airmen dispersing in small teams to generate sorties from far-flung locations. AI/ML and pre-staged data dumps make that Airman at an austere airstrip with a laptop and a handheld Kestrel weather meter much more capable than his or her predecessors, Williams explained.

“Where AI/ML comes in is when I can generate a full-on forecast necessary for tactics on my laptop,” the colonel said. “If they have the ability to reach back and get fresh data, great, but if they don't, they have more than enough capability at their fingertips to do what they need to for that specific mission.”

DECISION ADVANTAGE

The Air Force weather enterprise wants to better integrate with decision-makers across the board, Stebbins said, with an emerging focus on information warfare, where a range of career fields including cyber, weather, and intelligence work together to reduce uncertainty and influence adversary behavior. Stebbins pointed back to the D-Day example, where reconnaissance, deception, and weather forecasting combined to give the Allies better information and therefore better decisions than the enemy.

“Information advantage enables decision advantage by commanders at every echelon,” he explained. “And if we do that correctly, enough times and in enough places, then we gain a continuing advantage for America and her allies.”

Weather is another element in the information warfare portfolio, Stebbins said, because it affects human behavior: Freezing rain might keep enemy aircraft socked in and a solar storm could wreak havoc in the ionosphere.

“The idea is to stay in the competition phase, and that's where information warfare is perhaps most effective,” he said. “How do we project a strong deterrent message to the enemy:

‘You do not want to take on the United States of America and her allies today.’”

CHALLENGES AHEAD

It's not all sunshine, of course. “The challenge is that we need to stay ahead of the enemy,” Stebbins said. “If they know the weather at a particular time in the future to a certain level, we need to know it further in advance, and we need to know it better. We've got to have that environmental information advantage. Just like every other weapons system, the Air Force weather weapons system must be better than the other guys.”

That will require investment, since supporting research and transferring it to operations takes money and talented Airmen.

Another challenge: 500 miles above the Earth, only two of the military's 60-year-old weather satellites are still functioning, leaving troops dependent on commercial and foreign satellites for weather insights. While those partnerships are essential, it's risky to depend on others for such important intelligence. Experts argue the military needs its own modern weather satellites to maintain access to data during a conflict.

The future “weather decision advantage is wholly dependent upon a new set of space-based environmental monitoring technologies—and the investment required to underwrite this crucial capability,” according to a policy paper published by AFA's Mitchell Institute for Aerospace Studies in November 2023.

Williams agreed. Adversaries gain a critical advantage if they have satellite coverage over parts of the world where the U.S. and its allies do not.

“Not having weather satellites up there is a huge, huge problem,” Williams said.

The Space Force needs resources to fund new weather satellites, but in an era when the Air Force must fund new fighters, bombers, tankers, trainers, ballistic missiles and more, replacing the weather satellite infrastructure has not gained the traction necessary to generate the funding for a program of record. Investing in that technology, however, could help build an Air Force weather enterprise that, like Mother Nature herself, would be difficult to stop.

“We're going to figure out how the adversary is going to react to weather so we can take advantage of it and impose a cost,” Williams said. “That's where weather is going.”





Office of the President of Ukraine

Air Superiority and Russia's War on Ukraine

The clear lesson from this conflict is the necessity to achieve air superiority for decisive advantage.

With an F-16 in the background, Belgium Prime Minister Alexander De Croo, left, Ukraine President Volodymyr Zelensky, and Belgium's Defense Minister Ludivine Dedonder listen to a military briefing at Melsbroek Air Base in Brussels, May 28, 2024.

By Lt. Gen. David A. Deptula, USAF (Ret.) and Dr. Christopher J. Bowie

The conduct of the war in Ukraine provides two distinct lessons on airpower. The first lesson is what not to do: The Russian air force's failure to establish air superiority at the outset cost Vladimir Putin's forces the ability to achieve a decisive victory at the start of the conflict. The second is about the difficulty of establishing air superiority with insufficient resources and capabilities. This is what has forced Ukraine to endure costly attacks on its territory throughout the war.

Both sides possess lethal air defenses that deny opposing air forces the ability to penetrate their battlespace. The result is an attrition-based conflict that benefits Russia.

Yet Ukraine still has the potential to turn things around. Properly equipped, Ukraine could conduct an integrated air-ground campaign to secure air superiority, in the times and places of its choosing, to reverse the territorial gains the Russian army has achieved up to this point. To do so, Ukraine must plan and execute operations that integrate their long-range surface-to-surface weapons with combat aircraft, drones, cyber operations, electronic warfare (EW), and special operations to achieve air superiority.

If successful, Ukraine could gain an advantage over the Russians, breakthrough their front lines, and change the course of the war.

F-16s are about to enter Ukrainian service, but what



The Significance of Air Superiority: The Ukraine-Russia War. Download the entire report at <http://MitchellAerospacePower.org>.

effect they have depends on many factors: the number of F-16s and F-16 pilots available for combat operations; the level of training and pilot proficiency and experience; the capability, or block, of the F-16s provided; the weapons available; the numbers, level of training, and proficiency of F-16 maintenance personnel; and the ability of the aircraft to survive and operate under Russian attack, among others.

Currently, neither Russia nor Ukraine is using combat aircraft to conduct deep strikes, relying instead on missiles and drones. The lethal air defenses on both sides have resulted in a state of air parity, in which neither force has control of the air. Still, Ukrainian air defenses, combined with innovative indications and warning practices, have successfully limited the damage caused by Russian air attacks, despite Russia's numerical advantage in aircraft.

A key advantage for Russia thus far has been the freedom to operate from a sanctuary. Restrictions imposed on Ukraine have limited the employment of weapons provided by the U.S. to the use in Ukrainian territory and airspace. Russia possesses air superiority over its own territory and some portions of the battlespace in Ukraine. Ukraine's President Volodymyr Zelensky recently highlighted this condition as his military's top concern. Fortunately for Ukraine, the poor leadership, lack of training, and ground-centric doctrine of Russia's Aerospace Forces, or VKS, limit their potential. Russian airpower impacted the war much less than originally expected. But the VKS is learning from its earlier mistakes—and improving.

THE THEATER AIRPOWER BALANCE

The Ukrainian Air Force (UkAF) is an independent military service, reorganized in 2004 to integrate aviation and the missiles, guns, and radar of its ground-based air defense (GBAD) forces. Russia also maintains an independent air force, reorganized in 2015 to include the space forces. The VKS comprises aviation and GBAD units (though the Russian army also maintains separate air defense capabilities), but coordination of air operations is the responsibility of ground force commanders, not the VKS, thus inhibiting Russian forces from exploiting the full potential of airpower.

In the buildup to war, the balance of airpower was strongly in favor of Russia, which fielded 350 combat aircraft in the region, capable of hundreds of sorties per day. Among them were some of Russia's most advanced combat aircraft, including Su-30, Su-34, and Su-35S jets. In addition to its numerical advantage, the VKS also enjoyed a significant qualitative edge, with better radars and longer-range missiles. Russian fighters demonstrated they could gain a radar lock and execute "fire and forget" missile launches at 50 nm in combat. In one instance, a Russian fighter reportedly shot down a Ukrainian fighter at a range of 95 nm. The VKS fielded significant and effective EW capabilities and a small fleet of AWACs aircraft, whose long-range radar provided early warning to Russian combat air patrols. VKS fighter aircrews had combat experience flying in Syria, but had limited experience in complex operations and delivering precision-guided munitions (PGMs).

Ukraine entered the war with a much smaller and less capable force—roughly 50 MiG-29s and 32 Su-27s, plus about 40 Su-24 and Su-25 ground attack aircraft. While lacking combat strength, however, the Ukrainian pilot force was able to rapidly adapt during the first days of the war, shifting to low-altitude operations for self-protection, for example.

Air defense was a key task for the former Soviet armed forces, and both Russia and Ukraine inherited and maintained large GBAD establishments. After Russia, Ukraine has the second-highest density of GBAD in Europe. These layered GBAD capabilities consist of air defense radars, long-range (SA-10) and medium-range (SA-11 and SA-8) SAM batteries, anti-aircraft guns, and thousands of man-portable air-defense missiles (MANPADS). Following the Russian invasion in 2014, the UkAF prioritized modernizing this force and as the war progressed, it added contributions from NATO members, including Patriot/Hawk batteries and mobile short-range air defense systems such as Gepard and Avenger.

Russia's GBAD forces are similar, though larger, more modern, and more capable. They include the SA-21, which can combine with modern tracking and targeting radars to deliver a three-fold increase in engagement range over the SA-10. In combat operations, a long-range Russian SAM reportedly shot down a Ukrainian aircraft at low level from a range of 80 nm. To date, the lethality of Russian and Ukrainian defenses against penetrating aircraft has dominated the course of the air war.

RUSSIA'S ATTEMPT AT AIR SUPERIORITY

As Russian forces moved to attack at the start of the war, the UkAF dispersed its aviation assets to secondary and tertiary airfields to complicate Russian attacks. Deployable support kits enabled aircraft maintenance in the field and support personnel were trained to do maintenance and preflight inspections from the dispersed fields. Munitions stocks were relocated for security, and dummy batteries and radar sites, augmented by signals deception, were set up to draw attacks. Then, hours before the Russian assault, GBAD units also began to disperse. Although most survived, the haste and timing of this dispersal made a coordinated defense

more difficult during the opening phase of the conflict.

The Russians mistakenly expected their invading forces to be greeted with open arms throughout Ukraine. Russia's concept of operations was to employ special forces to eliminate Ukraine's political leadership in Kyiv—a task planned to take just a few days—while ground forces would trap Ukraine's army in the east and southeast and the air force would degrade Ukraine's air defense capabilities to gain control of the air.

With the opening of hostilities on Feb. 24, 2022, widespread electronic attacks sought to disrupt UkAF air defense radars, while aerial drones were employed to bait UkAF SAM batteries into revealing their positions. Russian penetrating aircraft and long-range missiles struck some 100 Ukrainian air defense targets (air bases, radars, SAM and anti-aircraft batteries, and command and control nodes), knocking out multiple radars and SAM batteries. But Ukraine's prewar dispersal ensured that most of Ukraine's aviation and GBAD units survived. Meanwhile, Russia's dynamic targeting and battle damage assessments proved slow, incapable of locating mobile UkAF GBAD units or dispersed aircraft, which took the lead in countering Russian air operations until the GBAD could reconstitute.

In the initial assaults, Russian fighter bombers averaged about 140 sorties per day, typically flying at medium altitudes to depths of 150 nm. VKS fighters, flying in single- to six-ship formations, struck the initial target set with mostly unguided weapons and poor accuracy. Russian Su-35 and Su-30 fighters flew medium- and high-altitude combat air patrols in support of the penetrating aircraft during the first three days, reportedly scoring multiple kills of Ukrainian MiG-29, Su-27, Su-24, and Su-25 aircraft. Ukrainian fighters, flying low to evade radar detection, also reportedly scored multiple kills. Heavy aerial combat operations concentrated around Kyiv.

UkAF fighters and drones, in combination with ground forces, inflicted heavy casualties on Russian armored forces advancing in a single column and to seize the Ukrainian capital. These forces, mired in traffic jams, had expected to take on occupation duties, not execute ground combat operations, and were unprepared for fierce resistance. Within three days, Russia's ground offensive bogged down, and with ground forces needing fire support, the VKS had to switch from controlling the air to close air support.

While historically consistent—aviation support for Red Army movements in WWII were called "aerial artillery"—this choice in a modern war was a strategic miscalculation. If the VKS had continued its counterair campaign, Russia might have achieved air superiority.

For deeper penetration strikes, the VKS used missile attacks against radars, bases, and infrastructure targets, firing about 24 missiles per day on average over the first three months of the war. Unable to respond to the rapidly changing battlespace, however, Russia failed to significantly degrade Ukraine's IADS. As a result, VKS fighters began low-level strikes to avoid Ukrainian radars, attacking Ukrainian forces in the front lines with unguided bombs and rockets. But flying predictable flight routes day after day, they exposed their jets to Ukraine's thousands of MANPADS, losing an estimated eight fighters in a week. Fratricide added to Russia's losses.

By the fall of 2022, the two sides reached a stasis that continues to the present day. MANPADS rendered daytime low-level sorties too dangerous, while SAMs and fighters made medium- and high-level altitudes lethal to penetrating sorties on both sides. Russia succeeded in pushing UkAF GBAD units back from the front lines, enabling the VKS to send glide bombs against Ukrainian positions, but the VKS was deterred from flying inhabited aircraft in deeper penetration missions, forcing it to rely on



An image from a Ukrainian army video shows a Ukrainian drone pilot from the 43rd Separate Mechanized Brigade "Heavenly Dream" holding a Taras Bomber drone armed with an explosive device at an undisclosed location on Oct. 5, 2023. This mobile group consists of a commander, a pilot, and an engineer. Intelligence units provide target coordinates so personnel can prepare their drones to deliver munitions to enemy positions.

Army TV/Ukrainian Army Military Channel

drones, cruise missiles, and ballistic missiles. Ukraine's defenses proved highly effective against those weapons. For instance, in May 2023 Ukraine reported shooting down around 90 percent of Russian cruise missiles and drones and nearly 80 percent of air- and ground-launched ballistic missiles nationwide. Patriot missiles, where employed, shot down 100 percent of incoming ballistic missiles. Such success illustrates why VKS combat aircraft were reluctant to penetrate these defenses.

In some respects, the air environment that evolved in Ukraine by the summer of 2022 illustrates the same fears held by the U.S. Air Force regarding GBADs following the 1973 Arab-Israeli War, when Soviet-supplied SAMs and guns shot down 60 Israeli fighters in four days. That success helped drive the United States to develop stealth technology in the 1970s as a means to counter integrated air defenses. The F-117 stealth fighter proved how effective stealth can be in the 1991 Gulf War, fueling an appetite for stealth that included the B-2 bomber, the F-22 and F-35 fighters, and the B-21 bomber over the next three decades.

UNINHABITED AERIAL VEHICLES

A signature element of this conflict has been the rapid development and employment of uninhabited systems—both by Ukraine and Russia. Although UAVs have been employed in multiple wars dating back to World War II, we have never seen such wide use of these systems in combat. In 2023, Ukraine sent 100,000 small drones to the front and conducted almost 200 long-range strikes using kamikaze/attack drones against Moscow and bomber bases. Russia, in turn, fired thousands of ballistic and cruise missiles as well as attack drones against Ukraine. While short-range quadcopters currently flying over the front lines already provide surveillance and targeting information, and offer limited precision strike capabilities, the longer-range uninhabited systems now proliferating across the battlefields in Ukraine represent the real potential of these lower-cost precision strike systems.

Historically, developing nations attempting to use airpower for offensive strikes have not fared well when confronting advanced Western powers: Think of Egyptian and Syrian aircraft losses at the hands of Israel in the 1967 and 1973 wars or the Iraqi Air Force against allied forces in 1991 and 2003. For decades, long-range precision strike conferred a significant military advantage to the United States and other Western powers. In Ukraine, however, the

fielding of a new generation of UAVs shows the potential is clear for less-developed forces to acquire precision long-range strike capability, including those employing irregular warfare tactics and terrorists. Not only are these weapons effective, but they can be affordably manufactured in quantity by non-state actors.

The cost to counter these weapons can be disproportionate. Iran's massive air attack against Israel in April 2024 consisted of hundreds of such UAVs, as well as cruise and ballistic missiles. While nearly all were shot down—or ignored if they did not have a lethal trajectory—the cost of intercept was significant.

Ukraine and Russia now fly thousands of sorties per month in the battlespace using short-range small UAVs, or drones. Both use commercial drones and military variants along the front lines. Indeed, Ukraine recently formed a separate branch of its armed forces to accelerate innovation in ground, maritime, and aerial uninhabited system development.

Small drones, roughly the size of a football, can be used for surveillance of the battlefield or direct attacks, where the drone is fitted with a small explosive charge and flown by an operator with a first-person view (FPV) camera directly into Russian armored vehicles, bunkers, and trenches. Buoyed by operational success, Ukraine is constructing thousands of small drones, using commercial components fitted into a 3D-printed airframe. After deploying 100,000 small drones to the front in 2023, Ukraine plans to build 1 million in 2024—about 3,000 a day—in some 200 factories spread across the country. The drones give platoon-sized elements their own ISR capability, a key to survival along the stalemated front lines.

Loss rates are high—the small drones are vulnerable to electronic attack and typically only survive for a few sorties—but their low cost allows both sides simply to buy and field more. The small drones perform important roles in surveillance and targeting, making hidden ground maneuver extremely difficult while providing precise targeting information to artillery, contributing to the current stalemate on the ground.

Longer-range attack drones have also seen widespread use. The Iranian Shahed loitering munition provides a useful illustration. Iran began developing UAVs 40 years ago during the Iran-Iraq War and now fields and exports a wide array of UAVs for reconnaissance/surveillance and strike. Iran has since supplied Shahed 131/136 attack drones to Russia, which is now manufacturing its own improved variant.



General Staff of the Armed Forces of Ukraine

An image from a video shows a Russian Mi-24 Hind helicopter gunship in flames after it was shot down 25 miles north of Kyiv, Ukraine, by a Stinger portable air-defense missile in 2022.

Shaheds can be launched from ground sites or the back of trucks using a boost rocket. The airframe is powered by a small gas engine driving a wooden propeller. Guidance is provided by satellites and an inertial navigation system. Flying at low altitudes and 115 knots, Shaheds deliver 30 to 50 pounds of explosive payload and can travel 700 to 800 nm (similar to a fighter aircraft). At \$20,000 to \$50,000, they cost a fraction of a manned system. Between September 2022 and August 2023, Russia fired roughly 1,600 Shahed drones and 1,651 missiles. Ukraine's defense forces use guns, if possible, to shoot down the Shaheds to preserve SAM stocks.

Ukraine plans to build thousands of systems like the Shahed—long-range attack drones capable of deep strikes. After the launch of a development effort in spring 2022, 10 companies in Ukraine are now making drones that can reach Moscow and St. Petersburg. As Ukraine's digital minister stated, "The category of long-range kamikaze drones is growing with a range of 300, 500, 700, and 1,000 kilometers. Two years ago, this category did not exist." New Ukrainian long-range UAV types are being field-tested and incorporated into the inventory. Ukraine now fields and has used UAVs out to a range of 1,500 km against Russian infrastructure targets, as well as a new MQ-9-like variant that has an advertised range of 3,300 km.

Ukrainian operations employing these systems have ramped up over time. Ukrainian long-range attack drones hit a Russian oil refinery in June 2022 near Rostov, then conducted strikes against Crimea, including an attack against the headquarters of the Black Sea Fleet and Saki Air Base, reportedly damaging or destroying 10 aircraft. In October 2022, Ukraine hit the Tu-22M3/BACKFIRE at Shaykovka, damaging two bombers. From January through September 2023, Ukraine conducted 190 long-range drone attacks against targets including oil fields, air bases, and even the Kremlin in Moscow. In August 2023, Ukraine hit six locations in Russia and Crimea, including Pskov Air Base, roughly 350 nm from the Ukrainian border, damaging four military airlifters. Nine months later, UkAF long-range strike drones attacked a Russian drone factory and an oil refinery 700 nm from the Ukrainian border.

GAINING AIR SUPERIORITY

If there is any lesson to extract from the Russia-Ukraine war to date, it is the absolute necessity of air superiority to achieve a decisive advantage. Without it, the conflict has devolved into a relative stalemate, resembling—literally—the trench warfare of World War I. Neither side has the freedom of maneuver and attack that air superiority enables, and victory is likely to go to the

side with the most warfighting personnel and materiel—Russia.

Two elements are required to achieve air superiority. The first is offensive counterair (OCA) missions, which seek to gain control of the airspace to provide friendly offensive forces (in whatever domain) the freedom of maneuver to fight without adversary air interference—that is, to attack at a time and place of one's choosing. OCA has five components:

- 1. Neutralizing Enemy Air Threats:** OCA missions aim to target and destroy enemy aircraft, including fighters, bombers, and reconnaissance platforms, as well as other airborne threats such as drones. This also includes attacking an adversary's bomber and fighter forces before they launch weapons.

- 2. Destroying/Suppressing Enemy Air Defense Systems:** Targeting enemy air defense systems, such as surface-to-air missile sites, radar installations, and anti-aircraft artillery paves the way for follow-on operations, including close air support, interdiction, and conventional strategic attacks against enemy centers of gravity.

- 3. Protecting Friendly Forces and Assets:** By gaining control of the airspace, OCA missions can help protect friendly ground and naval forces, as well as critical infrastructure. This enables friendly forces to maneuver effectively and at reduced risk.

- 4. Facilitating Follow-On Operations:** Once the airspace is secure, friendly forces can conduct reconnaissance, surveillance, and strike missions with reduced interference and risk.

- 5. Supporting Overall Campaign Objectives:** By disrupting enemy air operations, OCA missions help shape the operational environment in favor of friendly forces.

Defensive counterair (DCA) missions are the second major element necessary to achieve air superiority. This ensures friendly airspace, forces, and assets are safe from enemy air threats. DCA can be used to achieve freedom from attack, and can be decomposed into five components:

- 1. Protection of Friendly Forces:** The primary objective of DCA missions is to safeguard friendly ground forces, naval assets, air bases, and critical infrastructure from enemy air attacks.

- 2. Securing Air Sovereignty:** By intercepting unauthorized or hostile aircraft entering the airspace, DCA operations uphold national sovereignty and prevent airspace violations.

- 3. Air Defense of Vital Areas:** Deploying air defense assets such as fighter aircraft, SAMs, and anti-aircraft artillery, this ensures a layered defense for vital command centers, logistics hubs, communication nodes, and population centers from enemy air threats.

- 4. Maintaining Operational Freedom:** Neutralizing enemy air threats and denying adversary air superiority allow for the

unhindered generation of air and ground operations and logistical activities.

5. Protecting Strategic Assets: DCA missions ensure the continuity of military operations and national defense capabilities by protecting strategic assets, such as air bases, ports, air defense installations, and critical infrastructure.

6. Escorting and Protecting Friendly Aircraft: DCA missions may involve providing escort and protection for friendly aircraft, including bombers, reconnaissance aircraft, and strike fighters, during their missions.

The most important step to achieving air superiority for Ukraine will be the development of an integrated air and ground campaign that leverages a wide range of capabilities: UkaF aviation and GBAD, persistent surveillance and reconnaissance, long-range attack drones, army long-range fires, electronic warfare, cyberattacks, deception, special operations forces, timely intelligence from NATO allies, and tight coordination with the ground forces. Developing this campaign and acquiring the resources to conduct it will require detailed planning—but it could change the course of the war.

CONCEPT OF OPERATIONS

The 1991 Operation Desert Storm air campaign “was perhaps the most successful war fought by the United States in the 20th century,” according to a GAO report on the war. What made that success possible was its effects-based approach to planning, execution, and assessment, which tied tactical military actions to the ultimate political objectives for which military force was being applied. This effects-based methodology can be applied to any military operation.

Effects-based campaign planning begins with setting the strategic end-state upfront and unfolds by identifying the operational-level centers of gravity as target sets, along with tactical level targets that must be engaged to achieve those operational objectives. Cyber operations, deception and decoys, special operations, drones, anti-radiation missiles, electronic attack, and lethal precision attacks from both air- and ground-based weapons must all be coordinated to achieve air superiority. As Air Force doctrine states, this requires both a comprehensive plan and an effective command and control philosophy.

For Ukraine, the first step is for UkaF to work with the army to determine the optimal locations and times to gain air superiority. The desired effect is to use control of the air to gain momentum on the battlefield and begin reversing the gains the Russian army has achieved to date. Then, with the initial breaching of Russian lines, UkaF airpower must be employed to assist in the attack and, simultaneously, interdict Russian reinforcements being rushed to the area. With control of the air in critical areas, UkaF airpower assets such as the F-16s entering service can deliver heavy weapons to disrupt Russian ground forces, smash artillery positions, and pave the way for Ukrainian army breakthroughs on the ground.

Intelligence is the next area of focus. Here, Ukraine has a significant advantage, given that the U.S. and its NATO allies are already providing timely intelligence on the location of key Russian units and capabilities, such as radars, SAMs, air bases, artillery batteries, jammers, and other high-value targets. Providing the Ukrainian Air Force with its own ISR-capable aircraft, like the MQ-9 Reaper, would also help in this regard. As the campaign progresses, intelligence must be rapidly provided to Ukrainian military leadership and combat units.

As part of campaign preparation, an important step is the building and fielding of thousands of long-range attack drones. Ukraine already has a head start on this venture and has demon-

strated the potential in strikes over the past year. Ukraine’s allies could provide valuable assistance—the drones are low tech and low cost and can be manufactured in small factories in multiple nations. Harnessing additional advanced economies in this task could enable the rapid establishment of significant attack drone inventories.

Ground forces must likewise be integrated to assist in the suppression of enemy air defenses by employing long-range fires, such as the High Mobility Artillery Rocket System (HIMARS), ground-launched cruise missiles, and the Army Tactical Missile System (ATACMS). These long-range missiles can reach into Russian-occupied territory to eliminate key GBAD targets, such as radars and SAM batteries, and are more difficult to counter than slow-speed drones. Restrictions on their use, however, have hampered Ukraine to Russia’s benefit, and must be removed. Special operations forces and cyberattacks also have a role to play in this phase of the campaign. The UkaF and the Ukrainian ground forces must work in a truly integrated fashion to target and suppress Russian air defense systems.

UkaF GBAD units, notably the long-range S-200s, S-300s, Patriots, and other air defense systems, can help by threatening Russian fighter combat air patrols (CAPs), and electronic warfare (EW) assets could “sanitize” the airspace, grounding enemy reconnaissance and surveillance drones and degrading Russian SAM radars.

Air superiority is achievable if the tools outlined above are integrated into a cohesive, comprehensive, and integrated plan.

RECOMMENDATIONS

The comprehensive, integrated campaign proposed here can not be achieved by Ukraine alone. To be successful, the United States and its NATO allies must take a series of steps, and Ukraine must follow with steps of its own:

1. The United States should immediately remove constraints on U.S.-made weapons to help Ukraine defend itself against its much more powerful and well-equipped invader.


2. The United States and NATO should provide Ukraine with timely intelligence to make quick and decisive determinations to achieve windows of air dominance.

3. The United States and NATO must ensure military aid to Ukraine is sufficient to enable strategies that can achieve decisive outcomes and move Ukraine toward victory. Merely ensuring their survival against a greater force for a little bit longer buys only time, not victory.

4. Drop its Soviet-based military doctrine at all levels and focus on establishing air superiority, rather than using air assets to support ground maneuvers.

5. Evolve its current ground control intercept, and command and control doctrine to ensure that SAMs and friendly fighter aircraft can operate in the same airspace simultaneously.

6. Incorporate its Air Force leadership into the Ukrainian General Staff to foster and facilitate integrated, all-domain concepts, planning, and employment.

Lt. Gen. David A. Deptula (Ret.) is one of the world’s foremost airpower experts and Dean of AFA’s Mitchell Institute for Aerospace Studies. He visited Ukraine in April 2024 and shared his views with senior military, government, and Air Force leaders. Dr. Christopher J. Bowie worked at RAND on airpower doctrine and strategy, on the Secretary of the Air Force’s personal staff from 1989-1991, and later was Deputy Director for Strategic Planning on the Air Staff. He was Director of Northrop Grumman’s Corporate Analysis Center for more than a decade and is now a non-resident fellow at the Center for Strategic and Budgetary Assessments. 

Space Order of Battle: Beyond Domain Awareness

A more contested space domain calls for better-prepared Guardians and faster responses to dangers in space.



Mike Tsukamoto/staff; Pixabay

As space becomes more contested, the risk of encounters, such as this fictional standoff between a U.S. satellite and one belonging to a rival, is increasing, prompting a greater need for understanding the space order of battle.

By Maj. Gen. Thomas Taverney, USAF (Ret.)

The U.S. has been the dominant player in space for over 40 years. That has enabled commercial development of space capabilities to grow and thrive, freely and openly, both domestically and across much of the industrialized world. Today, a thriving global commercial space industry supports more than 60 nations in space.

However, today threats in space are significant. Increasingly, U.S. space capabilities are contested, as Russia and China pursue threatening capabilities to challenge what was once U.S. dominance and have become near parity. Each has been provocatively demonstrating capabilities, announcing intent for a variety of individual space weapons and even deploying systems that challenge U.S. superiority in space. This means the U.S. can no longer simply provide the space situational awareness (SSA) needed for observing and tracking and the space domain awareness (SDA) necessary to determine intentions, capabilities, and behaviors, but must be ready to conduct a space battle at speed.

“We have to keep in mind that space as a contested domain changed radically. The way we operate in space has to change.”

—Chief of Space Operations Gen. B. Chance Saltzman

This requires that we gain a full understanding of the entire space order of battle (SpOB) to underpin the ability to execute “Dynamic Space Operations” if these capabilities do not deter our adversaries.

Three years ago, Secretary of the Air Force Frank Kendall defined seven Operational Imperatives and listed “Defining Resilient and Effective Space Order of Battle and Architectures” at the top of his list. It was at once the broadest and most impactful of the imperatives, given that U.S. space capabilities are the foundation of America’s ability to project power not just beyond the Earth, but in every domain on Earth—air, land, sea, undersea, and even cyberspace. As Chief of Space Operations (CSO) Gen. B. Chance Saltzman said in March: “We see an incredibly sophisticated array of threats, from the traditional SATCOM and GPS jammers to more destabilizing direct-ascent anti-satellite weapons across almost every orbital regime, to on-orbit grapplers, optical dazzlers, directed-energy weapons, and increasing cyberattacks both to our ground stations and the satellites themselves.”

The Space Force’s chief of intelligence and the

National Space Intelligence Center (NSIC) assess threats by evaluating the capabilities, performance, system limitations, and vulnerabilities of potential adversaries. Thus informed, the CSO is responsible for developing and tailoring the space capabilities U.S. joint forces need to ensure access to space for U.S. and allied operators and to ensure the U.S. can hold at risk the space capabilities adversaries depend on for their own military operations.

62 YEARS OF HISTORY

Space has been a warfighting domain since 1962, when both Russia and the U.S. first pursued anti-satellite (ASAT) weapons. The Air Force's Program 505 conceived of a prototype Nike Zeus anti-ballistic missile with a 1 megaton warhead to destroy potential space weapons threatening the U.S. Tests at White Sands Missile Range, N.M., began in December 1962 with dummy warheads. After several successful tests, the system was deployed to Kwajalein Island in the Pacific, where it remained operational until its retirement in May 1966. Program 437, a Thor-launched Direct Ascent ASAT missile, operated from June 1964 to May 1970; the system was tested at Johnston Island eight times, always without the nuclear warhead.

Russia developed and demonstrated a co-orbital kinetic satellite interceptor called the Istrebitel Sputnikov (IS-Destroyer of Satellites) from 1967 to 1983. The system used radar and a heat-seeking guidance system to get within 1 kilometer of its target, at which point it would deploy a shrapnel warhead to kill the satellite. In February 1970, the Soviet Union conducted its first successful intercept with the weapon, firing on the Kosmos 217 target. Some 23 launches, including seven intercepts, followed, and it was declared operational in February 1973. Each intercept created between 80 and 109 trackable fragments. Russia's Polyus, Almaz, and Aryad ground lasers followed.

The U.S. military demonstrated the Airborne ASAT in September 1985. Since then, China, Russia, and India have demonstrated numerous on-orbit, direct-ascent, and ground-based weapons, all of which could potentially threaten U.S. satellites. In September 2006, China used a ground-based laser to dazzle a U.S. classified optical reconnaissance satellite, temporarily blinding the system. China and Russia have also attacked

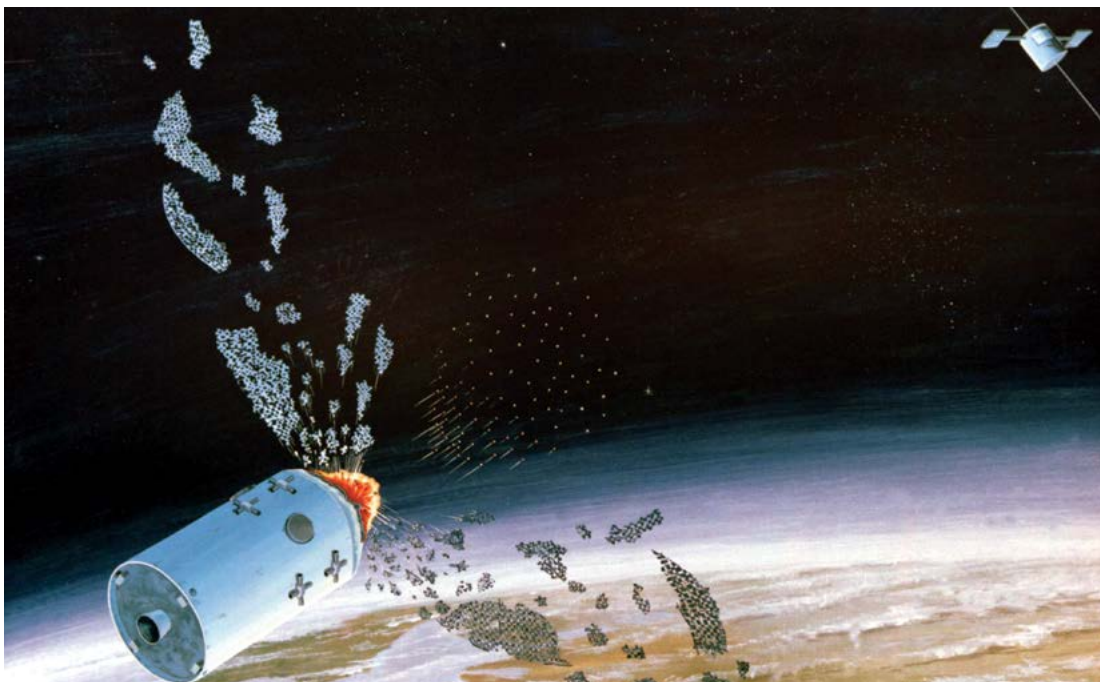
American space assets with cyber technology.

In those days, U.S. forces could provide only space traffic management and minimal space systems awareness, for collision avoidance from intentional threats. Over time, however, space situational awareness would grow, supported by sensors on the ground and in space. On Jan. 11, 2007, the Chinese anti-satellite missile test occurred. Then-Col. Stephen Whiting the Joint Space Operations Center commander noted, "We watched that test unfold over time, and we led the response for U.S. STRATCOM. We spent weeks and weeks figuring out how we would notify national leadership in real time. And those of us who were there, including then-Maj. Gen. Willie Shelton, Lt. Col. Chance Saltzman, and Maj. DeAnna Burt, knew the world had changed, on that day."

We subsequently moved from SSA to SDA, which meant thinking about activities in space globally, rather than on specific systems in isolation. The threats affecting the space environment have advanced significantly since 2007 and by 2019, expanded to include ground-based lasers, signal jamming, direct-ascent weapons, co-orbital threats—some equipped with robotic grappling arms—and even threats of nuclear ASAT weapons in space. This (along with other threats of hypersonic missiles and fractional orbital bombardment systems), has raised the stakes enough that Congress saw the need for an independent Space Force, with its mission to "Secure our nation's interests in, from, and to space."

Joint Publication 3-14, Joint Space Operations, describes space as a region "defined by altitudes rather than a nation's borders or latitude/longitudinal coordinates." Beginning 100 kilometers (54 nautical miles) above mean sea level and continuing into deep space, this area of operations is virtually limitless. Today, we know that threats in space no longer just reside in Earth orbit. As we move to the moon and Mars, the competition with China will certainly continue, and because of the great distances, responses will become more complex. JP 3-14 specifically defines the near-term area of concern as "ex-geosynchronous (XGEO)" orbit—that is, beyond about 36,000 kilometers (about 19,000 nautical miles), to include cis-lunar space, lunar orbit, and the Earth-moon Lagrange points.

To ensure access to the XGEO environment for both com-



The Soviet-era Istrebitel Sputnikov anti-satellite system, shown here attacking another satellite, used radar and a heat-seeking guidance system to get within 1 km of its target, where it could deploy a shrapnel warhead to kill the satellite.

DOD illustration

mercial and exploratory objectives, the U.S. faces a challenge unseen since the struggle to ensure freedom of navigation across the Earth's oceans. Like the seminal work of Rear Adm. Alfred Thayer Mahan, who defined the naval strategies and doctrine needed to secure our sea lines of communication over a century ago, we must now do the same to protect and defend our vast space area of responsibility.

READY FOR WAR IN SPACE

The United States would prefer to be in a state of competition with the People's Republic of China and Russia rather than in crisis or open conflict. That requires deterrence.

In General Saltzman's CSO C-Note 20, he lists current USSF goals and objectives to include "conducting low-intensity operations without compromising high-intensity readiness. The military of a great power must have the capacity to engage in protracted, day-to-day competition with its rival. Failing to do so cedes advantage and endurance. At the same time, a great power military must also prepare for high-intensity conflict, demonstrating the combat-ready credibility that underscores deterrence."

He goes on to say the Space Force must develop a space warrior mindset via the following measures:

- The U.S. Space Force will need to be able to fight through disruption by improving defensive capabilities and increasing options for reconstitution, while assisting allies and partners in doing the same.

- Provide assured delivery of capabilities to our warfighters.

- Provide capabilities and tactics, techniques and procedures (TTPs) for suppression of enemy space capabilities.

- Shift from static to dynamic operations.

A space war could be very short, over in just 24 to 48 hours, because of the relatively limited number of key satellite assets both sides possess. A move to blind early warning, jam GPS and critical comm systems, and otherwise cripple critical space capabilities would likely occur with simultaneous or nearly simultaneous attacks. Therefore, the United States must be ready to fight and win a conflict in space within minutes of warning. To do so requires a comprehensive offensive and defensive space order of battle, to enable Guardians to fight

dynamically with speed and exercised and rehearsed tactics, techniques, and procedures from the moment conflict begins.

There are two foundational elements to this approach: First, the Space Force's posture and order of battle and capabilities available, and second, USSF's ability to understand and monitor our adversaries' posture, capabilities, and order of battle. The Space Force has made significant progress developing a resilient U.S. space architecture and space order of battle capable of operating while under attack. However, work remains in developing and understanding the U.S. space "dynamic offensive & defensive response" needed to rapidly respond to the potential actions of an adversary.

This requires a further evolution beyond space domain awareness to a full understanding of the "offensive and defensive" space order of battle. While we would obviously prefer to be in a state of competition with our adversaries, the risk of crisis or open conflict demands we prepare for the worst.

COMPETITIVE ENDURANCE

In C-Note 15, General Saltzman defines his concept of "Competitive Endurance" as engaging strategic rivals long-term in pursuit of U.S. national interests without compromising the safety, security, stability, or long-term sustainability of the space domain. To do that, he wants Guardians to think critically, to challenge assumptions, test new ideas, share those ideas broadly, and to do these things with a clear sense of urgency.

"Our adversaries must never be desperate enough or emboldened enough to pursue destructive combat operations in space," General Saltzman wrote in that forcewide note. "We must have the capability and fortitude to endure in a long-term state of competition because doing so is preferable to crisis or conflict in the domain. The goal of Competitive Endurance is to ensure our ability to achieve space superiority when necessary while also maintaining the safety, security, stability, and long-term sustainability of space."

The Space Force must maintain "stability in Space and contest, deter and, when directed, fight in and control the space domain," he wrote, in order to "assure delivery of capabilities to our warfighter—without interruption—and deny adversary space capabilities that threaten our warfighters."

The recent launch of WorldView Legion satellites marked a collaboration between the U.S. Space Forces - Space and Maxar Technologies, a geospatial insights company. In April, members of the 18th Space Defense Squadron worked with Maxar civilians at Vandenberg Space Force Base, Calif.



Major Julian Labit

To achieve these goals, USSF must have the means to stop aggression before it starts; quickly respond at the time, location, and method of its choosing, and contain potential conflict before it grows into something worse.

To avoid operational surprise and prevent conflict in space, USSF must be able to “identify behaviors that become irresponsible or even hostile, and to detect and preempt any shifts in the operational environment that could compromise the ability of the joint force to achieve space superiority.” This means not just knowing when adversaries make a move, but also understanding the implications of the move and the TTPs available to counter it.

The predictability of orbits gives the offense a particular first-mover advantage in space, which is why resilience—that is, the ability to take losses, adapt, and survive despite an attack—is crucial to denying that first-mover advantage. The United States must be able to absorb losses and continue to operate, leveraging responsive launch capabilities that enable USSF to rapidly restore or reconstitute degraded capabilities. Strong offensive and defensive capabilities will allow us to defend against attacks and to conduct attacks of our own, if warranted. The Space Force strategy today seeks to make an attack on satellites impractical, even self-defeating, to discourage adversaries from taking such actions in the first place.

Deterrence can come in both offensive and defensive forms. Offensive deterrence discourages threats by holding selected adversary space capabilities at risk using means that will neither destroy nor damage the space environment. The offensive TTPs need to have been rehearsed and the operations team prepared to implement in a pre-approved fashion so that we can operate at the speed of our adversaries.

Defense can also deter aggression in space, through the ability to defeat threats by overcoming them without being destroyed. With the speed of activities in space, we need to have defensive responses that we have rehearsed and exercised immediately available to our space operators. A third form of deterrence is resilience: Both proliferated constellations that can absorb losses without impact to operations and responsive space, with which lost capabilities are rapidly reconstituted can provide a deterrent effect.

Offensive and defensive space operations may be necessary to prevent adversaries from leveraging space-enabled targeting to attack our forces—but we must balance our counterspace efforts with the need to sustain allied space assets in every orbit. We must protect the joint force from space enabled targeting, while simultaneously understanding that we cannot have a Pyrrhic victory in this domain. In other words, efforts to control the domain cannot inflict such a devastating toll on the domain itself, that our orbits become unusable for operations. The critical element in this battle will be speed, and this needs to be built on a foundation of understanding and being prepared built upon a robust SpOB.

If we cannot stop an adversary from being the first to move, we must be prepared to be faster in our responses than they will be in their aggression. We cannot take time to contemplate the situation, or the war will be over before we can act. We must understand where all the potential threats are and have exercised and rehearsed responses with well-trained Guardians. If we cannot stop an adversary from being the first to move, we must be prepared to be faster in our responses than they will be in their aggression.

Competitive endurance, therefore, is the driver to a more robust understanding of our adversaries and the need to evolve from domain awareness to a clear understanding of the space

order of battle.

“Do we have the tools that pull data together and contextualize it, so decision-makers can make timely, relevant operational decisions?” General Saltzman asked, in a rhetorical challenge to industry at the Mitchell Institute’s Spacepower Security Forum in March. The Space Force needs “tools that actually make the most out of the data that we are collecting and will be able to take on even more data and make more sense of it faster,” he added. “We cannot, as a country or a service, miscalculate the capabilities, force posture, or intentions of our potential adversaries. We must have timely and reliable indications and warnings to help us avoid operational surprise in crisis where appropriate to take defensive actions.”

Space operators must be able to quickly tell the difference between routine operations like refueling, refurbishing, and debris removal from potentially hostile activity, such as detecting the start of a kill chain. Timely and relevant SpOB should help avoid operational surprise in crisis and, when appropriate, dynamic offensive or defensive actions to counter adversarial moves.

As part of the new “warrior mindset” Lt. Gen. John E. Shaw, deputy commander, U.S. Space Command, and Gen. Michael A. Guetlein, vice chief of space operations, have discussed a shift from static to dynamic space operations (DSO). U.S. adversaries are now deploying satellites that can maneuver and rendezvous with other objects, which puts the U.S. at a disadvantage.

U.S. Space Command has stated the importance to be able to maneuver without regret and that dynamic space operations, maneuvering satellites, and refueling support would give the military options to better defend its assets in space by:

- Putting additional focus on attribution of malicious actions within the space domain or against space architectures, including how allies and trusted commercial partners can participate in attributing irresponsible or threatening behaviors toward their own space assets.

- Cultivate partnerships to build advantages. For example, hybrid space architectures incorporating U.S. government, allied, and commercial satellites—while spanning multiple orbital regimes—can help disincentivize an adversary’s potential attack.

- Build on changes made to implement a mission planning crew commander (who is dedicated to effects-based dynamic mission planning), so that we can better orient forces when it comes to space battle management. This member pairs resources (sensor network) to support a healthy space picture in support of current/future ops.

- Implement mission type orders, where we can hone sensor specific effects to better capitalize on intentional planning, and to measure the effectiveness of those mission plans. This would help build the initial space picture on the aggregate level for operations.

- Finally, in coordination with other U.S. departments and agencies, the Space Force must increase collaboration with the commercial space industry, leveraging its technological advancements and entrepreneurial spirit to enable new capabilities that support integrated deterrence. However, as the Space Force inevitably involves commercial space assets in tactical surveillance, reconnaissance, and tracking, and gathering SSA data and developing SDA data to support our SpOB capabilities, we need to be fully cognizant that we must protect these assets as if they were USSF assets, whether these be civil or commercial. Commercial space systems contributing to the defense of Ukraine have been declared by Russia as legitimate targets, and if we use them, we need to be prepared to defend them.

The new USSF Doctrine (SDP 3.0-July 2023) states the Space Force will undertake operations in three “baskets:”

The 5 Functions of Space Operations

	SPACE OPERATION FUNCTIONS	KEY OUTCOMES
1	<p>Space Traffic Management/Collision Avoidance (STM/CA) Charting the present position of space objects and plotting their anticipated orbital paths; detecting new man-made objects in space and producing a running catalog of man-made space objects; determining which country owns the space object; informing countries when objects may interfere with satellites and International Space Station orbits; predicting when and where a decaying space object will reenter the Earth's atmosphere, and ensuring that returning objects do not trigger missile-warning sensors to issue a false alarm.</p>	<ul style="list-style-type: none"> • Generating the space catalog. • Providing a Civil Space Traffic Coordination System. • Monitoring space objects for safety, security, and sustainability. • In-space servicing, assembly, and manufacturing (ISAM). • Debris removal. • Monitoring space weather; solar activity; and major electromagnetic radiation events, such as coronal mass ejections, radio bursts, solar flares and solar wind, and high energy solar particles. • Tracking all orbiting objects, including space debris. • Providing conjunction assessment and warning. • Monitoring and reporting on meteoroids, asteroids, and comets.
2	<p>Space Situational Awareness (SSA) Providing current and predictive knowledge and characterization of space objects and the operational environment upon which space operations depend, including tracking all launched and orbital objects to ensure awareness of and the future location of space objects.</p>	<ul style="list-style-type: none"> • Search, discover, and track spacecraft and events. • Distinguish and recognize objects as belonging to certain types and missions. • Detect, track, catalog, and identify artificial objects like active/inactive satellites, spent rocket bodies, and fragmentation debris. • Identify, characterize, and understand all factors in space that could affect space operations and the security, safety, economy, or environment of the United States. • Track, identify, and predict future positions of objects in space.
3	<p>Space Domain Awareness (SDA) Achieve an understanding of the space domain to enable decision-making throughout. Ensure rapid detection, warning, characterization, attribution, and prediction of potential threats; distribute as appropriate warnings to national, allied, civil and commercial space systems. Understand the operational space environment, assessing operational capabilities and intentions, and predicting future positions and potential threats.</p>	<ul style="list-style-type: none"> • Identify, characterize, and understand all factors in space that could affect space operations and thereby affect the security, safety, economy, or environment of the United States. • Characterize and describe each spacecraft tracked and identified by terrestrial or orbital sensors, including the spacecraft's potential employment, tactics, intent, and activity, to provide the joint force commander and other decision-makers with the knowledge and confidence to assess adversary space capabilities. • Integrate and exploit data as the final step in delivering decision-quality, fused, correlated, and integrated multisource intelligence to enable timely decision-making.
4	<p>Space Order of Battle (SpOB) Understand adversary space forces and organization, including how they are structured, organized, and equipped for combat; their satellites and ground systems; and the technical capabilities of potential weapons in space and the doctrine for how they could be used. All of this must be maintained and updated continuously. Provide threat warning and assessment to decision-makers to ensure awareness of potential and actual attacks, effects, and space system anomalies.</p>	<ol style="list-style-type: none"> 1. Adversary Nations or Organizations <ul style="list-style-type: none"> • What are their primary goals and objectives? 2. Capabilities <ul style="list-style-type: none"> • Type of weapon (kinetic or nonkinetic), maneuverability of weapon, and speed. • Potential attack timelines. • Strategic and tactical intent. • Weapon effects: reversible, non-reversible. 3. Disposition of Current Threats <ul style="list-style-type: none"> • Tactical deployment, orbital location for space threats, movement history. • Weapons and equipment capabilities, intent. 4. Adversary Strategy, Tactics, and Doctrine <ul style="list-style-type: none"> • Strategic doctrine. • Tactical doctrine. • Deployment doctrine. • Space strategy (government, civil, commercial). 5. Projected Combat Effectiveness <ul style="list-style-type: none"> • Adversaries' projected weapons effectiveness. • Adversaries' space systems expertise. 6. Attribution of Attacks <ul style="list-style-type: none"> • Ability to infer patterns, trends, and associations. • Sensor availability (number, capability, and location). • Find, fix, and track. • Maintain custody of potential threats. • Target, engage, assess, respond. • Damage assessment.
5	<p>Dynamic Space Operations Conduct rapid and effective offensive and defensive space operations when called upon to do so.</p>	<ul style="list-style-type: none"> • Detect movement if it is a space threat. • Detect ground action if it is a ground threat. • Assess and characterize. • Maintain custody. • Provide command and control of assets • Implement tactical planning. • Conduct response planning (including rehearsals and exercise). • Execute response <ul style="list-style-type: none"> - Disrupt Kill Chain - Maneuver - Direct Fires • Assess effectiveness of action.

■ **Shape the Operational Environment.** Space operations include activities to promote security and stability, preserve freedom of action, and deter adversary activities to the contrary. Space Force communicates with other DoD and Intelligence Community organizations, while building relationships with allies, partners, commercial entities, and academia. Along with data sharing and collaboration, where appropriate and authorized, these relationships help build support for operations in all domains, increase overall security in the space domain, promote appropriate behavior in space, and deter adversaries.

■ **Prevent Conflict.** Space operations to prevent conflict in, from, and to space include all activities to deter undesirable actions by an adversary. Space operations enhance safety and security of Joint operations and deterrence in all domains. As part of the joint force, the Space Force is focused on actions to deter dangerous or unlawful adversary behavior in all domains through a range of reversible and non-reversible effects.

■ **Prevail in Combat.** Should deterrence fail, the Space Force is prepared to enable lethality and effectiveness of the joint force by delivering space combat power to ensure the United States prevails in conflict. Space Force, as part of the joint force, will take actions to deter undesirable adversary behavior and deny, disrupt, damage, or destroy adversary space capabilities across all domains. Planners may also consider deceptive operations with appropriate authorities.

RESPONSIBLE COUNTERSPACE CAMPAIGNING

“If a near peer competitor makes a movement, we need to have it in our quiver to make a counter maneuver,” said General Guetlein, in January. “Tactical relevance could mean acting within minutes or just a few hours, not a day.”

In a paper titled “Dynamic Space Operations” published in *AETHER*, the Journal of Strategic Airpower and Space Power’s Winter 2023 edition, the authors make the case for better space maneuver capabilities as a key element in both offensive and defensive dynamic space operations.

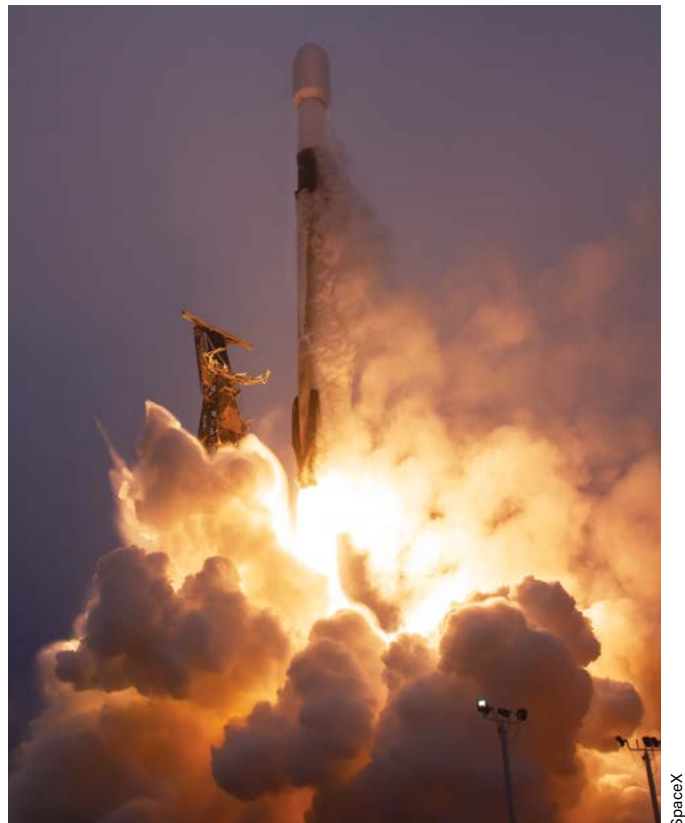
The authors argue for decentralized execution to create “reversible decisions that can be pushed to lower levels with less risk and opportunities for more expansive and resilient use of artificial intelligence (AI) and autonomy.” The payoff, they said, “decreases response times and increases the ability to improvise and pursue fleeting opportunities.” Given the speed of potential space wars, there is little time to go up and down the chain of command.

The paper also argues for preparedness. “Improved readiness enables routine and robust live training with on-orbit forces without sacrificing long-term mission success,” they wrote. “It establishes better avenues to reversibly explore new operating concepts, provides more robust testing opportunities for new systems and tactics, improves deterrence through demonstrated strength, and ensures capabilities can be quickly reconstituted to deter opportunistic third parties.”

To achieve these objectives, the U.S. should normalize space and treat it as any other warfighting domain. That means clearly and unambiguously stating a willingness to conduct both offensive and defensive space operations, including both “direct capabilities”—that is, “fires that impact an adversary”—and maneuver. U.S. Space Command is the combatant command responsible for such operations.

To make sound strategic and tactical decisions, USSF will rely heavily on its deep knowledge of the characteristics and current state of the Space AOR, both from LEO to GEO and beyond to XGEO (specifically cislunar) and intelligence regarding our adversaries’ capabilities both in space and on the ground.

Consideration of the natural environment of space, coupled



SpaceX delivered 10 communications and missile tracking satellites into orbit for Tranche 0 of the Space Development Agency’s missile warning and tracking constellation. The low-Earth-orbit constellation will enhance the Space Force’s space situational awareness.

with its current congested nature, implores us to keep track of what is there and what those objects are doing, which includes a growing amount of uncontrolled space debris. It is however, the adversaries that are of greatest concern, and information about their space capabilities and intent is difficult to obtain and process. This information is precisely the space order of battle that Space Command needs to be effective. SpOB refers to the intelligence and knowledge of any military force involved with the Space AOR. This includes not only our enemies or potential enemies, but also friendly and neutral forces since debris and inadvertent actions can cause misunderstandings in space.

Since our beginnings in space, it has not been a benign environment. While mostly unknown to U.S. citizens, provocations and dangerous tests have occurred from the major powers to assert their dominance over the domain. Demonstrating offensive space capabilities have damaged the environment of space, and since the provocative Chinese test in January 2007, things have become more and more dangerous.

This does not necessarily mean there will be a space war, but it has become a possibility. Like the first Space Race based on nuclear missile capabilities, deterrence will be critical in averting a space war. China and Russia must be convinced that a space war cannot be won by them. Toward this end we must demonstrate to them we can operate at the potential speed of a space war. Moving to SpOB and dynamic space operations will assure that, buoyed by constant training and delegated T&T’s that can be executed at the speed of a potential space war, and this will deter that terrible event from occurring. ★

Thomas “Tav” Taverney is a retired Air Force major general and former vice commander of Air Force Space Command.

DAF ENLISTED TOTAL FORCE BY AIR FORCE SPECIALTY CODE (AFSC)

(As of Sept. 30, 2023)

AFSC	TOTAL	AFSC	TOTAL	AFSC	TOTAL
1A3	In-Flight Refueling Spc 1,517	3E3	Structural 2,664	8P1	Defense Attache 121
1A1	Flight Eng 2,566	3E4	Water and Fuel Systems 2,617	8R0	Enlisted Accessions Recruiter 1,806
1A2	Aircraft Ldm 3,341	3E5	Engineering 1,580	8R2	Second-Tier Recruiter 967
1A3	Airborne Mission Sys Spc 1,787	3E6	Ops Mgmt 1,177	8R3	Third-Tier Recruiter 500
1A6	Flight Attendant 300	3E7	Fire Protection 5,447	8S0	Missile Facility Mgr 196
1A8	Airborne ISR 2,102	3E8	Explosive Ordnance Disposal 1,944	8S2 COMBAT CREW COMMUNICATIONS	
1A9	Spc Mission Aviator 1,055	3E9	Emergency Mgmt 1,659	8T0	PME Instructor 610
1B0	Cyber Warfare Operations Supt 31	3F0	Personnel 9,250	8T1	Enl PME Instructional Sys Designer 32
1B4	CW Ops 1,659	3F1	Services 7,228	8T2	Airman Development Advisor 87
1C0	Aviation Rsc Mgmt 3,047	3F2	Education and Training 2,663	8U0	Unit Deployment Mgr 232
1C1	Air Traffic Control 2,994	3F3	Manpower 439	8U1	WMD Civil Support Team 10
1C3	C2 Ops 2,799	3F4	Equal Opportunity 374	9A0	Enl Amn, Disqualified for Reasons Beyond Ctrl 112
1C5	C2 Battle Mgmt Ops 2,431	3F5	Administration Manager 6,072	9A1	Enl Amn, Disqualified for Reasons Within Ctrl 66
1C6	Space Sys Ops 711	3H0	Historian 8	9A2	Enl Airman Awaiting Discharge, Separation, or Ret for Reasons Within Ctrl 62
1C7	Airfield Mgmt 1,251	3N0	Public Affairs 1,867	9A3	Enl Awaiting Dis, Sep, or Ret for Reasons Beyond Ctrl 58
1C8	Radar, Airfield, and Weather Sys 1,757	3N1	Regional Band 472	9A5	Enl Amn Temp Ineligible for Retraining, Disqualified for Reasons Beyond Ctrl 82
1D7	Defensive Cyber Ops 31,392	3N2	Premier Band - The USAF Band 173	9B0	Sr Enl Adv to Chair of Joint Chiefs of Staff 1
1H0	Aerospace Physiology 234	3N3	USAF Academy Band 50	9C0	Chief Master Sergeant of the Air Force 1
1N0	Intelligence 6,915	3P0	Security Forces 36,341	9C1	Executive Asst to the CMSO 1
1N1	Imagery Analysis 3,469	4A0	Health Services Mgmt 3,944	9D1	AF Developmental Senior Enlisted Positions 17
1N2	Sigint 2,231	4A1	Medical Materiel 1,465	9D2	Key Developmental Senior Enlisted Positions 22
1N3	Cryptologic Language Analyst 3,212	4A2	Biomedical Equip 686	9E0	Command Chief Master Sergeant 384
1N4	Network Intel Analysis 4,313	4B0	Bioenvironmental Eng 1,238	9E1	Command Chief Executive Assistant 18
1N7	HUMINT Spc 165	4C0	Mental Health Svc 983	9E2	Individual Mobilization Augmentee to CCMS 11
1N8	Targeting Analyst 858	4D0	Diet Therapy 220	9G1	Group Senior Enl Leader 783
1P0	Aircrew Flight Equip 4,042	4E0	Public Health 1,352	9H0	Academic Faculty Inst 11
1S0	Safety 722	4H0	Cardiopulmonary Lab 492	9I0	Futures Airman 9
1T0	SERE Specialist 796	4J0	Physical Medicine 295	9J0	Prisoner 10
1U0	RPA Sensor Operator Manager 2,229	4M0 AEROSPACE AND OPS PHYSIOLOGY		9L0	Interpreter/Translator 77
1U1	RPA Pilot Manager 200	4N0	Aerospace Medical Svc 11,308	9L1	Enl Engagement Mgr/Int'l Affairs 5
1W0	Weather 3,087	4N1	Surgical Technologist 636	9M0 MILITARY ENTRANCE PROCESSING	
1Z1	Pararescue 938	4P0	Pharmacy 699	9M0	MEPCOM Sr Enl Advisor 1
1Z2	Combat Control 622	4R0	Diagnostic Imaging 782	9M2	Intl Health Spc 3
1Z3	TACP 1,952	4T0	Medical Lab 1,083	9M4	Chief, Medical Enl Force 14
1Z4	Special Recon 126	4V0	Optometry 332	9Q0	Reserve Force Generation and Oversight NCO 16
2A0	Avionics 1,516	4Y0	Dental 2,797	9S0 CHIEF MASTER SERGEANT OF THE SPACE FORCE	
2A2	SOF/PR Integrated Comm/Nav/Mission Sys 394	5C0	Cyber Ops (USSF) 1	9R0	Civil Air Patrol Assistance NCO 1
2A3	Fighter/RPA Maint 19,578	5J0	Paralegal 1,277	9S1	Scientific Applications Spc 504
2A5	Airlift/Special Mission Aircraft Maint 20,629	5R0	Religious Affairs 985	9T0	Basic Enl Amn 4,750
2A6	Aircraft Sys 26,637	5S0	Space Sys Ops (USSF) 2	9T1	Officer Trainee 503
2A7	Aircraft Metals Technology 8,923	6C0	Contracting 1,753	9T2	Pre-Cadet Assigned 310
2A8	Mobility AF Integrated Comms/Nav/Mission Sys 518	6F0	Financial Mgmt and Comptroller 3,526	9T4	AF Institute of Tech or Ed With Industry Enl Students 4
2A9	Bomber/Spc Integrated Comms/Nav/Mission Sys 7,606	7S0	Special Investigations 1,219	9T5	Basic Special Warfare Enlisted Airman 190
2F0	Fuels 4,508	8A1 CAREER ASSISTANCE ADVISOR		9V0	Key Developmental Joint Enlisted Position 8
2G0	Logistics Plans 1,540	8A2	Enlisted Aide 67	9V1	Exec Asst to the Sr Enl Advisor to the Chairman of the Joint Chiefs of Staff 2
2M0	Missile and Space Sys Maint 1,617	8A3	Protocol 59	9W3	Non-Combat Wounded Warrior 1
2P0	Precision Measurement Equipment Lab 792	8A4	Talent Mgmt Consultant 175	9Z0	Special Warfare Mission Support on HAF Staff 2
2R0	Maintenance 1,015	8B0	Military Training Instructor 675	9Z2	Special Warfare Mission Support Supt 5
2R1	Maint Prod Mgmt 1,123	8B1	Military Training Leader 483		
2R2	Maint Mgmt 404	8B2	Academy Military Training NCO 118		
2S0	Materiel Mgmt 9,492	8B3	AFROTC Training Instructor 88		
2T0	Traffic Mgmt 2,676	8C0	Amn and Family Readiness Center NCO 193		
2T1	Ground Trans 3,077	8D1 LANGUAGE AND CULTURE ADVISOR			
2T2	Air Trans 10,791	8F0	First Sergeant 2,556		
2T3	Vehicle Mgmt 5,179	8G0	Premier Honor Guard 269		
2W0	Munitions Maint 9,309	8G1	USAF Installation Honor Guard Prgm Mgr 73		
2W1	Aircraft Armament Sys 9,511	8H0	Amn Dorm Leader 302		
2W2	Nuclear Weapons 687	8I0	Superintendent 260		
3D0	Cyberspace Ops 1	8I1	Inspections Coordinator 322		
3E0	Civil Engineer 4,915	8I2	Complaints Resolution Coordinator 11		
3E1	Heating 2,388	8K0	Software Development Specialist 1		
3E2	Pavements and Construction Equip 3,180	8L5	Air Advisor Advanced 1		
		8L7	Combat Aviation Advisor 25		
		8P0	Courier 78		

DAF OFFICER TOTAL FORCE BY AIR FORCE SPECIALTY CODE (AFSC)

(As of Sept. 30, 2023)

AFSC	TOTAL	AFSC	TOTAL	AFSC	TOTAL			
10C	Ops Cmdr	588	42P	Clinical Psychologist	303	64P	Contracting	897
11B	Bomber Pilot	611	42S	Clinical Social Worker	280	65F	Financial Mgmt	810
11E	Experimental Test Pilot	164	42T	Occupational Therapist	22	65W	Cost Analysis	59
11F	Fighter Pilot	3,719	43B	Biomedical Scientist	115	71S	Spc Investigations	463
11G	Generalist Pilot	411	43D	Dietitian	41	80C	Cmdr, Cadet Squadron, USAF Academy	45
11H	Helicopter Pilot	957	43E	Bioenvironmental Eng	382	81C	Instructor, Officer Training School	56
11K	Trainer Pilot	1,565	43H	Public Health Officer	267	81D	ROTC Detachment Commander	
11M	Mobility Pilot	7,932	43P	Pharmacist	293		and Professor of Aerospace Studies	150
11R	Recon/Surveillance/EW Pilot	804	43T	Biomedical Lab	146	81L	Education and Training Leader	22
11S	Spc Ops Pilot	1,507	44A	Chief, Hospital/Clinic Svcs	76	81T	Instructor	888
11U	RPA Pilot	230	44B	Preventive Medicine	28	82A	Academic Program Mgr	61
12B	Bomber Combat Systems Officer (CSO)	632	44D	Pathologist	73	83R	Recruiting Svc	191
12E	Experimental Test CSO	29	44E	ER Services Physician	382	84H	Historian	15
12F	Fighter CSO	419	44F	Family Physician	544	85G	USAF Honor Guard	5
12G	Generalist CSO	125	44G	General Practice Physician	111	86M	Ops Mgmt	250
12H	Rescue CSO	104	44J	Clinical Geneticist	2	86P	C2	72
12K	Trainer CSO	167	44K	Pediatrician	307	87G	Wing IG	259
12M	Mobility CSO	413	44M	Internist	494	87I	Director, Wing Inspections	145
12R	Recon/Surveillance/EW CSO	874	44N	Neurologist	50	87Q	Director, Complaints Resolution	114
12S	Spc Ops CSO	675	44O	Physician	69	88A	Aide-de-camp	43
12U	RPA	127	44P	Psychiatrist	177	88B	Protocol Officer	21
13A	Astronaut	3	44R	Diagnostic Radiologist	168	88C	Sexual Assault Response Coordinator	27
13B	Air Battle Mgr	1,829	44S	Dermatologist	38	88I	Innovation Officer	1
13H	Aerospace Physiologist	85	44T	Radiotherapist	5	89G	Combat Aviation Advisor	14
13M	Airfield Ops	297	44U	Occupational Medicine	15	89W	WMD Civil Support Team	1
13N	Nuclear and Missile Ops	1,235	44Y	Critical Care Medicine	72	90G	General Officer	573
13O	Multi-Domain Warfare Officer	17	44Z	Allergist	22	91C	Cmdr	156
13S	Space Ops	465	45A	Anesthesiologist	207	91W	Wing Cmdr	461
14F	Info Ops	163	45B	Orthopedic Surgeon	112	92F	Foreign Area Officer Trainee	38
14N	Intelligence	5,178	45E	Ophthalmologist	46	92J	Non-Designated Lawyer	5
15A	Operations Research Analyst	470	45G	Obstetrician and Gynecologist	167	92M	Health Prof Scholarship	
15W	Weather and Environmental Svcs	523	45N	Otorhinolaryngologist	50		Prgm Med Student	248
16F	Regional Affairs Strategist	431	45S	Surgeon	318	92P	Physician Assistant Student	9
16G	AF Ops Staff Officer	840	45U	Urologist	30	92R	Chaplain Candidate	100
16K	Software Development Officer	9	46A	Nursing Admin	228	92S	Student Officer Authorization	1,895
16P	Political-Military Affairs Strategist	274	46F	Flight Nurse	974	92T	Pilot Trainee	2,631
16R	Planning and Programming	758	46N	Clinical Nurse	3,041	93P	Patient	9
17C	Cyberspace Warfare Ops Cmdr	20	46P	Mental Health Nurse	70	95A	Non-Extended Active Duty	
17D	Warfighter Comms Ops	2,905	46S	Operating Room Nurse	187		USAFR Academy Liaison Officer	
17S	Cyberspace Effects Ops	1,244	46Y	Adv Practice RN	672		or CAP Reserve Asst Prgm Officer	14
18A	Attack RPA Pilot	2,006	47B	Orthodontist	28	96A	Disq. Officer, Reasons Beyond Control	3
18E	Experimental Test RPA Pilot	13	47D	Oral and Maxillofacial Pathologist	3	96B	Disq Officer, Reasons Within Control	5
18G	Generalist RPA Pilot	75	47E	Endodontist	32	96D	Officer N/A for Use	
18R	Recon RPA Pilot	560	47G	Dentist	951		in Awarded AFSC for Cause	15
18S	Special Ops RPA Pilot	421	47H	Periodontist	45	97E	Executive Officer	795
19Z	Special Warfare	753	47K	Pediatric Dentist	17	99A	Unspecified AFSC	2
20C	Logistics Cmdr	369	47P	Prosthodontist	51	99G	Gold Bar Diversity Recruiter	3
21A	Aircraft Maint	2,019	47S	Oral and Maxillofacial Surgeon	55			
21M	Munitions and Missile Maint	317	48A	Aerospace Medicine Physician Spc	144			
21R	Logistics Readiness	2,173	48G	General Med Officer, Flight Surgeon	131			
30C	Support Cmdr	474	48O	Aeromedical Physician	1			
31P	Security Forces	939	48R	Residency Trained Flight Surgeon	809			
32E	Civil Eng	1,903	48V	Pilot-Physician	1			
35B	Band	22	51J	Judge Advocate	2,253			
35P	Public Affairs	625	52R	Chaplain	1,174			
38F	Force Support Officer	2,151	60C	Sr Materiel Leader-Upper Echelon	15			
40C	Medical Cmdr	226	61C	Chemist/Nuclear Chemist	63			
41A	Health Services Admin	1,725	61D	Physicist/Nuclear Eng	170			
42B	Physical Therapist	220	62E	Development Eng	1,821			
42E	Optometrist	256	62S	Materiel Leader	6			
42F	Podiatric Surgeon	16	63A	Acquisition Mgr	2,061			
42G	Physician Asst	804	63G	Sr Materiel Leader-Lower Echelon	56			
42N	Audiology/Speech Pathologist	31	63S	Materiel Leader	135			

AFA IN ACTION

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



AFA Nominees 2024-2025

CANDIDATES FOR NATIONAL OFFICERS AND DIRECTORS.

The Air & Space Forces Association Nominating and Governance Committee met by video conference in April 2024 and selected seven candidates to send forward for open National Officer positions and National Director positions on the Board of Directors. The Committee consists of a Chair and Vice Chair of the Committee as well as at least three actively serving AFA Directors. The Chair and the Vice Chair of the Committee shall be the two most recent past serving Chairs of the Board, unless the Board determines to elect a different Chair or Vice Chair by a majority vote of the Board.

Self-nominations were submitted by the June 15 deadline, and the Nominating and Governance Committee conducted interviews and selected two additional candidates to add to the 2024 slate.

Elections by authorized voters for these open Board positions will take place electronically between Sept. 1-14, 2024. No votes will be accepted after Sept. 14.

VICE CHAIR OF THE BOARD, EDUCATION



Joe Abegg, Easthampton, N.J., is the current AFA New Jersey State President, past AFA N.J. State Executive Vice President, an AFA Life Member joining in 1981, and a current member of both the AFA Education Council and the new AFA Recruiting Task Force. He recently retired as a United Airlines Captain (free travel for life). Retiring after 29 years in the Air Force as both Officer and Enlisted, AF Command Pilot, and CAP Command Pilot. Abegg holds a B.S. in Aerospace Engineering, and a master's in Management. He was the Arnold Air Society Squadron Commander, AFROTC Cadet Group Commander, a flight test engineer at McDonnell Douglas Aerospace, graduate of SOS, ACSC, and AWC, and an Astronaut (select) for the Ansari X-Prize team. Awards received include the AFA Exceptional Service Medal, the AFA Medal of Merit, the CAP Distinctive Service Medal, four CAP Exceptional Service Medals, six CAP Meritorious Service Awards, and three DOD Meritorious Service Medals. Most recently, Abegg led the CAP contributions from 16 CAP Wings at the 50th Anniversary

of the Vietnam War; advocated for CAP funding on Capital Hill for the 10th year; and was the National Activity Director for the sold-out Spaatz Association Award Gala with the Air Force Band and the CSAF as the keynote speaker.

A message from Joe Abegg: I plan to give back and to pay forward in the best way that I know possible. I bring 42 years of active AFA service, 51 years in CAP service with executive leadership over CyberPatriot teams, StellarXplorer teams, Flight Academies, and Flight Scholarships—noting that CAP has 30,000 cadets and 5,800 Aerospace Education Members. My vast and diverse Aerospace Education background from CAP, to Industry, to AAS, to AFROTC, the airlines, the military, and the Boardroom will allow me to make a difference.



Gary Cosey, Fair Oaks Ranch, Texas, served 30 years in the U.S. Air Force, retiring as a colonel. He was an Instructor Pilot (IP) and Flight Examiner in helicopters at formal school; developed new training programs for USAF IPs; developed night vision goggle training; served as Squadron Assistant Chief Pilot and IP in C-141s; Chief, SOF and Rescue Branch, HQ MAC Plans and Programs; Chief of Protocol HQ MAC and USTRANSCOM; Deputy Chief of Staff OPS/PLANS, U.S. Forces Azores; Deputy Director Command and Control and Director, Ops Management, HQ AMC TACC; Chief of Staff, Inter American Defense Board and College (Washington, D.C.); and Commander, AFROTC Det. 930, Marquette University.

While in AFROTC, Cosey was selected to command Ellsworth II Field Training with 325 cadets, having to establish relationships with base leadership as a tenant org. He spent nine years at USAA leading training design and development teams for training at USAA Bank and for New Employee Orientation. Cosey served as Lead Learning/Performance Consultant where he advised senior leaders at USAA with direct report to SVP. He was also selected as HR "Volunteer of the Year" based on his work with AFA. Bottom line: He spent both of his careers in service to people by helping them succeed—in turn, helping organizations succeed.

A message from Gary Cosey: With over 10 years on the Field Council and six on the Education Council, I have the experience, skills, and background to be a servant leader as VCED. I'm deeply committed to the mission of AFA and STEM education. I've seen it from the grassroots chapter level through region as a Region President. My goal, if selected: further the great work that's been done, come up with new ideas from the field, listen to the membership, and take action if feasible. I will also look for and find solutions to issues.

NATIONAL SECRETARY



Paul Hendricks, Spicewood, Texas, is an AFA Life Member (49 years). He has extensive management experience while serving as an Air Force officer (20 years) and as a Program Manager for Boeing (21 years). As the Fairview, Texas, Town Council Mayor Pro Tem (6 years), Hendricks maintained community balance. He also founded the Veterans Center of North Texas providing social work to Veterans and their families. He was recognized as the Fairview Outstanding Citizen of the Year, the “Hero of the Year,” and the Outstanding Volunteer Social Worker of the Year. Serving as the Trinity Presbyterian Church Clerk of Session (Board Secretary) (10 years), Hendricks developed agendas, called and officiated meetings, maintained parliamentary procedures, developed meeting minutes, tracked action items, and produced statistical reports. As the AFA Deputy Chief of Staff, Vietnam 50th Celebration Committee, he scheduled and coordinated meetings, maintained organizational contacts, conducted critical path analyses, performed financial assessments, developed meeting minutes, and tracked action items.

A message from Paul Hendricks: I am a member of the AFA Board. I enjoy collaborating with members of the Board, the AFA Staff, and Field members. I am dedicated to serving the AFA at the highest level to foster growth, prosperity, and harmony. I have previously served as the Board Secretary on other boards. I have experienced and observed the value of organized, structured, and well-documented meetings. I am ready and eager to function as the AFA Board Secretary.



Jackie Trotter, Warner Robins, Ga., served 11 years on Active duty and 22 years as a Reservist (primarily ART/AGR tours) in the Air Force as a public affairs officer. When not on Active duty, she served in public affairs and publications management as a civilian. After her retirement from both the military and civilian positions, Trotter worked for the American Red Cross and Habitat for Humanity. Those jobs gave her extensive experience in working with both nonprofit organization volunteers and governing boards.

A message from Jackie Trotter: In my first term on the Board, I became heavily involved in the development of the new By-laws and Governance Manual. I would like to continue that work, organizing and revising as necessary all the Association publications. I believe the Field and our staff deserve a centralized location for all guidance materials. Our Board minutes should also be published so our members are more knowledgeable of the Association’s leadership actions.

TREASURER



Chuck Martin, Fort Mill, S.C., is currently the AFA National Treasurer. Martin has an BBA from Manhattan College and an MBA from Michigan State University, and is a member of Beta Alpha Psi (National Accounting Fraternity). He is a Certified Association Executive; Certified Internal Auditor; Adjunct Instructor, USAF Academy; Regis University; University of Maryland (European & Pacific Divisions); Member AFA FINCOM; Chair of the AFA PECC (President’s Evaluation and Compensation Committee); Board Officer on MOAA National Board; COO/CFO, American Physical Therapy Association. Martin has also served as Treasurer, Foundation for Physical Therapy Research; AFROC Treasurer; Audit Committee, American Academy of Audiology (Public Member). He served as Treasurer or on Finance Committee of various HOAs, conducted numerous pro-bono financial/audit reviews of the AFA Steele Chapter; AFCEA, AF4C, and many national medical associations for ASAE. Having Board and staff expertise and governance experience provides a

clear understanding of roles and responsibilities. Transparency and recognition of Field and Education roles are vital for an AFA Treasurer and have been demonstrated in his AFA roles/performance.

A message from Chuck Martin: Upon retirement from the Air Force as a Colonel and MAJCOM comptroller, I moved into the NFP space and continued in my volunteer activities, while accepting a COO/CFO staff position at APTA for 18 years. I received the CAE Certification and was elected/selected for Board service in MOAA, AFA, AFROC, and other roles. I believe my continued performance as AFA Treasurer is vital as we take on the challenges facing us in 2025 and out. I am ready!

NATIONAL DIRECTOR, WEST GEOGRAPHICAL AREA



Bobi Oates, Las Vegas, Nev., served 23 years in the U.S. Air Force, retiring as Senior Master Sgt. in Aircraft Maintenance. She spent nine years at the Armed Forces Bank, seven years as Exchange Branch Manager. Oates spent 14 years actively with AFA in Chapter positions: VP, Treasurer, President, three and a half years as Southwest Region President, and more than two years as the National Director, West Area. She worked several years with the Wounded Warrior Trials & Caregiver events at Nellis Air Force Base, Nev., also working closely with the leadership at both Nellis and Creech AFBs to promote AFA and to support bases. Being part of the larger Las Vegas Veterans community, she works with them to help our Airmen, Guardians, Families, and Veterans. Oates is a member of the Advocacy and Region President subcommittee, a member of the Finance committee, and helps with the Field Council on whatever is needed.

A message from Bobi Oates: I want to continue as a National Director for the West Area, to be their voice from the Field on the Board. I work closely with Airmen, Guardians, Families, and Veterans to know their needs and to be their voice as an advocate for them. I want to help the Association grow and continue to do great work for our Airmen, Guardians, Families, and Veterans.

NATIONAL DIRECTOR AT LARGE

Two National Director at Large positions are open and each will be elected for a three-year term.



Wesley Hallman, Washington, D.C., served 27 years in the U.S. Air Force before retiring as a colonel. His last assignment was as the Chief Air Force Liaison to the House of Representatives. Prior to Congress, he served in several flying and staff positions, including commanding a squadron and a fighter group. Hallman was a White House Fellow, serving as Special Assistant to the Secretary of Agriculture, and his staff assignments included AFCENT Forward Chief of Staff and Joint Staff (J5).

He was formerly the Senior Vice President for Strategy & Policy at the National Defense Industrial Association (NDIA) and is now a private sector Executive Vice President and Head of Washington Operations. Hallman has a bachelor's from the U.S. Air Force Academy and graduate degrees from The Ohio State University, the School of Advanced Air and Space Studies, and the Eisenhower School. He also serves on the Falcon Foundation's Board of Trustees, the parent board of School Without Walls, and as a mentor for the White House Fellows program.

A message from Wesley Hallman: Our Air and Space Forces are our continuing strategic advantage that we have in an increasingly dangerous world. Unfortunately, reinvestment in that advantage is not happening at the pace and scale needed to stay ahead. A vibrant and effective AFA is critical to both serving our current Airmen and Guardians, but also to advancing and advocating for air and space power. I can bring together teams with diverse backgrounds to lead successful efforts on behalf of our association, from advocacy to membership services and association growth.



Dan Ohnesorge, Tulsa, Okla., retired as a colonel after serving as a pilot, flying fighter-type aircraft (F-4s and F-16s), both in CONUS and at several overseas locations, including Korea, Germany, Italy, and Turkey. Ohnesorge also served in assignments on USAFE, NATO, and ACC staffs. His final assignment was as Vice Commander and Instructor Pilot at Vance. After retiring in 2003, Ohnesorge worked as Deputy Program Manager and then Program Manager for the "Umbrella" contract supporting Vance Air Force Base.

In 2008, he was hired as the Director of the Woodring Regional Airport, located approximately 5 miles east of Vance Air Force Base, Okla. In the position he was responsible for several different improvements to the airport. Any project that aided the military would also benefit the civilian fliers. They built a large joint-use hangar, a joint-use parking ramp, and extended the primary runway to 8,000 feet so T-38s could land there. Ohnesorge has spent his entire adult life either on Active duty or supporting the USAF.

A message from Dan Ohnesorge: I have been successful at organizing events/projects and providing resources to support them. As Chapter President of the AFA Enid Chapter, I challenged the chapter to add 100 Community Partners to our rolls within a year. Our plan included a massive letter-mailing campaign, followed by chapter members divided into teams for person-to-person meetings. We met our goal. In another action as co-fundraising chairman, I played an integral part in sourcing over \$400,000 to purchase an 80 percent replica of the Vietnam Wall and erect it at Woodring Regional Airport.



Doug Slocum, Macomb, Mich., has served as the Michigan State AFA president and the Chapter 179 President since January 2021, which has expanded in scope, membership, and impact every year. Pioneering a single-entity organizational structure to streamline administration and maximize efforts on community engagement. Also introducing virtual events.

His professional background includes 35 years in uniform retiring in 2019 as a brigadier general. Slocum's experience includes executive leadership and management at local, state, national, and international levels capping his career as the Commander of Selfridge Air National Guard Base and the 127th Wing, where he turned the Wing from one of the most stressed/lowest performing organizations in the ANG to the award-winning "best Wing in the ANG" within two years. Prior to Selfridge, Slocum innovated and introduced safety/human factors programs to maintenance and logistics career fields across the USAF as well as suicide prevention and resiliency. He is a career fighter pilot with more than 4,000 hours in F-4, F-16, and A-10 aircraft.

A message from Doug Slocum: I think I can make a difference. I branded my engagement/leadership style "violent positivity" by focusing on people—equipping and motivating individuals to reach new levels of excellence. It works. I think I can bring that same energy and people-centric focus as a member of the board to positively influence and contribute to field effectiveness as well as nationwide AFA activities. I also believe I'll bring a reserve component perspective and experience that will add value.

U.S. Air Force Lt. Col. Nathan Malafa, Thunderbirds commander/leader and Thunderbird #1, administers the oath of enlistment to Air and Space Force recruits in the San Antonio delayed entry program during The Great Texas Airshow, at Joint Base San Antonio-Randolph, Texas, April 6, 2024



Airman 1st Class Gabriel Jones

AIMS: Advocates to Inspire Military Service

The Air & Space Forces Association officially rolled out “AFA Advocates to Inspire Military Service” (AFA AIMS) May 28 to equip AFA’s members and chapters with the resources to help inspire the next generation of Airmen and Guardians.

“The key letter is the ‘I’ in AIMS: ‘Inspire.’ We have professional recruiters who recruit. Our role is to become advocates who help inspire service by telling our stories,” said Chief Master Sgt. Vance Clarke, USAF (Ret.), AFA AIMS Co-Chair and former U.S. Air Force Recruiting Service (AFRS) command chief. “It’s not just the Gen-Zers we want to reach, but also their influencers: parents, teachers, and neighbors. Many of them may never have met anyone who served and may not have any knowledge of the military or why service is important,” said Clarke.

An AIMS resource toolbox is now available at www.afa.org/AIMS. The page is also discoverable under the “Advocate” menu on AFA’s website. The new page includes:

- An interactive map allowing AFA Chapters and AFRS squadrons to locate one another and get in touch. AFA Chapters and members are encouraged to volunteer their information to join in the initiative.

- The AIMS Toolbox, a collection of downloadable resources designed by the AIMS Committee and AFRS. The resources—speech templates, fact sheets, current organizational information, and more—will help AFA members “tell their stories” more effectively.

AFA developed AIMS through an official partnership with the AFRS, culminating with the signing of a letter of intent between the two organizations.

“AFRS and AFA are natural partners,” AFRS Commander Brig. Gen. Christopher Amrhein said at AFA’s National Convention in 2023. He called on AFA leaders and members

to help his organization address the Air and Space Forces’ recruiting crises by “telling their Air Force and Space Force stories.”


“The Toolbox resources should help us all do a better job of telling the Air and Space Forces story by providing correct and current information and providing some presentation ideas,” said AFA AIMS Co-Chair Lt. Gen. John Campbell, USAF (Ret.). “There’s no pass-fail grade; just do what your time and resources allow. There are lots of ways to get engaged, but at the end of the day, it’s as simple as General Amrhein’s request: ‘Tell Your Story.’”

One objective of AIMS is to promote closer relationships with recruiting squadrons. To make contact easier, the interactive Chapter-Squadron Locator Map on the AIMS website provides contact information for AFRS Squadrons and for Chapters and members who have specifically volunteered (via the Raise Your Hand link on the web page) to have their contact information displayed.

The map is sparse now but will grow as Chapters and members sign up. Volunteering yourself or your Chapter signals your willingness to:

1. Contact the nearest squadron to introduce yourself;
2. Respond if a recruiter contacts you and explore ways to help; and
3. Provide feedback via the AIMS Contact Us link of your successes so we can share good ideas.

A Guide to Chapter-Squadron Engagement is under development and will be available through the AIMS Toolbox when complete.

“The current recruiting challenge is not a short-term problem,” Campbell said. “AFA is in a unique position to make a big impact with its national presence, proactive and engaged membership, and partnership with AFRS.” 

Robinson Risner

Korean War Ace Who Survived as POW.

Robbie Risner was a hero in two wars. Earning two Air Force Crosses, he was an ace in Korea and a prisoner of war (POW) in Vietnam who survived over seven years in captivity.

Raised in Oklahoma, Risner enlisted as an aviation cadet during World War II and flew P-38s in Panama. When the Korean War broke out, Risner transitioned to F-86s and was sent to Korea.

In September 1950 while escorting F-84s over North Korea he encountered MiGs. Risner chased one aircraft at low level and high speed deep into Chinese airspace. He finally caught up with his prey over Antung Airfield and shot it down. His wingman then took a fuel tank hit and began losing gas. Risner told him to shut down his engine and he would push him home. Inserting the nose of his Sabre into his wingman's tailpipe, he began to nudge the two aircraft out over the water. Despite heavy turbulence and oil and hydraulic fluid covering his own canopy, the maneuver worked. His wingman eventually bailed out over water, and Risner, running out of fuel himself, made a dead-stick landing at Kimpo Air Base, South Korea.

He became an ace later that month and finished the war with eight victories.

Returning to the States, Risner attended the Air War College and served on a Joint Staff in Hawaii. In August 1964, Lt. Col. Risner took command of an F-105 squadron on Okinawa as the Vietnam War began to heat up. He wrote later that when he left there for the war he had a premonition that it would be a long time before he saw his family again. From Korat Air Base in Thailand, the Thuds began flying missions over North Vietnam.

In April 1965 Risner led his squadron against the Thanh Hoa Bridge south of Hanoi. The bridge was heavily defended and almost impervious to damage. Nonetheless, his determined attack earned him the Air Force Cross and his picture on the cover of Time magazine—an honor he would soon regret.

On Sept. 16 while flying against a SAM site, Risner was shot down. Captured immediately, he was moved to Hoa Lo Prison in Hanoi—the infamous Hanoi Hilton. His tiny cell was infested with rats and the food was awful, usually a thin gruel. Then the torture began. Although North Vietnam had signed the Geneva Conventions regarding the treatment of POWs, they refused to follow the rules. When Risner pointed this out, they snarled that he was not a prisoner—but a criminal who had no rights. The guards singled him out for special treatment upon seeing his picture on the cover of Time. There were repeated beatings, but the worst was the use of straps, tied tightly around his arms and then stretched back so that his elbows touched. Another strap was tied around the ankles, and this was then connected to the arms and tightened until his body was shaped like a bow. He was then usually hung from a meat hook on the ceiling. The pain was excruciating.

Other tortures were less physically painful, but hurt more psychologically. As a senior POW, it was Risner's responsibility to agitate for better conditions for all prisoners. Doing so earned him solitary confinement and starvation. Worse, the guards



USAF

Then-Maj. James Robinson "Robbie" Risner poses with his F-86 Sabre in South Korea. He became the 20th jet ace of the Korean War.


boarded up his cell's air vents and turned off his light—plunging him into total darkness for weeks at a time.

Eventually, all prisoners broke and answered questions. Risner told his fellows they should "resist until you are tortured. But do not take torture to the point where you lose your capability to think and do not take torture to the point where you lose the permanent use of your limbs."

Risner credits his faith for surviving this ordeal. He prayed constantly: for his family and fellow prisoners, that he would endure, and that the torture would stop. He related later that his prayers were answered, and he was able to miraculously remove his shackles on one occasion when the pain was especially bad.

The Son Tay raid of November 1970 caused over 350 POWs to be moved to the Hanoi Hilton from other camps around the country to prevent more rescue attempts. Risner describes the sheer joy he and others felt at being able to see other humans and talk to them. The Linebacker strikes of later 1972 were critical. The bombs of the B-52s falling on Hanoi shook the prison guards, and the POWs knew that negotiations were producing results.

Risner went home in the first group of POWs to be released in February 1973.

He received another Air Force Cross for his leadership as a POW and was promoted to brigadier general. He retired soon thereafter to raise horses. 

Risner's memoirs, "The Passing of the Night" (Random House, 1975) are extremely moving. He died of a stroke in 2013.



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