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# AIR FORCE

MAGAZINE

# WINDS OF CHANGE

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# AIR FORCE

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Photo: NASA/NOAA

Tropical storms and hurricanes in a Sept. 4 NASA satellite photo.



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# Matching Up Against the Threat

**T**his month marks 18 years since the United States launched its first counterstrikes after 9/11. The generation of recruits now joining the Air Force was born after that worst-ever terrorist attack on US soil; America has been at war for their entire lives.

In that time, our Air Force has developed and fielded new weapons, such as the MQ-9 Reaper and F-35 fighter, and found new ways to employ old ones, such as using B-1 and B-52 bombers for close air support. Improved intelligence, surveillance, and reconnaissance systems and better computer analysis tools have likewise enhanced commanders' ability to gather and unify intelligence and to operate effectively with joint force and coalition partners.

Yet the US military has honed its 21st century warfighting skills not against peer competitors, but rather insurgent targets in Afghanistan, Iraq, Syria, and Libya. Rivals are eating away at its advantages in both low- and high-end fights. Today, forces are vulnerable in multiple areas:

- Iran and its Houthi rebel proxies in Yemen have each demonstrated an ability to knock down slow-moving American drones.

- Russia has enhanced its ability to identify and strike incoming targets with its next-generation S-400 mobile anti-aircraft system, the most advanced of its kind, with a range of 400 km, 30 percent greater than the S-300. It is already working on an S-500, "and that range is just going to get longer and longer," says a senior analyst and integrated air defense systems expert with the Air Force's National Air and Space Intelligence Center (NASIC).

- China is developing counter-stealth stealth technology by integrating multiple types of radars, operating in different frequency bands and modes, along with infrared, electro-optical, and acoustic sensors, making America's low-observable aircraft easier to spot and track.

Age and wear, meanwhile, are catching up with US forces, especially the US Air Force: F-16s average over 28 years old; F-15Cs average 35; and even F-22s, new by comparative standards, are already averaging 12 years of age. Given a year to raise mission capable rates above 80 percent for its top-line fighters, USAF couldn't deliver.

The bomber force is even older. The Air Force has just 20 B-2 bombers, aircraft that are already in their third decade, and their planned successor, the B-21, is still more than a year away from its first flight. Meanwhile, the venerable B-52, the workhorse of the bomber fleet, is about 58—uncharted territory. The plan is to keep them around for decades more. For today's young airmen, this is not your father's Air Force. Oh, no. This is your *grandfather's* Air Force.

China's interests are global. With a population of 1.4 billion people to feed, an insatiable appetite for energy and raw materials, and a robust requirement for global markets in order to sustain its fast-growing, manufacturing-based export economy, China sees itself at the center of the universe. More than a benign trade rival, it is ideologically opposed to American influence and the Western freedoms we take for granted: freedom of

speech and religion, freedom of movement, intellectual property rights. China wants others to follow its model and hopes to supplant the US as the world's greatest economic and military power.

"They're dumping so much money into research," the NASIC analyst said, that China is rapidly closing the gap with the US military. Watching what works for the US military, it is incorporating computers, networking, and other advanced technologies. One example: Integrated air defenses that used to rely on point-to-point data links, making them vulnerable to disruption, now employ robust, automated, and more survivable networks.

China and Russia have used these past 18 years to study the American way of war, emulating what they see as useful and identifying weaknesses they can seek to exploit in the future. Like a football coach with access to his rival's playbook, China now knows how to read America's offense and defense and to anticipate what plays will be called and when.


In a new report produced for the Defense Advanced Research Projects Agency, the Air Force Association's Mitchell Institute for Aerospace Studies starts from the premise that America is losing its competitive edge and that the greatest Air Force ever built is now so dependent on a small number of sophisticated weapons that it can no longer afford to take operational risk.

"China is developing their own theory of system conflict," says Heather Penney, a senior resident fellow at Mitchell and a co-author of the study. That system targets "our data links and information networks to disrupt our information flows" and aims to dismantle "key nodes of our operational system, specifically our command and control ... to get inside of our decision cycles and induce even further confusion."

The study offers a vision for how to turn things around. Its report, "Restoring America's Military Competitiveness: Mosaic Warfare," introduces a game-changing, force design concept that could help rewrite the US playbook to create a perpetually changing, unpredictable puzzle to adversaries.

To seize back the initiative, DARPA's Mosaic concept would gradually trade today's platform-centric force design and its small number of highly integrated and extremely expensive systems in favor of a highly disaggregated web of lower-cost, more specialized assets, none of which can be deemed a critical point of risk. Like an artist's colored tiles or a child's Lego bricks, these pieces could be assembled, disassembled, and reassembled in an infinite number of ways, creating a widely dispersed web of weapons and sensors to confound adversaries with a constantly changing and overwhelming set of threats.

It's not all new. The concept builds on ideas already being investigated by the Air Force: swarming drones, loyal wingman, and Next-Generation Air Dominance, which like Mosaic, has been described as a system of systems, rather than a platform. It is encouraging to see DARPA and the Air Force so closely aligned.

The risk now is not that leaders rush ahead and experiment—that is essential. Rather, it is that they not put off near-term modernization while waiting for future concepts to mature. That is a risk the Air Force cannot afford—now or ever. 

**For today's young airmen, this is not your father's Air Force. Oh, no. This is your grandfather's Air Force.**

## Family Fight

The inimitable John Correll has succinctly stated the challenge facing the Nation's Armed Forces ["The Counter-Revolution in Military Affairs," July-August, p. 52]. Correll's article could be summarized in the words of the great strategist, Pogo, who said, "We have met the enemy, and it is us." That is not a facetious statement.

The fight for dominance of one military service over another is a long one. The Army has long considered airpower as a means of reconnaissance or long-range artillery, beginning with balloons in the 19th century, and continuing into the advent of aircraft in the early 20th century. Visionaries such as [Col. William] "Billy" Mitchell saw airpower technology in a broader and more decisive role. The waning days of World War II signaled a quantum leap that spelled the diminuendos of airpower's influence, the introduction of ballistic and guided missiles into battle (notwithstanding the use of rocket-propelled ballistic missiles by the Chinese in the 13th century). The fight for service dominance began again post World War II. Maj. Gen. John Medaris and his German scientists at Redstone Arsenal, Ala., capitalizing on the German World War II experience, were pitted against a young new Air Force Brigadier General, [Bernard] Ben Schriever, bolstered by strong aerospace allies, such as General Dynamics and Ramo-Wooldridge Corporation, for control of the intercontinental ballistic missile mission. Politics prevailed over reason. The Air Force was given the task of developing intercontinental

ballistic missiles, "long-range artillery" in the eyes of the Army, and the battle quickly expanded to include nonballistic guided missiles. The Navy quietly pursued both under Adm. [William F.] "Red" Raborn. Enter the new Space Forces in the 21st century and the interservice battle begins anew.

As long as DOD is organized along separate land, sea, air, and space military forces instead of mission-oriented forces, the competitiveness between the uniformed services will continue with the expense of spending excessive dollars to perform similar missions. Technology is driving warfare as author Correll pinpoints, but the Armed Forces of the United States should support national goals determined by an elected government and not the parochial goals of generals and admirals.

Lt. Col. Bill Getz,  
USAF (Ret.)  
Fairfield, Calif.

## Walk the Walk

As a person who has had a lifelong struggle with serious mental illness, is a mother, an Active Duty spouse, and an AF veteran, this article resonated with me in a big way ["World: Air Force Orders Ops Pause to Address Suicide," September, p. 20]. We need to stop preaching resilience while continuing to make it hard to practically seek mental health care without the worry of repercussion at the duty level. We want airmen to seek help and take timeouts when they need it. I can speak to the fear and stigmatization of anything other than bearing troubles with a smile and keeping pain and dysfunction inside. The consequences of seeking help are real and swift, and until one experiences the benefits of long-term therapy, the cons of seeking help often do outweigh the unknown of revealing what our military and civilian culture continues to tell us are weaknesses. I talk about the benefits of mental health care, but also the realities—whenever I can with whomever will listen.

Let's find a better way to help people rather than preaching one thing and practicing another. Enlisted Jesus [CMSAF Kaleth O. Wright], as my husband lovingly refers to him, is correct. But

how do we get there? I think it is by making tangible changes in the way we treat troops that seek help. Thanks for listening.

Devance Wright  
Mackenbach, Germany

## Space-Mindedness

Like all lifelong airmen, I was completely inculcated into the cult of [Col. William] Billy Mitchell. From my earliest cadet days, I was assailed with stories of Mitchell and his acolytes, [Gen. Henry H. "Hap"] Arnold and [Gen. Carl "Tooney"] Spaatz, who along with others, bucked the system and took on an Army which, in the face of observable certainty, refused to recognize the imperative of airpower. Eventually they succeeded in igniting a revolution which produced the greatest Air Force the world has ever known.

Embracing the ethos of Mitchell meant—my contemporaries and I believed—a willingness to speak truth to power, a conviction that, in the face of overwhelming bureaucratic opposition, one should continue to fight for the best military solutions and capabilities. ... We knew we were part of something innovative—that the Air Force was vested in the future and not the past, and that, with airpower, we could change the way our nation fought and won wars. ... In short, we believed we were part of an ongoing revolution ... an airpower revolution.

That airpower revolution is dead!

I'm not sure when it died, precisely, but the commitment to out-of-the-box thinking, the belief that domain experts should determine and direct domain operations, and the certainty that victory trumps tradition, which were the hallmarks of what it meant to be an airmen, are gone. The ongoing Space Force debate ["Editorial: A Space Force For the Future," June, p. 2] and stand-up have effectively pulled back the curtain and revealed a bureaucracy struggling for little more than to hang [on] to the resources it has.

The topic of an independent Space Force has been around since at least the mid-60s. It gained some momentum after the Gulf War. Operation Desert Storm has been recognized as the

## WRITE TO US

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—The Editors

first space war. Spaceborne capabilities were a key component of combat operations and vital to the coalition's success. When the discussions of a Space Force or Space Corps began in earnest, more than a decade ago, the Air Force tried to manage its resistance to change by closeting the conversation in exclusively academic circles, while paying light lip service to the notions of an eventual, singular, Air and Space Force that might someday evolve into the Space and Air Force ... maybe, someday. Simultaneously, leaders introduced the concept of space-mindedness. Young military space professionals assumed that space-mindedness was analogous to air-mindedness, a way of thinking that appreciates and exploits the possibilities of the domain, while recognizing the challenges and risks inherent therein as a means of seeking rapid victory in combat, or by thoughtful preparation and display of prowess, avoiding conflict altogether.

Space-mindedness would come to mean something else entirely. Being space-minded became code for the appreciation of how spaceborne effects could enable or augment terrestrial operations. At no point were space-minded airmen and other joint leaders required to recognize cislunar [between the moon and the Earth] orbit as a potential domain for conflict in which an adversary might seek advantage by attacking US space assets or even by trying to deny the US access to orbit. If anything, in the Air Force, being space-minded meant little more than that a weapons officer knew his GPS-guided bomb was enabled by a satellite (sometimes).

Since the Trump administration announced its intention to create a separate and independent Space Force, the bureaucracy seems to have gone into overdrive in its efforts to block the creation of a new service, and barring that, to insure that any new organization is as impotent and transitory as possible. The counter-revolution began with the Air Force's partner, the Air Force Association, attacking the concept of an independent space service through its think tank, the ironically named Mitchell Institute. Unable to mount a compelling argument for maintaining the Air Force's management of the space domain, the Mitchell Institute instead created an internally contradictory and deliberately unobtainable series of steps that would have to be taken before the creation of a new service. When this approach proved insufficient, the former Air Force Secretary dropped an unsupported and

undetailed cost assessment designed to shock the Congress, a startling \$13 billion price tag to stand-up a new Space Force, using nothing but existing DOD resources. Congress' reaction was predictable, scale everything back and keep Space within the department of the Air Force. While that cost estimate is now widely discredited, it has largely achieved its purpose.

Today, a small cadre of airmen space professionals is shuttered out of sight in the bowels of the Pentagon, building an organizational plan for a space service within the Department of the Air Force. Their deliberations are not public and are being directed and guided by senior airmen, who no doubt have the best of intentions, but for whom it must be acknowledged that there exists at least some conflict of interest. They continue to work for the senior Air Force leadership, who are themselves wary of losing quality service members and other precious resource flexibilities to a new Space Force and who are already on record, formerly or otherwise, as opposing the concept.

Adding to the conflicted nature of these planners is a Stockholm Syndrome-like determination in many space officers to avoid any accusation of disloyalty to the

Air Force. The question, "Which team are you on?" has become common when discussing this subject inside the Pentagon, ironic since all DOD service members and employees are on the same team.

While still in uniform, I received a call from a contract employee on the Secretary of the Air Force's staff who stated that some of my previous work was "off message" and that "I needed to be sure I knew what I was doing." Colleagues have relayed similar experiences, with one reporting that a wing commander had stated "the only airmen allowed to have an opinion on Space Force are the Secretary and the Chief of Staff." Any Air Force space-minded professional, operating in this environment, is forced to choose between their informed sense of how best to protect US interests in space and their aspirations for their military career.

In the final analysis, this is much larger than the just the Space Force debate. If the US Air Force intends to stay the dominant airpower on the planet, then it must learn to again embrace the gutsy, risk-taking, mission-focused, innovative, and visionary approach to airpower preached by Mitchell.

Timothy Cox  
Woodbridge, Va.

# (EXTREME)



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**The Structure of the Force**

Having worked in the organizational histories section of the Air Force Historical Research Agency for most of my 37 years working for the Air Force, I have three organizational changes to recommend as I prepare to retire [See "Air Force Magazine, 2019 USAF Almanac: Major Commands," p. 63].

The biggest organizational change I can recommend to improve the Air Force is to consolidate the inactive Air Force Logistics Command with Air Force Materiel Command. I can think of eight good reasons to do so: 1. Air Force Materiel Command uses the emblem of the inactive Air Force Logistics Command, and the consolidation would justify the use of one command's emblem by another. 2. The two commands were not active at the same time. 3. The two commands have had similar functions. 4. The consolidation would enhance the heritage of the command by giving it many more years of active service. 5. The consolidation would enhance the heritage of the command by giving it more honors. 6. Tactical Air Command has already been consolidated with Air Combat Command, for similar reasons. 7. Military Airlift Command has already been consolidated with Air Mobility Command, for similar reasons. 8. There would be no cost involved.

A second organizational change I recommend is to inactivate the 9th Air Force at Shaw Air Force Base [N.C.] and activate an inactive numbered air force in its place. The reason is that the current 9th Air Force is constantly confused with the original 9th Air Force, also at Shaw, and now designated as the United States Air Forces Central Command. The newer 9th Air Force has had a relatively short active life, compared to other numbered air forces, and United States Air Forces Central Command is still functioning as a numbered air force, and not as a command. The United States Air Forces Central Command (original 9th Air Force) is assigned, like the newer 9th Air Force, to Air Combat Command. I recommend not only that the newer 9th Air Force be replaced with one of the inactive numbered air forces with more heritage, but also that United States Air Forces Central Command be redesignated to its original name, 9th Air Force, an honorable name it had beginning in

World War II and for generations and decades afterward.

A third organizational change I recommend, to solve the problem of how to combine into one numbered air force the functions of 24th Air Force with 25th Air Force (they cannot be consolidated since they have been active at the same time for many years), is simply to keep the one with more heritage and temporarily inactivate the other one, for possible activation for other functions later. The 25th Air Force has far more heritage than the 24th Air Force, so the logical course of action would be to inactivate the 24th Air Force and keep the 25th Air Force active. The 25th Air Force has a very long and distinguished history and was once even a major command, Air Force Intelligence Command. Keeping the 25th Air Force active while inactivating the 24th Air Force would be much more cost effective, and more reasonable, than inactivating both the 24th and 25th Air Forces and activating another inactive numbered air force in their places.

I think implementation of these three recommendations would improve the organization of the United States Air Force.

Daniel L. Haulman  
 Maxwell AFB, Ala.

**Forerunners**

Just saw Jennifer-Leigh Oprohory's article stating that A1C William Pitsenbarger was the first enlisted airman to receive the Medal of Honor. While it's certainly good news about the movie, to be strictly accurate, Pitsenbarger was not the first enlisted airman awarded the MOH. Obviously Ms. Oprohory means the first USAF enlisted man, but there were other AAF enlisted recipients in World War II.

Barrett Tillman  
 Mesa, Ariz.

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## Turn It Up

Q: "On the scale of 1-to-10, how important is it that we get this budget done?"

A: "Eleven."

Exchange between Sen. Roger Wicker (R-Miss.) and then-Army Secretary Mark T. Esper, at Esper's July confirmation hearing to be Defense Secretary, on the urgency of passing a defense budget and avoiding a continuing resolution. A CR keeps Pentagon spending limited to the levels of the previous budget, and prevents new starts in technology, readiness, and modernization.

## Fly Me to the Moon

"We have the wrong strategy, the wrong ideas, the wrong doctrine. We are trapped in an industrial age model of thinking about space."

**Lt. Gen. Steven L. Kwast**, former commander of Air Education and Training Command, making the case for why the nation should shoot for the moon.



Photo: James Irwin/NASA

## En Garde!

"America has never been satisfied with bringing a knife to a knife fight. We will approach a fight with a peer adversary from a true position of strength, of readiness, and of skill, regardless of the quantity of their forces."

**Acting Air Force Secretary, Matthew P. Donovan** [Defense News Conference, Sept. 4].

## Embrace the Yuck



Photo: Leonard DeFrancisci

"The more it sucks out here—and you're eating MREs and you're pooping out in the Porta-John—the higher the morale is."

**Col. Donn Yates**, commander of the 4th Fighter Wing, Seymour Johnson AFB, N.C., during the Operation Rapid Forge exercise, which prepares airmen to operate in an austere environment [Defense News, August 2019].



Photo: AIC Aspen Reid

## Curtain 1 or Curtain 2

"It's either the F-35 or the S-400. It's not both. It's not park one in the garage and roll the other one out. It's one or the other!"

**Defense Secretary Mark T. Esper**, Pentagon press briefing [Washington Post, Aug. 27].



Photo: Russian Ministry of Defense

## Depends On Your Perspective



Illustration: Mike Tsukamoto/staff

"When I meet with my international counterparts, I try not to spend too much time talking about how \$738 billion doesn't go as far as it used to."

Commander of Air Combat Command **Gen. James M. Holmes**, noting that the US defense budget dwarfs that of most allies.

## IS THAT A THREAT?



Photo: Buddy8d

"The Chinese side urges the US side to fully comprehend the severity of selling arms to Taiwan, and clearly evaluate the situation."

**Senior Col. Wu Qian**, China Ministry of National Defense, on the sale of US F-16s to Taiwan [August 2019].

# Toward a Seamless Pacific

Gen. Charles Brown Jr. discusses PACAF mission readiness with airmen at JB Elmendorf-Richardson, Alaska, in February.



Photo: ATC Caitlin Russell

*Pacific Air Forces Commander Gen. Charles Q. Brown Jr. spoke with Editorial Director John A. Tirpak on Sept. 3 about the challenges of operating in the Pacific Theater, deterring China and Russia, a new force dispersal strategy, and lines of responsibility between regional commands. (The conversation has been edited for length and clarity).*

**Q. China and Russia recently conducted joint bomber flights in the Pacific. Does this development drive a new operational response from PACAF?**

A. Our operations don't necessarily change dramatically. It's really our focus on what both Russia and China might do. One of the goals of the National Defense Strategy is to not drive the two of them together. When they do collaborate, that sets off some alarm bells that we need to pay closer attention. And it's not so much that Russia and China will come together, but they will make it way more difficult for us in the region.

We also need to backstop our partners, particularly Japan and South Korea, because many times, when Russia flies, they tend to come out toward Japan and/or South Korea. So we work with them to help their awareness, and our own awareness will be key.

**Q. Were those July 23 bomber flights a grave concern?**

A. I don't think their level of interoperability is anything like when we operate and do an exercise with our partners. So, it may be in the nascent stages, or just for show. Time will tell.

**Q. What does it mean for your long-term posture?**

A. It's not just what we do in PACAF. It's INDOPACOM, US-AFE-AFRICA, and what we do with EUCCOM. And also NORAD and NORTHCOM. It requires more collaboration and a more concentrated effort between those combat commands and their air components, so that we don't have any seams, because Russia can influence any of those combatant commands. How we work together, share information, and coordinate our activity will be what's important. And also the strategic message we send.

**Q. The Air Force and Navy developed the AirSea Battle concept. What did that yield?**

A. It really helped open our eyes to the anti-access/area-denial environment and our understanding that we're going to have to change some of our approaches. We now practice what we call Agile Combat Employment. We've learned that we have to be lighter, leaner, more maneuverable, and working multi-domain operations to create multiple dilemmas for our adversaries. In the era of anti-access/area-denial, you're probably not going to be able to go toe-to-toe—well, you can, but there's more risk associated with it—so it's about having different options available, and this aspect of being able to work in multiple domains versus just the air domain. And we work closely with PACFLT.

**Q. Will the Air Force's Pacific bomber presence mission expand to more locations?**

A. I don't see the numbers increasing. And I wouldn't say we'll probably change locations—we are pretty much based out of Guam. But we do change up the flight profiles, and we've done a variety of them with different partners in the region. And that helps with my awareness in the air and maritime domains. ... I want to see where the [People's Republic of China forces] have gap seams or where they're able to track us.

**Q. Are those bomber presence flights dangerous, given China's complaints about them?**

A. When we do freedom of navigation profiles—our bombers, or the Navy's ships—we're actually flying [and steaming] where international law allows. When we go to a disputed area, what I expect is we'll get calls on Guard. And depending on how close we get—just like we do with them—I expect to be intercepted. But I also expect it to be safe and professional.

**Q. How do you reassure our allies in the Pacific that the US is a credible security partner, and that an attack by China on, say, Taiwan, wouldn't be over before the US could react?**

A. We have a national commitment to help provide Taiwan the capabilities for its own self-defense. Some of those capabilities—they're pursuing additional F-16s—will help them. But one of the ways we show our commitment is with our presence—people or aircraft. It's part of my engagement when I travel, and when my senior officers or even junior airmen travel. They spend time in various countries and build those relationships.

We exercise with various nations to the level of their ability and interest. It not only demonstrates our commitment but our level of assurance, and we also see it as a deterrent.

**Q. Some argue such exercises sap your readiness because USAF units don't get much training benefit. Others say exercises are crucial to building interoperability and relationships. Where's the balance?**

A. There are several lines of effort in the PACAF strategy. One is to strengthen allies and partners. A second is to increase our interoperability. Those go hand in hand. That being said, certain partners are very far along, and we get great ... rigorous, high-end training in exercises with them. By the same token, when we go to nations that don't have the same level of capability, it challenges us to learn a bit more about how we would execute with them. But the key to me is building those relationships, because we all have to start someplace. We can't say we'll only exercise with a nation that can do the high-end work. If we do, we'll leave a partner on the sidelines, and that's not my intent. My airmen are not going to get a whole lot of readiness training in some places, but it's about building a relationship. That leads to access—basing and overflight—which are important to be able to operate.

**Q. How is USAF responding to Chinese and Russian long-range missiles?**

A. The ability to disperse—historically, we've gone to places where we've got a big base with a big footprint. But I need to be able to go someplace that simply has a runway, a ramp—a place that I can put fuel bladders, some munitions trailers, and some airmen. They can operate that airfield and also bring in folks to reload, rearm, and move on.

We've been working on ... a hub-and-spoke concept. I'll disperse over a number of different airfields, over a number of different islands, and work the command and control between those to create a little more flexibility.

The more airfields I prove I can operate from, the more airfields our adversaries have to account for. We need to shift and move. At the same time, I want to do some counter-ISR and deception to make it more challenging for the adversary. It's all about affecting their decision-making cycle [and] where they might target us. I want to spread out, so if we do get attacked, we're able to recover very quickly, and still put pressure on our adversary.

**Q. What are your biggest investment requirements for PACAF?**

A. Multi-domain operations and command and control—I need a robust way to push information.

Tied to that, a long-range kill chain. It's good to have long-range weapons, but also to have the supporting ISR to target the right locations. As our ranges and speeds increase, we start going down the path of hypersonics. In command and control, I need a self-healing network; it's going to be contested.

The last piece is fifth-generation capability. Our partners, and we are bringing F-35s [to the Pacific]. We'll get the first of ours here at Eielson [AFB, Alaska] next spring. But it's also how we take advantage of that capability and think differently about how to do things. Since Desert Storm ... we've had a fairly permissive

air environment, and now the dynamic is changing. We're going to have to take a few risks here and there, and we'll probably take some losses. But a different mindset is important. We have to counter the advanced capabilities that our adversary has.

**Q. How do you counter the stealth capabilities China and Russia are beginning to field?**

A. Infrared search and track is one. The AIM-260 missile with increased ranges is good. But it's also how I take information off an F-35 and push it to my other assets or platforms.

We're using the Loyal Wingman concept and others to advance our thinking on how we would employ. Because, again, I want to create dilemmas.

It's not just the F-35 or F-22 or B-2 or B-21, it's how do we bring the team together so that our adversary has to consider all the different platforms. And we have to take advantage of those capabilities today, and not just hope [a conflict] will kick off in the future. Because it could kick off sooner than later.

**Q. The "tyranny of distance" means you need to increase the range of your platforms. Do you need more tankers?**

A. Tankers are high on my list. This is another reason why the "hub-and-spoke" approach is helpful to me, because I can do drop-ins at different locations. This is why ISR is so important, so we can have a good understanding of where we can get tankers a bit closer to the threat and also areas where we have to pull the tankers further back, which may change our scheme of maneuver.

**Q. With the return of great power competition, do you think a dedicated electronic warfare aircraft is needed?**

A. Of some sort: I'm not sure whether it's a dedicated machine, but it's broader than just a particular platform. A lot of work has been done in the last year to really look at EW, but we haven't been focused on it for a while.

We're picking back up on this because the electromagnetic spectrum will be contested. Our adversaries have the capability to make it difficult, but I also want to make it difficult for them. Whether it's a specific platform, or pods on aircraft, or ways that we use deception and some other means, nonkinetic, we want to drive doubt in the mind of our adversary.

**Q. A shortcoming of fifth-generation aircraft is their limited number of shots. Are you interested in an arsenal plane?**

A. It gives us more options. We're going to test the concept, and it shows a bit of promise, and that will help us in the long run.

This goes to the whole concept of innovation. We want to get ahead and test this and figure out what works and what doesn't. Various options are in play. We just had this test with the XQ-58, the Valkyrie, that's starting us down a path a bit faster to some new platform, whether it be an arsenal plane or a Loyal Wingman.

**Q. You've sounded the alarm about Russia and China being more aggressive in the Arctic. Does that suggest that US combatant command boundaries in that region should be redrawn?**

A. No, not really. In the past, a map of the Unified Command Plan would show dark, solid lines between commands. I think those lines are a bit more dashed now. What I mean by that is, the dialogue between combatant commands has only increased, and it has to.

The problems and crises we face, the adversaries we deal with, they don't stop when they get to a combatant command line, or slow down so we can hand off from one to another. We have to have a bit more flexibility between our leadership teams and operations centers so we don't drop the ball on something. ❏

By John A. Tirpak

# Meet the New Boss

## APOLITICAL VALUES

With an armful of priorities and promises, Mark T. Esper launched his tenure as the 27th Secretary of Defense in July. Like Jim Mattis, who departed last December—leaving Patrick M. Shanahan as the Acting Secretary for seven months—Esper has pledged to make the US military more lethal and better able to tackle the new era of great power competition. But he's staked himself to an apolitical approach to national defense, emphasizing international alliances, personal ethical behavior, and transparency with the press. If he can't make good on those markers, Esper said, he'll resign.

Comparisons between Esper and Mattis are perhaps inevitable, as both had long military careers, are strategic thinkers, and clearly prize America's alliances more greatly than does President Donald J. Trump. It remains to be seen whether Esper will feel as free to disagree with the president as Mattis did about how to maintain those alliances, which are called out in Trump's own National Defense Strategy as the bedrock of American security.

At a Pentagon press conference a month into his tenure, Esper said "my commitment is to keep this Department apolitical" and promised that he and the incoming Joint Chiefs of Staff Chairman, Army Gen. Mark A. Milley, will set the tone for the armed forces by "behaving in an apolitical way," and through "the leadership that we demonstrate, the values we emulate."

Mattis, promoting his new book, *Call Sign Chaos: Learning to Lead*, warned in September that the nation has divided into "hostile tribes cheering against each other, fueled by emotion and a mutual disdain." The former Marine general turned Defense Secretary said he worries that this attitude may be soaking into the armed forces as well, such as incidents when troops have been seen wearing "MAGA" hats or attending political rallies in uniform. Asked about this at Esper's first press conference, outgoing Chairman of the Joint Chiefs Marine Gen. Joseph F. Dunford Jr. said top leaders shouldn't get involved in such things. These are best addressed by the "sergeants major, first sergeants, and chief master sergeants on the scene," he said. "They're not things that rise to the level of the Secretary of Defense or the Chairman."

The US military consistently polls as one of the most highly trusted institutions in the US. Still, Esper added, "It's a fragile thing, and we have to safeguard it."

In the briefing, Esper outlined his three principal "lines of effort": Build a more lethal force, strengthen alliances and partnerships, and reform the Pentagon's business practices to be more speedy and efficient. "And I added line of effort four for me: Taking care of service members and their families."

## BIPARTISAN SUPPORT

Esper was introduced at his confirmation hearing by Sen. Tim Kaine (D-Va.), who offered confidence in the sincerity of Esper's concern for the troops by telling a story from Esper's time as Army Secretary. Esper had invited Kaine and Sen. Mark Warner (D-Va.) to see housing conditions at Fort Belvoir, Va., not far from Washington, quarters that were notorious for problems. Kaine said he was skeptical, expecting to see a "Potemkin Village," meant to suggest the Army had successfully addressed complaints.

Instead, Esper revealed "the unvarnished version of problematic



Photo: SSgt. Nicole Mejia

**Secretary of Defense Mark Esper speaks to reporters at the Pentagon Aug. 28.**

housing and people who had been treated badly and couldn't get help from their chain of command," Kaine said, describing it as a "blunt and heartbreaking" display. In subsequent discussions with other families and base leaders, Esper wouldn't accept delay or "substandard responses," Kaine said, insisting "that the families be dealt with fairly and promptly."

While "most of us were very discouraged by the resignation of Secretary Mattis," Kaine told his fellow senators at Esper's confirmation hearing, "we've hoped for ... a successor who could show the same level of candor and principle and a willingness to remain independent even in the most challenging circumstances. I believe Dr. Esper has those traits."

Asked in Senate Armed Services Committee colloquy whether he would consider resigning if he can't live up to the ethical bar he's set for himself, Esper answered "absolutely." Convinced, the Senate confirmed Esper by an overwhelming 90-8 vote.

## CHINA, RUSSIA, AND A NEW BATTLE RHYTHM

Esper said his priority would be confronting China and Russia, both of which, he told reporters, are "building up and modernizing their military forces to challenge the United States and enable their geopolitical aspirations." He also accused North Korea and Iran of intentionally moving to "promote instability." In response, he said, the Defense Department must continue to "balance current needs"—

that is, readiness—with “the needs of the future,” or modernization.

He described a whirlwind first month in office, during which he made a lengthy tour of Pacific allies and US installations. Strategically, Esper said, the Far East is his top “priority theater,” and that’s why he went there first. China, he said, is executing a “deliberate strategy to undermine the stability of the region.” Leaders in the Indo-Pacific with whom he met told him they want the US to “show leadership” in their part of the world, and this Esper said he promised, although, in a nod to one of President Trump’s favorite themes, he said the US will press “for equitable burden-sharing from them, as well.”

He also asserted that he’s changed the “battle rhythm” in the Pentagon, stepping up meetings with department leaders to rapidly realign departmental priorities with the National Defense Strategy.

For all programs and activities, he’s asking, “Why are we doing it?” and “What should we be doing instead?” Often running late, the meetings have come to be known as “Night Court.”

This all amounts to a DOD-wide review process to identify money or manpower that can be reallocated to higher priorities. Deputy Defense Secretary David L. Norquist is in charge of this effort, beginning with the Pentagon’s so-called “fourth estate”—civilian defense agencies and their army of employees.

Following Esper’s lead, Air Force officials are also looking for things it can stop doing.

Acting Air Force Secretary Matthew P. Donovan quoted Esper in a speech in Arlington, Va., Sept. 4, saying, “his guidance states that ‘No reform is too small, too bold, or too controversial to be considered.’” Then he added: “The Air Force is leading the way with bold and likely controversial changes to our future budgets. We need to shift funding and allegiance from legacy programs we can no longer afford due to their incompatibility with future battlefields.” The Air Force canceled the Joint STARS Recap program for just this reason.

## J’RECUSE

In his confirmation hearing, Esper stated that he’s “fully committed” to honoring the department’s ethics requirements as regard any actions affecting his former employer, defense contractor Raytheon. But he stopped short of saying he would recuse himself from any decisions affecting that company and that a “screening process” is in place to flag any potential conflicts of interest. He said he had divested himself from Raytheon interests “in accordance with all my ethics obligations and requirements,” but still has some deferred compensation coming from the company. Those monies can’t be “influenced” by anything Esper does at the Pentagon, he insisted.

As Deputy and later Acting Secretary, Shanahan was never able to shake the perception that he favored Boeing, his employer for 30 years. Boeing won a series of big-ticket, high-profile contracts while Shanahan served first as Deputy Secretary and later as Acting Secretary, but an inspector general review found no evidence of Shanahan attempting to influence the process on Boeing’s behalf.

## CONTINUITY UNDER FIRE

Esper’s approach to dealing with military crises is likely to be consistent with those of Mattis and Shanahan. In a de facto tour of world hotspots under questioning from the press, Esper gave no indication he will deviate much from the policies of the past two years.

**Afghanistan:** He declined to answer directly questions about a potential deal, which appeared to fall apart in September. Dunford tried to assure reporters that any deal with the Afghan government and the Taliban will have to be “conditions-based,” and must result in meeting the original goal of the US involvement in Afghanistan: to ensure the country cannot be a springboard for terrorism against the US and its allies. Dunford said Afghanistan cannot again become “a sanctuary from which we can be attacked.”

Asked, however, about President Trump’s controversial remark that the US could use nuclear weapons in Afghanistan, Esper answered that “we reserve the right to keep all options on the table.” But “we have a plan ... to resolve this conflict in a political agreement.”

**Korea:** Esper was asked if large-scale US-South Korean exercises—given up by President Trump as a condition of talks with North Korean dictator Kim Jong Un—will ever be resumed. He responded that Army Gen. Robert B. Abrams, commander of US forces on the peninsula, “feels that the training and exercise plan we currently have underway is sufficient to maintain our readiness” with Republic of Korea forces.

Dunford added that the exercises have been “adjusted” to be “less visible,” and “we have found other ways of maintaining a high level of readiness.”

Nevertheless, Esper said North Korea’s recent acceleration of short-range ballistic missile tests is grounds for concern and came up frequently in talks with Pacific leaders during his trip. “We want to understand what they’re doing, why they’re doing it,” he said. “On the other hand, we’re not going to overreact. We want to take a measured response and make sure that we don’t close the door to diplomacy.” The goal remains to achieve an “irreversible, verifiable, complete denuclearization of the peninsula,” and the best way to get there is through a “political agreement.”

**Iraq and ISIS:** Responding to a question about Iraq and the health of the coalition there, given Israeli actions in that country and Lebanon, Esper said the US remains focused on “supporting Iraq and supporting our forces in Iraq to go after ISIS” and is “concerned” about anything that would “impact our mission.”

**Turkey, Syria, and ISIS:** NATO’s second-largest contributor of troops and equipment to the alliance isn’t getting off the hook regarding its purchase of the Russian S-400 air defense system, and Esper said he’s not budging from the US stance that Turkey be ousted from the F-35 fighter program as a result.

“We are where we are, and it’s regrettable,” Esper said. He praised Turkey for historically being a friend and ally, “and I would hope that they would move back in our direction.” Getting the S-400 “completely out of the country” is the precondition for being readmitted to the F-35 project.

He acknowledged, though, that Turkey sees its own security problems with the war against ISIS that diverge from those of the US.

“One ... we’re trying to maintain continuity in our campaign against ISIS in Syria. And two, we’re trying to address what are legitimate concerns by the Turkish government for the border between Turkey and Syria,” Esper explained, adding that such discussions have stretched for more than two-and-a-half years. The US has agreed to create a joint coordination center inside Turkey “to immediately address the threats along the border between Turkey and Syria,” to focus on removal of heavy weapons from the frontier and establish “combined patrols.”

## FINAL FRONTIERS

Esper won’t be challenging Trump on the creation of the Space Force, telling the press he’s “excited” for activation of US Space Command as “the next crucial step” in creating “an additional armed service” for space.

While Trump has frequently demonized the press as the “enemy of the people,” Esper said he’s committed to dealing honestly and cooperatively with the media, pledging to continue the habit he set as Army Secretary—to make himself available on a regular basis to explain what the service was doing, and why. He made a point, in his first press conference as SecDef, to say he’ll extend that policy and encouraged other Pentagon leaders to do the same, as the US military “has a proud history and a great story to tell.”



TSgt. Gregory Green runs a security check on a C-130 at an undisclosed location in Southwest Asia. The Air Force temporarily grounded about a quarter of the C-130 fleet in August after cracks were discovered on the lower center wing joints of some H model C-130s. A week later, most of the 123 grounded H and J model aircraft were back on duty around the world.



Amn. Kristina Schneider aims a water hose at an exterior aircraft fire trainer at the Louis F. Garland Department of Defense Fire Academy at Goodfellow AFB, Texas. The 40-year-old mother of two became a civilian firefighter and paramedic eight years ago but only recently joined the Air National Guard and graduated from her third fire academy near the top of her class.



Capt. Benjamin Aiken maneuvers a C-17 into refueling position under a KC-135 Sept. 10 during Mobility Guardian, AMC's largest full-spectrum readiness exercise to date. Hosted by Fairchild AFB, Wash., 46 US aircraft joined aircraft from 29 international partners and more than 4,000 US and international Air Force, Army, Navy, and Marine Corps aviators. The massive exercise emulated the contested, degraded, and operationally limited environments mobility forces can face in combat and emergency conditions.





An MQ-9 Reaper waits to roll out on an ISR mission from Ali Al Salem AB, Kuwait, in July. The remotely piloted aircraft have been a mainstay of US intelligence gathering and strike missions for more than a decade during a time when US air superiority has rarely been tested. Sophisticated air defense and missile systems, however, pose an increasing threat to these aircraft. Houthi rebels in Yemen shot down a Reaper in June and claimed a second downing in August.

# US Space Command Takes Reins on Space Ops

President Donald Trump, flanked by Vice President Mike Pence (right), and Gen. John Raymond, USSPACECOM chief, watch as Secretary of Defense Mark Esper signs documents establishing US Space Command Aug. 29 in the White House Rose Garden.



Photo: Tia Dufour/White House

By Rachel S. Cohen

**P**resident Donald J. Trump formally revived US Space Command to oversee daily space operations in an Aug. 29 White House ceremony, the most recent step in the federal government’s overhaul of military space organizations.

“The dangers to our country constantly evolve, and so must we,” Trump said. “Now, those who wish to harm the United States, to seek to challenge us in the ultimate high ground of space, it’s going to be a whole different ball game.”

Flanked onstage by Vice President Mike Pence, Defense Secretary Mark T. Esper, and SPACECOM boss USAF Gen. John “Jay” Raymond, Trump pointed to other countries’ anti-satellite weapons and said now is the time to deter enemies and “prepare for victory” in space in the same way the military approaches the air, land, and sea. Esper then signed the order establishing the command in the Rose Garden.

SPACECOM, which handed its responsibilities to US Strategic Command and disbanded in 2002, is taking that work on once again.

“The United States Space Command of today shares the same name as the original command. However, it is designed for a different strategic environment,” Raymond told reporters.

“Today’s US Space Command has a sharper mission focus on protecting and defending our critical space assets,

a stronger unified structure with our intelligence partners, a strengthened relationship with our allies, and a closer connection to our joint warfighting partners and other combatant commands,” he said.

The 11th unified combatant command will manage the daily business of running communications and GPS satellites, tracking missile launches and space debris, and more, under Raymond’s leadership. He also runs Air Force Space Command, which will provide the bulk of the Pentagon’s space personnel and assets to SPACECOM.

“Space systems enable a more lethal, resilient, and agile joint force to deter and defeat aggression by strategic competitors,” defense officials told reporters. “Our space capabilities allow our military leaders to see the battle space with clarity, provide early warning, strike with precision, navigate with accuracy, communicate with certainty, understand weather impacts, and operate anywhere in the globe.”

However, certain questions remain unanswered. SPACECOM is temporarily headquartered at Peterson AFB, Colo. At press time, Acting Air Force Secretary Matthew P. Donovan was still reviewing six possible locations in California, Colorado, and Alabama that could serve as a permanent headquarters. The Air Force said an announcement on the preferred location is slated for sometime around the end of 2019.

Colorado’s congressional delegation in August again lobbied for their state to be the command’s permanent home.

“Colorado provides the existing command structure, infrastructure, and communications platforms necessary to host additional national security space initiatives and ensure coordination of efforts,” the bipartisan group wrote to Donovan and Raymond on Aug. 29. “Our state ranks first in the nation in its concentration of aerospace jobs and has the nation’s largest aerospace economy on a per capita basis.”

The state is home to Air Force Space Command, as well as Buckley, Schriever, and Peterson Air Force Bases, the National Space Defense Center, US Northern Command and North American Aerospace Defense Command, and the US Air Force Academy. Major defense contractors such as Lockheed Martin have facilities a short drive from Colorado Springs, a key military space hub that hosts a massive conference focused on the cosmos each year.

“Throughout the basing process, the Colorado community has demonstrated continued support for US Space Command, further augmenting the workforce talent, innovation in industry, institutions of higher education, national labs, and unparalleled quality of life Colorado already provides,” lawmakers wrote.

Other SPACECOM personnel and functions are working at key space bases Schriever AFB, Colo., and Vandenberg AFB, Calif., as well as Offutt AFB, Neb., the home of STRATCOM headquarters. SPACECOM’s two major components will be located at Vandenberg and Schriever.

Raymond used his first full day on the job to establish the two subordinate commands that will carry out the organization’s main responsibilities. One supports field commanders’ needs for space capabilities, namely GPS and communications, while the other protects US assets.

The Combined Force Space Component Command at Vandenberg, led by Maj. Gen. Stephen N. Whiting, is in charge of supporting other combatant commanders and the joint force through the Combined Space Operations Center at Vandenberg; the Missile Warning Center at Cheyenne Mountain AFS, Colo.; the Joint Overhead Persistent Infrared Center at Buckley AFB, Colo.; and the Joint Navigation Warfare Center at Kirtland AFB, N.M.

The CFSCC also oversees certain Air Force, Army, and Navy space units, SPACECOM said in an Aug. 30 release.

The Joint Task Force-Space Defense, run by Brig. Gen. Thomas James, works to “deter aggression, defend space capability, and ... defeat adversaries” through the National Space Defense Center at Schriever, and other groups, according to SPACECOM. The task force is located at Schriever as well.

It’s still unclear how many people will end up working at SPACECOM. Initially, SPACECOM has 287 employees assigned to its headquarters and staff, and it will gain more workers over time. SPACECOM’s workforce could grow to more than 600 people. The Defense Department’s 2020 budget request includes about \$84 million to stand up the command.

In “higher states of conflict,” the National Reconnaissance Office has agreed to answer to the SPACECOM commander, Raymond recently told reporters. He did not elaborate on what circumstances would trigger that chain of command.

Officials are still working through the process of shifting certain missions, resources, and authorities from STRATCOM to SPACECOM.

The new combatant command is expected to work hand in hand with a potential new Space Force. At press time, the Trump administration was still hashing out the details with lawmakers and eventually wants the Space Force to become a stand-alone department in the Pentagon.

## AFSPC MULLS INTEL, PERSONNEL QUESTIONS

Figuring out how to keep a closer eye on what’s happening in outer space—rather than using space to peer down at the Earth—is among the uncharted capability and personnel issues the Air Force must navigate as a possible Space Force comes to fruition, according to the deputy commander of Air Force Space Command, Maj. Gen. John Shaw.

“When you think of space and intelligence together, you might be like me,” Shaw said at a Sept. 5 conference hosted by the Armed Forces Communications and Electronics Association and the Intelligence and National Security Alliance in National Harbor, Md. “In my career, I think about intelligence collection in space, coming down to the Earth—intelligence from space. We need to think really, really hard now about intelligence for space. Where is that intelligence expertise, the processes, the capabilities we have to understand what’s actually happening in the space environment?”

Traditional defense contractors, industry, and allies all have a role in helping the military figure out how to build space situational awareness, Shaw said. To get there, the Pentagon and the Intelligence Community must also keep its ground systems modernized so they can continue “talking” to systems in space, and those systems must be able to communicate with each other—no matter which organization owns them.

“It’s a ‘big data’ problem to understand what is going on within the space domain,” Shaw said. “Space is pretty big. ... It’s only getting bigger, in many senses, from a cosmological as well as a policy scope. How do we make sure that we’re harnessing all of the capabilities to understand and attack that problem?”

Shaw said the National Air and Space Intelligence Center at Wright-Patterson AFB, Ohio, should “scale up” to offer more operational intelligence support. A Space Force would probably leverage what NASIC already offers for the foreseeable future, but a separate national space intelligence center may be needed later.

Boosting the military’s space domain awareness will shape how people command and control assets like satellites, as the Air Force works toward a more overarching, integrated approach to operating and defending those systems.

If Congress approves a new military service for space in its 2020 defense policy bill, the organization could face the same hiring and retention challenges that the broader Air Force sees for pilots and cyber forces sees for experienced employees who might rather work in private industry. That service will have to consider creative ways of letting space personnel move between government and industry, along with sharing them between organizations, Shaw said.

He’s started crunching the details of how Space Force recruitment might work, both in and out of the intel field. Those efforts could piggyback on the brick-and-mortar recruitment shops of the other services nationwide, or the potential service could turn to recruitment online.

“We could probably follow the models from our sister space agencies (at the National Reconnaissance Office and National Geospatial-Intelligence Agency) that are represented here as well as NASA in that regard,” Shaw said.

In the event that Congress allows for a Space National Guard, Shaw said it would serve as the “perfect vehicle” to draw on the private sector’s experience to bolster what a Space Force can do.

He expects space ISR training, which changed from a two-week, missile-focused course to a five-week, space-focused course over the past couple of years in the Air Force, will grow

increasingly specialized under a Space Force. The Space Force would have its own intel officers and enlisted airmen, he said.

“We are starting to grow that and the ramp-up has been huge,” Shaw said.

Another area the Defense Department is still fleshing out is which cyber personnel should work with a new Space Force. There’s no firm answer yet, Shaw said, but the military’s priority is defending the networks that enable space systems to do their jobs. Supply chain cybersecurity is also a growing issue across the Pentagon.

“We won’t be able to do things in the vast reaches of space with mostly autonomous vehicles being operated remotely

without the cutting-edge cyber capabilities that we need to bring to bear,” stated Shaw.

Adding artificial intelligence and machine learning into those protected systems will be key to the Space Force’s long-term capabilities as the Pentagon’s reach in the domain expands.

“When the Space Force stands up, it’s going to be around for a long time, and its ultimate destiny is going to be providing security and projecting power for increasingly vast distances—from geosynchronous (orbit) to cislunar to beyond,” Shaw said. “We’re not doing that, probably, with humans in space anytime soon.”

## 24th and 25th Air Forces Inch Toward Merger

By John A. Tirpak

The long-planned merger of 24th and 25th Air Forces into a new information warfare organization will take place in the fall and will include weather specialists and several other activities not initially included in the plan, Air Combat Command chief Gen. Mike Holmes said.

“We’ll start off with consolidating a component [numbered Air Force] with an integrated staff and a single operations center that ties those things together,” Holmes said Aug. 23. “We can do that at [initial operational capability] this fall.” The original plan had been to combine the two organizations in late summer.

Holmes acknowledged the service is still working out how to operate in the “information spectrum” and what that should encompass. Initially envisioned to combine intelligence, surveillance, reconnaissance, cyber, electronic warfare, and cryptography, the vision has since expanded.

“We’re going to move the 557th Weather Wing over in alignment with this NAF,” he said. “When you think about what our weather wing does, it takes information, gathered by sensors all over the world, it uses algorithms and people to work through it, and provides it out through networks. So, it kind of fits in with our ISR and cyber missions, and we think it’ll have a better home there.”

The 557th WW was created from the Air Force Weather Agency in 2015 and currently falls under Air Forces Southern within Air Combat Command.

The new NAF commander will serve as the Air Force’s service component within US Cyber Command, Holmes said. One commander will oversee all of the Air Force’s new cyber mission force teams within the merged organization as well.

The NAF commander will also lead a “Joint Force Headquarters Cyber/Air Force” focused on US European Command, US Transportation Command, and US Strategic Command, Holmes said. That same person is expected to run all Air Force-provided networks, from the unclassified level to higher, more secret levels.

“He’ll be our service cryptological component commander, working in support of any airmen that we provide to the National Security Agency and the other things we do across the Intelligence Community,” Holmes added.

The Air Force has yet to officially name the new organization, but has chosen a headquarters location: JBSA-Lackland, Texas. *Air Force Magazine* previously reported that officials at Offutt AFB, Neb., believe their base could serve as a major information warfare hub as well.

Each service defines information warfare differently. For the Air Force, Holmes said, it boils down to the central issue



Photo: Paul Shirk

Dainius Slavisnkas (right), technical director at Myriad Global Media, shows Jeffrey Fries, the ops director at 557th Weather Wing, how to use virtual reality controllers. The merger of 24th and 25th Air Forces will bring weather airmen into the information spectrum.

of “how do we take all that data that’s out there available to us, and use tools to make that data work on behalf of warfighters?”

It should not be confused with information operations, he said, which is “a little more tailored; precise intelligence information, crafting a message that will have the right impact, finding the right audience to deliver it to, and have the means to deliver it to them, to derive an effect.”

Yet the new NAF will build on Air Forces Cyber’s work as the service looks to deter bad actors in the digital sphere.

“We’re in a competition with peer adversaries, that have a military component that largely stays below the level of armed conflict, and we’d like to keep it there,” Holmes said.

The Air Force wants to recast the competition “in terms that are favorable for us” and add new data-driven options for national leaders that help rebuff “malign activities at all levels from that information warfare level all the way up to major conflict.”

The new NAF is also poised to play a key role in planning for future military activity in the electromagnetic spectrum, as the Air Force looks to rebuild those capabilities after 15 years of focusing on violent extremism. Holmes envisions the branch could oversee rapid analysis of sophisticated EW threats and counter them in near-real time.

# US Deploys Fighters and Bombers As Tensions Ease in Gulf

By Rachel S. Cohen

Peace hasn't quite broken out in the Arabian Gulf and Strait of Hormuz but tensions have subsided.

"I'm not sure I'm ready to call the crisis over yet, but so far, so good," Defense Secretary Mark T. Esper told reporters. "We hope the trend lines continue that way. We hope that the parties, that the Iranians would agree to ... meet and talk, and help us resolve these issues."

The US blames Iran and its paramilitary Revolutionary Guard for attacking ships, seizing oil tankers, and downing a Navy drone over the course of a tense summer in the Gulf.

Operation Sentinel, a multinational maritime effort to boost surveillance and security in the region, is now underway, Esper said, with the UK, Australia, and Bahrain joining the US on a framework to escort allied ships through those waters, according to US Central Command.

"The purpose of this operation is twofold: first, to provide freedom of navigation for the commercial shipping that is so vital to global economic trade, and second, to deter provocations and avoid conflict in the region," Esper said.

Outgoing Chairman of the Joint Chiefs of Staff, Marine Corps Gen. Joseph F. Dunford Jr., who spoke alongside Esper at the briefing, said the US is changing how it plans for global threats posed by countries including Iran. The Pentagon has moved from its traditional focus on "operational plans for specific contingencies" to instead charting out plans that are specific to challenges laid out in the 2018 National Defense Strategy. That strategy is most concerned with China, Russia, Iran, North Korea, and violent extremism.

*The New York Times* reported Aug. 28 that the US secretly



Photo: SSgt. Chris Thornbury

An F-15E weapons load crew team lifts an AIM-9X missile to attach to a pylon at Al Dhafra AB, United Arab Emirates.

launched a cyberattack against a key Iranian database in June that helped to plan attacks on oil tankers. The US also temporarily degraded Iran's ability to target shipping traffic in the Persian Gulf, according to *The Times*.

The US has also moved F-22 fighter jets and B-52 bombers to Al Udeid AB, Qatar, and F-15s and F-35s to Al Dhafra AB, United Arab Emirates.

Esper and Dunford said the US forces help deter "bad, provocative" behavior. "The forces that are in the region that the Secretary approved are to deter aggression and to provide the president with options in the event that deterrence fails," Dunford said. ✪

## New Mission for EC-130H Compass Call?

By Rachel S. Cohen

The Air Force's EC-130H Compass Call electronic-attack plane has taken on a new role at the intersection of cyber and electronic warfare, according to Capitol Hill researchers.

"Compass Call is normally used to jam enemy radars and communications," said an Aug. 13 Congressional Research Service report. "However, in recent years, it has been used to transmit computer code to wireless devices using radio frequencies."

An Air Combat Command spokeswoman declined to comment on that new mission because it is classified. The information comes as the Air Force is merging its intelligence, surveillance, reconnaissance, cyber, and EW forces into a new organization.

It's unclear whether the Compass Call is passing code between friendly forces or whether it's meant to disrupt enemy operations. CRS declined to elaborate on its report.

"The most recognizable convergence of electronic warfare and cyberspace operations is when forces transmit computer code to inject it into an adversary's network," CRS noted. "In these types of operations, radios can transmit data packets on Wi-Fi networks, even if these networks are closed (i.e., not connected to the Internet)."

In 2017, *The War Zone* reported on a US Central Command document that acknowledged the potential crossover between EW and cyber operations.



Photo: SSgt. Jonathan Snyder

An EC-130H Compass Call takes off during training exercise Aviation Rotation 19-2 at Krzesiny AB, Poland.

"Cyberspace operations may be used to force an adversary from wired to wireless networks that are vulnerable," the document states. "EW may be used to set favorable conditions for cyberspace operations by stimulating networked sensors, denying wireless networks, or other related actions. In the defensive environment, EW systems may detect and defeat attacks across wireless access points."

Compass Call entered service in the 1980s, but the Air Force's secretive Big Safari group routinely updates it with new EW technology. The service is in the process of moving the EC-130H's equipment into a new fleet of 10 Gulfstream G550s, dubbed the EC-37B. Air Force operators will receive the first EC-37B in 2023, *Inside Defense* reported last year. ✪

# USAF's Niger Base Starts Limited Operations

By Brian W. Everstine

The Air Force's new operating base in central Niger began its first regular operations in August, with C-130s flying limited missions into the facility, the service announced Aug. 15.

The US military was waiting on Nigerien approval to start operations at the base, US Africa Command and US Air Forces in Europe-Air Forces Africa officials told *Air Force Magazine*. USAFE-AFAFRICA said the Nigerien Civil Aviation Authority, Nigerien Air Force, and USAF reached an agreement to start limited "visual flight rules" operations Aug. 1. A C-130J from the 409th Air Expeditionary Group landed at the base two days later.

VFR flights are part of the airfield assessments and procedure development that must take place before an installation begins full operations, the Air Force said.

Unmanned MQ-9s are slated to start flying missions at Air Base 201, near the village of Agadez, by the end of the year. "Air Base 201 gives Niger and the US incredible capability in a challenging region of the world," USAFE Commander Gen. Jeffrey L. Harrigian said in the Aug. 15 release. "This joint-use runway allows for a better response to regional security requirements and provides strategic access and flexibility."

An AFRICOM official, during an interview with *Air Force Magazine* at the command's headquarters in Stuttgart, Germany, said the base will serve as a hub for operations in the region. The 323rd Expeditionary Reconnaissance Squadron will fly Reapers out of the installation. The MQ-9's ability to loiter for hours "gives us a lot of good options" in the region, according to a second AFRICOM official.



Photo: SSgt. Devin Boyer

A C-130J takes off from the new Nigerian Air Base 201 in Agadez, Niger, on Aug. 3.

Constructing the base was a long-term logistical challenge. Supplies had to either be flown in on C-130s or trucked over a three-week journey from the nearest ports. Food, tools, supplies, and workers also had to be flown in. The US has a 10-year lease agreement at the base, according to AFRICOM.

The Air Force also has an existing presence at Nigerien Air Base 101, near the capital city of Niamey. Together, the bases will give the Air Force a large, persistent intelligence, surveillance, and reconnaissance presence in a country that has been a hotbed for extremist activity. For example, the 2017 ambush of Green Berets in the village of Tongo Tongo took place in the same region of Niger. ✪

## 'Cyber Flight Plan' to Determine Intel's Future

By Brian W. Everstine

The Air Force is developing a new "cyber warfare flight plan" that will lay out a path for merging various types of intelligence in a secure cloud so airmen around the world can access and analyze it, the service's top intelligence official said Sept. 4.

Lt. Gen. VeraLinn "Dash" Jamieson, the service's deputy chief of staff for intelligence, surveillance, and reconnaissance, and cyber effects operations, said the flight plan is looking at how to develop a network that integrates traditional ISR sensors and platforms in each domain with electronic warfare and cyberspace tools to "give us what we call a collaborative sensing grid."

The Air Force has assets focusing on space, air, surface, subsurface, and cyber, and all that data needs to be put into a network that can be "shared, stored, accessed and secured," Jamieson said at the Intelligence & National Security Summit in National Harbor, Md.

"Without a hybrid cloud capability, you really can't operate [artificial intelligence], machine learning, human-machine teaming at the speed and scale of relevance that is required for the great power competition we are in," Jamieson said.

The Pentagon needs to directly partner with industry, academia, and think tanks to reach that goal, she added.

Jamieson oversaw the rollout of a similar ISR flight plan last year that helped chart the future of the Air Force's intel-gathering platforms and how the enterprise manages data. This cyber-focused blueprint comes as the Air Force is



Photo: SSgt. Ramon Adelman

Airmen ready a RQ-4 Global Hawk for launch at NAS Sigonella, Italy.

beginning to align its ISR, cyber, and EW assets under new organizations and management structures. Jamieson, who plans to retire at the end of the year, did not say when the flight plan will be done.

Jamieson also pointed to a pilot program involving the Air Force's Distributed Ground System in Europe, which processes intelligence data from platforms such as the RQ-4 Global Hawk, to focus on the US European Command boss's top issue. The pilot program has a cross-functional ISR team that is integrating intelligence from the national to the tactical level, she said. She did not elaborate on what the problem set entails. ✪

# How USAF Is Spending \$1B in Disaster Aid

By Rachel S. Cohen

The Air Force will spend \$1 billion in supplemental disaster-aid funding on 15 military construction projects at three bases, according to a list of the projects obtained by *Air Force Magazine*.

## The beneficiaries are:

■ Tyndall AFB, Fla.: Seven projects to help the base recover from the damage inflicted by Hurricane Michael in October 2018.

■ Offutt AFB, Neb.: Four projects to help restore facilities lost following severe flooding that covered about one-third of the base in March.

■ JB Langley-Eustis, Va.: Four projects to help permanently accommodate an F-22 training unit that will not return to Tyndall.

Congress approved the supplemental funding in June after a drawn-out debate over how to allocate relief funds across the continental US and Puerto Rico. The Air Force's \$1 billion share can be used through the end of September 2023 for planning, design, and new construction expenses related to rebuilding from Hurricane Michael and floods in 2019. The bill also provided \$670 million in fiscal 2019 to restore salvageable facilities.

The Air Force has a 12-part plan to rebuild Tyndall as a model "base of the future." Among the immediate needs, however, are four projects to support F-35 fighters when they take up residence at Tyndall starting in 2023: a maintenance hangar, a parking apron, a maintenance squadron complex, and munitions storage. Other Tyndall projects include improvements to basewide site development and utilities and restoring the child development center. The total cost to restore Tyndall is expected to be about \$5 billion.

At Offutt, the supplemental will fund work on a campus for aircrews who sit on alert for the E-4 Nightwatch and E-6 Mercury nuclear command, control, and communications aircraft; a nonkinetic operations campus for intelligence, cyber, and electronic warfare; and a Milstar satellite communications station. Rebuilding



Photo: TSgt. Rachelle Blake

Cars nearly disappear beneath floodwaters at Offutt AFB, Neb., after severe weather devastated the base in March.

Offutt is currently slated to cost more than \$650 million and last into the mid-2020s.

A separate project to replace an Offutt runway—sections of which are more than 70 years old—won't begin until October 2020 so workers can avoid demolition and initial groundwork over the winter. Flight operations will move about 50 miles away to Lincoln Airport.

For JB Langley-Eustis, the Air Force wants to build a hangar for both operations and maintenance, a training support squadron facility, and a facility to repair stealth components of the F-22.

All contracts on the list are slated for award next summer or early fall, with the exception of two Tyndall and Offutt planning and design contracts that will be awarded by the end of September. ✪

## Pararescueman Honored with Bronze Star with Valor Device

By Brian W. Everstine

SSgt. Aaron Metzger, a pararescueman with the 38th Rescue Squadron at Moody AFB, Ga., on Aug. 26 received the Bronze Star Medal with Valor device for aiding two injured Afghan soldiers while under fire in a 2018 battle.

"Despite being exposed to continuous enemy fire, Metzger ran to aid two Afghan partners who were severely injured by a grenade," the Air Force said in a release. "Disregarding the risk to himself, he carried the two partners away from enemy fire."

Metzger, hit by shrapnel from a nearby grenade explosion, saved his own life by guiding a teammate through the required treatment, then was injured again by gunfire, according to the release.

Yet Metzger refused to be carried to a medical evacuation helicopter, choosing to fight on so his teammates could secure the area.

"I'm really proud of the work that he did," said Air Combat Command boss Gen. Mike Holmes, who presented the award to Metzger at Moody. "I'm proud of the team that took part in helping Sergeant Metzger return to status because that's a tough voyage." ✪



Photo: A1C Taryn Butler

Gen. James Homes (I), ACC commander, presents a Bronze Star Medal with Valor device to SSgt. Aaron Metzger on Aug. 26.



# Dozens of USAF Projects May Lose Funding

By Brian W. Everstine

Money for more than 50 Air Force-related military construction projects may be reallocated so the government can build a wall along the southern US border, according to the Defense Department.

The Air Force's share of \$3.6 billion in MILCON spans efforts such as range improvements, maintenance hangars, and operations facilities, among many others. Some projects were scheduled to improve Air Force installations, while others affect the service's operations but are not on its property.

The Pentagon announced Sept. 4 it would divert money for 127 existing MILCON initiatives to instead fund 11 barrier projects along 175 miles of the southern border. The military needs those particular border projects to support its effort to help handle immigration issues, Pentagon spokesman Jonathan Hoffman said in a release. Congress may decide to backfill the MILCON efforts in a future budget.

The Pentagon will send border wall funding to the Army in two installments, with the first half coming from deferred overseas projects. This includes several initiatives at USAF bases and elsewhere, for instance an elementary school and F-22 facilities at Spangdahlem AB, Germany; a large project for deployable air base systems and war reserve materiel at Ramstein AB, Germany; C-130J hangars and facilities at Yokota AB, Japan; and RC-135 infrastructure at RAF Fairford, UK. Additionally, European Deterrence Initiative-funded improvements at bases in Poland, Romania, Slovakia, and others will be delayed.

The second segment of funding, if needed, will come from deferring domestic projects in the US and its territories. Potentially impacted work at several USAF locations includes a maintenance hangar in Puerto Rico; range improvements at Eielson AFB, Alaska; a space control facility at Peterson AFB, Colo.; an MQ-9 operations facility at Holloman AFB, N.M.; a hazardous cargo pad and explosive ordnance disposal range at JB Andrews, Md.; a dining facility at JB San Antonio, Texas; a control center at the Utah Test and Training Range; cyber operations facility at JB Langley-Eustis, Va.; among others.

The full list of impacted projects can be found in a Secretary of Defense memorandum found at [www.defense.gov/](http://www.defense.gov/)

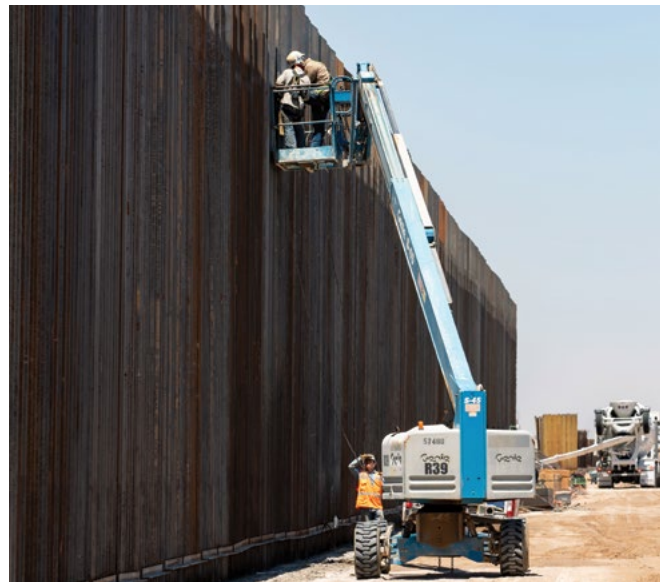


Photo: Jerry Glaser/US Customs and Border Protection

A section of border wall is replaced near Yuma, Ariz., on July 16.

newsroom, under the publications tab dated Sept. 4. Some lawmakers have pushed back on the plan, which comes as the military works through a slew of facilities problems that affect people and programs nationwide.

Sen. Jim Inhofe (R-Okla.), chairman of the Senate Armed Services Committee, said the money will allow the government to make real progress on securing the southern border without inflicting lasting readiness issues on the military. Others aren't convinced.

"Military installations will have crucial repairs and upgrades delayed as a result of this irresponsible action by the president," Rep. John Garamendi (D-Calif.), House Armed Services Committee readiness subcommittee chairman, said in a release. "This comes at a time when more than \$11 billion is needed to repair bases that have been ravaged by recent natural disasters. ... We will do everything in our power to push back against this irresponsible and irrational decision." ❖

## Reserve: If Airmen Don't Attend Stand-Down, Reach Out

By Jennifer-Leigh Oprihory

As the Air Force went into the final two weeks during which all Air Force units were to hold a one-day Resilience Tactical Pause, Col. Amy J. Boehle, commander of the Reserve's Headquarters Individual Reservist Readiness and Integration Organization, recommended that supervisors reach out to airmen who fail to show up and ensure they know how connected they feel and how they can get help if they need it.

Boehle said the Air Force is committed to help airmen get the support they need. "We can help locate religious support teams, mental health professionals, community support coordinators, violence prevention integrators, sexual assault response coordinators, volunteer victim advocates, military and family life counselors, family advocacy program personnel, community cohesion coordinators, physical health professionals, master resilience trainers, and legal assistance attorneys," she wrote.



Graphic: USAF

Air Force Chief of Staff Gen. David L. Goldfein and Chief Master Sergeant of the Air Force Kaleth O. Wright announced the service-wide tactical pause on Aug. 1 and said units had until Sept. 15 to complete the stand-down.





Photo: Ryan White/ANG

A-10s have been marked for termination many times, but it's not on the chopping block this time.

## USAF Hints at Ditching Some Legacy Programs—But Not A-10

By Rachel S. Cohen

Acting Air Force Secretary Matthew P. Donovan hinted at possible budget cuts in an address about the paradigm shift taking place toward more integrated and data-driven warfare.

“New capabilities are only half the story,” Donovan said at the *Defense News* Conference in Arlington, Va. Making the right choices about what to keep and what to let go is also important. “Secretary of Defense [Mark T.] Esper said recently that he was open to ‘divesting of legacy capabilities that simply aren’t suited’ for future battlefields.”

Esper wants the Defense Department to shift funds from programs that offer less value in future wars in favor of systems that deliver more capability. “His guidance states that ‘No reform is too small, too bold, or too controversial to be considered,’” Donovan said. “The Air Force is leading the way with bold and likely controversial changes to our future budgets. We need to shift funding and allegiance from legacy

programs we can no longer afford due to their incompatibility with future battlefields.”

Overall defense spending is capped at \$740 billion in 2021, up from \$716 billion this year and \$738 billion in 2020.

Lt. Gen. Jerry D. Harris Jr., the Air Force’s deputy chief of staff for plans and programs, was to have delivered the 2021 budget blueprint to Chief of Staff Gen. David L. Goldfein in late July. That plan, still under wraps, will point the way to a larger, but more capable military Air Force that will rely on improved communications, artificial intelligence, predictive maintenance, spiral software upgrades, space assets, and networks to enhance responsiveness and lethality, rather than on a platform-centric approach to completing certain tasks.

The 2021 budget could lay out concrete steps toward the Air Force’s plan to grow its squadrons and will continue its work on joint, multi-domain command and control, the Advanced Battle Management System, and weapons that strike across long distances and in the cyber and electromagnetic realms, among other priorities.

One aging platform that will not be on the chopping block: the A-10, according to Lt. Gen. Timothy G. Fay, deputy chief of staff for strategy, integration, and requirements. The Warthog has been marked for termination repeatedly over the past 30 years, only to remain a mainstay of the close air support mission. The Air Force last tried to cancel the A-10 in 2014, but was rebuked by Congress, which blocked the move in a budget battle that soured relations between the service and lawmakers.

“Everybody loves the future force. Our challenge is, what are you going to stop doing in order to pivot?” Maj. Gen. Michael A. Fantini, who runs the Air Force Warfighting Integration Capability planning group, said at the conference. “That’s where we see we’re making really tough choices.”

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# Next-Gen B-21 Looms Large

By Brian W. Everstine

Northrop Grumman is expanding its side of the secretive USAF Plant 42 facility and hiring thousands of employees, but its new B-21 bomber remains largely under wraps.

The company won't specifically say whether the growth is driven by the B-21 Raider, only that the new construction is for "programs." But it has invested "multiple hundreds of millions" of dollars to improve Plant 42, according to Janis Pamiljans, the president of Northrop's aerospace sector, and the company has added about 3,000 employees in California alone since 2015. There are 28,000 employees here now, and hiring continues.

"We've been on a tremendous hiring spree ... and you can see the kind of structures being built," Pamiljans said. Nearby, an older tan hangar-turned-production facility could be seen beside recently built white and blue buildings, and a large new hangar that is still under construction.

At the same time, Northrop has moved its work on other systems, such as the RQ-4 Global Hawk and the MQ-4 Triton, to new locations.

Reporters were not allowed near the new facilities during an escorted visit throughout the Southern California site in August. No other companies that are involved in B-21 development were visible on the premises. Still, the promise of a new bomber was in the air, even as Northrop and the Air Force celebrated the B-2's 30th anniversary at an Aug. 20 event, where the "Spirit of Missouri" was parked in front of a hangar that is now used to produce F-35 jet fuselage parts and "other programs," Pamiljans said.

The B-21 is eventually expected to replace the stealthy B-2



Northrop Grumman facility at USAF's Plant 42, a classified manufacturing facility in Palmdale, Calif. Other tenants include Boeing, Lockheed Martin, and NASA.

over the coming decades. Northrop plans to use the Spirit program's focus on supportability, sustainability, and mission capable rates as the blueprint for maintaining the B-21 as well.

"The B-2 is setting the path, course for the B-21," Pamiljans said. "What we've learned on B-2, we're finding baselined into the design of the B-21."

Eighth Air Force Commander Maj. Gen. James Dawkins told reporters in Palmdale that aspects of B-2 sustainment like computers, maintenance, and materials can naturally be leveraged for the B-21.

He said the platform's cost and schedule performance are "right on expectations."

"From that standpoint, it's been very successful so far," he said. "We're really happy about the way Northrop has approached this."

The Air Force plans to buy at least 100 B-21 bombers to complement 75 B-52s as its future bomber force. Air Force Vice Chief of Staff Gen. Stephen W. Wilson said in July the service anticipates the B-21's first flight in December 2021. ✪

## Mold, Moisture in USAF Dorms

By Jennifer-Leigh Oprohory

The Air Force recently found evidence of mold and moisture in dormitories at five bases during inspections of 17 domestic and overseas installations, following recent reports of a widespread mold problem at JBSA-Lackland, Texas.

Signs of mold and moisture were discovered at JB San Antonio, Sheppard AFB, Texas, Barksdale AFB, La., Al Udeid AB, Qatar, and Kadena AB, Japan, service spokeswoman Ann Stefanek told *Air Force Magazine*. The Air Force found mold in about 34 percent of dorms that participated in the spot checks, which finished Aug. 9, she said.

The service chose to look at installations that sit in hot, humid climates that foster mold, and at those for which it received feedback from airmen. Mold can also pop up in crowded dorms where near-constant showers generate a lot of moisture, Stefanek said.

The checks aimed to identify what kinds of mold issues airmen face, to figure out which of those issues could stem from systems like heating and cooling, to communicate with commanders and building owners about their own hurdles, and to see where leaders can help with remediation, she added.

In some dorms that need more extensive work, the Air Force put moisture-sucking fans into buildings while airmen wait for longer-term fixes.

Not all cases were severe, Stefanek noted. Some situations could be remedied by teaching airmen how to check for early signs of mildew and to properly clean their living spaces.

### No issues were found during inspections at:

- Charleston AFB, S.C.
- Eglin AFB, Fla.
- Ellsworth AFB, S.D.
- Holloman AFB, N.M.
- JB Langley-Eustis, Va.
- Keesler AFB, Miss.
- Kunsan AB, South Korea
- MacDill AFB, Fla.
- Maxwell AFB, Ala.
- Moody AFB, Ga.
- Robins AFB, Ga.
- Seymour Johnson AFB, N.C.

Imager: Google maps

Commanders at bases affected by mold put in work orders to address building problems or moved airmen and their families if needed, Stefanek said. Leaders “will continue inspections and are actively engaged in addressing the problem,” she added.

The spot checks wrapped up after *Air Force Times* reported in July that JBSA-Lackland had relocated about 200 residents while it battled “overwhelming mold problems” in some of its dorms. More airmen would likely need to move, a base official said at the time.

JB San Antonio and 502nd Air Base Wing Commander Brig. Gen. Laura L. Lenderman held three meetings across the installation from Aug. 13-15 to address the mold issue, according to a wing release. The joint base also recently launched a website dedicated to documenting mold-remediation efforts and centralizing related resources for airmen and their families.

“We have been facing these challenges for many years,”

Lenderman told airmen at the Aug. 13 meeting held at JB-SA-Fort Sam Houston, Texas. “But this is a tremendous moment in time where we can actually get things done.”

Stefanek said the service is sharing the lessons it learned from JB San Antonio and plans on teaching airmen how to prevent mold, how to handle maintenance work orders, and who they should contact to make sure mold issues are quickly remedied.

“In the longer term, we will analyze the data to help inform actions needed to identify, mitigate and resolve the issues, so we can provide our airmen safe and healthy living environments,” she said. “The analysis will help identify root causes for mold issues, with timelines to be scheduled based on the severity of the issue.”

The military is also battling broader issues within its privatized housing that have spurred changes like a Resident Bill of Rights. ✪

## Goldfein and Brown Visit Vietnam



Image: USAF

Air Force Chief of Staff Gen. David Goldfein meets with his Vietnamese counterpart, Lt. Gen. Lê Huy Vịnh, in front of a golden statue of Ho Chi Minh. Goldfein and Gen. Charles Brown Jr. (far left) visited Hanoi in August.

By Tobias Naegele

US Air Force Chief of Staff Gen. David L. Goldfein and Pacific Air Forces Commander Gen. Charles Q. Brown Jr. went to Vietnam in August, visiting a place where their fathers fought and served half a century before.

“I realized I was looking at the exact same picture my dad looked at in the cockpit of his F-4,” said Goldfein, recalling his emotions as his plane approached its destination. “I looked down and saw this big river that was flowing very red with mud, and I said, ‘Well, there it is, the Red River Valley,’ as it came into view.”

Brown said his father completed two tours in Vietnam, working special operations intelligence and subsequently as an adviser to a South Vietnamese transportation unit. “As we flew in, I reflected on my memories of my dad leaving home and at such a young age not fully appreciating he’d gone to war,” Brown said.

How times change. The official visit was marked by two days of cooperative meetings with senior Vietnamese offi-

cial. “I wasn’t sure what kind of reception we’d get, given our history between our two countries,” Goldfein conceded. “What was really rewarding was how sincerely warm the reception was.”

Added Brown: “Those that had once been my father’s adversaries were now our partners, focused on common security interests.”

Goldfein’s visit marked the first time a US Air Force Chief of Staff went to Vietnam since the war ended. Cooperation has not erased the past, however. From their hotel in Hanoi, Goldfein and Brown could see the red rooftop of what remains of the notorious Hanoi Hilton, where US prisoners of war were held in brutal conditions. The generals visited the site and stood where US heroes such as Col. George E. “Bud” Day and Arizona Sen. John McCain were held captive and tortured.

“Standing in one of the concrete cells for just a few moments,” Brown said, “I reflected on the fact that many of our POWs spent not moments, but years in these cells under arduous conditions. It was a very sobering experience.” ✪



# Pilot Training Next to Tackle Multi-Domain Ops

By Brian W. Everstine

The Air Force's third iteration of its Pilot Training Next initiative will focus on preparing pilots for multi-domain operations against advanced militaries, Air Education and Training Command said in an Aug. 29 release.

PTN began in February 2018 to modernize training and speed up the process with technologies like virtual reality headsets and gaming and new learning theories.

Its third phase, which begins in January, will use a T-6B aircraft variant to test the service's ability to teach combat and mobility flight skills to Formal Training Unit-ready pilots using "moving map display, synthetic radar, air-to-air and air-to-ground symbology, as well as detailed downloadable debrief files," AETC said.

The program's use of VR alongside traditional assets supplements academics and replaces up to 80 T-6 flying hours. Pilots are encouraged to use their systems outside of class as much as possible, according to AETC officials.

PTN recently graduated its second class of 14 pilots from the US Air Force and Navy, as well as the Royal Air Force. Graduates will go on to fly a range of fighter, bomber, airlift, intelligence, special operations, and training aircraft. The Navy pilot was chosen to fly the T-45A Goshawk, and the RAF graduate will fly the Eurofighter Typhoon, according to the release. ✪

To qualify for a slot in the course, Hibsich was the first female to complete the Ranger Assessment Course (RAC), which is hosted by the Air Force Security Forces Center. After training there, she went on to improve her skills at the Tropic Lightning Academy in Schofield Barracks, Hawaii.

Throughout her RAC training, Hibsich said it was "an unmatched learning experience on leadership and followership." The RAC is designed to help airman develop into better leaders and commanders while enduring mental, emotional, and physical strain. It improves resilience and strengthens coping mechanisms, allowing airman to function while "hungry, tired, wet, cold, or worse," according to Hibsich.

Now that training is complete she is slated as flight commander in the 821st Contingency Response Support Squadron at Travis AFB, Calif. ✪

## ■ The War on Terrorism

### Casualties:

As of Aug. 28, 79 Americans had died in Operation Freedom's Sentinel in Afghanistan, and 89 Americans had died in Operation Inherent Resolve in Iraq, Syria, and other locations.

The total includes 163 troops and five Defense Department civilians. Of these deaths, 77 were killed in action with the enemy, while 91 died in noncombat incidents.

There have been 453 troops wounded in action during OFS and 80 troops in OIR.

# New Female USAF Army Ranger

By Chequita Wood

1st Lt. Chelsey Hibsich is the first Air Force female to compete in and become an Army Ranger, graduating from Army Ranger School held at Fort Benning, Ga.

The Army Ranger course is an extremely tough course, and only about half of those attending will graduate. There are three



Photo: Machiko Arita

1st Lt. Chelsey Hibsich

rigorous phases each student must go through in order to become a Ranger: The Fort Benning phase, the mountain phase, and the swamp phase.

According to Army Sgt. 1st Class Jeremy Billings, an Airborne

Ranger and Training Brigade public affairs officer, "after these three phases, Ranger students are proficient in leading a squad and platoon dismantled operations around-the-clock, in all climates and terrain."

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# FACES OF THE FORCE



Photo: Courtesy

89th Airlift Squadron flight commander, C-17 instructor pilot, and Ohio State University alumnus **Maj. Andrew Pierce** earned a spot in his alma mater's Athletics Hall of Fame for men's track and field. Pierce took gold at the World University Games in China in 2001 and became an Adidas-sponsored competitive runner after graduating. He stopped competing in 2003 and was commissioned into USAF in 2005. "The way I was raised ... you work hard at it and do your best, but stay humble," Pierce said.



Photo: DPAA

Five decades after **Col. Roy A. Knight Jr.** was killed in action during the Vietnam War, his remains returned home to Texas Aug. 8 in a Southwest Airlines jet flown by his son Bryan. Knight ejected from his damaged aircraft, but his parachute was never spotted, and a search failed to find him. He was promoted to his last rank while MIA, and he was deemed KIA in 1974. Knight's casket was met by a military guard, and the airline shared his story with passengers over the public address system at Dallas Love Field Airport.



Photo: Barksdale AFB

Barksdale Air Force Base's Weapons Load Training Facility has been renamed in honor of **TSgt. Joshua L. Kidd**, a former loading standardization crew chief who passed away last September. The Aug. 16 dedication ceremony was attended by Kidd's wife, Alyssa, son, Beckham, plus former colleagues, friends and other loved ones. "To see his name on the side of this building ... that's amazing," said 2nd Maintenance Group commander Col. Michael Colvard.



Photo: SrA. Tara Stetler

Six 375th Aeromedical Evacuation Squadron medics from Scott AFB, Ill., helped Southwest Airlines avert an emergency landing in June. They were en route to a training mission at Travis AFB, Calif., when one medic noticed a passenger in distress. **Capt. James Bickel** realized it was an allergic reaction, and he and **Capt. James Howell** led the team in stabilizing the man and coordinating with the pilot and an off-site flight surgeon. "There's no way we would sit idly by and say, 'Oh, not for me today,'" Bickel said.



Photo: USAFA

USAF acquisitions officer and former Air Force Falcons long snapper **2nd Lt. Austin Cutting** signed a four-year NFL contract with the Minnesota Vikings in late July. Cutting is making good on his service commitment by helping USAF recruit while attending training camp. "I'm grateful to be able to do both—fulfill my commitment and potentially make the team as well," Cutting said. "I'm not going to say anything was given, but the Academy has helped me a lot."



Photo: USAF

Retired **Col. Jennifer A. Block** left the Air Force in April and was named the US Air Force Academy's executive director of athletics Aug. 12. Block, a USAFA alum and former Falcons' women's volleyball team MVP, said, "I'm a huge believer in the benefits and leadership lessons [college athletics] provide." Block previously served as reserve adviser to USAFA Superintendent Lt. Gen. Jay B. Silveria. "We are proud to have her on our team," said Silveria.



Photo: Courtesy

**Lt. Col. Glenn Mandeville**, an ANG doctor with the 181st Intelligence Wing Medical Group, spent two weeks working as a pro bono surgeon aboard a hospital ship based in the West African nation of Guinea-Bissau as a volunteer with Mercy Ships. Mandeville and approximately 400 colleagues cared for "about 50-70 patients at a time," he said. "Their [medical] problems are more advanced than what we would see here and can be debilitating," he said.



Photo: USAF

The Society of Asian Scientists and Engineers will bestow a professional achievement award upon **Vikas Varshney**, a researcher in the Air Force Research Laboratory's Materials and Manufacturing Directorate, for his work with "multi-scale modeling, nanocomposites, and carbon nanostructure," AFRL said. Varshney's current efforts combine machine learning and materials science for use in aerospace engineering applications. "I am thrilled to do great research for the Air Force," said Varshney.



Photo: SrA. Tristian Biese

633rd Civil Engineer Squadron base manager **Dan Porter** met **Carissa Agnese**, a senior biologist with the Army Corps of Engineers, during a standard site survey at JB Langley-Eustis, Va. When their initial conversation turned to her kidney dialysis—just about an hour after meeting—Porter offered Agnese a kidney. Porter wasn't a match, but the two discovered a kidney exchange program that led her to a compatible kidney and him to an alternate recipient.

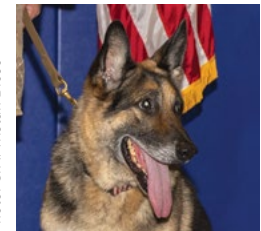


Photo: A1C Leela Marquez

**Wax**, a military working dog with the 56th Security Forces Squadron at Luke AFB, Ariz., retired on Aug. 9. Over the course of his nine-year career, he deployed to Afghanistan, supported 11 US Secret Service missions (which included protecting Presidents Donald J. Trump and Barack H. Obama), performed 23,000 explosive detection searches at Luke, and saved lives by finding more than 800 pounds of explosive-making materials within a vehicle before tragedy had a chance to strike.

Know of someone we should recognize? Send nominees to [afmag@afa.org](mailto:afmag@afa.org)

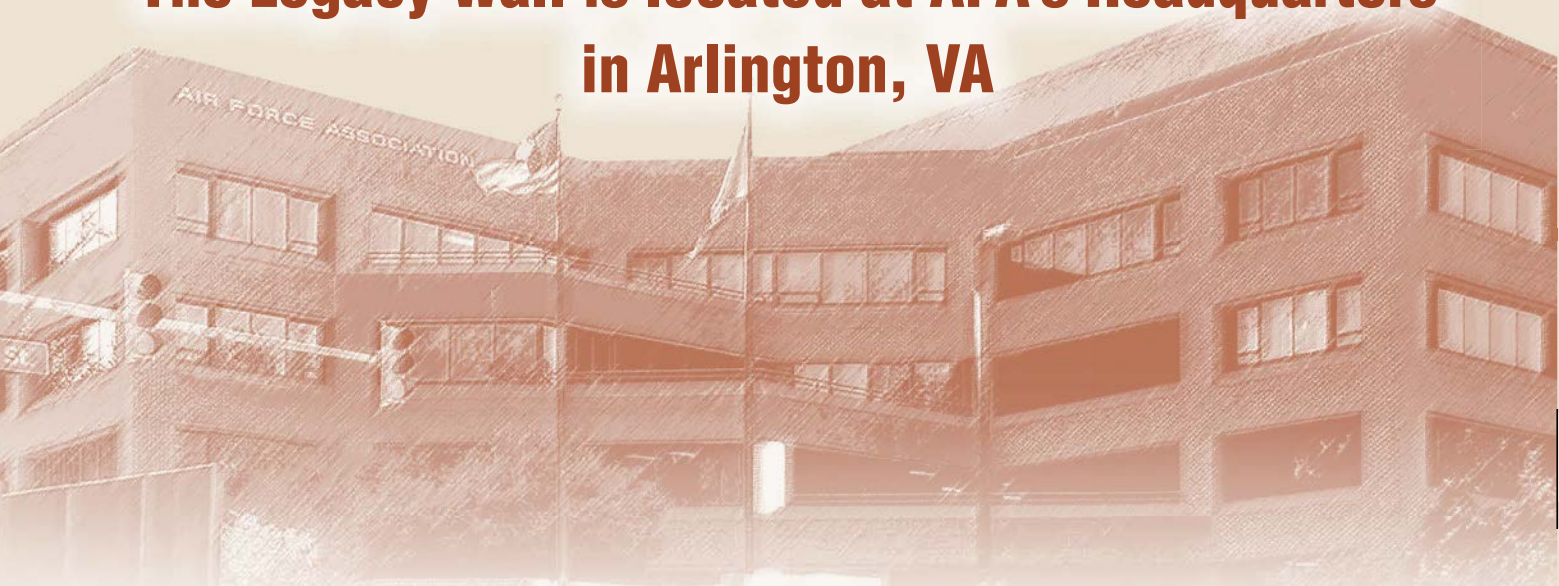
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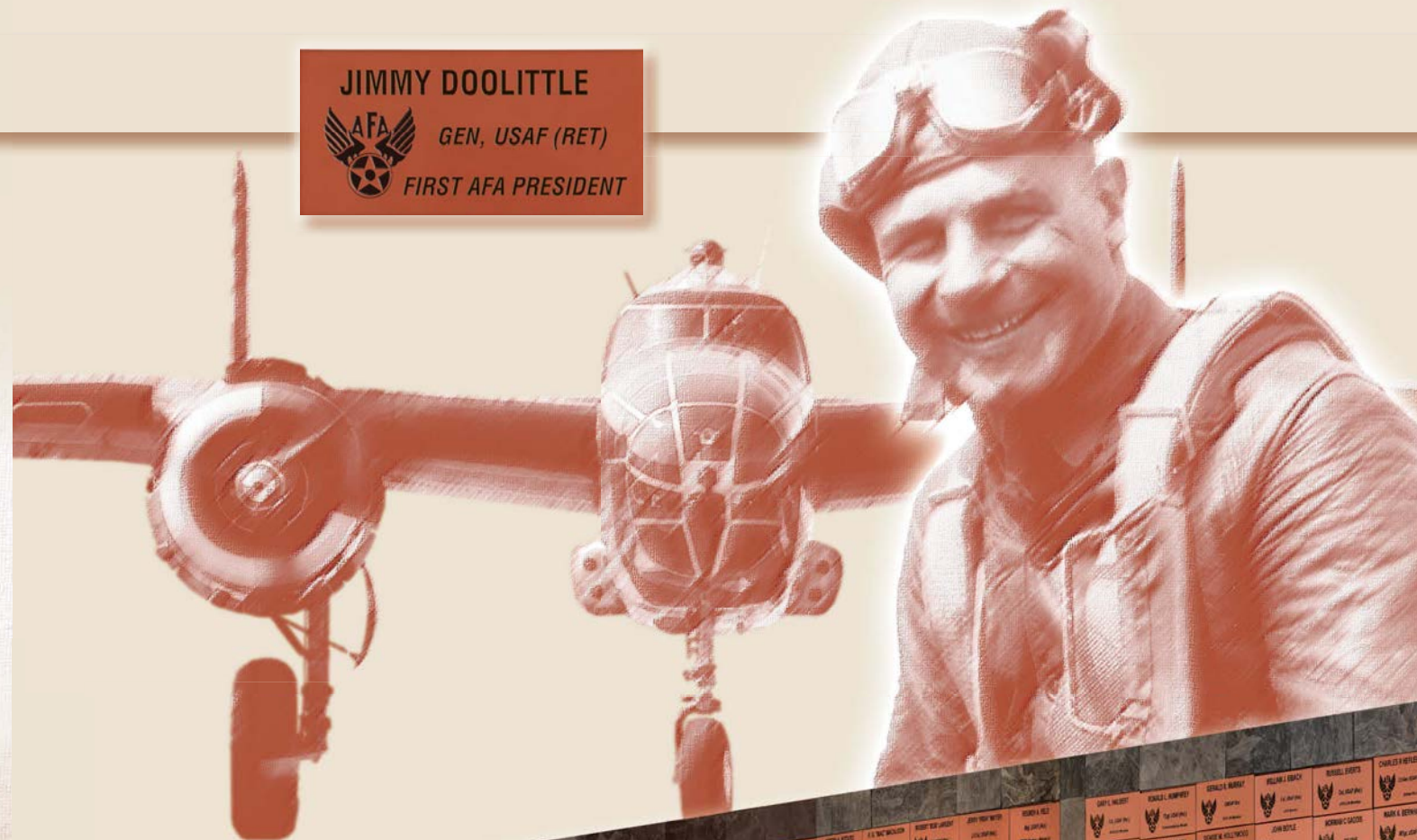


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# Keeping 4th-Gen Fighters In the Game

A-10s, F-15s, and F-16s aren't giving up the fight.

By John A. Tirpak

**T**he Air Force planned for a fighter force comprised mostly of stealthy, networked, and hyper-situationally aware F-22 and F-35 fighters. But the premature termination of the F-22, delays with the F-35, and decades of anemic investment mean USAF will have to rely on its 1980s-era fourth-generation jets for many years to come.

To keep its A-10s, F-15s, and F-16s combat-relevant and capable, the Air Force is strengthening their fatigued structures and buying avionics that will let them get close to the battle. To strike deep, USAF is buying stealthy standoff missiles to keep them in the game.

"Fourth generation ... will be with us into the 2030s," USAF Chief of Staff Gen. David L. Goldfein told *Air Force Magazine* in a recent interview. That's a major challenge in executing the National Defense Strategy, because the fighter fleet "is the oldest it's ever been," on average, while competitor air defenses continue to improve, and adversary air fleets bulge with new airframes.

**"What do you do to keep those [fourth-gen] airplanes relevant and useful? ... We have plans!"**

—Gen. James Holmes, Air Combat Command boss

Even adding 48 or 60 new F-35s per year doesn't chip away much at the 28-year average age of the fighter fleet. To bring that number down to something manageable, the service needs to buy 72 new airframes annually, and the F-35 production line hasn't spun up to that level yet.

"At 48, 72, or even 100" new fighters a year, "we're going to have a mix of fourth- and fifth-gen ... for a long time," said Air Combat Command chief Gen. James M. Holmes in August. "I think that was always a reality."

The ratio of 4th-to-5th-gen aircraft in the fighter force is 82 percent to 18 percent, said retired USAF Lt. Gen. David A. Deptula, dean of AFA's Mitchell Institute for Aerospace Studies. "Not all contingencies will require fifth-generation capability," he added. "Fourth generation will suffice in relatively permissive airspace." But, "the Air Force needs to maintain air superiority across the spectrum of conflict."

At Air Force Materiel Command's Life Cycle Industry Days in June, Brig. Gen. Heath A. Collins, program executive officer for fighters and bombers, said the Air Force is investing in an expansive program of aircraft modifications for its existing



An F-16 releases a flare in the USAF CENTCOM area of responsibility. F-16s have had countless capability upgrades, patches, and life-extension mods since joining the fleet in the 1980s and early 1990s.

Photo: SSgt. Chris Drzazgowski

fighters. He said in the year leading up to his presentation, 221 modifications were performed on the A-10; 970 on F-15s; and 281 on F-16s. To accelerate the improvement of older fighters, Collins said AFMC is trying to integrate new information technologies and tools, upgrade its facilities, and hire new talent as rapidly as possible.

The four fourth-gen fighters are collectively getting \$15.9 billion worth of new investment over the next five years, not including regular repair and maintenance or the purchase of new F-15EXs included in the 2020 budget.

“And so, what do you do to keep those [fourth-gen] airplanes relevant and useful?” Holmes said. “We have plans.”

### THE A-10C WARTHOG

From 2018 to 2024, the Air Force plans to spend nearly \$2.9 billion on a life-extension program for the A-10C Thunderbolt II. The last update gave the “Warthog” a digital backbone, a helmet-mounted cueing system, and the ability to carry multiple new Global Positioning System-enabled precision weapons.

Boeing completed the first phase of rewinging the A-10 in August, providing new wings for 173 aircraft, adding 10,000 flight hours—or about 10 years—to their service lives. That

means the jets can fly safely well into the 2030s. The upgrade also installed a new wire-bundling arrangement to make the wings easier to remove, service, or modify. Boeing received a follow-on contract worth up to \$1.3 billion in August that could replace the wings on 109 remaining aircraft, plus a few spare sets, under the Thunderbolt Advanced-Wing Continuation Kit, or ATTACK.

“We’re focused on the re-winging effort to make them structurally sound,” Holmes said of the A-10. Other A-10 upgrades underway include the Lightweight Airborne Recovery System, which is a radio system to make it easier for A-10 pilots to find downed airmen in hostile territory and protect them until they can be extracted; a new Identification, Friend, or Foe system; a new On-Board Oxygen Generating System; new computer software, radios, and a high-resolution display; and anti-jam Global Positioning System capability. A new computer could also be in the offing.

The A-10 will also get a raft of new weapons, including the Small Diameter Bomb, a new variant of the Joint Direct Attack Munition; a new laser-guided rocket; and the AIM-9X dogfight weapon for self-defense. The requested funds also buy contract depot maintenance in the Pacific Theater and fuselage repairs.



# Staying Relevant: Major Modifications to Fourth-Gen Fighters

Premature termination of the F-22, delays with the F-35, and long-standing anemic investment means USAF will have to depend on fourth-generation aircraft for years to come. To make that feasible, the Air Force is investing heavily in new capabilities.

## Aircraft



A-10C Thunderbolt

## Modifications

- **A-10 Thunderbolt Advanced-Wing Continuation Kit (ATTACK):** Re-winging to extend service life and improve safety and maintenance
- **Service Life Extension Program (SLEP):** Structural modifications to prolong service to 2032 or beyond
- **Lightweight Airborne Recovery System (LARS):** Improves speed of location and recovery of downed airmen
- **GPS Anti-Jam capability:** Replaces unprotected GPS antennas
- **Other Projects:** New Identification, Friend, or Foe system; new oxygen system; improved displays; secure radios

**Cost (FY18-23)**  
**\$2.9 billion**



F-15C/D/E Eagle

- **Eagle Passive/Active Warning Survivability System (EPAWSS):** Improves survivability through autonomous threat detection/jamming, management of countermeasures, and electro-optical defenses; geolocation of enemy emitters, classified functions
- **Active electronically scanned array (AESA) radars:** Provides longer-range detection, tracking, targeting and mapping; adds electronic warfare capabilities; improves performance and maintainability
- **Infrared Search and Track (IRST):** Permits detection of stealth targets through infrared signatures
- **Other projects:** New processor, new radios/data links, structural enhancements to recapture speed and load performance

**\$7.6 billion**



F-16 Falcon

- **AESA radars:** Provides longer-range detection, tracking, targeting, and mapping; adds electronic warfare capabilities; improves performance and maintainability
- **SLEP:** Adds up to 8,000 hours of service life
- **Ground Collision Avoidance System (GCAS):** Automatically recovers aircraft from imminent collision with terrain
- **New Weapons:** Adds ability to carry and launch the B61-12 tactical nuclear weapon and precision weapons designed for low collateral damage
- **Other Projects:** New radios, data links, and digital radar warning receiver

**\$5.4 billion**

## F-15C/D EAGLE AND F-15E STRIKE EAGLE

The F-15's life expectancy has been much in the news in the last year because the Air Force was presented with a plan by the Office of the Secretary of Defense to buy brand-new air superiority versions of the airplane, known as F-15EX, that the service didn't ask for. Congress funded eight airplanes in the fiscal year 2020 budget. At least 80—and as many as 144—aircraft could be built.

Why buy “new old” airplanes? The F-15C and D models “won't make it” to the late 2020s, Air Force Materiel Command chief Gen. Arnold M. Bunch Jr. told *Air Force Magazine* in an interview. The aircraft now in the fleet are speed- and load-limited due to stress fatigue in key parts, such as the longerons, Bunch noted. Longerons are major load-bearing structures running alongside the cockpit and connecting the front of the aircraft to the back; they were “life of the aircraft” parts specified to last up to 30 years. The F-15Cs and Ds have exceeded the parts' life expectancy and replacing them entails virtually dismantling the aircraft.

Goldfein said the Air Force agreed to OSD's plan to buy new Eagles because the service needs more fighters, and Lockheed Martin can't boost production to the required 72 F-35s per year fast enough. The F-15EX will rapidly

slide into existing squadrons, Boeing argues, using existing ground equipment and weapons, and pilots will transition to the new version in only a few months.

A similar version of the F-15 are in production for the United Arab Emirates, and it is that version that's the basis for the F-15EX. Development costs have been amortized and testing is nearly complete on foreign variants, so those costs can be saved, the Air Force asserted.

On the jets that it will retain—of both the air superiority F-15C/D and E model for strike—the Air Force has budgeted \$7.6 billion for hardware upgrades and life-extension modifications for the period 2018 to 2023.

The biggest capability upgrade planned for F-15s is the Eagle Passive/Active Warning Survivability System, or EPAWSS. This electronic warfare system should provide a big increase in the jet's situational awareness, its ability to autonomously and automatically detect threats, jam enemy radars, geolocate enemy emitters, defeat enemy electro-optical and infrared sensors, and function in a “highly contested” battle space, according to Boeing and the Air Force.

EPAWSS will also manage the F-15's deployment of physical countermeasures, such as chaff. The EPAWSS is estimated to

Photos: USAF



Photo: Alex Lloyd/USAF

Contractor Dale Benoit inspects paint beneath a new A-10 Thunderbolt wing at Hill AFB, Utah. The aircraft was the last of 173 to receive new wings under the initial program, which extends the life of the fleet.



Photo: SSgt. Daryn Murphy

An F-15 (left, rear) flies in formation with two F-22s over Nevada. USAF is buying new-build F-15EXs. At least 80 are expected to be produced.

be a \$2.4 billion program in then-year dollars, and it goes beyond the future years defense plan.

“EPAWSS is the answer, we think, for the F-15 fleet,” Holmes asserted. He also noted that an effort to re-equip the F-15 inventory with Active Electronically Scanned Array (AESA) radars has been “really successful” and is “fairly close to being complete.”

Boeing officials, at an advance Paris Air Show briefing earlier this year, said the EPAWSS will “buy back” some of the Eagle’s ability to approach modern adversary air defenses.

The EPAWSS was put on hold for a couple of years as the Air Force wrestled with how long it would keep the F-15, and a Pentagon inspector general report at the time said the funding was diverted to an unnamed “higher priority” air superiority program.

The Pentagon’s Selected Acquisition Reports for 2018, released in July, describe major program cost and schedule fluctuations. The Defense Department said EPAWSS had experienced a cost increase of 24.3 percent because of a sharp reduction in the number of units the Air Force programmed. The program will be revisited later this year

by the Defense Acquisition Board, which will determine if it is mature enough to move forward.

“Like most complex programs,” Holmes said in April, the EPAWSS suffered from a combination of inconsistent funding and shifting requirements. The system “won’t make an F-15 into an F-35 or an F-22, but it makes it a whole lot better, and it expands the envelope quite a bit,” he said. “I’m in favor of continuing the investment.” Initially, Holmes said, installing EPAWSS will reduce F-15 availability, but “we have a plan to do it, and we’ll manage it.”

Collins reported that the EPAWSS is actually moving about a year faster than it normally would because one of his program managers had the idea—employing new authorities from Congress—to “break up the program” into “multiple decision points,” with fewer reviews looking at more manageable chunks.

The EPAWSS upgrade goes hand in hand with a new processor for the Eagle, which will give the F-15 the fastest fighter processor flying. Other major initiatives include a new Infrared Search and Track system, to assist the F-15 in seeing, tracking, and shooting stealthier targets; the MIDS/JTRS (Multifunctional Information Distribution System/Joint Tactical Radio System) digital data link and programmable radio; and a new cockpit pressure monitor and warning system.

Future F-15 improvements under consideration include a full cockpit upgrade with new displays; a ground collision warning system; “3-D” audio; a pod to allow direct, encrypted and low probability of intercept communications with fifth-gen aircraft; removable memory; and a Digital Radio Frequency Memory (DRFM) pod. In very basic terms, a DRFM can capture an incoming radar signal and send it back, attenuating its own signature, and fooling the radar into thinking the aircraft is somewhere else, or is a different kind of aircraft.

## F-16 FIGHTING FALCON

The most numerous of the Air Force’s fighters, the F-16 has had countless capability upgrades, patches, bulkhead strengtheners, and life-extension modifications since join-



Two A-10s fly over Southern California. USAF plans to spend nearly \$2.9 billion from 2018 to 2024 on a life-extension program for the Thunderbolt.

Photo: TSgt. James Hodgman

ing the fleet at a rate of hundreds per year in the 1980s and early 1990s.

The Air Force has planned to spend \$5.4 billion on F-16 upgrades from 2018 to 2023, with the biggest improvement being an AESA radar, which will become operational on some jets this year and will be fully equipped across the Falcon fleet by fiscal 2025. In addition, a service life extension program intended to add up to 8,000 hours to the F-16's service life is planned to begin around fiscal 2022, with completion in fiscal 2029.

The F-16's Auto Ground Collision Avoidance System, or Auto-GCAS, has already been installed in some aircraft and should be widely in place in two years, with the whole fleet equipped by fiscal 2025. A modular mission computer is also in final development and should start installations next year.

Further improvements include a new digital radar warning receiver, a new operational flight program, the MIDS/JTRS and a communication suite upgrade, all planned for initial capability in the early 2020s and full fleetwide installation by the late 2020s.

The Air Force is also pursuing integration of the B61-12 tactical nuclear weapon on the F-16, as well as the Advanced Precision Kill Weapon System, which is a new precision seeker warhead for the Hydra rocket.

The radar and digital radar warning receiver upgrades are to ensure that the F-16 "can detect the more modern threats," while the new computer will "tie those things together," Holmes said in August.

## STEALTHY MISSILES

Across the fourth-gen fleet, Holmes said the Air Force is considering "options for a next-generation jamming pod." He said USAF has worked with contractors and is "evaluating

that, and we hope to make some decisions" in time for the 2021 Program Objective Memorandum.

He acknowledged that the Air Force has invested heavily in refilling its weapons stocks, saying "we've made good progress in trying to buy back depleted munitions" used heavily in the "15 years of a pretty kinetic operation in Afghanistan and Iraq." Because of the need to limit collateral damage, the vast majority of weapons used were what are called "preferred" munitions, which Holmes described as the Joint Direct Attack Munition, Small Diameter Bomb, and Hellfire missile.

The Air Force also recently revealed that it has sharply increased its planned acquisition of the AGM-158 Joint Air-to-Surface Standoff Missile (JASSM), a long-range, stealthy weapon that can be launched by a nonstealthy, fourth-gen aircraft from well outside enemy air defenses. The Air Force will nearly double its planned acquisition from 4,000 units to more than 7,200. Production will shift to the longest-ranged variant, the AGM-158D.

Asked if USAF was trying to accomplish with stealthy missiles what it can't manage by buying stealthy aircraft, Holmes would only say that the JASSM is "a fairly important capability" useful for "detering peer adversaries."

He also said he doesn't anticipate a time when USAF won't need to be able to penetrate enemy air defenses. Adversaries—noting what USAF is "good at"—are investing in mobile air defenses, anti-satellite systems, and theater ballistic missiles. Attacking these targets requires either "exquisite knowledge" of their movements or a platform operating "in and around them," Holmes said. "Those are the kind of trade-offs we look at."

And for those missions that the fourth-gen force can't take on, the fifth-gen airplanes will be available, Holmes said. "There will still be places they can't go and things they can't do, that the fifth-gen airplanes can." ❏

# Beyond the Buzzword: AFWERX Aims to Make Innovation the New Normal



Photo: AIC Zachary Heat

Gen. James “Mike” Holmes, Air Combat Command boss, pilots a virtual reality simulator at Vance AFB, Okla. VR training, pioneered by AFWERX, is part of the Pilot Training Next curriculum at Vance.

By Rachel S. Cohen

**A**FWERX, one of the newest additions to the Air Force’s technology innovation ecosystem, aimed to hold its biggest event to date in July. It almost didn’t happen.

With hubs in Las Vegas, Washington, D.C., and Austin, Texas, the two-year-old AFWERX is designed to seek out interesting ideas and invest seed money to try to help get them from the laboratory into production. But the unique format of its 2019 “Fusion Xperience,” where about 120 businesses vied to move on in a Las Vegas competition for innovative, multi-domain tech, raised red flags for Air Force lawyers.

More than 1,000 people had signed up to attend, meaning the competition didn’t neatly fit into the service’s idea of what an event of that type should be or how the military should scout new products. Their advice: shut it down.

“We had to make some last-minute changes,” said Lt. Gen. Jerry D. Harris Jr., the Air Force’s deputy chief of staff for plans and programs. “I had counsel—it was good counsel—that recommended I cancel the event.”

**AFWERX leaders see their role as catching the wave of commercial technology development and helping to adapt it to Air Force needs.**

The show did go on—but the bumpy ride illustrates just how hard it is to change business practices in the well-established military bureaucracy.

“The exchange of information, the ability to change the way we go out and do this, that’s what’s really important to us,” Harris said. “That’s why we continued on with the event.” AFWERX leaders see their role as catching the wave of commercial technology development and helping to adapt it to Air Force needs. AFWERX hosts technology competitions to attract business interest; issues exploratory small business contracts to fund initial development, and matches startups with venture capital investors to cultivate industrial innovation. Sister organizations follow similar models, including DEFENSEWERX and its SOFWERX and MGMWERX, which respectively work with the special operations community and Air University at Maxwell AFB, Ala.

To identify needs within the service, AFWERX supports local Spark Cells throughout the Air Force. Their role is to find technology applications to solve wing- or squadron-level problems. Spark Tank, an annual Air Force competition where airmen

MSgt. Christopher Joyce, a 56th Air Refueling Squadron boom operator, inspects a new boom pod bed designed to help with neck and back issues. All KC-135 Stratotankers will soon be equipped with the bed, which was the winning idea from the Air Force Spark Tank competition in 2018.



Photo: USAF

pitch innovations to senior leaders in hopes of getting the Air Force to fund their ideas, is also sponsored by AFWERX. The organization is now teaching staff at major commands how to pursue new ideas, too.

### 'LET THE BEST TECHNOLOGY WIN'

AFWERX wants to change small- and medium-sized businesses' perceptions of what it's like to work with the Air Force. The organization has worked with more than 4,000 companies so far and is cutting up to three years from conventional processes, officials claim. It has awarded more than \$250 million across more than 1,000 contracts so far.

Companies may learn about AFWERX by word of mouth, through referrals from other organizations, such as DOD's Defense Innovation Unit, or from solicitations online. AFWERX was created specifically to help nontraditional suppliers connect with military customers and shorten the program development cycle that can stretch out to a decade.

Capt. Steven D. Lauver, AFWERX's technology accelerator director, said his agency is starting to attract higher-quality participants to its events and seeing more return on its investments in technologies with dual military/commercial applications. That can range from cybersecurity measures and communications equipment, to virtual reality inventions and more.

He added that in the past year, the Air Force has started turning around its reputation as a tough, slow customer.

Kevin Montgomery, chief executive officer of IoT/AI (Internet of Things/Artificial Intelligence), said AFWERX is accomplishing what others in the military have long sought to do: buy products based on the technology's merit, regardless of how large or long-standing a company is. Montgomery runs a small, California-based company that offers a data-collecting and data-processing sensor system.

"Let the best technology win," Montgomery said.

David Knight runs Terbine, a Nevada-based company that



Photo: TSgt. Anthony Plyler

The Joint Chemical Agent Detector (JCAD) Solar Power Supply, a 2019 submission to the Innovation Madness Spark Tank, provides continuous uninterrupted power.

indexes piles of data generated by the IoT. He argues AFWERX is normalizing fair competition between very large companies and startups like his.

"When somebody walks up who is a potential customer, they're not dazzled by a 50-foot booth that's two stories tall by one of the big aerospace contractors," Knight said.

Government contracting is still a "ponderous process at times," said Michael Hodge, vice president of federal sales at Avocado Systems. His company makes software that identifies cyber threats to cloud infrastructure.

"Since we have a product that does not have any federal certifications," he said, "we've got to go down a road where we get development money. ... Unless, of course, we want to spend [\$200,000] or \$300,000 to go get the certifications, which, as a startup, that's not really a feasible business answer."

On top of connecting companies to a unique funding pot, events like Fusion make matchmaking easier—both for pairing



At the AFWERX Fusion Xperience held in Las Vegas in July, judges of the Multi-Domain Operations Challenge assess submissions aimed at improving the efficiency and effectiveness of operations in real time.

businesses and customers, as well as fostering partnerships between businesses.

A company may have the resources to develop a few prototypes through AFWERX, but not to produce thousands of its product if the Air Force wants to go all in. That's where large companies can come in, whether by working with smaller contractors or by purchasing them.

Small companies are "looking to plug their technology into a bigger system," said Steve du Plessis, head of engineering at Hexagon US Federal. "You need the combination of the big Lockheeds and the Raytheons but you [also] need the innovation and the ideas from the small companies."

There's more AFWERX could do to fuel possible relationships, Hodge said. In the earliest stage of small business contracting, for example, AFWERX could offer retired officers as "sherpas" or mentors to help startups understand the Air Force and to help USAF customers connect with innovative companies.

AFWERX's approach aims to get innovative technology into the field faster, but the turnaround times are still far from immediate. Lauver said it takes three to five years to go from idea development to operations.

At least one product is now in full production: an ergonomic platform developed to reduce neck and back injuries among KC-135 boom operator instructors. The idea was selected as the first "Spark Tank" winner in 2018, it is now in production. A new helmet for airmen and crews is also nearing a production contract. Accelerating that piece of the puzzle is still a work in progress.

"AFWERX ... is great for creating technologies, prototyping it, doing the whole field test," Montgomery said. "But there is a valley of death between that and being in production mode."

## CHANGE FROM WITHIN

AFWERX also bets it can change Air Force culture from the inside out and from bottom to top by putting more trust in airmen. As a result, the number of Spark Cells across the service has boomed from two in 2017 to about 50 so far in 2019. The two Spark Tank winners so far—the KC-135 boom operator bed and a solar-powered chemical agent

detector—promise to save \$100 million a year in costs and thousands of hours of work.

Spark Cells start with a question: What gets in your way? Then, team members partner with local businesses and schools, or with Air Force small business contract recipients, to develop solutions. Cells can offer dedicated workspace as well as tablets, laptops, TVs, microphones, and "smart boards" to foster collaboration.

Among the products developed so far: 3D-printed dental implants, a color-coded, flashlight-like gadget for MC-130J loadmasters, and drones that airmen can use for counter-unmanned systems training.

"I love the opportunity to be able to connect what we're doing on a base to what is happening in the greater mission and find the way to 'yes,'" said Maj. Kinsley Jordan, a T-6 instructor pilot who runs the Spark Cell at Vance AFB, Okla. He also coordinates innovation efforts across Air Education and Training Command.

In the past year, Vance's Spark Cell came up with a kit that turns an iPad into a secure, portable computer so airmen can access email and other government tools on the go instead of being chained to a desktop. Airmen can also access training videos when they need them, as well as virtual reality courses and 360-degree videos with added animation. Training bases are increasing the number of classroom VR headsets from 20 to 25.

"When a student actually gets time with an instructor, they've had time in the VR [simulator], they've had time with the 360 [-degree] video headsets, they've had time to be able to watch the video-recorded academics, and their knowledge base is a lot deeper than it previously would have been," Jordan said.

Another project on the horizon involves asking airmen about their passions when they first arrive at a base. That way, they can be matched up with projects where they can truly shine, boosting that project's chance of success as well as encouraging the airman to stay in the service, Jordan said. Other ideas, like buying augmented reality glasses for training, have fallen flat.

Encouraging people to brainstorm together helps generate better ideas than telling people what needs to happen, Jordan said.

"Success has nothing to do with what the outcome is," he

Col. Randy Gordon, AFWERX test and evaluation lead, spoke to a sold-out crowd of 1,200 registered innovators at this year's annual event. USAF only expected around 600 people to participate.

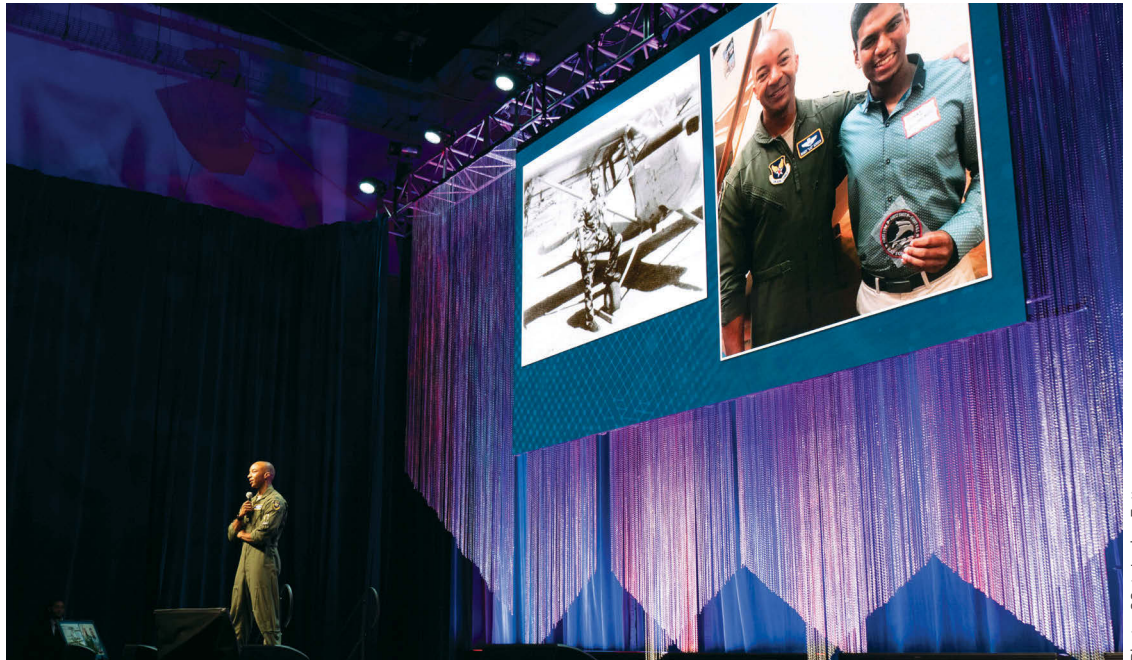


Photo: SSgt. Jordyn Fetter

said. "Success has everything to do with the process of finding out what is it you're trying to accomplish, what are the goods and bads, and [then] as a team, you say, can we make this happen or not? ... The only way it fails is if you continue down a project that you know you should have abandoned a long time ago."

To get ideas across the finish line, though, airmen have to work through the proverbial "frozen middle:" program offices and others who resist change.

Jordan said that when managers say no, it's often because their ideas were also turned down in the past. But sometimes getting past that hurdle is as easy as getting rid of an old form or tweaking a solicitation, he added. Then those naysayers can become the biggest cheerleaders.

AFWERX CEO Brian Maue argues the problem isn't so much a frozen middle as it is a "fearful middle," where managers feel uncomfortable when asked to "play in the gray."

"I think there's a fear factor," he said. "I could apply that to almost anything that we've tried to do. ... I don't know what percentage of the culture that represents, but we've definitely encountered that difference in philosophy."

To spread its doctrine among middle managers, AFWERX convened representatives from most of the major commands for a three-month course earlier this year. Participants learned about small business outreach and discussed challenges and how to pool resources to address them. Major command representatives now hold periodic calls and meetings on common priorities and command-level initiatives as commands figure out their roles and engage with businesses.

"We as a Majcom have no ability to procure at a large scale and sustain at a large scale—you have to have [the] Life Cycle Management Center for that," said an AETC technology official who also works with AFWERX, Lt. Col. Eric Frahm. "AFWERX brings some tools to the table for the development phase, AETC brings that broad evaluation, DIU [the Defense Innovation Unit] brings a prototype, LCMC brings acquisition and sustainment. Everybody has a niche, and I think we all fit together ... if we can get everybody lined up, working together."

## WHERE IT'S HEADED

Watch for AFWERX-backed products to start rolling out

to airmen in the next two years. In July, Maue said the organization had about 70 products in the pipeline. Lauver, the technology accelerator director, said the Air Force awarded nearly 400 small business contracts worth about \$90 million between the summers of 2018 and 2019—small in the scheme of DOD funding, but potentially transformative in his eyes.

Word about Spark Cells is also spreading through everyday conversations, networking events, podcasts, and social media. But Spark Cells can do more to collaborate with their counterparts at other bases to avoid duplicating efforts and could use a database that shows airmen what others are working on, Jordan said.

He added that bases should deliberately choose airmen to work for cells instead of letting them grow organically. Instead of seeing that as shortchanging other career fields to build Spark Cells, Jordan said, "what you're actually doing is investing in future innovation and creation and efficiency."

AFWERX headquarters intends to keep its \$10 million operations small to avoid bureaucratic bloat.

"We have the ability to expand, should a [demand] surge be that strong, but we have a very light and lean budget, which I think makes us very frugal and a little more picky," Maue stated. "At the moment, no, we have no intention to grow our physical hub presence. We have full capacity for our virtual presence to continue to grow."

AFWERX concepts are spreading outside the Air Force as well. The Navy is learning from the group's Las Vegas hub and mining its events for new products. "We're very conscious about wanting to make this a joint integrated effort over the years, but we're still a little too young," Maue said.

Perhaps AFWERX's closest joint relationship so far is with Army Futures Command, with which it shares a building in Austin, Texas. Army and Air Force staff are on a first-name basis, Frahm said, and share best practices, seek ways for projects to dovetail, and plan to partner on future industry events.

"We've handed them our small business playbook, we've handed them the challenge playbook, and I think we need to be ready for the Army to zip right past us," Frahm said. "They came to town with a four-star and, basically, Life Cycle Management Center's equivalent already right there, baked in. It's going to be fun to watch what happens." ❖

# What is a Modern Integrated Air Defense System?

Modern air defense systems are better than ever. Misunderstanding them could prove deadly.



A Russian S-400 SAM system on alert during an exercise near Leningrad in 2017. An IADS allows SAMs to engage multiple threats seamlessly.

By Maj. Peter W. Mattes, USAF

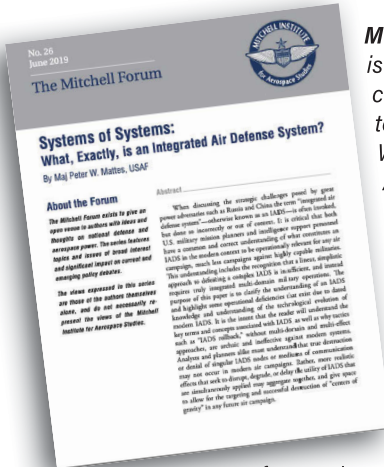
**Maj. Peter W. Mattes, USAF,** is an intelligence officer currently serving as director of operations at the 19th Weapons Squadron, Nellis AFB, Nev.—part of the US Air Force Weapons School. Prior assignments include support for a variety of Air Force platforms and missions, including the F-16CM, the Distributed Common Ground System (DCGS), and Air Operation Centers (AOCs). He has deployed in support

of operations Odyssey Dawn, Unified Protector, New Dawn, Freedom's Sentinel, Resolute Support, Restore Hope, and Inherent Resolve. This article is adapted from the Mitchell Forum paper, "Systems of Systems: What Exactly is an Integrated Air Defense System?" which can be downloaded in its entirety at: [www.mitchellaerospacepower.org](http://www.mitchellaerospacepower.org). The views and opinions expressed here are those of the author and do not necessarily reflect the views of the US Air Force or the Department of Defense.

**A**ir defense, long neglected in the low-threat air campaigns that dominated the past 18 years of combat operations, is again at the fore of defense planning. The June 2019 shutdown of a US Navy RQ-4A high-altitude remotely piloted aircraft (RPA) variant flying over the Persian Gulf by Iran's Revolutionary Guard forces raised tensions significantly between the United States and Iran, nearly leading to a retaliatory military strike. The high-altitude intelligence, surveillance, and reconnaissance (ISR) aircraft, used extensively for operations in the Middle East, was brought down by an Iranian derivative of the Russian Buk M3 (SA-17), a medium-range surface-to-air missile (SAM) system.

The relative ease with which Iran shot down the US ISR asset raised concerns among many defense analysts and observers. Mitchell Institute Dean and retired Air Force Lt. Gen. David A. Deptula said subsonic, nonstealth aircraft such as the RQ-4 "were not designed to operate in areas covered by advanced SAM or air-to-air threats." Advanced SAM threats have proliferated around the world, he said, even to second-rate military powers like Iran.

Senior Air Force and Department of Defense officials have been warning about this threat for some time. In late 2015, then-Maj. Gen. VeraLinn Jamieson—retiring soon after being the Air Force's three-star deputy chief of staff for ISR and cyber effects operations—co-authored a Mitchell Institute Forum





paper, “An ISR Perspective on Fusion Warfare,” that forecast an array of anti-access and area-denial (A2/AD) threats proliferating around the world by 2030 that threaten American airpower’s historic reach and dominance. These threats include hypersonic weapons, air-to-air missiles with ranges exceeding 150 nautical miles, and long-range surface-to-air missiles with reaches of up to 500 nm. In another decade or so, the paper warned, potential adversaries could enhance traditional ground-based radar detection with advanced passive detection systems and tools such as cyber capabilities, advancing their primary goal of “attacking and disabling our capabilities before we employ them.”

America’s technological edge, as the 2018 National Defense Strategy pointed out, is under pressure from would-be adversaries looking to dull the competitive edge the US Air Force could once virtually guarantee in any conflict. As famed airpower theorist and retired USAF Col. John A. Warden III once observed, since 1939, “no country has won a war in the face of enemy air superiority, no major offensive has succeeded against an opponent who controlled the air, and no defense has sustained itself against an enemy who had air superiority.” Attaining air superiority, he added, has “consistently been a prelude to military victory.” America’s adversaries and rivals, especially since observing the success of Operation Desert Storm, know this acutely, and are not simply focused on increasing the accessibility and range of their weapons. They are instead developing holistic capabilities that operate in every domain—land, sea, air, space, cyberspace, and across the electromagnetic spectrum. These are not just offensive capabilities, but defensive tools to thwart American airpower’s ability to seize the initiative and establish air supremacy in any future conflict. These defensive capabilities, such as radars, communication systems, and SAMs, are purposely organized into what is termed an “integrated air defense system”—or an IADS.

### WHAT IS AN IADS?

A modern IADS is far more complex than a singular SAM battery or its associated command vehicle and radar. Analysts and operational planners should strive to use a common language when discussing IADS, and incorporate this knowledge in order to plan against these complex systems as missions dictate. This understanding must include recognition that a linear, simplistic approach to defeating modern, complex IADS is insufficient and instead requires integrated multi-domain operations.

An IADS is the “structure, equipment, personnel, procedures, and weapons used to counter the enemy’s airborne penetration of one’s own claimed territory,” according to one Air Force intelligence expert. Rather than a single weapon or person, it is an amalgamation of elements, organized to minimize threats in the air domain. Thus, an effective IADS performs three functions—air surveillance, battle management, and weapons control. Of these, air surveillance alone includes five specific sub-functions: detect, initiate, identify, correlate, and maintain.

Air surveillance is often described as the “eyes” of an air defense system. A radar will “detect” an aircraft entering an IADS’s area of coverage, while the “initiate” function transforms radar returns into “tracks.” The “identify” function examines the track and categorizes it as friend, foe, or unknown.

These three phases occur relatively independently, which necessitates a “correlate” function. For example, if a system sees three tracks in close proximity, a sensor operator has the

## How Integrated Air Defense Systems (IADS) Work

1. Air surveillance provides the potential threat or target; this decision is effectively finalized through threat evaluation and the move to engage.



2. Battle management represents a key transition from identifying a threat to committing against that threat through command decisions.

3. The role and responsibility of a weapon system informs a decision-maker’s selection to ensure a relatively efficient engagement, balanced against the variety of threats that may exist at the same time or in a similar geographic region (such as an IADS’ area of responsibility).

Source: *The Mitchell Forum/Mitchell Institute*

option to consider the tracks a single entity or three different aircraft. Correlation is important as it can have a significant impact on weapon resourcing. Finally, the “maintain” function allows for specific tracks to be continuously monitored. In modern systems, much of this can be automated, resulting in less “man *in* the loop” processing and more “man *on* the loop” paradigms. This reduces the ability to defeat the human factor in a modern IADS, and there is more importance given to the ability to generate multiple effects on air surveillance nodes in order to degrade the awareness of an IADS.

After surveillance, the battle management aspect of an IADS includes four functions: Threat evaluation, engagement decision, weapon selection, and engagement authority. Battle management marks the transition from identifying a threat to acting against it. Battle management makes the determination that a given radar track is in fact a threat and then selects the weapon to counter that threat. The engagement authority is the final step in battle management that confirms the threat, engagement, and weapon selection decisions.

These decisions transition into weapons control, where a particular weapon system performs the weapons pairing, acquiring, tracking, guiding, killing, and assessing functions. Within weapons control, even more refined degrees of air surveillance and battle management tasks are occurring too. The difference is these are strictly related to the specific weapon that is engaging a threat.



A Chinese battery fires surface-to-air missiles in northwest China during an air defense combat exercise in August.

Photo: Zhou Rui and Hu Yonghui/China Ministry of Defense

The complexity of modern command, control, communications, computers, and intelligence (C4I) systems, and processes used by IADS are often underestimated. For instance, it would be unusual to observe an individual weapon system component of an IADS, such as a fire-control radar, providing air surveillance within an IADS. Because these weapon systems share similarities with air surveillance tools, they appear as though they can do just that, and are often mistakenly thought to perform the same task.

As a result, the control functions and guidance aspects of air defense are often analyzed more than other elements of an IADS' kill chain. This is because capabilities such as fire-control radars and missile batteries that make decisions and have their own radars are perceived as performing these functions across the entire system, irrespective of a weapon's role or responsibility in a larger IADS.

Modern IADS leverage multiple communications channels, including traditional landlines, fiber-optic networks, and radio frequency and electromagnetic spectrum links. No longer can an operation against a modern IADS plan to achieve a singular effect against a singular node or IADS means of communication.

## AIR DEFENSE AND THE IADS

Air defense, as its name implies, is the act of safeguarding some protected asset or assets—specifically against threats from the air domain. But not all militaries approach air defense with a similar mindset.

Russia, for example, stipulates that air defense units are to “protect troops and facilities from a different means of air attack (strike aviation, cruise missiles, UAVs) in a combined-arms combat environment and on the march,” according to Russian ground force doctrine. In support of this responsibility, Russian air defense units carry out: air defense combat, detection of enemy aircraft and providing warning for ground units, destruction of the means of an enemy air

attack, and theater missile defense support. By contrast, the US Air Force has historically mischaracterized air defense weapons systems based on their range and altitude. A tactical SAM, for example, is considered a short-range system, while a strategic SAM is viewed as a longer-range system. The assigned mission and defended asset, though, should be the key consideration when trying to understand weapon roles in IADS. As such, the tactical or strategic nomenclature of a specific air defense system should not be tied to its range. Although a positive correlation does often exist, this view of air defense could result in misunderstanding the impact an air defense weapon could have in a defended region and in misprioritizing effects against a particular system. This could result in the destruction of a component that matters little to the operation at hand where disruption or denial effects could suffice.

Russian SAMs are fielded across all of the country's military services, and what makes a given system tactical or strategic is the nature of the target or area the SAM is defending—what Warden called the “center of gravity.” The determinant could include leadership, facilities, forward echelons of fielded forces, or other concerns. These centers are defined by their apportionment to a specific command and control (C2) structure and assigned mission. This is an important distinction as the S-300, -400, and -500 SAM systems have tremendous advertised ranges—some reaching out to 500 miles—while most Russian air defense assets are of the short- and medium-range variety, according to recent analysis. A range, in distance, is thus more closely aligned to the primacy a given system has within an IADS. An S-500, with a reported 500-mile reach, would likely be the first line of defense for an IADS over the expected combat radius of a Su-35 Flanker or a Pantsir-S1 missile system.

The term “air defense” provides the functional characteristic of an IADS from a target development perspective, and aids in understanding what a specific system does, how it functions

A Russian self-propelled medium-range surface-to-air missile and gun system (right), the Pantsir S1, guards an air base in Syria in 2015. Two S-400 SAM launchers are on the left. The systems are used together in Russian IADS.



Photo: Russian Federation Ministry of Defense

within a greater target system, and its significance. It is obvious that systems like the S-400 or the Pantsir are designed for air defense. But other systems, such as the Su-35 or the MiG-35 Fulcrum fighters, may also provide air defense, just as the US Air Force F-15C Eagle performs the defensive counter-air (DCA) mission. The same is true also for electronic warfare systems; other defense capabilities can and do indirectly or directly affect air operations and support air defense.

## A SYSTEM OF SYSTEMS

Across the US Air Force, SAM systems are often misunderstood as a singular key component, like a missile battery or radar, for targeting purposes. This unintentionally de-emphasizes the other components of both the SAM system and the greater IADS. Thus, the question should be answered—what is a system, in the context of the IADS discussion?

A system like an S-400 SAM should not be viewed simply as a transporter-erector-launcher (TEL) or a single radar. The Russians themselves describe the S-400 as consisting of a battle management system, six separate SAM systems, maintenance facilities, and other nodes. At least seven vehicles are required for the S-400 system to carry out its mission, according to Russian defense literature, and that does not include C2 vehicles, generators, fuel and oil, engineering equipment, and support personnel—or the defended asset itself.

An S-400 is therefore just one component in a series of systems that make up the IADS. There could be one S-400 or multiple S-400s in an IADS, depending on the mission or the area to be defended. Different weapons could be tied together with dissimilar capabilities as well, such as pairing an S-400 with a Pantsir-S1—a shorter-range road-mobile SAM capability. A literal analysis would falsely conclude that this is just a two systems working in close proximity. The reality is that the Pantsir and the S-400 are part of an integrated system. The Pantsir-S1 is often used to reinforce air defense groupings when repelling “massive air attacks,” according to literature from the weapon’s manufacturer, Rosoboronexport. This has

direct parallels to aircraft and electronic warfare capabilities. Ultimately, all these systems are interconnected in order to provide a seamless integrated defense.

## INTEGRATION AND AIR DEFENSE

Integration marries a variety of systems into an efficient defensive enterprise, and allows for the three functions of an IADS to occur simultaneously and repeatedly. In effect, it takes the linear IADS kill chain and allows parallel kill chains to occur concurrently within the broader system. Outdated approaches to defeat IADS are reminiscent of the childhood “telephone game”—where one breaks a link in the chain and the whole system fails. Modern IADS, though, are more resilient and operate much like social media platforms: Removing one user or component does not stop a Facebook post from spreading. The use of multiple attacks to deny, delay, and degrade the “message” must occur in an IADS, since it is improbable that any one attack can permanently break every critical link.

At the component level, some systems have the ability to run a localized version of an IADS. The S-400 has its own organic air surveillance capability, battle management, and engagement functions. But a single S-400 operating independently is not providing air defense alone. In this case, a single S-400 would (at a minimum) work closely with a Pantsir-S1 to provide comprehensive air defenses to maximize the strength of one system, while mitigating weakness and vulnerabilities of the other system. Said another way, an IADS enterprise prevents an Su-35, S-400, or a Pantsir-S1 from engaging a single threat at the same time but allows for each system to engage multiple threats seamlessly. This is done with redundant modern communications tools, including satellite communications, 4G (and now 5G) cellular networks, public switch telephone networks, data links, Wi-Fi networks, cloud computing, and others. Not only does the modern range of communications networks allow for redundancy, it also allows for the seamless passage of

Russian military personnel monitor data in an S-300 command and control trailer during an exercise at the Ashuluk Firing Range in Astrakhan, Russia, in 2016.



Photo: Russian Federation Ministry of Defense

data—irrespective of a unit’s echelon or span of control. The hierarchical or linear understanding of an IADS, thus, is not the correct representation of the interoperability of tactical units to higher headquarters units.

Modern integration allows the concept of “skip echelon” to occur with regularity, where communications skip an intermediate step of an organization. If a mid-level battle management node is destroyed or isolated from the rest of an IADS in a combat action, an individual air defense unit can reach out directly to a division or leadership headquarters. This represents a significant change from the Iraqi IADS of Operation Desert Storm, the Serbian IADS of Operation Allied Force, or even the Libyan IADS of Operation Odyssey Dawn. Most of these IADS, built with 1980s—or even 1970s—technology, featured limited communications means and static assignment of air defense roles. Today’s modern IADS can be integrated via the networks and tools listed above, allowing for more seamless data sharing, limited only by commanders’ decisions to delegate roles, responsibilities, and decision-making. The paradigm of “IADS rollback” in modern air operations, as a result, is woefully outdated if not adapted to a multi-domain, multi-effect approach. A modern IADS can now easily mitigate the destruction or isolation of singular nodes potentially faster than the complex problem-solving approach to current rollback strategies.

## CONCLUSION AND RECOMMENDATIONS

The 2018 National Defense Strategy identifies Russia and China as “revisionist powers” that aim to challenge US military advantage in every domain. Modern IADS, as described above, enable these nations to challenge the US military and create environments where they can potentially project their own forces to degrade and eliminate Ameri-

can advantage. It is therefore imperative that intelligence analysts and planners understand and adopt a thorough understanding of modern, complex IADS in order to properly communicate about these threats to decision-makers at the tactical, operational, and strategic level, in support of campaign goals. A common understanding must be shared across all levels of leadership to create a shared model and enable a culture of critical thinking that will be crucial to defeating modern IADS.

The reliance on traditional IADS rollback strategies should be phased out of modern joint combat operations. Instead, leaders and planners should encourage true joint campaign interoperability by harnessing both lethal and nonlethal effects across domains to defeat air defenses. Analysts and planners must understand that in future conflicts, total destruction or denial of singular nodes or mediums of communication may never occur. More realistic will be to seek effects that disrupt, degrade, or delay, and to simultaneously apply force to achieve those effects to allow for the destruction of enemy centers of gravity—including IADS.

Ultimately, military analysts and campaign planners should heed the lessons from Operations Desert Storm, Allied Force, and Odyssey Dawn, while striving to adapt their operational approaches for more sophisticated threats in order to ensure the US Air Force’s unique ability to seize the initiative in future conflicts. A full understanding of adversary IADS centers of gravity—which include human dependencies, critical equipment and infrastructure, communications, plans, and deployment and employment tactics, techniques, and procedures—remains crucial to developing and executing an effective multi-domain counter-IADS strategy. These requirements will only rise as system complexity steadily increases, and defense technologies improve through the 2030s and beyond. ❖



# Chief Wright, Superstar

Chief Master Sergeant of the Air Force Kaleth Wright may be the most popular Air Force enlisted leader ever. Here's why.

By Brian W. Everstine

TINKER AFB, OKLA.

**C**hief Master Sergeant of the Air Force Kaleth O. Wright wants airmen to have a plan. It should be specific and ambitious. In his meetings with airmen, from one-strippers to senior noncommissioned officers, Wright asks airmen what they want from life, from their families, from their careers. Most in the room share generic answers: Be the best they can be. Be a good father. Make a difference.

Wright wants more.

"You are good people," he told a gathering of non-commissioned officers at Tinker AFB, Okla., recently. "But you are crappy dreamers." Welcome to the Chief Wright show. The popular CMSAF fills auditoriums regularly and attracts crowds of followers to line up afterward for pictures, like a rock star in combat utilities.

Achieving one's dreams means being specific, Wright says. Determine your goal and write it down. Early in his career, Wright decided he wanted to be Chief Master Sergeant of the Air Force. About 29 years later, he got the opportunity. Now, with about a year left in his four-year tenure, Wright says he still has

**"It's important—at any level of leadership—to get out in the spaces [where] people you serve actually live and work and gain that understanding so you can best help them."**

—Chief Master Sergeant of the Air Force Kaleth Wright

one big goal to achieve: overhaul the enlisted evaluation system before he "drops the mic" and heads into retirement.

That done, Wright says he will hang up the uniform, move to Texas, start a second career coaching leadership. And open a cigar bar.

"I'm pretty excited about transitioning, and leaving it all on the field," Wright told *Air Force Magazine* during a series of visits to bases across the South in July. "I've had a great career, and I've really enjoyed it. But I really am ready to transition to something new."

Wright became Chief Master Sergeant of the Air Force in early 2017. As a dental assistant, he got off to a rocky start, full of discipline issues and a lack of motivation—"I was in my own way," he said. Wright found mentors and evolved into teaching, then leadership roles. He decided he wanted to reach the top of USAF enlisted ranks and, despite a large failure in his first test as a command chief (it took harsh words from an airman under him to light the fire he needed, he says), he made it.



Airmen stand in line for up to an hour to take a picture with the top enlisted member of the US Air Force, CMSgt. Kaleth Wright. Airmen brag about their interactions with Wright, showing off memes and morale patches featuring his likeness.

CMSAF Kaleth Wright addresses the concept of wingmen and Total Force resiliency at an enlisted all-call at Rose State College near Tinker AFB, Okla.

Wright became the Air Force's top enlisted member in the midst of a budget crisis, job cuts, and low morale. Then he hit the road.

Since taking office, he's averaged 280 days traveling per year. That's 75 percent of his time, or 23 days a month, an op tempo as stiff as any in the service. He travels with a small team, piled into small executive transport aircraft, such as C-12 Hurons or C-21 Learjets, launching from his home base at JB Andrews, Md., to bases across the country and abroad, often traveling alongside Chief of Staff Gen. David L. Goldfein.

Fueled by tall cans of *AriZona* Arnold Palmer drinks and family-size bags *Smartfood* white cheddar popcorn, Wright blasts through hours-long itineraries, featuring visits with commanders, briefings on base initiatives, coining ceremonies to recognize exemplary performers, small group visits with airmen of all ranks, and finishing up with all-call gatherings.

When meeting with senior noncommissioned officers, Wright likes to test them with questions about Air Force priorities. Most of the answers are incorrect—points Wright uses to drive home his message that airmen need to take it upon them-

## Going Viral

Airmen often take to online communities such as Reddit and Facebook groups to show their fondness for Chief Master Sergeant of the Air Force Kaleth Wright through a unique way—by creating memes. This is a small collection of examples shared on the unofficial Air Force Reddit community.



selves to learn more about the Air Force's broader mission.

Younger airmen quiz Wright about how to navigate their careers, sharing concerns about the promotion process, and posing questions about the generational divide between new airmen and elder statesman NCOs.

The visits “help us get a real-life worldview and understanding of what airmen are going through, like the challenges,” Wright says. “It would be easy to ask the chiefs to send in a weekly report to say, ‘Hey, this is what’s good and what’s bad.’ ... But being out here, being on the ground with airmen and seeing the conditions that they work in, and see[ing] the conditions in which they live, it really helps us figure out how to prioritize where we should be advising, or pushing, or advocating. I think it’s important—at any level of leadership—to get out in the spaces that people you serve actually live and work and gain that understanding so you can best help them.”

Wright’s regular contact with airmen, whether on bases, on Facebook, on his “Ask Me Anything” discussions on Reddit, and soon on a planned video game streaming event on Twitch, have made Wright a celebrity among airmen. During recent base visits, airmen showed off Wright memes in their offices, pictures of the CMSAF with catchy or inspirational phrases. Airmen brag online about their interactions, showing off morale patches depicting Wright, some featuring an Internet nickname—“Enlisted Jesus”—which makes Wright uncomfortable.

At all-calls, Wright shares his priorities and answers questions such as, “When are you making changes to the PT test?” or “How can you improve the enlisted promotion system?”

The all-calls are so popular that, at Tinker, officials had to employ a ticketing system and rent a 1,400-seat auditorium at an off-base college. After speaking for an hour-and-a-half, Wright posed for selfies while airmen, lined up single-file for more than an hour waiting their turn. Almost instantly, the photos were posted to Instagram and Facebook as excited airmen bragged about the interaction.

In the year ahead, Wright is pushing for a major overhaul of the service’s enlisted performance management evaluation system.

“It’s one of the more important things that we need to be able to do as a force is drive performance, to get the most out of the airmen that we have, to best utilize the skills that they bring to the table, to be able to provide them clear and concise feedback, and give them the best opportunity to succeed,” Wright says. “So we need a performance management system that can give them all the best opportunities to become the best version of themselves and promote them at the right point in their careers with the right skills and the right experience.”

### SPECIFICALLY, WRIGHT WANTS TO:

- Revise the Weighted Airman Promotion System tests. Wright calls the exams a “dodo bird” headed for extinction. Airmen competing for promotion to staff sergeant and technical sergeant are compared based on enlisted performance reports, the promotion fitness examination, and a specialty knowledge test. Wright wants to drop the knowledge test, because the future performance of an NCO can’t be predicted by an exam that one can study for in a few days and forget a few days later.

- Increase performance reporting. Wright says feedback and “the whole continuum of development and promotion” should be improved to get a better grasp on how to effectively progress each airman’s career.

- Improve physical fitness. Wright is calling for a more holistically healthy Air Force, one where vegetables pair with birthday cake, and a fairer physical fitness system can be put in place. While the PT test is still alive for the foreseeable future, the Air Force is looking at ways to improve the test so airmen can focus more on “overall fitness, health, and wellness,” Wright says, rather than be punished for falling short.

First, Wright wants to implement a “bad day” policy for the PT test: If an airman has a sub-par test, he advocates



Photo: Brian Everstine/Staff

Wright (center) and CMSgt. Manny Piniero (left) take an E-3 AWACS briefing from SSgt. Kasey Vance, an engine maintainer with the 552nd Maintenance Squadron at Tinker AFB, Okla., in late July.

“no harm, no foul, no discipline,” Wright says. Instead, airmen should have 45 days to “get yourself together” and retake the test. If the airman passes that first test, then it counts. Wright also wants the Air Force to stop judging short and tall airmen by the same abdominal circumference standard.

Currently, the Air Force PT test model functions as a carrot and a stick: An airman can pass their PT test with flying colors, earning a “baby carrot,” like a positive mark on a performance review, Wright says. But when airmen fail, they get whacked with successive blows, from a negative mark up to expulsion from service.

The test is “too heavily weighted on the negative side,” Wright says. Airmen who are good at their jobs can be passed over for promotions because of a bad PT test, while airmen without leadership skills get promoted because they have a good one.

## BEREAVEMENT LEAVE

Another “common sense” change Wright wants: designated time off for bereavement for the death of a family member or similar emergency. Under current rules, airmen must use regular leave. This doesn’t make sense, Wright explained, pointing to his own experience: For the first 17 years or so of his Air Force career, Wright played basketball and never had a problem getting approval for temporary duty travel for games. But when he needed to travel for family emergencies, he says, he had to use leave.

The Air Force needs to be more flexible, he argues. Often, approved personal leave lasts only a couple of days, too short to make arrangements when a parent has died when funeral or estate arrangements must be made, he says.

Wright would like the Air Force to allow up to 14 days of bereavement leave on top of other forms of time off,

although he hasn’t made a formal proposal.

Others are pushing back on the bereavement leave idea, he says.

“Someone looked and said, ‘Hey, the average E-4 or E-5 has a set number of days of leave on the books already, and they should be using that leave,’” Wright says. “That may be true. But fundamentally, I think [bereavement leave is] the right thing to do.”

Once this to-do list is done, and Wright passes his last PT test, he’ll put in his papers. And though he could compete to fill the military’s overall top enlisted position—senior enlisted adviser to the Chairman of the Joint Chiefs of Staff—that job doesn’t interest him.

“It’s not something I’ve thought about,” he says. “I’ll be right around 32 years when I transition, and ... for my last two jobs I’ve been traveling. I don’t want to commit to four additional years of traveling the world, so I’m pretty excited about transitioning, and leaving it all on the field. I’ve had a great career and I’ve enjoyed it, but I really am ready to transition to something new.”

Those 32 years of service and assignments all over the world—and the relationships they came with—will highlight his memories in retirement, Wright says, not necessarily the to-do list of changes he wants to check off.

“I won’t say that I won’t remember any of the ‘we fixed this, we changed that, we made this better,’” Wright says. “I know, for a fact, what I’ll cherish the most and spend the most time thinking about, and perhaps missing, [it] will be these trips, the time I get to spend with the team who are on these trips. ... I’m pretty sure I know somebody at every base in the Air Force.

“So that’s what I’ll spend the most time thinking about, all the relationships. Folks I’ve had the opportunity to influence, to watch ... grow up and blossom throughout their careers.” ❖

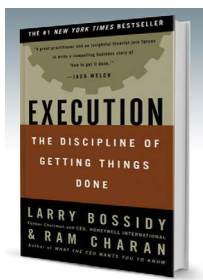


Photo: USAF

Kaleth O. Wright is the Chief Master Sergeant of the US Air Force, the most senior enlisted member of the force, and the personal adviser to the Chief of Staff and the Secretary of the Air Force on issues regarding the welfare, readiness, morale, and development of the enlisted force. In this companion to the Air Force Chief of Staff Gen. David L. Goldfein’s reading list, Wright recommends six books he thinks every airman should read—officers, enlisted, and civilians.

**Execution: The Discipline of Getting Things Done**

by Larry Bossidy & Ram Charan  
In the Air Force, success is underpinned by leaders who can execute—those men and women who stay laser-focused on the goal, pull the best from those around them, and simply get the job done. We need airmen with vision, who put plans into action and boldly take risks when required. This book offers insight into successful execution in high-paced, high-threat environments—those that airmen thrive in every day.



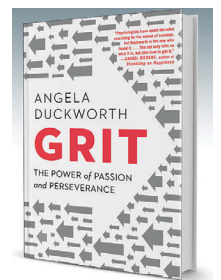
**The One Thing**

by Gary Keller  
The demands on an airman’s time—from work to family to friends and beyond—are insatiable and only grow by the day. This book helps you cut through the noise to focus on the things that matter most in your lives, allowing you to prioritize and gain more satisfaction with the things you need to do, and choose to do, with your time.



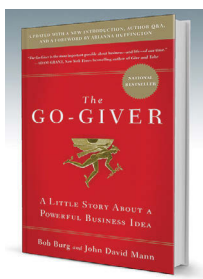
**Grit: The Power of Passion and Perseverance**

by Angela Duckworth  
True grit is something most of us think we have in abundance, but quickly find that may not be the case when we need it most. However, in *our* business, grit may make the difference between success and failure or, more importantly, life and death. This book is a resource for helping airmen understand what grit is, and how they can deliberately grow perseverance over time, so they’ll have it when it counts.



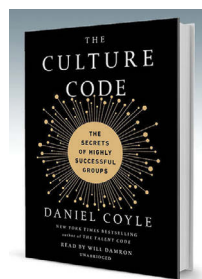
**The Go-Giver**

by Bob Burg & John David Mann  
This book tells the story of an ambitious young man named Joe who yearns for success. Joe is a true go-getter, though sometimes he feels as if the harder and faster he works, the further away his goals seem to be.



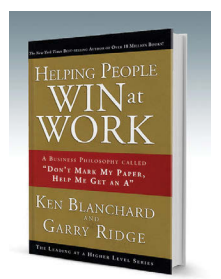
**The Culture Code**

by Daniel Coyle  
*The New York Times* bestselling author of “The Talent Code” unlocks the secrets of highly successful groups and provides tomorrow’s leaders with the tools to build a cohesive, motivated culture. Where does great culture come from? How do you build and sustain it in your group, or strengthen a culture that needs fixing?



**Helping People Win at Work**

by Ken Blanchard & Garry Ridge  
Blanchard and WD-40 Company leader Garry Ridge reveal how WD-40 has used Blanchard’s techniques of partnering for performance with every employee—achieving levels of engagement and commitment that have fortified the bottom line.



For more on CMSAF Wright, see “Chief Wright, Superstar,” this issue, p. 48.





# Against the MiGs in Vietnam

US airmen were clearly more capable, but the North Vietnamese held several advantages.

Photo: USAF via National Archives

A North Vietnamese MiG-17 is hit by 20 mm rounds from an Air Force F-105D on June 3, 1967.

By John T. Correll

In the beginning, the North Vietnamese air force was a rag-tag operation with obsolete, cast-off equipment. The first unit was formed in 1959. The first combat aircraft was a T-28 trainer whose pilot defected from the Laotian air force.

The Vietnamese Peoples' Air Force—as it was officially called—sent pilots to the Soviet Union and China for training in MiG fighters but had no jet aircraft of its own until February 1964, when the Soviets donated 36 MiG-15s and -17s to the VPAF.

For reasons of security, the MiGs were based across the border in southern China and did not deploy to Phuc Yen Air Base near Hanoi until August 1964, after the buildup of US forces in Southeast Asia following an attack on US ships in the Tonkin Gulf.

The VPAF would not gain its first MiG-21s until November 1965, and the MiG-15s and -17s were not regarded as any real threat to late-model US fighters. Thus, it came as a surprise on April 3, 1965, when a pair of MiG-17s pounced on a US Navy strike flight

**US pilots and aircraft were clearly superior, and they had an overwhelming advantage in numbers. Even so, the small, quick-turning MiGs proved formidable opponents.**

south of Hanoi and raked the F-8E Crusader fighter-bombers with 23 mm cannon fire.

The North Vietnamese believed, erroneously, that they had destroyed two of the Crusaders. In fact, they inflicted significant damage on only one of them. However, they had better luck the next day.

On April 4, in the first confirmed aerial victories for either side, MiG-17s shot down two US Air Force F-105s that were attacking the “Dragon’s Jaw” bridge at Thanh Hoa. The MiGs came in through a thick layer of haze, eluding the F-100s flying protective air patrol. The Thuds, carrying heavy bomb loads, were unable to react.

The first US victories were in June 1965 by Navy F-4Bs operating from a carrier in the Tonkin Gulf. The first Air Force victories did not occur until July 10, when F-4Cs, flying from Ubon Air Base in Thailand, shot down two MiG-17s.

USAF and USN fighters confronted the MiGs in two phases: 1965-1968 and 1972-1973, separated by an interval when operations over North Vietnam were halted during negotiations attempting to end the war.



Photo: AIC Larry Groom

An F-4 crew admires a fifth aerial kill marked on their F-4 Phantom. L-r: Capt. Charles DeBellavue, Sgt. Reggie Taylor, Capt. Richard Ritchie, and SSgt. Frank Falcone.

US pilots and aircraft were clearly superior, and they had an overwhelming advantage in numbers. Even so, the small, quick-turning MiGs proved to be formidable opponents. American airmen shot down 196 MiGs—137 by the Air Force, 59 by the Navy and the Marine Corps—and sustained 83 losses.

In historical context, it was a far cry from World War II, when the Army Air Forces awarded more than 15,000 aerial victory credits, or the Korean War, in which Air Force F-86s shot down 792 MiG-15s and achieved an exchange ratio of better than 10-to-1.

Vietnam was a different kind of war.

### LIMITED OBJECTIVES

“Winning the air war” in a classic sense was not the strategy followed by either side. Destruction of enemy aircraft was, for both, a secondary objective.

The purpose of US fighters engaging the MiGs was to protect the strike flights. “MiG killing was not our objective,” said Maj. Gen. Alton D. Slay, deputy chief of staff for operations at 7th Air Force. “The objective was to protect the strike force. Any MiG kills obtained were considered a bonus. A shootdown of a strike aircraft was considered a mission failure, regardless of the number of MiGs killed.”

For their part, the North Vietnamese employed MiGs specifically to stop the strike flights. They avoided combat when risk was high. “The principal MiG mission was to interfere with bombing attacks, seeking to force the incoming F-4s and F-105s to jettison their bombs before getting on target, a strategy that took full advantage of the encumbrance of US rules of engagement and prevented the F-4s from mixing it up with the MiGs,” said Air Force historian Walter J. Boyne.

In any case, the air campaign in North Vietnam was of limited interest to officials in Washington. Although the war was instigated, directed, supplied, reinforced, and sustained from the North, US policy was that the outcome would be decided in the south.

By order of Defense Secretary Robert S. McNamara, the only military goal of the air campaign was “to reduce the flow and/or increase the cost of infiltration of men and supplies from North Vietnam to South Vietnam.” Confrontation with MiGs was incidental to that.

The North Vietnamese gained extra advantages from the sanctuaries and rules of engagement created by US policy.

Attacks were forbidden in large prohibited areas around



Photo: USAF

Col. Robin Olds (third from left) celebrates completing the famous MiG sweep, Operation Bolo, with airmen at Ubon AB, Thailand.

Hanoi and Haiphong. The principal MiG base at Phuc Yen was not struck until 1967, and Gia Lam was never struck. US airmen could watch MiGs come out, taxi to the end of the runway, and run up their engines for takeoff, but could not touch them until they actually took off. The MiGs could also escape over the border into China.

Visual identification of enemy aircraft was required rather than using radar for target acquisition and firing long-range missiles before the MiGs could attack. “We forfeited our initial advantage of being able to detect a MiG at 30- to 35-mile range,” said Gen. William W. Momyer, commander of 7th Air Force from 1966 to 1968.

An Air Force report from the period noted that “on several occasions US fighters found that by the time visual identification of the MiG had been made they were no longer in the prescribed missile launch or range envelopes. The engagement then became a short-range maneuvering encounter, which further compounded the problem of accurate missile launch.”

### MATCHUP

The principal matchup was between the McDonnell Douglas F-4 Phantom II—flown by the Air Force, the Navy, and the Marine Corps for bombing, combat air patrol, reconnaissance, and suppression of enemy air defenses—and North Vietnam’s MiG-17s and MiG-21s.

The F-4 was developed by the Navy and entered service in 1962. It had impressive speed, range, and versatility, and it remained the leading US fighter into the 1970s. The original Phantom was modified and employed in Vietnam as the Air Force F-4C and F-4D and the Navy F-4B and F-4J. The ultimate USAF model was the F-4E, introduced in 1968 and adding a 20 mm cannon to the existing armament of air-to-air missiles.

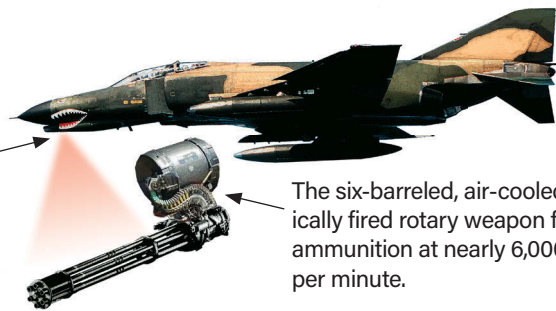
The single-engine MiGs were half the size of the F-4 and more agile. The MiG-17, an advanced version of the Korean War MiG-15, was no longer top of the line, but it performed well as an interceptor. The MiG-21 was North Vietnam’s best fighter and a close match in capability with the F-4.

The older MiG-15s were used only for training purposes. The MiG-19, manufactured in China, did not appear until the last part of the war. It was less maneuverable than the MiG-17 and slower than the MiG-21.

The North Vietnamese offset their vulnerabilities by picking their times to fight. “MiG pilots only attacked under ideal circumstances, such as when USAF aircraft were bomb-laden, low on fuel, or damaged,” an Air Force statement said. “The

## M61A1 Vulcan Rotary Cannon

The F-4 lacked a gun. Without a gun that could be employed in close-in dogfights against North Vietnamese MiGs, F-4 pilots found it difficult to safely engage with air-to-air missiles. The F-4E, introduced in 1968, added an M61A1 cannon under the nose.



The six-barreled, air-cooled, electronically fired rotary weapon fired 20 mm ammunition at nearly 6,000 rounds per minute.

Airmen load an F-4E with laser-guided bombs in Thailand. Phantoms counted for most MiG kills in the war.



Graphic: Mike Tsukamoto/staff  
Photo: USAF

Photo: USAF via National Archives

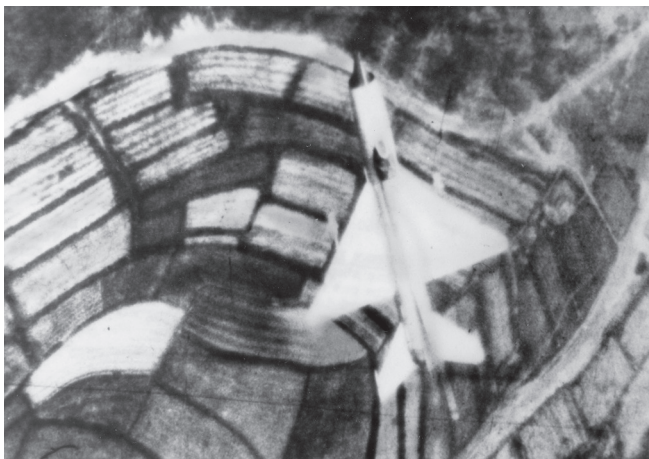


Photo: USAF

The image of a North Vietnamese MiG-21 as viewed through the lens of a USAF gun camera during a dogfight.

small, hard-to-see MiGs typically made one-pass attacks at high speed, then escaped to a sanctuary.”

When the engagement was straight forward, the MiGs seldom won. The trick was inducing them to engage at all, if the F-4s were ready and configured to fight.

In Operation Bolo, the famous “MiG Sweep” of January 1967, a force of F-4Cs from Ubon entered North Vietnam pretending to be bomb-carrying F-105s. They followed Thud ingress routes, and their radio calls simulated Thuds. The MiG-21s at Phuc Yen were deceived and rose up to meet them. In a swirling 15-minute dogfight, the Phantoms shot down seven MiG 21s—almost half of the total possessed by North Vietnam—with no loss of F-4s.

The F-4s did not account for all of the MiGs destroyed, though. The older F-105 had been designed primarily for high-speed, low-altitude nuclear delivery missions. Momyer rated it “a very poor plane in a dogfight,” but it managed to bring

down more than two dozen MiGs. The Navy’s single engine F-8 Crusader bagged 15 MiGs.

The most surprising victories were by Navy propeller-driven A-1H Skyraiders, which shot down two MiG-17s with their 20 mm cannons.

MiGs were the most flexible and versatile part of the most lethal air defense system US aircraft had ever faced—but the MiGs were not the greatest threat. USAF combat losses in Vietnam were distributed as 67 to MiGs, 110 to surface-to-air missiles, and 1,443 to anti-aircraft artillery.

The combination of MiGs, SAMs and guns was so effective that in 1966, the USAF loss rate in Route Pack Six, around Hanoi and Haiphong, was one aircraft per 40 sorties. This made the odds very tough for aircrews, who had to fly 100 missions to complete a full combat tour.

### GUNS AND MISSILES

When the F-4 was designed and developed in the 1950s, US planners believed the era of the dogfighter was over. “Fighter design priorities emphasized the nuclear delivery and interceptor missions,” Jim Cunningham said in an analysis for *Air & Space Power Journal*. “The underlying assumption was that nuclear weapons would make conventional wars obsolete and that as a result, air combat maneuvering (ACM) was dead, overtaken by the interception mission, which required supersonic speed, high technology sensors, and missile weaponry.”

The F-105 packed a fast-shooting 20 mm cannon, but early models of the F-4 did not have a gun. This was a disadvantage in the subsonic, turning battles with MiGs where it was often awkward to employ missiles.

In 1967, a gun pod mounted on a pylon was provided for the F-4D but the problem was not completely resolved until the first F-4Es with built-in guns arrived in Southeast Asia in November 1968, just as the bombing halt over North Vietnam went into effect. After operations in the North resumed in 1972, half of the USAF victories were achieved by guns.

Navy airmen also complained about the lack of a gun, but a cannon in the nose shifted the F-4's center of gravity too far forward for carrier operations, so USN aircrews finished the war with their missile armament.

The main US air-to-air missiles were the radar-guided AIM-7 Sparrow and the heat-seeking AIM-9 Sidewinder. Sparrow had an effective range of more than 10 miles, compared to about two miles for Sidewinder.

Overall, Momyer said, "most of our kills were made with missiles, and in fact, 57.5 percent were made with Sparrows. Navy fighters, on the other hand, made almost all of their kills with the Sidewinder."

The Navy kills, Momyer said, "were predominately MiG-17s and they were made in close-in engagements. Such engagements required more frequent employment of short range weapons, and since the Navy F-4s had no guns, the Sidewinder missile was their primary weapon."

As for the VPAF, the MiG-17 was basically a gun platform. The MiG-21s had guns but relied mainly on their Atoll heat-seeking missiles.

## AGAINST THE MIGS

Despite the success of the Bolo operation, the Air Force did not conduct any more fighter sweeps. "There weren't enough fighters available to conduct random fighter sweeps and also protect the strike force during their specified times in the target area," Momyer said. "Even if fighters could have been spared for daily sweeps, the shortage of tankers would have precluded such a tactic."

"US Air Force coverage ranged from spotty to nonexistent over assigned strike routes," said military analyst William Sayers, writing in *Vietnam Magazine*. "Fighters escorting the bomb-carrying aircraft never knew where the threat would come from and therefore normally stayed close to the planes they were protecting so they wouldn't be caught out of position during an attack. As a result, US Air Force aircraft usually entered engagements from a defensive and reactive posture."

"After action reports found that 65 percent of Air Force losses were suffered by aircraft fighting from a defensive posture, which required a fighter under attack to reverse positions to get a kill, a very difficult maneuver to make," Sayers said.

The North Vietnamese air defense system had more than 200 radar facilities that provided warning and guidance for the MiGs, SAMs, and guns.

"The MiG-21s were operated under tight ground control," said historian Boyne. "They typically sought to stalk American formations from the rear, firing a missile and then disengaging."

At one point in 1967, Momyer believed that the MiG threat had been neutralized. The North Vietnamese fighter fleet stood at 40, of which only 12 were MiG-21s. However, the losses were soon replenished by the Soviets and the Chinese. When the air war resumed in 1972 after the bombing halt, the VPAF MiG total was up to 206, an all-time high.

## TEABALL

In the final count of aerial combat credits and losses, US fighters in battle with the MiGs achieved an exchange ratio of 2.36-to-1. More than two-thirds of the MiG kills were by the Air Force, but the USAF exchange ratio of 2.04 was not as good as the Navy's 3.68.

Several factors contributed to the difference. Navy airmen, flying off carriers in the Tonkin Gulf, entered Vietnam with their backs to the sea and the MiG threat in front of them.



Photo: Vietnamese News Agency

**North Vietnamese pilots are briefed on dogfighting tactics in front of Chinese-made MiG-19s. These aircraft arrived late in the war, were less maneuverable than the MiG-17, and slower than the MiG-21.**

This limited the opportunity for the MiGs to use their favorite tactic of surprise attacks from the rear.

Whereas the large majority of Air Force encounters were with MiG-21s, about half of the Navy engagements were against MiG-17s and -19s. Furthermore, many of the Navy targets were near the coast and did not require extensive time to be spent in enemy territory.

Without doubt, naval aviators also got a performance boost from the Top Gun combat training introduced in 1969 by the Navy Fighter Weapons School. The Air Force did not have anything comparable until its Red Flag program began in 1975.

The biggest advantage for Navy F-4s, though, was probably Red Crown, a picket ship stationed a few miles offshore that provided radar coverage and warning of MiG activity. Its signal reached into the Red River delta as far as the airfields around Hanoi and directed intercepts of the MiGs. A number of Air Force aircrews credited Red Crown with vital assistance to them as well.

Air Force results against the MiGs improved markedly in the last six months of US involvement in Vietnam. In 1972, a fusion center to pull together intelligence information from all reconnaissance sources was established at Nakhon Phanom air base in Thailand with the call sign "Teaball."

Teaball screened, combined, and analyzed a large volume of data in order to provide the earliest possible MiG warning to the strike forces. Controllers notified aircrews not only of the location of a MiG, but also whether it was a MiG-17, -19, or -21. Having tracked the aircraft from time of takeoff, Teaball could determine when they were low on fuel.

Gen. John W. Vogt Jr., commander of 7th Air Force from 1972-1973 described Teaball as "by far the most effective instrument in the battle with the MiGs." Some disagreed with that assessment, regarding Red Crown and other intelligence sources as more important.

As historian Wayne Thompson has noted, though, there was an "obvious correlation" between the beginning of Teaball operations in August 1972 and 7th Air Force's "dramatically improved performance against MiGs. During the next three months, the score was 20 MiGs down at a cost of only four F-4s," raising the exchange ratio to 5-to-1 in the USAF's favor.

## ACES

In World War II, hundreds of US airmen became aces, credited with five or more aerial victories. By contrast, the Vietnam

## USAF MiG Victories

	Weapon/Tactics	MiG-17	MiG-19	MiG-21	Total
<b>F-4C</b>	AIM-9 Sparrow	4	0	10	14
	AIM-9 Sidewinder	12	0	10	22
	20 mm gunfire	3	0	1	4
	Maneuvering tactics	2	0	0	2
<b>F-4D</b>	AIM-4 Falcon	4	0	1	5
	AIM-7 Sparrow	4	2	20	26
	AIM-9 Sidewinder	0	2	3	5
	20 mm gunfire	4	0	2	6
	Maneuvering tactics	0	0	2	2
<b>F-4E</b>	AIM-7 Sparrow	0	2	8	10
	AIM-9 Sidewinder	0	0	4	4
	AIM-9/20 mm gun (combined)	0	0	1	1
	20 mm gunfire	0	1	4	5
	Maneuvering tactics	0	1	0	1
<b>F-4D/ F-105F</b>	20 mm gunfire	1	0	0	1
<b>F-105D</b>	20 mm gunfire	22	0	0	22
	AIM-9 Sidewinder	2	0	0	2
	AIM-9/20 mm gunfire (combined)	1	0	0	1
<b>F-105F</b>	20 mm gunfire	2	0	0	2
<b>B-52D</b>	.50 cal. gunfire	0	0	2	2
<b>Totals</b>		<b>61</b>	<b>8</b>	<b>68</b>	<b>137</b>

Source: USAF Aces & Aerial Victories

An F-4D armed with two GBU-10 laser-guided bombs and AIM-9 Sidewinder missiles.



Photo: USAF

War produced only five aces, three from the Air Force and two from the Navy.

The leading US ace in Vietnam was Air Force Capt. Charles B. DeBellevue with six victory credits. He was a navigator, flying as a weapons system officer, in the back seat of the F-4. Air Force and Navy officers assigned to the back seat of the Phantom were not required to be pilots, and full credit for a MiG was awarded to the airmen in both seats.

Only two of the Vietnam War aces—Air Force Capt. Richard S. “Steve” Ritchie and Navy Lt. Randall H. Cunningham—were pilots. Air Force Capt. Jeffrey S. Feinstein was, like DeBellevue, a WSO. Navy Lt. William Driscoll was a naval flight officer flying as a radar intercept officer. Except for DeBellevue, the US aces had five MiG credits each.

North Vietnam recognized 16 VPAF aces. The leader was Nguyen Van Coc, with nine credits awarded, seven of them for US aircraft and two for Firebee drones. In accumulating his credits, he flew combat missions from 1967 to 1969.

Thirteen of the North Vietnamese aces flew the MiG-21 and three flew the MiG-17. There were no MiG-19 aces.

One of the enduring legends of the war was “Colonel Toon,” supposedly the greatest of all North Vietnam’s MiG

pilots with 13 small red victory stars on the fuselage of his airplane, signifying US fighters shot down. The legend was embellished with the supposition that on May 10, 1972, Randy Cunningham—on the mission in which he became an ace—shot down Colonel Toon. William Driscoll was in the back seat that day.

In reality, Colonel Toon never existed. The stars on the fuselage, if they were there at all, were the collective credits by a number of pilots flying that airplane. The imagined Colonel Toon was traced in part to confusion by signals intelligence operators listening to North Vietnamese radio communications.

In broad context, the US fighters in Vietnam succeeded in their air-to-air objectives, and the MiGs did not. From beginning to end—from Operation Rolling Thunder early in the war to Linebacker in the finale—the strike forces got through to their targets. The MiGs, try as they might and despite occasional periods of success—could not stop them. ✪

**John T. Correll** was editor in chief of Air Force Magazine for 18 years and is a frequent contributor. His most recent article, “From Out of the Shadows,” appeared in the September issue.

# **OUTSTANDING AIRMEN OF THE YEAR**

The Air Force Outstanding Airman program annually recognizes 12 enlisted members for superior leadership, job performance, community involvement, and personal achievements.



The program debuted at the Air Force Association's 10th annual National Convention in 1956. The Chief Master Sergeant of the Air Force and the command chief master sergeants from each USAF major command comprise the selection board, with the Air Force Chief of Staff reviewing their selections. The 12 selectees are awarded the Outstanding Airman of the Year ribbon with the bronze service star device and wear the Outstanding Airman badge for one year.



Photos: USAF

## **SMSgt. Sylvetris Hlongwane**

### **Eleventh Air Force Paralegal Manager**

Eleventh Air Force, JB Elmendorf-Richardson, Alaska (Pacific Air Forces)

**Home of Record:** Sumter, S.C.

Senior Master Sergeant Hlongwane led five teams in the command's largest military justice arena, servicing five wings, 26 sites, and 55,000 clients. As the staff superintendent and acting first sergeant, she guided 380 mission partners through 320 joint taskers, linking critical mission gaps. She excelled as a senior enlisted advisor during a commander-directed investigation, delivering 448 hours of testimony, supporting improvements in pilot training. Sergeant Hlongwane executed exercises to assess a \$21 million security contract that authenticated safeguards of \$3 billion in protection-level assets, contributing to the return of 26 defenders to home station. Her leadership to 534 peers and 800 junior leaders culminated in her recognition as the US Pacific Air Forces' Lance P. Sijan Award recipient.



## **SMSgt. Philip B. McAlpin Jr.**

### **Heavy Repair Superintendent**

5th Civil Engineer Squadron, Minot AFB, N.D. (Air Force Global Strike Command)

**Home of Record:** Philadelphia

Senior Master Sergeant McAlpin Jr. led 28 multicraft airmen in the daily maintenance of Syria's sole C-17A capable semiprepared landing zone. His efforts delivered 7,900 warfighters, ensured 900 combat sorties, and the reception and deployment of 8,900 short tons of essential cargo supporting Operation Inherent Resolve. He identified critical airfield deficiencies and established courses of action to ensure air line of communications remained open throughout the region during the Battle of Raqqa. His efforts and data led to him authoring the Air Force's first Comprehensive Landing Zone Maintenance Plan, reducing downtime from 12 to four hours daily, resulting in an increase of 90 sorties per month. He also managed 32 projects, valued at \$3.7 million in support of Special Operations Joint Task Force Syria.



## **SMSgt. Andrew J. Kehl**

### **Deputy Fire Chief**

99th Civil Engineer Squadron, Nellis AFB, Nev. (Air Combat Command)

**Home of Record:** Indio, Calif.

Senior Master Sergeant Kehl led 124 firefighters at the busiest airfield in the command, providing command and control capabilities for 1,400 emergencies. While leading the best training program in the wing, he secured 624 manpower days to support America's largest multinational exercises. As the Air Force's Innovator of the Year, he built a standardized business platform to conduct all daily fire operations at 47 bases, eliminating 80 percent rework and setting the stage for the first-ever fire department vehicle standardization project. He pioneered an expeditionary tasking aid, syncing available posturing to 99 multinational personnel at three areas of responsibility in support of 1,200 combat sorties. Simultaneously, he finished his master's degree in organizational leadership and published a 287-page book on enlisted force growth.



## M Sgt. Jahara A. Brown

### Plans and Programs Superintendent

78th Security Forces Squadron, Robins AFB, Ga. (Air Force Materiel Command)

**Home of Record:** Atlanta

Master Sergeant Brown directs 25 military and civilian personnel in developing and maintaining security plans for the protection of \$18.7 billion in assets and 24,000 personnel. His expertise in law enforcement and security proved evident in his leadership of 85 personnel during 64 patrol responses that netted 32 criminals. While deployed as a combat arms program manager, he streamlined the movement of 1,500 weapons in 48 hours, aiding the success of the North Atlantic Treaty Organization airstrikes against Syria. A true wingman, Sergeant Brown sustained injuries during a vehicle rollover where he quickly reacted to save the lives of six other airmen. Finally, Sergeant Brown mentored 420 airmen during three TED talks, cultivating an environment of ownership versus rentership.



## TSgt. Inna A. Lvova

**Financial Analysis Noncommissioned Officer in Charge** 50th Comptroller Squadron, Schriever AFB, Colo. (Air Force Space Command)

**Home of Record:** San Jose, Calif.

Technical Sergeant Lvova skillfully managed the 50th Space Wing's \$3 million reimbursement program, surpassing five command metrics, which led directly to Team Schriever's No. 1 ranking across Air Force Space Command. Her superior analytical skills proved pivotal in vaulting Installation Mission Support Center's obligation rate to \$24 million, a 93 percent surge from the prior year. Her actions drove the execution of 15 construction projects, integrating joint operations for two combatant commands, and instituting the first \$85,000 network enclave, enabling data transfer across 89 civil engineering squadrons. Furthermore, Sergeant Lvova's leadership elevated her team and delivered the Comptroller Organization and Financial Analysis Flight of the Year for Space Command. Her skilled leadership was further showcased by her selection as a Noncommissioned Officer in Charge Academy Distinguished Graduate.



## TSgt. Kenneth T. O'Brien

### Special Tactics Team Element Leader

320th Special Tactics Squadron, Kadena AB, Japan (Air Force Special Operations Command)

**Home of Record:** Bunker Hill, Ind.

Technical Sergeant O'Brien seamlessly embedded with the Secret Service and Joint Special Operations Forces as part of a President of the United States protection team, ensuring safety and security during the first United States and North Korean negotiation summit in history. While on temporary duty, he charged into a burning vehicle in South Korea where he extracted an injured civilian and successfully performed life-saving procedures. Additionally, he played an instrumental role in the Thailand cave rescue mission. He was essential in creating the rescue plan, which placed himself as the furthest American inside the cave. During the mission, he also led the effort to retrieve and successfully resuscitate a Thai navy SEAL. His team's heroic efforts led to the rescue of 13 Thai civilians.



## TSgt. Andrew C. Merrylees

**Radio Frequency Transmission Systems  
Noncommissioned Officer in Charge**

166th Communications Flight, New Castle, Del. (Air National Guard)

**Home of Record:** New Castle, Del.

Technical Sergeant Merrylees' innovations saved the 166th Airlift over 1,000 man hours, regaining over 550 training hours. His efforts in the quality assurance program automated processes and eliminated redundancies, increasing evaluation output by 200 percent and overcoming a major unit effectiveness inspection deficiency. As the unit training manager, he created a new workflow and developed a database system which led to a 70 percent drop in overdue training. Sergeant Merrylees crafted a vital analysis tool that captures major wing-level deficiency trends and armed leadership with key metrics to enable critical decision-making capabilities. He is a multiyear audio and visual coordinator for the Special Olympics Delaware, and volunteers monthly to support technical requirements for children with psychiatric needs.



## SSgt. Caryn N. Frederick

**Satellite Systems Operator and Orbital Analyst Technician**

19th Space Operations Squadron, Schriever AFB, Colo. (Air Force Reserve Command)

**Home of Record:** Aurora, Colo.

Staff Sergeant Frederick qualified as the second Reservist to certify as an orbital analyst in support of the \$7.5 billion Global Positioning System 35-satellite constellation. Additionally, she participated in a three-day exercise and developed a 240-step procedure for the first-ever Block IIR satellite disposal. She advised a 70-member contractor team in the validation of launch and early orbit processes and identified and corrected severe training deficiencies prior to the first GPS Block-3 launch. These efforts led to 235 critiques for the next-generation technical order, driving over 200 modifications and three major risks associated with the command and control system, which culminated in the redesign of its maneuver planning interface.



## SSgt. Gary G. Jeffrey

**Medical Materiel Technician**

81st Medical Support Squadron, Keesler AFB, Miss. (Air Education and Training Command)

**Home of Record:** Tiffin, Ohio

As a Senior Airman, Jeffrey led the wing's flu vaccine program by securing 190,000 doses and coordinating with four agencies, ensuring immunizations for three Department of Defense sites five weeks early. He secured a cross-command leech treatment transfer within 24 hours, avoiding a two-week patient care delay, ultimately saving a patient's limb. He designed training for 29 accounts, briefing three acquisition processes to 96 customers, cutting 1,500 errors and decreasing delivery time from seven days to one. He balanced cost center operations, certifying 44 Air National Guard and Air Force Reserve accounts worth \$670,000, supporting one of three national disaster response teams.





## SSgt. Christopher M. Stuebbe

### Forward Area Refueling Point Program Manager

628th Logistics Readiness Squadron, JB Charleston, S.C. (Air Mobility Command)

**Home of Record:** Mentor, Ohio

Staff Sergeant Stuebbe was a critical member of the crew that enabled Special Operations Task Forces to conduct raids against high-value targets during Operation Freedom's Sentinel. He flew 35 combat missions totaling 133 hours, and transferred 283,000 pounds of fuel that were vital to the mission. Additionally, he expedited emergency repairs on Air Force Special Operations Command equipment valued at \$500,000, enabling joint force teams to be mission ready in under 12 hours. He also led a presidential-approved operation, refueling 28 aircraft, ensuring mission success. Finally, while deployed, he completed 18 credit hours toward his bachelor's degree, helped wounded warriors as a volunteer in the hospital's critical care section, and organized USO events for 19,000 personnel.



## SrA. Misty A. Richmond

### Public Health Technician

52nd Aerospace Medicine Squadron, Spangdahlem AB, Germany  
(US Air Forces in Europe-Air Forces Africa)

**Home of Record:** Blue Creek, Ohio

Senior Airman Richmond managed the preventative health assessment program for 21 units, reviewing 1,800 medical records, validating 21,600 requirements. Her efforts led to a 99.4 percent compliance rate, culminating in the 52nd Medical Group earning the No. 1 rating in the command. Additionally, as the group's liaison for Trident Juncture, she readied 321 members and validated 4,000 individual medical requirements enabling 209 joint sorties, vital to the execution of the US and NATO's largest exercise since the Cold War. Furthermore, Airman Richmond completed a food vulnerability assessment, evaluating 360 security items, identifying five concerns, safeguarding a \$65 million food supply. Finally, she completed 30 credit hours, and upheld a 4.0 GPA, making the Dean's List and earning her Community College of the Air Force degree.



## SrA. Justin Allen Starks

### Fire & Emergency Services Driver and Operator

Organization: 11 Civil Engineer Squadron, JB Andrews AFB, Md. (Joint Forces Headquarters-National Capitol Region)

**Home of Record:** Jackson, Miss.

Senior Airman Starks is a driver and operator for JB Andrews' Fire & Emergency Services, where he is the lead trainer for 25 assigned shift personnel. An expert at his craft, he responded to 11 motor vehicle accidents, seven suspicious package emergencies and four fires, safeguarding 16,000 personnel. As a staff assistant, he scrutinized 53 training records and corrected 231 errors, realigning the flight within Air Force Instruction and validating the department's 2018 accreditation selection. Airman Starks received the first-ever Military Honeywell Scholarship from the International Association of Fire Chiefs, which showcased firefighter training across the enterprise. He completed his master's degree in public administration with a 3.9 GPA and authored two books on investing and finance.



Photo: Courtesy of Michael Vargas

AFA Teacher of the Year Michael Vargas (center) and his "Near Space Team" students from Pinnacle High School get an assist from NBA Phoenix Suns mascot "Go" before launching a weather balloon into the atmosphere.

## AIRMAN FOR LIFE

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

# The Sky Is Not the Limit

By Chequita Wood

### STEM FOR ALL

Michael Vargas, the Air Force Association's 2019 National Teacher of the Year, stands out for his experience, vision, and commitment.

A ninth-grade physics teacher at Pinnacle High School in Phoenix, Vargas is an innovator both within and outside the classroom. Inside, he's an advocate for "physics first," believing physics is a gateway to science, technology, engineering and math (STEM) fields. Outside, he has successfully lobbied the Arizona state legislature to award scholarships to 150 physics and chemistry teachers, and more recently, extend that program with an additional \$1.2 million in state funding.

AFA's Teacher of the Year, presented by Rolls-Royce, recognizes teachers from across the country for their contributions to STEM education, which is critical to developing future leaders in aerospace.

An educator for 19 years, Vargas attended Northern Arizona University and enjoys opening up new ideas for students and watching them succeed. His "physics first" philosophy introduces students to launching rockets and weather balloons, providing firsthand exposure that brings the subject to life. Physics is the chief STEM pathway and the gateway class to all other STEM disciplines, Vargas says, being that physics is the science of everything, it teaches students to think critically about data.

Traditionally, physics follows biology and chemistry in most high school curricula. But by teaching it first, Vargas believes students get a clearer picture of the world, whether that's the mechanics of flight or of simply moving an object.

Future generations must understand not only how to get off the ground, he says, but also how to break orbit. Training students to think and tackle problems head-on allows them to adapt, handle challenges, and overcome adversity.

Since 2013, Vargas and the Pinnacle H.S. Near Space Team have conducted weather-balloon missions. Each year, he invites freshman students to participate, drawing on grants provided by the National Basketball Association's Phoenix Suns and other local businesses. He has also invited local Civil Air Patrol members to teach students how to track locations using GPS in emergency rescue missions.

By involving the community and other STEM organizations in teaching his students, he's been able to raise awareness about his programs.

Today's students are training for careers that may not even have been invented yet; they'll need to be critical thinkers and able to multitask to keep up with the evolving technology.

School systems need more physics and upper-level STEM classes, according to Vargas, whose energy and enthusiasm is as great as his commitment to education. Teaching is about helping students achieve—and that's what makes him proudest.

"I produce not only thinkers, but leaders." 



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1/ Col. Einar Malmstrom. 2/ A Minuteman launch facility operated by Malmstrom AFB, Mont., in 2017. 3/ An F-101B assigned to the base in the 1960s.



Photos: USAF (1-3); SSgt. Delia Marchick

# MALMSTROM

## Man of the People

Einar Malmstrom was a courageous and talented air warrior, but the USAF officer's noncombat achievements were no less impressive.

In recognition of these accomplishments, his name was bestowed upon Malmstrom Air Force Base, near Great Falls, Montana.

Einar Axel Malmstrom, the son of Swedish emigré parents, was born in Chicago on July 14, 1907. The youth took a strong interest in military affairs and aviation.

On May 12, 1929, young Einar enlisted as a private in Washington state's National Guard. He quickly decided to become an officer and was commissioned as a second lieutenant in May 1931. He entered flight training and received his wings, but promotions came slowly in the shrunken US military of the 1930s.

On Sept. 16, 1940, he was called to Active Duty at Parkwater, Wash., and was made a first lieutenant. Then, promotions came rapidly, so that when Malmstrom was transferred to Europe in May 1943, he was already a lieutenant colonel. He was put in command of the 356th Fighter Group, a P-47 fighter outfit based at RAF Martlesham Heath, UK.

By all accounts, Malmstrom was a brave commander who led from the front. On April 24, 1944, while flying his fifty-eighth combat mission, Malmstrom's P-47 was shot down over France.

He was captured by German soldiers and, for the next 13 months, Malmstrom was a prisoner of war.

Throughout his captivity, Malmstrom was the senior allied officer in the South Compound of Stalag Luft I in Germany. He was responsible for organizing US officers for survival.



It was a sensitive and difficult job, encompassing matters of security, discipline, morale, and welfare.

He did it well. When the camp was liberated on May 15, 1945, Malmstrom was awarded a Bronze Star for his able leadership.

Malmstrom returned to the US in May 1945. By February 1954, he had been promoted to colonel and became deputy commander of 407th Strategic Fighter Wing, a Strategic Air Command outfit at Great Falls AFB, Mont.

His tenure was short—about seven months—but it was memorable. During those seven months, Malmstrom formed an unusually productive working relationship with the local community, which viewed him as a great friend.

On Aug. 21, 1954, Colonel Malmstrom was killed in the crash of a T-33 just after takeoff. Investigators concluded that Malmstrom's last act—to steer the stricken T-33 away from a populated area—probably cost him his life.

The grateful local citizenry successfully petitioned to have the base renamed in his honor.

In 1959, Malmstrom was selected as the first site for deployment of the Minuteman intercontinental ballistic missile, which went on alert for the first time in October 1962, during the Cuban Missile Crisis. Today, Malmstrom is the home of the 341st Missile Wing, one of three USAF wings that operate the Minuteman III. It reports directly to 20th Air Force and is responsible for the readiness and operation of some 150 launch facilities. Also on site is the 341st Security Forces Group, the largest such organization in the Air Force.

### EINAR AXEL MALMSTROM

**Born:** July 14, 1907, Chicago  
**Died:** Aug. 21, 1954, near Gore Hill, Mont.  
**College:** Air War College  
**Occupation:** US military officer  
**Services:** Washington state National Guard; US Army (Air Corps, Air Forces); US Air Force  
**Main Era:** World War II  
**Years of Service:** 1929-54  
**Combat:** European Theater, 1943-44  
**Final Grade:** Colonel  
**Honor:** Bronze Star  
**Resting place:** Arlington National Cemetery

### MALMSTROM AIR FORCE BASE

**State:** Montana  
**Nearest City:** Great Falls  
**Area:** Main base 44.7 sq mi / 28,600 acres; Missile Complex 13,800 sq miles / 8.8 million acres  
**Status:** Open, operational  
**Opened as Great Falls Army AB:** Sept. 15, 1942  
**Renamed Great Falls Air Force Base:** Sept. 18, 1947  
**Renamed Malmstrom Air Force Base:** Oct. 1, 1955  
**Current owner:** Air Force Global Strike Command  
**Former owners:** Second Air Force, Air Service Command, Air Transport Command, Military Air Transport Service, Air Defense Command, Strategic Air Command, Air Mobility Command, Air Force Space Command



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The U.S. Air Force's B-52 Stratofortress makes its maiden flight, powered by eight Pratt & Whitney J57 engines.



**1961**

The B-52H, the final variant of the aircraft built, enters service with Pratt & Whitney's TF33 engines.



**1991**

B-52s deliver approximately 40% of all ordnance dropped by coalition forces during Operation Desert Storm.



**2000s**

B-52H aircraft play a key role in the 9,000+ total airstrikes conducted on targets between mid-2014 and the end of 2016.



**2050**

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