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the Air Force Gen.
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Jr. speaks with
Pentagon Editor
Brian Everstine
about China.
See p. 47.

ON THE COVER



Top photo: U.S. Air Force F-16 over Southwest Asia, Dec. 15, 2020. Lower photo: An Afghan child on the floor of a C-17 as it leaves the chaos in Kabul, Afghanistan.

Staff Sgt. Taylor Harrison; CMSAF JoAnn Bass Facebook



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Out of Afghanistan, Into the Fire

It was airpower that kicked in the door to Afghanistan in 2001 after the 9/11 attacks and it was airpower that closed out the campaign 20 years later these past few weeks. The unwinnable “forever war” in between wore the wings off Air Force fighters and bombers and left the force much worse for wear.

Yet the end of America’s Afghanistan chapter represents a historic opportunity for the Air Force. Unburdened of that drag on people, equipment, operations, and misplaced investment, the Air Force can finally rally to its Chief’s call and “accelerate change.”

Air Force Chief of Staff Gen. Charles Q. Brown Jr.’s appeal to “accelerate change or lose” was never just about reinvestment. He’s sought as much to break down barriers to change as to move faster to a future end state. It wasn’t that the Air Force was on the wrong track before, Brown has said, but that it lacked sufficient urgency.

That urgency is driven by China’s aggressive actions in the Pacific and informed by Brown’s recent experience as commander of Pacific Air Forces. Agile Combat Employment, which came about during his tenure there, embodies his philosophy. “When I travel,” he said in an August interview, “what I usually get is, ‘I can’t do this until I have more Airmen or X more dollars.’ And I go: ‘What if I gave you nothing—but the authority to do something different?’ ... How would you effectively create more manpower resources?”

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Brown’s greater challenge is increasing airpower capability with the resources he has, and to do so a timeline that grows shorter every day. The Chinese navy is already bigger than America’s and the People’s Liberation Army Air Force is on pace to overtake the U.S. Air Force in size and capability in less time than it took the United States to pull chocks in Afghanistan.

It’s not just about numbers. It takes the Air Force a decade or more to develop and field new capabilities, and the service urgently needs to accelerate that pace and to insert game-altering technologies and innovative operating concepts to dissuade China from pursuing its regional ambitions. Continued advances in stealth, manned-unmanned teaming, information sharing, satellite communication and intelligence, long-range precision weapons, advanced sensors, directed-energy, and more efficient and powerful engine technologies are all in the works. They need to reach the warfighter.

More critical are the operational concepts enabled by those technologies, which can unleash our joint military force to confound adversaries with more options and potential threats—air, land, sea, space, cyber—than they can fathom.

This is about shortening the kill chain, and it’s the promise behind Joint All-Domain Command and Control. It’s one reason why Frank Kendall, the new Secretary of the Air Force, repeats the mantra “one team, one fight” over and over. He spent the first half of his 50 years in defense locked in strategic competition with the Soviet Union. Since 2010 he’s watched China become America’s “pacing threat,” a strategic rival that competes militarily, technologically, and economically, as well. Winning against such a rival requires the entire joint team.

Kendall combines a data-centered analytic engineering sensibility with a lawyer’s linguistic precision. With degrees in both disciplines, he is an unusual combination of military technophile capable of extolling the potential of cognitive radar and policy critic, comfortably questioning whether JADC2’s proponents have focused sufficiently “on specific outcomes for specific operational purposes.”

His drive now, as it was when he was Undersecretary of Defense for Acquisition, Technology and Logistics, is putting “meaningful military capability in the hands of warfighters.”

Kendall can play hardball. He once capped F-35 production for two years over developmental concerns and could be willing to do so again. “The thing people should remember about the F-35 is what a dramatically improved capability it is over fourth-generation aircraft,” he said in his first interview as secretary. He’s accepting of high operating costs for now, but impatient for the more capable Block 4 configuration that is lagging behind schedule.

As DOD’s chief weapons buyer, Kendall championed “Better Buying Power” and replaced PowerPoint briefings with database tools that ensured backup data was never more than a click or two away in program reviews. As secretary, he can be expected to incisively drill program executives and senior leaders but should also take time to hear wing-level operators share their perspectives on operational requirements and challenges.

Kendall heads an Air Force that, at 74 years old, is showing its age, and a Space Force that is more vulnerable than our nation can permit. The Air Force has too few aircraft overall, too many that are past their primes, and limited in its ability to deliver effective firepower in the face of modern air defenses. With too few bombers and fifth-generation fighters, it is too small to absorb losses, an inevitability in a peer fight. An Air Force needs to be big enough to fight through losses. This one is not.

Kendall is similarly challenged with the Space Force, which is unquestionably vulnerable to kinetic, cyber, and other threats. His role will be to ensure the Space Force develops and fields a more defensible and survivable space architecture and that the new service has the means to hold adversaries at risk in space.

Achieving these objectives will be too costly for the Air Force and Space Force to fund all on their own. While some in Congress and the administration will see the end of hostilities in Afghanistan as license to hack defense spending, the reality is that 30 years of constant combat since Desert Storm have left the Air Force in dire need of modernization. It’s like a house whose owner deferred maintenance for too long such that now it needs a near total renovation.

Kendall’s “one team, one fight” mantra applies within the Department of the Air Force as a reminder that Air and Space are intimately intertwined, but it serves just as well in his dealings across the rest of the Pentagon. The Army and Navy are no less dependent on the Air and Space Forces; indeed, they cannot win or fight without them. Restoring the Air Force and enabling the Space Force are joint responsibilities, and the expense must be borne by the entire Department of Defense.

Winning—or avoiding conflict in the future—depends on it. Repeat after Frank Kendall: “One team, one fight.”



Restoring the Air Force and enabling the Space Force are joint responsibilities.

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On Race, Unrest, and USAF

After reading recent letters to the editor regarding discrimination issues in the Air Force, particularly from those suggesting it never existed, wasn't a major issue if it did, and if it does then it's the Black family's fault, I wish to provide my experiences and perceptions.

I'm a White male who enlisted in the Air Force in June 1971 after graduating from high school in Iowa, and I retired in December 2000. After basic I went DDA [direct duty assignment] to Wright-Patterson Air Force Base, Ohio, in September 1971, as a Law Enforcement Specialist. By June 1977, I had been convicted by SPCM [Special Court-Martial] for theft of government property and reduced to Airman Basic (I was on the E-3 promote list), received two Article 15s for disorderly conduct, was given a suspended Undesirable Discharge and placed on Probation and Rehabilitation.

During my Air Force journey I had four overnight stays in local jails for minor misconduct. I was also sentenced to six months in jail for disorderly conduct, resisting arrest, and assault and battery on two Ohio state troopers (It was a brief, but spirited fist-fight—I ultimately lost). But ... they didn't put a knee on my neck or shoot me; they just took me to jail. After serving 51 days I was released after paying a princely fine. Understandably, the Air Force adjusted my enlisted entry date by 51 days to August 1971. In June 1977, I put on staff sergeant, but had an Unfavorable Information File on and off until about 1980. The Air Force also allowed me to get

a CCAF degree, a bachelor's degree, and take several graduate courses via tuition assistance.

When I got my second Article 15, a Black friend of mine got his first—and only one—for disorderly conduct. I had been drinking beer, he liquor. I had a line number for staff sergeant and he for technical sergeant. I got a \$50 fine and put on staff sergeant, he forfeited half a month's pay per month for two months and lost his line number. We had the same White commander. I eventually was retrained as a paralegal, and I saw where minority Airmen often seemed to get more and harsher punishments than White Airmen for similar misconduct. Rate per thousand disciplinary reports frequently reflected this.

All the military and civilian authorities involved in determining how my misconduct would be handled were White. They rightfully dished out stern punishments and conditions, but in ways that gave me countless opportunities to rehabilitate myself and ultimately have a successful Air Force career, which lead to a successful civilian career, and now a comfortable retirement. I'm eternally grateful for their compassion, understanding, and tolerance. But it's equally important to note many directly associated with my rehabilitation and ultimate success were Black civilians, NCOs, and SNCOs.

MSgt. George Cox fought to get me into the paralegal career field, which required a waiver due to my misconduct, because he believed I could succeed. One of his sons graduated from the Air Force Academy and retired as a colonel, another retired from the Army as a SNCO—not bad for a Black family in my book.

There was and remains racial imbalance

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WRITE TO US

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

both in the military and society that needs [to be] resolved. I'm absolutely convinced had I been a Black/minority Airmen, I never would have received my second Article 15, and likely not the first one; because I wouldn't have been in the Air Force to accept them. If my circumstances and opportunities are the exception to the rule (whatever that may be), I'd recommend this concept be applied more equitably, especially when misconduct isn't involved. Because, in the end, all the Air Force denied me was a couple less Oak Leaf Clusters on my Good Conduct Medal.

CMSgt. Brian Wygle,
USAF (Ret.)
Clinton, Md.

Colonel Thomas' letter regarding race, unrest, and the USAF [August, p. 5] is on point word-for-word, and cannot be over emphasized. I expressed the same sentiments during an oral history interview for the AFA, and was pleased to see his letter in Air Force Magazine.

[Also], Kudos to Lt. Col. Getz and Lt. Col. Noguchi re: "Rocking the Joint." It might not hurt for senior commanders to take a refresher course on Soviet Military Power (c.f., Soviet Military Power, DOD, 1981). Soviet military focus was on the mission. Notice the designation of their armed services: Strategic Rocket Forces, Ground Forces, Air Forces, Air Defense Forces, and Naval Forces—"Forces," not Force. The difference is subtle, but significant

CMSgt. Kenneth Benesh,
USAF (Ret.)
Colton, Calif.

I read with interest that the military is having a problem controlling sexual harassment issues. This is a lack of leadership at every level. This is tough, so, why should it surprise me that senior leadership wants to pawn off the responsibility and accountability to someone else rather than really fixing the problem? Leaders, from team chiefs, division chiefs, squadron commanders, wing commanders, and on up the leadership line, need to be held accountable for any harassment in a 'professional' organization.

What happened to the independent chain of command for the Inspector General? There was a

time when the IG spoke with power and authority if all other chains of command failed to help.

There was a time when a wing commander of mine was having trouble meeting suspenses on efficiency reports ... it had become chronic. He called in every leader in the wing from lieutenant up and said, "The next late report means you get fired." That was the end of meeting. Result, no late reports. You can say that is some old retired colonel just remembering the "good ole days."

Leaders are paid to resolve tough issues. Failing to address tough issues by pushing them to a staff agency to resolve is nothing more than a failure of leadership at every level to do their job. Get off your collective butts and *demand* professional conduct at every level from and to every member ... if not: "You are fired." When will someone have the guts to do their job?

Col. Quentin M. Thomas,
USAF (Ret.)
Woodstock, Ga.

One hundred eighty-two missiles were in Cuba in 1962 during the Cuban Missile Crisis, and 100 were removed by Soviet ambassador Mikoyan. [Dragon Lady, August, p. 50.] One can ask are there any

missiles still there? Do the math, 82 are unaccounted for.

There is some possibility that the Russians left some missiles in Cuba. Sadly, the Cuban Missile Crisis can be seen as ongoing.

James T. Struck
Evanston, Ill.

But, Why?

One thing I have never heard answered to my satisfaction: Why was there a decision made to forgo a direct view boomer station and go with the clearly flawed and inadequate TV vision system with its silly 3D glasses? ["Pegasus Power," August, p. 32]. Is there some compelling reason the boomer can't be in the rear, looking out through a window with actual 3D human vision? It's an airliner, for goodness sake, pressurized all the way back.

My own tanker experience is limited to lying beside a KC-135 boomer watching some of my wing's Eagles refuel back around 1990. It worked great! That was a Boeing airplane. Did they forget how to build refueling systems?

Is there a compelling reason?

MSgt. Bill Brockman,
USAF (Ret.)
Atlanta

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Staff Sgt. Justin Parsons

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—**Gen. Mark D. Kelly**, commander, Air Combat Command, offering his view of the long-term effectiveness of keeping the A-10 in the combat air forces, Air Force Life Cycle Management Center Life Cycle Industry Days streaming seminar, Aug. 3.



Staff Sgt. Mackenzie Mendez

Fly! Fight! Win!

"Me being me, I've always felt I'm not real cocky, but if I get in an airplane, you better watch out."

—**Air Force Chief Gen. Charles Q. Brown Jr.**, Aug. 6, at the National Press Club, describing a new recruiting commercial which ends with him saying he's "an American Airmen, kicking your butt."

NEVER SAY NEVER



Staff Sgt. Whitney Amstutz

"Afghanistan was the largest redevelopment program ever in the history of the United States. Bigger than rebuilding Europe, with the Marshall Plan after World War II. ... Don't believe what you're told by the generals or the ambassadors or people in the administration saying we're never going to do this again. That's exactly what we said after Vietnam. ... And lo and behold, we did Iraq. And we did Afghanistan. We will do this again. And we really need to think and learn from the 20 years in Afghanistan. Two words that can describe Afghanistan: One is this "hubris" that we can somehow take a country that was desolate in 2001 and turn it into a little Norway in that time frame. And the other thing is "mendacity." You know we exaggerated, we over exaggerated, our generals did, our ambassadors did, all of our officials did to Congress and the American people about: We're just turning the corner, we're about ready to turn the corner. We give you a chapter and verse about how many of our generals talked about 'just about ready to win.' Well, we turned the corner so much, we did 360 degrees, we're like a top."

—Special Inspector General for Afghanistan Reconstruction **John Sopko**, July 29 at the Defense Writer's Group virtual roundtable.

FREEDOM—AT WHAT COST

"Like many, I struggle to make sense of it all. There will be history books written about everything from our tactics to our strategy and a host of unanswered questions swirling around in all our minds ... all of it will be dissected under the cold, unforgiving light of retrospective assessment. I think I'm still way, way too close to be able to opine on any of this with any degree of certainty. However, there are a few things of which I'm certain. First, the Airmen of AFSOC have done what they were asked to do magnificently. Valor. Sacrifice. Duty. All of it. ... Second, there will be many hard days ... months ... years ... ahead for many of us as we reflect—often with deep ambivalence—on how we feel about our experiences in Afghanistan. We'll process this all while continuing to deal with the physical wounds, the neurocognitive wounds, the psychological wounds, and the moral wounds we've suffered along the way. If, like me, you find yourself trying to put your own experiences into some context which will allow you to move forward positively and productively—I urge you to talk about it."

—**Lt. Gen. James C. "Jim" Slife**, commander, Air Force Special Operations Command, perspective after U.S. troop withdrawal from Afghanistan [Aug. 15].



Staff Sgt. Whitney Amstutz

Space Battlefields

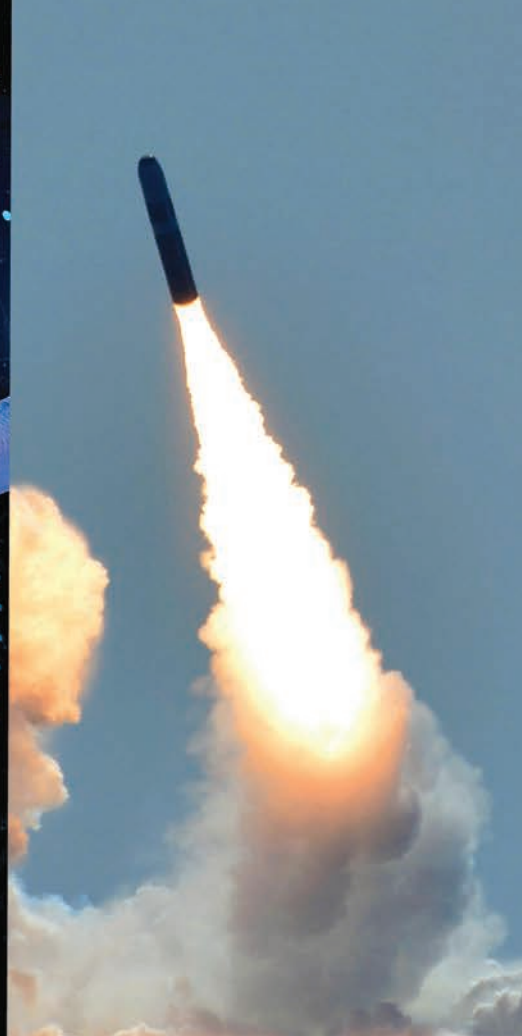
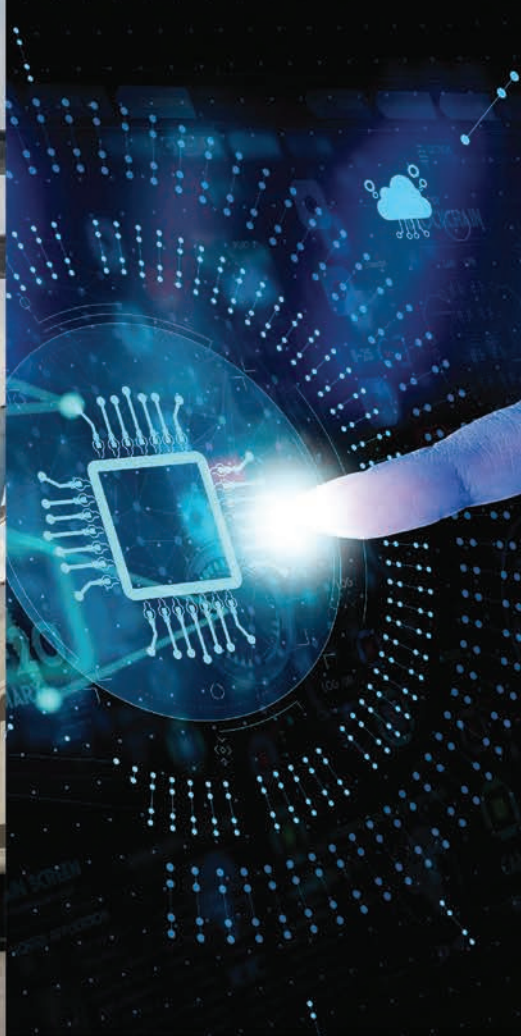
"The next war ... will be fought in cyberspace and outer space, initially. You aren't going to see land wars in Asia or tank battles in Europe. What you are going to see is cyber attacks ... attacks against strategic assets in space, to compromise communications and sensing systems. And being able to defend those assets, being able to project and to replenish those assets, is really what we're focused on."

—**Greg Hayes**, CEO, Raytheon Technologies, speaking with reporters on a second quarter earnings call, July 27.

First, First Responders

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—**International Military Council on Climate and Security**, June report.





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Welcome Back, Secretary Kendall

Frank Kendall became the 26th Secretary of the Department of the Air Force on July 28, 2021. An engineer, lawyer, and West Point graduate, Kendall was the Defense Department undersecretary of defense for acquisition, technology, and logistics from 2012 to 2017. Air Force Magazine Editor in Chief Tobias Naegele and Pentagon Editor Brian Everstine interviewed the new Secretary Aug. 6, less than two weeks into his term.

Q. What made you come back to the Pentagon, and why this job?

A: The short answer is I thought I could make a contribution to our national security. I've been obsessed, if you will, or 'very concerned' maybe would be a better way to say it, with Chinese military modernization since 2010. And I think we have made some progress in addressing that problem. But there's a lot more that can be done. And I have a long background in the intersection of technology and operations. And I thought that I could make a contribution in that area. There is a lot of things happening with technology that are offering some interesting opportunities. I think the department, and particularly the Department of the Air Force, has an opportunity to take advantage of those technologies and do some pretty interesting things.

Q: Within the Air Force, what are some examples?

A: Well, the obvious one that people talk about a lot is artificial intelligence and autonomous capabilities. But there are others. There's some sensing advantages that are coming along, there are opportunities there. Things like cognitive radar, and cognitive [electronic warfare]. There are things that allow us to take some commercial technologies and communicate much more effectively and process data much more effectively, that allow us to make better decisions, [in] various parts of an engagement scenario, if you will. And I think we can mature that technology very quickly and get it applied to military problems.

Q: That sounds like the Advanced Battle Management System, if you've been following the Air Force development in that area. What potential do you see there?

A: Yeah, I have from the outside, and in the larger picture of [joint all-domain command and control]. And I think it's absolutely correct that if we can integrate our capabilities and use them more efficiently, we'll get a better outcome. My



Eric Dietrich/USAF

Secretary of the Air Force Frank Kendall at the Pentagon after his swearing in as the Department of the Air Force's 26th Secretary. Kendall is a familiar face at DOD, having served as the department's acquisition chief from 2012 to 2017.

observation from the outside was that we hadn't focused that effort on specific outcomes for specific operational purposes. And I thought I could help us do that, at least for the Air and Space Forces, and hopefully, with the joint force as well.

Q: The Air Force has had challenges with acquisition. You certainly oversaw some of those programs in your last job. How does that background apply to what you just described?

A: Well, what I did in acquisition is a very different job here. I'm not coming here to be the acquisition executive for the Air Force, I'm the Secretary. But generally speaking, programs should be laid out to get to meaningful operational capability as quickly as possible. And I've looked at literally hundreds, if not more, a thousand maybe, programs. So I've got 50 years of experience doing that now, roughly. And I worked very hard when I was in the acquisition position downstairs in the [Defense] Secretary's office to structure programs to get to that objective of meaningful military capability as quickly as possible and as efficiently as possible. You know, cost and schedule overruns disrupt everybody else. They cause lots of problems, and I try to avoid those, but do so in an approach that took some risk, but not outrageous amounts of risk. And what I've seen in the last few years, is situations where people are going very, very quickly, but not necessarily in the right direction and not necessarily very efficiently. If you're running fast in the wrong direction, you're not making progress. And if you're running as if you're in a sprint when you're actually in a marathon, you're not going

to do very well either. So, getting what we do right is first, and then doing it in the most efficient way is second, and in this position, I'm going to be focused on both.

Q: You talked about going very quickly, but not necessarily in the right direction. [Chief of Staff Gen. Charles Q. Brown Jr.] has said the Air Force must accelerate change or lose. ... How do you know you're making progress?

A: Well, there was a discipline that was very prominent during the Cold War—I spent the first 20 years of my career in the Cold War working on some of the types of issues that we're actually confronted with now—[a] peer competitor who's acting very aggressively to try to defeat us, and responding to that. One of the things that we did then routinely, and in great depth, was operational analysis. Modeling and analysis to support requirements decisions. And I noticed when I came back in 2010 ... that we weren't doing that. That capability had atrophied. So, one of the things I hope to do is recreate some of that or expand on the capabilities that we have now. That's the work you need to do upfront to help you get the right decisions about what it is you're going to build. And you bring into that mix, an understanding of technology and what it can support. Some cases, technologies you still think can be developed, but aren't quite there yet. They'll enable that sort of thing that you want to have as an operational capability. And once you've done that, then you can go off in kind of as efficient of a process as possible to get to the outcome that you're looking for. ... But if you don't do that work upfront, you risk finding out that you've gone in the wrong direction, or you're doing something that really isn't going to give you much of an operational advantage, or that's not even achievable, or [it] just isn't going to be done ... in anywhere near the time and level that you're planning.

Q: How do you see the personnel and force structure side of things?

A: One of my biggest challenges will be making sure I have people working for me who are as capable as possible of doing the jobs that have to be done. We talk a lot about diversity, and I'm fully supportive of that, I think we need to have to tap into all the human capital potential that's out there, wherever it may come from. One area—I surprise people when I say this—but one thing that I think we need to do is make sure we have more engineers. We need to have people who are technically astute. We're in a technological competition, in part,

and developing technologies and then applying them more effectively than our potential adversaries is the key to success. And what I just described is engineering. And I think, since the Cold War ended, we have let some of our capability in that area atrophy. It's not been emphasized as much because we came out of that era, in the first Gulf War, with a very strong dominance in conventional warfare. We demonstrated it very convincingly back in 1991. But that's a long time ago. And the people who studied that operation more than anyone else probably were the Chinese. And I remember reading about what they were saying about what we had accomplished. And they've reacted. ... They've assessed how we fight, how we project power, in particular. And they've analyzed where our weak points are, and they're coming after them. I've been saying this since 2010.

Q: How can you get more engineers into the service?

A: Well, we offer them challenging work, we offer them very important work. And as an engineer, personally, I think those are two things that I find very attractive. We are in competition with a very aggressive and dynamic—and sometimes lucrative—commercial market. But if you want to do something meaningful for your country, if you want to do something that's cutting edge, something that's vitally important to the continuation of our freedom and our way of life, then we have that opportunity for you. And we'll be looking for people who can come in and do that and I'll be emphasizing that a lot.

Q: Within the past year, the Air Force has conducted two large-scale reviews that found very significant barriers to service among minority Airmen, women, and LGBTQ service members. How can you break down those barriers to ensure all Airmen have the same chances to succeed?

A: We are going to check that problem aggressively. I've got two great leaders in the service chiefs, in General Raymond and General Brown. There are programs in place to do that. We want to make sure every Airman and Guardian is treated with dignity and respect and we have a culture in which that is the norm and anything else is not accepted. It's largely a leadership problem to me. And we need to address it at every level. And we need to address it constantly. I'm going to be emphasizing that, I'm going to be talking with Airmen. I'm a believer in using data to support decisions. We're going to be trying to measure our performance in that area. And it's



Eric Dietrich/USAF

'We need to tap into all the human capital potential that's out there,' Kendall said. He also praised his leadership team, from left to right, Chief of Space Operations Gen. John W. Raymond, Air Force Chief of Staff Gen. Charles Q. Brown Jr., Kendall, and Undersecretary Gina Ortiz Jones.

not just about how many people you have in the service of different categories. It's about how those people feel about the way they're treated, how they feel their careers are progressing, whether they feel they're being treated fairly or not, what kind of environment they live in. And we're gonna do everything we can to make sure that people come into the Air Force know that they have an opportunity to grow to their full potential and to be appreciated for what they're able to do.

Q: You just you said, 'I'm a believer in using data to make decisions.' How do you apply that kind of thinking at this level? You've got more data to look at now. Do you anticipate creating an Air Force dashboard, a readiness dashboard?

A: Actually, now that you mentioned it, I am. I did a report each year on the performance of the Defense Acquisition System. And I haven't fully fleshed this idea out yet or discussed it in detail with the staff. But I do think we should be looking at meaningful metrics in each of the areas that we're managing, whether it's financial management, human resources management, management of our installations, as well as acquisition. And so I am going to be looking for ways to assess performance, to ask our leaders to develop plans of action, and ways to assess their performance. And then I'm going to be monitoring them.

I've always been a big believer in the idea of continuous improvement. And these are not problems that people have never worked before, obviously they have, right? But under that doctrine, you look for places where you think you can have an impact, you apply policies, you measure the results of those policies, and then you make adjustments.

That was what I did for the seven years I was running acquisition. And I haven't really, again, had the chance to pursue this very far with the staff. But the concept I have is that we will do that for any number of areas that are my responsibility now. I have a mantra that I've been using since I came in, and it really applies to all this. It's the idea of 'one team one fight,' that we work together to achieve common goals, and that we reinforce each other and support each other. The one fight, and you asked me about why I came back, the one fight is this contest we're in with a strategic competitor. And it's a long-term contest. It's not something that's going to be resolved in the next year or two. China, in particular—certainly is a formidable competitor—but [we] can't discount Russia entirely.

And I have a memory of being in a competition just like this one. There's some differences. But we had a competitor during the Cold War, who was, technologically, reasonably sophisticated. For our good fortune, the Soviets at the time, while they had good scientists and engineers, were horrible at manufacturing things. They couldn't make things. But they were smart. And they were working hard to try to get ahead of us. And it was a constant understanding of that that motivated us every single day. And we need to get back to that mindset. So the idea of one team is that the Air Force, and certainly within [the Department of] the Air Force, the Space Force and the Air Force, have to work together. We also have to work in a joint environment. We have to work with our allies and our partners, other aspects of the federal government. At the end of the day, it's a team writ large, which is trying to protect our national security that we're a part of, and a critical part of.

Q: We're coming up the second anniversary of the creation of the Space Force. What is your plan for continuing

that service's growth, and how the Space Force can address the problems that you just laid out?

A: First of all, what I've seen so far, [USSF Chief of Space Operations Gen.] Jay Raymond has done a fantastic job and he's had great support from [USAF Chief of Staff Gen.] C.Q. Brown. They're off to a good start. It's not easy to set up an organization like that. The model of the Marine Corps and the Navy doesn't apply exactly. The Space Force in terms of people is quite small. In terms of importance, it's quite large. And the types of systems they operate are, for the most part, not manned. So it's a different kind of a service in several ways. General Raymond fully understands that. And I think he's worked hard to keep the service lean, and to tailor it to the specific missions that he has. And I think General Brown has worked very hard to ensure that the Space Force is supported fully by the corporate Air Force, if you will. And in my case, I think the people that were here did well in the Secretariat, to ensure that that organization, and those organizations, also supported that endeavor. But it's early stages yet—we still have a lot of work to do. We're going to learn from what we've done. And we're going to adjust as we go forward. But I think we're off to a really good start.

Q: What does the Space Force really get to own and control, in the end? Budgetarily, you've got more money that goes out through the Air Force as a pass-through than the Space Force gets probably by a factor of four. Do you have a picture of where you think those two things need to go?

A: Roughly, yes. That money is referred to as pass-through money that is in the Air Force's overall budget but goes to other parts of the government. It's been that way for a very long time. And I think it might be clearer to people who are casual observers of the budgets that if that money were somewhere else, then you could put it into the Department of Defense at the department level, you could put it into other places, potentially. I don't find that to be terribly debilitating. Most people understand what it's there for, why it's there, that it's a convenience to have it there, basically, budgetarily. So, among the things I'm worried about, that's not at the top of my list.

What I'm focused on is what we do have for the Space Force, what [are] the missions the Space Force has, and whether it has adequate resources to do those missions, and authorities. There are also, I think, questions that I hope to help answer: Where does the Space Force go? What is our future order of battle in space? And again, I've been quite encouraged by the work that I've seen that's been done.

The fundamental change that led to the creation of the Space Force was the recognition that we no longer have impunity in space. And that happened back in the Obama administration, we changed our strategy, in the second term of the Obama administration, to account for the fact that space was contested, and that we no longer could assume that our resources there were going to be survivable. We also had to deal with the fact that some of our potential adversaries were fielding their own space capabilities that were very threatening to our capabilities, particularly terrestrial capabilities. So, we've got to sort through. Again, we've made progress. This is one of the areas where I thought I could be helpful coming back in. But we've got to figure out what our future order of battle is, now we've got to figure out the most efficient path to get there. And from what I've seen so far, I think General Raymond and his team and others have made a pretty good start at that. But we do have more work to do there, too.

Q: What is your read on the progression of some of the major programs of the Air Force? For example, how LRSB has become the B-21?

A: I actually walked in here from a from a brief on it, but that really doesn't mean I can tell you anything about it.

Q: Or, on Next-Generation Air Dominance. NGAD came out of a proposal to really change how the Air Force is doing acquisition, with digital engineering, the digital century series proposal. Have you been briefed on that, and what's your read on that approach?

A: I'm working through that process. Now, I've been here, I think including weekends, 10 days. I have been anxious to get in the saddle, so to speak, get inside and get to work, because we're in the middle of the process of preparing our FY23 budget, and I've done a lot of budget preparations. I understand what happens within that process. So I wanted to get here when I could be most influential. I think it's fair to say that I may have just made it. But I came in, I think, two days before our program objective memoranda were due downstairs to the Secretary of Defense's office. ... I've been given a little bit of time at least to review where we are and possibly make some changes and alternative proposals, if you will. So, I'm in the middle of that right now. It's been a pretty hectic first 10 days. Now, I've had great support from the staff. That's been very encouraging and we're working our way through that. So, it's possible that I'll make some different recommendations than the Air Force did or would have made before I came and then we'll go through a process with the secretary's office to end up with a budget we'll submit. In parallel with that, we're working on a National Defense Strategy, which should influence what we finally do, and I think it will. So, there are a lot of moving parts right now that I've jumped into the middle of.

To your specific question on programs, I give every political appointee I've ever met the same advice: Never say that a program is doing great or is in good shape, because you never know for sure what's going to happen tomorrow. That said, it's encouraging to me to see that some of the programs that I was involved with before I left seem to be staying on schedule and cost so far. Doesn't mean they will tomorrow. But so far, they're working reasonably well to plan. NGAD hadn't really started, it was very early stages when I was here before. And that's a highly classified program. I can't say very much about it, but it's one of the ones I'm looking at. You mentioned the B-21. That one was a little more mature

when I left. And I think the Air Force has put out that that's performing reasonably well. What I've seen [so far] suggests that's the case. So, I'm encouraged by that. But again, we still have a long way to go.

Q: A program that you certainly oversaw is F-35. And the challenge there has not so much been getting the cost down, they seem to have done OK with that, but reducing its operating costs?

A: The operating costs are high. And I actually had a conversation with [Joint Program Office] about that today, too. I haven't looked into it in detail, but they do feel that they have some ways to reduce costs significantly that they're still exploring. So that's encouraging. The thing that people should remember about the F-35 is what a dramatically improved capability it is over fourth-generation aircraft. It is a game-changing tactical air warfare capability. And it is expensive, compared to much earlier systems, which are much simpler and much less capable. I don't think that even ... at the current level, I'd be willing to pay that for a certain number of airplanes because of the dominance that will give us in the air. But as we expand the fleet, and we try to upgrade it to greater capabilities, which we need to do, we do need to drive those costs down. Some of the technologies that are involved in sustainment, like the [Autonomic Logistics Information System], for example, have their roots in technology that is quite old. The Air Force has been working to upgrade that system or replace it. And I haven't seen the details of that yet. But I think there's some real opportunities there. We can hopefully reduce some manpower through that, we can reduce the cycle times for maintenance, and get some savings there as well. There are also some technologies that could go into future upgrades that could reduce some of the operational costs such as fuel significantly, but we're not ready to commit to those at this point.

Q: You mean a next-generation engine?

A: Mm-hmm.

Q: The Air Force is going to get 48 in the '22 budget, fewer than in the last few budgets. At some point, buying more should help bring the cost down?

A: Of course, but you've got to be buying the airplane that you need, and the airplane that we need right now is the is the Block 4 airplane, with the Technology Refresh 3, which is having problems. So what I think we need to look at, at



The F-35 "is a game-changing tactical air warfare capability," Kendall said. "But it's critically important to the success of that program that we get the Technology Refresh 3 fielded into it, get the Block 4 upgrade fielded. ... Meaningful military capability in the hands of operators. That's what it's all about."

Airman 1st Class Jake Welty

this point, is what the appropriate production rate is to get us from where we are to when we have that capability in hand. And the contractors have not been performing very well, there have been a lot of problems with that. We're a situation that bears some resemblance to one that I had earlier on around Lot 4 or so, when there were a lot of design issues on the plane that hadn't been resolved, and we were in the process of buying airplanes that were going to need expensive modifications. At that point, I seriously considered stopping production for two or three years to get those design issues resolved. ... I decided not to do that. But instead of ramping up, as we had planned, I held the production rate constant at 30 for two years, to put pressure on the contractor, in part, but also to avoid buying airplanes that we were going to do expensive modifications on after we bought them. That worked out, and we got, that cycle anyway, cost under control, got most of those design issues resolved. So, we could be in a similar situation now. ... I don't want to lean too far forward on this without looking at it much more carefully. But it's critically important to the success of that program and the capability of that platform that we get the Technology Refresh 3 fielded into it, get the Block 4 upgrade fielded. Remember what I said earlier—meaningful military capability in the hands of operators. That's what it's all about.

Q: There's been some discussion of a DOD roles and missions review. Do you see a place for that? What missions do you see are core to the Air Force? And what could some other services pick up? The Army's looking at more long-range fires, for example.

A: I'm not aware any major changes are being contemplated there. There may be some being discussed somewhere that I'm not aware of. I have no problem with the Army having some long-range precision fires, I think they can take out targets that are threatening to the Air Force, or even to the Space Force potentially, and to other sister services. The 'one team, one fight' mantra that I use, you know, we're all in this together, and it's about meaningful military capability. And if the services can support each other, that's what we need to do. So, if the most efficient way, operationally and just from cost-effectiveness point of view, is to deal with certain targets is to have the Army use long-range fires against them, I'm all for it. It'll save Airmen's lives. If the most efficient way is to use airpower, then I'm all for that. If the most efficient way is to use space power, I'm all for that. The whole 'one team, one fight' thing is about setting aside parochialism and institutional interests and biases, in some cases, keep focused on the thing we're trying to accomplish here, which is to ensure that the United States stays the dominant military power in the world. And that's it, that's being challenged. That's a big thing. And I think we've got to change our mindset to make that the first thing we think about when we contemplate these decisions.

Q: What surprised you, since you got here? You've been here 10 days, certainly there have been things you've seen that were not what you expected?

A: The thing that surprised me the most is perhaps how fast I was able to get back in the saddle, how quickly I adapted back to the Pentagon pace of doing business, to 12- and 14-hour days and not getting much sleep. And going from one subject to the other. And the intensity of what we're trying to do here, coupled with its importance, I think, and the

terrific people that I get to work with. I said to somebody the other day that I actually like working in the Pentagon. There [aren't] many people that would say that out loud. But as in the show "Hamilton," this is the room where it happens. In fact, this is the building where it happens. This is where we decide. And again, getting back to attracting people in the workforce: This is where we're going to do the things and make the decisions [that] are going to keep us safe and—free or not. And it's an honor, it's an awesome amount of responsibility I have and it's very humbling to be back in that game again after a four-year hiatus. But it's also incredibly stimulating and rewarding and fulfilling. And I feel like I walked in the building, and there I was back in the game just like that. It was an interesting thing to experience.

Q: Can you say how the offer came to you?

A: Yes I can, in general terms, I got a call from the White House basically and asked if I was interested. That didn't take me long to think. ... And then I talked with Deputy Secretary [Kathleen] Hicks and Defense Secretary [Lloyd J.] Austin. Things proceed from there.

Q: Anything else that you wanted to say to close?

A: There's one thing I would say to our Airmen and Guardians in particular, and to their families: Please get vaccinated. We're experiencing something that is life-threatening, dangerous for us, it's not good for the team. If you get vaccinated, you're gonna help protect your teammates and your loved ones. So, the Delta variant of COVID that's out there is spreading rapidly. I watch the data, and we're back in exponential growth again. Every morning I get a report about other air bases that have raised their levels of concern about COVID and [are] taking greater steps. If we want to get out of this and really get this behind us, people have to get vaccinated. And so the one thing I would say is to urge our Airmen, our Guardians, their families, and the people that they know, associate with, their loved ones, to get vaccinated. ★



Tech. Sgt. Tory Patterson

Kendall urges everyone in the Air Force family to get vaccinated, "for the team." Capt. Sarah Gilbert, (center, kneeling) discusses the COVID-19 vaccine with a basic trainee assigned at Wilford Hall Ambulatory Surgical Center, Joint Base San Antonio, Texas.

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In the weeks following the Sept. 11, 2001, attacks on the Pentagon and World Trade Center, Air Force combat controllers were among the first Special Forces teams on the ground in Afghanistan, providing the vital link between Northern Alliance forces on the ground and U.S. airpower in the sky. U.S. Air Force Master Sgt. Bart Decker and other Airmen helped the Northern Alliance defeat the Taliban government and put its Al Qaeda allies on the run, accomplishing more in a few months than tens of thousands of troops achieved over the following 20 years.



U.S. Air Force F-15E Strike Eagles from the 335th Expeditionary Fighter Squadron dropped 2,000-pound Joint Direct Attack Munitions on a cave in eastern Afghanistan in 2009. With total command of the skies, Air Force bombing was largely for close air support missions supporting Soldiers and Marines on the ground. From 2007 through 2019 alone, U.S. Air Forces Central Command launched 244,536 close air support sorties over Afghanistan, expending 56,577 weapons.

Six weeks after the United States pulled out of Bagram Air Base, it's home in Afghanistan for nearly 20 years, the Afghan government collapsed. Taliban fighters seized control of Kabul, causing panic in the streets and at Hamid Karzai International Airport in Kabul, where thousands fled in hopes of a ticket out of their country. This Air Force C-17 Globemaster III transported about 823 Afghan citizens (the total was a record for the C-17) from Hamid Karzai International Airport Aug. 15, 2021.



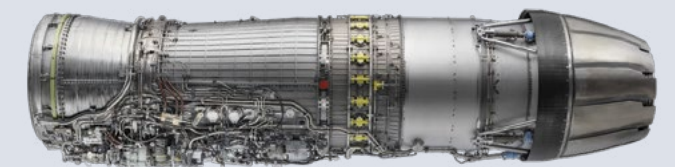


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An Afghan child, covered with a USAF Airman's jacket, sleeps on the floor of a C-17 as it leaves the chaos in Kabul, Afghanistan.

Afghanistan's Saigon Moment

The Air Force rose to the challenge as the Afghan government and military collapsed.

Air Force Magazine Staff

Gen. Mark A. Milley told reporters on July 21 that the U.S. withdrawal from Afghanistan was more than 95 percent complete, and while the Taliban was already making rapid advances throughout the country, "it remains to be seen over the rest of the summer" if the Taliban's momentum would continue.

Less than a month later, the Taliban entered the Afghan capital as U.S. and coalition aircrews rushed to evacuate U.S. citizens, allies, and fleeing Afghans from Kabul, recalling scenes of chaos strikingly reminiscent of the fall of Saigon in Vietnam nearly 50 years before.

By the time Afghan President Ashraf Ghani fled the country Aug. 15 the country was in chaos. Taliban troops took over Humvees and other U.S.-furnished equipment from surren-

dering government soldiers, seizing the presidential palace in Kabul as U.S. helicopters ferried personnel from the sprawling embassy complex in the middle of the city to Hamid Karzai International Airport.

The situation there was desperate. Afghan civilians breached the airport's blast walls and thronged the runway and climbing atop civilian airliners. One C-17, call sign RCH871, loaded up with 823 Afghan men, women, and children, flying them to safety late Aug. 15. Another was mobbed as it landed to deliver equipment to support the evacuation, prompting the aircrew to depart immediately. In desperation, Afghan civilians chased the plane, with some clinging to the landing gear. At least one person was killed, falling to the ground after liftoff; on landing at Al Udeid Air Base, Qatar, human remains were discovered lodged in the wheel well.

American Soldiers and Marines contained the crowds with concertina wire, warning shots, and vehicles. U.S., Turkish, and other troops cleared the airfield. But as Americans watched from home in disbelief, President Joe Biden made his case that there was never going to be a good time to depart Afghanistan and that he was resolute in his decision to pull out.

The events unfolded “more quickly than we anticipated,” he said, but pulling out was the right decision. “We will end America’s longest war after 20 long years of bloodshed,” Biden said. “The events we are seeing now are sadly proof that no amount of military force would ever deliver a stable, united, secure Afghanistan—as known in history, the graveyard of empires. What’s happening now could just as easily happen five years ago or 15 years in the future, let’s be honest. Our mission in Afghanistan has ... made many missteps over the past two decades.”

Among those ordered back to Afghanistan were the Air Force’s 621st Contingency Response Group at Joint Base McGuire-Dix-Lakehurst, N.J., and the 821st Contingency Response Group (CRG) from Travis Air Force Base, Calif., both of which had returned home from the country just weeks before. The CRGs are organized to deploy on short notice to set up airfield operations, and include air mobility liaison officers to coordinate with ground forces and others to coordinate air operations, provide security, and load and unload aircraft.

Col. Daniel Mollis, Task Force 74 commander and deputy commander of the 621st Contingency Response Group, comparing the drawdown in Afghanistan to the “Super Bowl,” saying in an early August interview that the totality of the unit’s job was “coming together in terms of our capabilities.”

Contingency response Airmen got orders to quickly deploy to Afghanistan as President Joe Biden announced the withdrawal plan in April. The group built its teams and orders

within 72 hours of the President’s announcement and was on the ground in Afghanistan in just 10 days—most of those in a restriction of movement due to COVID-19.

“It’s not hard to fill our requirements. This was something that everyone was ready to go do—and ready to drop everything, no notice, and go execute this mission,” he said.

EBB AND FLOW IN KABUL

C-17s, C-130s, and international airlifters flowed in and out of the airport on its single-runway airstrip. Meanwhile, the Air Force helped to provide a heavy security presence above the city including USAF F-16s, B-52s, AC-130s, and MQ-9s, along with F/A-18s and AV-8s.

The scale of the evacuation was epic: between 5,000 and 9,000 Americans in Afghanistan, perhaps 20,000 Afghans seeking special immigrant visas, plus spouses and children. Estimates suggested as many as 70,000 men, women, and children in all.

Just getting to the airport was a challenge. The Taliban established checkpoints outside the airport, checking passports and only allowing some to pass through. U.S. troops and State Department personnel manned two gates, processing about 400 to 500 people per hour. But while the Americans said they were coordinating and “deconflicting” with the Taliban, officials in the United States were freezing Afghanistan’s bank accounts to stop the Taliban from accessing those funds.

American veterans scrambled to provide support for the thousands of Afghans who had helped the U.S. mission as interpreters find their way out of the country rather than face Taliban retribution. They faced the choice of holding or hiding U.S. documents and visa applications.

“These are things that people have been clinging to for 20 years,” said Zach Asmus, a retired Airman and active volunteer



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PASSION FOR **TECHNOLOGY.**



Thousands of Afghans breached security walls and rushed the runway at Hamid Karzai International Airport Aug. 16, desperate to flee the Taliban. Swarming an Air Force C-17 before it could unload its cargo, some of them tried to cling to the aircraft as it took off again. At least one fell to his death.



Image from Al Jazeera video.

with Combined Arms, a veterans group. “They would never part with these things, because that’s [their] ticket out of the country. But right now if you’re caught with that on you, you’re identified as allied to the Americans, so it’s pretty much a death sentence.”

The Air Force aimed to move 5,000 people a day, but it was a struggle. As C-17s and C-130s moved in and out, the number of American forces on the ground swelled to 4,500 and the number departing hovered around 2,000. Ensuring the safety of the airport and those there was a prime concern. “There will be many postmortems on this topic, but right now is not that time,” Milley said Aug. 18. “Right now, there are troops at risk.”

READING THE TEA LEAVES

The collapse of Afghanistan may not have been anticipated or predicted with precision, but it was probably inevitable. The office of the Special Inspector General for Afghanistan Reconstruction’s (SIGARs) 11th and final “lessons learned report,” released Aug. 18, offered a scathing 140-page treatise that, compiled well before the Taliban takeover, appeared to predict the Afghan military’s capitulation.

The report cited telltale signs over the 10-year U.S. drawdown that the Afghan government could not sustain progress made nor provide for its own security and criticized the \$145 billion reconstruction effort for harboring unrealistic goals and timelines.

“If the goal was to rebuild and leave behind a country that can sustain itself and pose little threat to U.S. national security interests, the overall picture is bleak,” the report’s conclusion reads.

The reason, the report stated, was a failure of clear strategy. And once the drawdown began, it became clear “how dependent and vulnerable the Afghan government remains.”

It noted that the Taliban controlled more territory in 2020 and 2021 and that security had progressively worsened, despite \$83 billion spent to build the Afghan National Defense and Security Forces. The report concluded the absence of a clear strategy was to blame.

“At various points, the U.S. government hoped to eliminate al-Qaeda, decimate the Taliban movement that hosted it, deny all terrorist groups a safe haven in Afghanistan, build Afghan security forces so they could deny terrorists a safe haven in the future, and help the civilian government become legitimate and capable enough to win the trust of Afghans,” the report reads. “Each goal, once accomplished, was thought to move the U.S. government one step closer to being able to depart.”

Instead, after a decade of escalating operations, the U.S.

reversed course, gradually decreasing its footprint and spending, starting around 2011. That drawdown revealed “how dependent and vulnerable the Afghan government” really was.

“There [was] a fundamental gap of understanding on the front end, overstated objectives, an overreliance on the military, and a lack of understanding of the resources necessary,” said Douglas Lute, who coordinated Afghanistan strategy at the National Security Council from 2007 to 2013, according to the SIGAR report.

Yet Milley insisted Aug. 18 that none of the intelligence he and other military leaders had reviewed “indicated a collapse of this army and government in 11 days.” Military commanders and the president expected the Afghan military to put up more of a fight.

That probably should have been more clear. As early as 2014, the report said, “The drawdown laid bare just how hollow the alleged progress had been. Contested territory that had been cleared by U.S. forces was hastily ‘transitioned’ to Afghan officials who were not ready, allowing the Taliban to seize districts as U.S. forces vacated them.”

REFLECTIONS

That pattern will be reminiscent to many of similar problems in Vietnam, until now America’s longest war. Writing in response to a query from Air Force Magazine, former Air Force Chief of Staff Gen. John Jumper, who took that job days before 9/11 and retired in 2005, described that parallel poignantly: “For those of a certain age, the images of chaos in Afghanistan conjure up dark emotions of Vietnam in 1975—a tactical surprise born of strategic failure at the cost of American credibility.”

Over the past 20 years, he said, “men and women in uniform accomplished their assigned combat mission against al-Qaeda, but struggled to absorb the mission creep of nation building that followed.”

But Jumper sees both parallels and opportunities ahead. “The lessons of Vietnam prompted the transformation of our military services, and a wake-up call for the Air Force,” he said. “Since Vietnam we have embraced the values of stealth, standoff, and precision; become better partners in the Joint battlespace; and leveraged burgeoning digital power to enable near real-time command and control.”

Now, he continued, “the lessons of Afghanistan, the return of peer adversaries, the prospects of an operationalized Space Force and rapidly advancing cyber weapons, demand a new reckoning and thoughtful reflection about the expanding scope of threats that blur distinctions between the tactical, operational, and strategic levels of joint combat.”





Senior Airman Hannah Bean

The Air Force's new force generation model will rotate units through four phases of readiness over the course of two years, standardizing the approach across every major command. The new system, years in the making, aims to improve readiness and enhance predictability for Airmen and their families.

The Air Force's New Deployment Model

Predictable two-year cycles will enhance readiness and predictability, CSAF Gen. Brown asserts.

By Brian W. Everstine

The Air Force is overhauling its force generation and deployment model with the goal of standardizing a schedule that both Airmen and combatant commands can understand while also providing enough down time for rest and training.

Air Force Chief of Staff Gen. Charles Q. Brown Jr., in an exclusive interview with Air Force Magazine, outlined the new Air Force Force Generation (AFFOR-GEN) model, which he said will be “better aligned with how we present Airmen and air power to support the joint operations, while at the same time, it actually

“The Air Force can’t just ‘flip the switch’ and go ‘OK, ... so we’re starting today!’”

—Gen. Charles Brown Jr., USAF Chief of Staff

preserves some of that readiness, not only for today, but for the future.”

The model is broken down into four “bins,” each lasting six months. These include:

1. “Available to Commit.” This is when a unit is deployed, or ready to go at a moment’s notice for things such as short-notice task force or dynamic force employment deployments. “Commit is our traditional, you’re deployed, or you’re on the bubble, you’re ready to go,” Brown said.

2. “Reset.” After the six-month deployment or standing-by for operations, these Airmen will have six months to come home and take a breath. “Reconnect

to your family, but also look at your basic skill sets you need ... It's a chance for you to reset," Brown said.

3. "Prepare." After six months of rest and a focus on the basics, Airmen will then rotate into a six-month phase in which they prepare for a possible future deployment. "Now you start to up your level of training and expanding beyond just your unit and start to work with others," Brown said.

4. "Ready." After preparing, the next six-month phase will have Airmen in a "ready" phase in which the focus is on high-end, more intense, multi-unit training. This includes things like certification exercises with multiple wings, capstone exercises such as Red Flag, or the USAF Weapons School. The final bin is the time to ensure Airmen are at peak readiness and are ready to move back to the deployment, or "Commit" phase.

While the goal is to have AFFORGEN reach IOC in fiscal 2023, some units are already starting to move toward it. Brown said the Air Force can't just "flip the switch and go, 'OK, ... so we're starting today.'"

"The thing that this is going to help us out with is, our United States Air Force is very popular," Brown said. "And so we get ... pulled into a lot of things, but I want to be able to use this to have a little bit of discipline about how we do things, how we communicate to the joint force, so we can preserve readiness."

Under previous force generation models, such as the Air Expeditionary Force, the Air Force was often stretched thin, with high demand, low dwell time, and low corresponding

readiness.

"We would actually rip ourselves apart to satisfy all the requirements," Brown said. "And what we found is each of the [major commands], depending if you are fighter vs. bomber vs. ISR vs. mobility—we're all doing things just a little bit differently."

The Air Force needs to standardize its force generation model across the major commands, Brown said.

"Part of our discussion with the Majcom commanders ... was, 'We've got to have a standard model that we all use, that we can talk about, and be on the same page, particularly as we talk to the Joint Staff,'" Brown noted.

As the Air Force moves toward Agile Combat Employment and begins operating from different locations without the same established presence that Airmen are used to, the deployment model of a fighter unit needs to align with that of combat support units to better enable those operations, according to Brown.

"Think about it: For the past 30 years, we've been going to the same bases, and things are already established," he said. "Well, we've got to look at these things differently now. This is why Agile Combat Employment comes into this factor as well, because you're going to go someplace that may not already have everything set up. It's going to be fairly austere. You've got to have that capability to be able to do this and to align the aviation package with the agile combat support." ★

Maintainer Error Made F-22 Crash

By Brian W. Everstine

A maintenance error, committed after an F-22 was washed, affected its control inputs and caused the Raptor to crash May 15, 2020, at Eglin Air Force Base, Fla. The pilot safely ejected, but the aircraft was totaled, with an estimated loss of \$201 million, according to Air Combat Command.

ACC released limited information on the crash despite the significant loss to the Air Force's fifth-generation fighter fleet, because unlike most major mishaps, the command did not conduct a publicly releasable investigation.

In a statement, ACC said that "due to operational concerns," it directed a Safety Investigation Board and a Commander Directed Investigation into the crash and did not complete an Accident Investigation Board report. The AIBs typically detail the circumstances concerning a crash, as well as the AIB president's determination of the cause.

The other two types of investigations are not released, so the limited information in a press release is the extent to which ACC is telling the public about what happened to the F-22. The Northwest Florida Daily News was the first to report on the cause of the crash.

Air Force Instruction 51-307 governs the Air Force's aerospace and ground accident investigations. It requires the publicly releasable AIB for on-duty Class A mishaps—defined as incidents that cause a loss of life or more than \$2.5 million in damage. But there's an exception.

"This requirement may be waived by competent authority," an ACC spokesperson said in a statement to Air Force Magazine. "In the case of the May 15 incident, the convening authority, ACC's deputy commander, was the waiver authority for this provision. With the concurrence of Air Force Judge Advocate, who was the AFI approval authority, ACC's



Senior Airman Sergio Gamboa

An F-22 Raptor crashed in May 2020 because of a maintenance error. The Air Force did not conduct a publicly releasable investigation. Only limited information is available on the mishap.

deputy commander waived the requirement for an AIB."

ACC said the Safety Investigation Board and the Commander Directed Investigation were "conducted to determine the cause of the accident and to prevent future mishaps."

The full description of the crash is: "Upon takeoff, the pilot noticed a Flight Control System advisory and elected to continue with takeoff. Shortly after the aircraft became airborne, the pilot began having trouble controlling the aircraft and declared an emergency. While a recovery plan was being coordinated, the pilot continued to have issues with the aircraft and ejected."

The pilot, who was assigned to the 43rd Fighter Squadron, 325th Fighter Wing, sustained minor injuries in the ejection. The incident was one of two involving fifth-generation fighters at the base. Less than a week later, on May 19, 2020, an F-35 crashed at Eglin. An AIB into that mishap found that excessive landing speed, exacerbated by issues with the pilot's helmet-mounted display, caused the crash. ★



Hypersonic Missiles Suffer Another Failed Test

By John A. Tirpak

Getting the Air-launched Rapid Response Weapon (ARRW) hypersonic missile into production before the end of fiscal 2022 depends on quick resolution of the most recent failure of the missile to make its first flight, the Air Force's program executive officer for weapons said.

A failure review began immediately after the July 28 attempted test off the coast of California in which the rocket motor did not fire after separation from a B-52 test aircraft, said USAF weapons Program Executive Officer Brig. Gen. Heath A. Collins in early August.

Collins could not yet say why the missile failed, but the review will determine if the failure will affect the desired "early 2020s" initial operating capability. With a "quick and rapid resolution," the transition to production can still likely happen by this time next year, but that requires at least two all-up successful tests of the weapon, he said. If the investigation is "prolonged, ... or drives anything excessive from a redesign perspective, which we don't know at this point, ... it may impact our ability to meet the next test window," Collins said.

For now, "we are still postured ... to transition to award and production by the end of fiscal year 2022." Lockheed Martin is the contractor for ARRW, and the company recently submitted its production proposals for the missile. The Air Force asked for \$161 million in its fiscal 2022 budget submission to build 12 ARRW missiles.

Collins said Lockheed Martin's \$225 million loss on a classified program, reported in its second-quarter results, was not related to ARRW. Meanwhile Kenneth Possenriede, Lockheed Martin's chief financial officer, unexpectedly resigned his post in August without giving a reason. Stock analysts speculated that it had to do with the write-down.

ARRW has experienced several test failures already. Collins said the cause of an April failure is understood, that a fix was made, and the problem did not occur again in the July test. "The corrective action was sufficient and working," Collins said. An Air Force press release noted that although the missile's motor didn't fire, the test demonstrated a successful release from the launch aircraft. It unfolded its fins and established navigational links. The test missile was not recovered.

Asked how many tries Lockheed Martin gets before the program is reconsidered, Collins said ARRW is the only boost-glide hypersonic missile the Air Force has on contract and the program is constantly being "evaluated" for success.

"We also knew at the beginning this was a rapid-prototyping, ... risky program," Collins said. If not for congressional authorities



Giancarlo Casem/USAF

Master Sgt. John Malloy and Staff Sgt. Jacob Puente secure an ARRW under a B-52H's wing during August tests at Edwards Air Force Base, Calif.

to use streamlined program management and skip traditional methods, "we would not be where we are today." The "mid-tier acquisition" approach was the right one for ARRW because it is appropriate for rapid prototyping and "new technology," he added. The Air Force will work through the root-cause investigation and get back to flight-testing as soon as possible.

If ARRW proves unworkable, Collins said, "We certainly could go back to HCSW," the Hypersonic Conventional Strike Weapon the Air Force curtailed in February 2020. The HCSW had been through its critical design review at the time the Air Force stopped the project, which had some common elements with Army and Navy hypersonic programs.

But, "You'd have to trade that with the amount of cost and schedule" it would take to get HCSW back up and producing hardware, he said.

Collins, who is also director of the Air Force Life Cycle Management Center's Armaments Directorate, said the directorate is "tracking" language from House appropriators that would cut \$44 million from the program line that funds ARRW and the unrelated Hypersonic Attack Cruise Missile—an air-breathing, as opposed to a boost-glide system—and said that if the change becomes law, "that would impact" a contract award because lowering the quantity purchased would raise cost per unit. The language raised concerns that the Air Force would enter production before the missile's bugs have all been worked out. The directorate is working to increase transparency in the hypersonic programs, he said, and will split up ARRW and HACM funding lines in the future. ★



Kelly: Downed Airmen Will Have Few Rescue Options in the Pacific

By John A. Tirpak

The combat search-and-rescue (CSAR) mission will be extremely challenging in a fight against a peer adversary, and the focus may have to shift to downed Airmen finding their own way to safety, Air Combat Command boss Gen. Mark D. Kelly said Aug. 3.

The future of CSAR is “a tough, tough equation,” Kelly said. The mission may have to change given the long distances and enormous expanses of water in the Indo-Pacific theater and the “speed, the vulnerability, and the range of our current rescue platforms.”

Air Combat Command is “looking at it from the lens of ... how much can the isolated personnel get themselves out or get themselves to a place where they can be recovered, as much as how the recovery force is going to get to them.”

He noted that if a pilot needed a stealthy F-35 to get to a well-protected location, “it’s going to be tough to get in that same chunk of airspace with the [rescue] equipment we have.” The challenge is to come up with “avenues and means for the isolated personnel to help themselves, if at all possible, to get to a more opportune location” for recovery.

Many rescue operations have been spearheaded by an A-10 flying top cover for the recovery and managing the movement of CSAR assets into and out of the rescue area. The A-10 was “great” at this in Afghanistan and Iraq, and Kelly said many lives were saved because an A-10 “took charge overhead.”

But he also said the Air Force’s planned inventory of A-10s is “more than enough” to meet its close air support and other needs and that the seven squadrons the service will retain into the early 2030s is not the way to build the Air Force of the future. Lacking stealth, the A-10 can’t get into those areas where a fifth-generation jet such as the F-35 can go.

“The fact of the matter is, as we sit here today, I have exactly zero A-10s in the Middle East, for a couple of reasons. One, the distance is too far to go from our Middle East basing to places like Afghanistan, over the horizon. Two, the threat in and around Syria—the Russians’ air defense systems—[is] too great to operate in, so we essentially had to bring them home.”

Given the considerations of distance and threat, and applying them “to places like the Asia-Pacific, the distances just become greater and the threat becomes infinitely greater,” Kelly said, indicating the A-10’s ability to help with CSAR in that region will continue to diminish. While he respects the “phenomenal performance” of the A-10, there’s an “ever-decreasing of the niche areas where it can operate, day in and day out.”

The Air Force will put new wings and avionics on 218 A-10s, which Kelly noted is 34 more than the F-22s in inventory, but of them, he emphasized, “I have zero engaged.”

For Korea, where one A-10 squadron is available to defend



Airman 1st Class Taryn Butler

Gen. Mark Kelly, Air Combat Commander, sees a mission change for combat-search-and-rescue Airmen as America's focus shifts to vast expanses, such as the Asia-Pacific region. Here, a pararescueman fast-ropes from an HH-60G Pave Hawk during training in Eufaula, Ala., in 2019.

the demilitarized zone, seven squadrons is not only “more than enough,” it’s “more than the South Korean Peninsula can hold,” in terms of locations to base the jets.

Kelly said China is “our pacing threat. If we’re going to keep pace with what they’re doing, ... you’re not going to do it by refurbishing a fleet of 40-year-old, single-mission, 210-knot airplanes. You’re just not, regardless of how much they’re loved and the great performance they’ve done.”

Chief of Staff Gen. Charles Q. Brown Jr. told an audience at the National Press Club in early August that China could overcome U.S. air superiority by 2035, noting how change has largely stalled in the U.S. Air Force, while China has spent the last several decades modernizing its force.

Brown said when he was commissioned in 1984, the United States was developing a new fighter jet every two and a half years. But only four fighters have been developed since.

The Air Force is the oldest and smallest it’s ever been, yet Brown acknowledged it might have to get even smaller to afford the new technologies that will enable it to compete against peer adversaries like China.

“I’d rather have a smaller capable force than a larger, hollow force,” he said. “The United States Air Force has some tough decisions as we go forward to make sure we have the capabilities that will be competitive against the threat.” ✪

Senior Editor Abraham Mahshie contributed to this report.



Senate Confirms 12 Generals For New Roles

The Senate on July 29 confirmed new bosses for Air Force Global Strike Command and Air Mobility Command along with five other general officer roles in the Air and Space Forces.

Lt. Gen. Anthony J. Cotton will receive his fourth star and replace Gen. Timothy M. Ray as the head of Air Force Global Strike Command. The official swearing-in ceremony is slated for late August. Cotton, a missileer by training, previously served as Ray's deputy. He's commanded the 20th Air Force, the 45th Space Wing, and the 341st Missile Wing. He also served as commander and president of Air University from 2018 to 2019. Ray, who has led the command since August 2018, was ceremoniously retired in July after 36 years in uniform.

Lt. Gen. Mike Minihan also will receive his fourth star to lead Air Mobility Command. He replaces Gen. Jacqueline D. Van Ovost, who has been nominated to lead U.S. Transportation Command. Minihan is a command pilot with more than 3,400 flying hours in the C-130, KC-10, and C-32.

Other confirmations include:

■ Lt. Gen. Kevin B. Schneider to serve as the Air Force's director of staff.

■ Maj. Gen. Tom D. Miller to receive his third star and to lead the Air Force Sustainment Center in Air Force Materiel Command.

■ Maj. Gen. James A. Jacobson to receive his third star and to serve as the deputy commander of Pacific Air Forces.

■ Maj. Gen. Mark E. Weatherington to receive his third star and to replace Cotton as deputy commander of Air Force Global Strike Command.

■ Space Force Maj. Gen. Michael A. Guetlein will receive his third star and become the first commander of Space Systems Command when it stands up.

The Senate on Aug. 11 confirmed a new leader for U.S. Southern Command and a new undersecretary of defense for personnel and readiness. The pace of confirmations ticked up with the approach of Congress' August recess.

■ The Senate confirmed Army Lt. Gen. Laura Richardson, commander of United States Army North, to receive her fourth star and to lead SOUTHCOM. President Joe Biden nominated Richardson for the job in March while also nominating USAF Gen. Jacqueline D. Van Ovost, current Air Mobility Command boss, to lead U.S. Transportation Command. That nomination is still pending without a confirmation hearing date set.

The Senate also made additional confirmations, including:

■ Mara E. Karlin to serve as assistant secretary of defense for strategy, plans, and capabilities.

■ USAF Maj. Gen. Ricky N. Rupp to receive his third star and to command U.S. Forces Japan and Fifth Air Force.

■ USAF Maj. Gen. Russell L. Mack to receive his third star and to serve as deputy commander of Air Combat Command.

■ Carlos Del Toro to be the next Secretary of the Navy. ★



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USAF: There is No MQ-Next, Yet

By Brian W. Everstine

The Air Force is starting to field some enhanced capabilities for the MQ-9 Reaper fleet that will better prepare it to operate in more denied environments while also moving away from the idea of an “MQ-Next” direct follow-on for the remotely piloted aircraft (RPA).

While the Air Force Life Cycle Management Center has released two requests for information (RFI) looking at future RPA capabilities, those requests were just “market research,” not the beginning of an MQ-9 replacement, said Col. William S. Rogers, the program executive officer for intelligence, surveillance, reconnaissance, and special operations forces, on Aug. 3. One RFI looked at what type of multirole RPA members of private industry could produce, and the other looked at airborne sensing and high-value asset protection.

“We’re really providing information at this point, up to Air Force futures and the Air Staff, [to help] them try to decide how that future medium-altitude UAS capability could fit into the overall force design for the Air Force,” Rogers said. “So, at this point, short answer is there’s no direct replacement termed MQ-Next.”

In the meantime, the Air Force Life Cycle Management Center (AFLCMC) has laid out its timeline for an overall suite of updates for the MQ-9, called the “MQ-9 multi-domain operations,” or M2DO configuration, which includes improved communications, increased power, autonomous takeoff and landing, and eventually increased use of artificial intelligence to make the Reaper more relevant in a high-end fight.

“The M2DO configuration is really envisioned to mature the MQ-9 and really keep its relevancy through the planned divestiture of the MQ-9 later in the 2030, 2035 time frame,” said Col. Mike Jiru, the senior materiel leader for the Medium Altitude UAS Division at AFLCMC. “As we’re experiencing right now, the MQ-9 conducts both a counter [violent extremist organization] mission and then looks at missions in what we’ll call the ‘gray zone.’”

This includes operations conducted by the recently stood up 25th Attack Group now operating out of Romania. These missions, in more contested environments with Russia nearby, are “obviously very different than the original design criteria of the MQ-9, which was air dominance wherever it flew. So, given that, there’s recognition that we have to do something to ensure that the MQ-9 remains relevant. It’s never going to be a penetrating ISR asset that’s going to go into China or anything like that,” Jiru said.

First, M2DO is focused on improving the MQ-9’s ability to communicate, like bringing on the Link 16 data link and improving its command and control “resiliency” through the use of different waveforms and an improved modem, both within the aircraft and with the ground systems. Additionally, AFLCMC is looking to bring on open mission systems, including the Stellar Relay computer system, as the first internet protocol “backbone” for the aircraft, with interfaces at each pylon “enabling a really



The MQ-9 Reaper is an armed, multi-mission, long-endurance, remotely piloted aircraft. It is now set to receive a suite of upgrades to allow the platform to offer a host of new capabilities for combatant commanders and warfighters.

plug-on-and-play sort of aspect,” Jiru said.

The Air Force is also looking to double the amount of power the MQ-9 can distribute. Future upgrades will include “an enhanced suite of mission capabilities” with the ability for high-power computing, opening “up the ability of the MQ-9 to be a host for significantly advanced artificial intelligence algorithms and autonomy algorithms,” he said.

AFLCMC is working with the Joint Artificial Intelligence Center to support its development of a “smart sensor,” with demonstration expected in exercises over the next year that will serve as “both a cornerstone for the department’s development of a suite of autonomy algorithms, but then also looking at how does an MQ-9 as a surrogate vehicle help inform the future development of AI and the integration of that AI into the overall fight,” Jiru said.

The Air Force is already bringing on anti-jamming GPS capability, with retrofits underway.

“So that suite of M2DO configurations really is what the Air Force is depending upon to ensure that the MQ-9 remains relevant in its expanding role through the 2030-35 time frame,” Jiru said.

The Air Force is planning on installing the M2DO configuration on 71 aircraft, but that is a “dial” that will be adjusted depending on budget constraints, he said.

Below is a schedule for upcoming MQ-9 enhancements:

■ Anti-jam GPS: Fielding underway.

■ Enhanced power: Fielding to begin in the first quarter of fiscal 2023.

■ Command and control elements: 2023.

■ Link 16: The first quarter of 2024.

■ Stellar Relay: The third quarter of 2024.

■ Automatic takeoff and landing for the MQ-9 fleet is also in a continuous development effort over the next several years, Jiru said.



AFRL Seeks Microwave Weapon to Counter Drones

By John A. Tirpak

The Air Force Research Laboratory is looking for contractors to develop a fieldable, high-powered microwave system that can protect air bases by disabling or destroying hostile drones, according to a solicitation published July 28. The program will launch this fall, and AFRL wants a prototype system in 2023.

The program is called “Mjölnir,” the name of the hammer wielded by the Norse god Thor. It will build on the success of an existing experimental version, the Tactical High-power Operational Responder (THOR), and AFRL wanted a related name for the next version, according to an AFRL press release.

The THOR demonstrator “uses bursts of intense radio waves to disable small unmanned aircraft systems [sUAS] instantly,” according to AFRL. An AFRL video posted on YouTube shows the THOR sweeping microwaves against a UAS swarms, causing them to explode or fall out of the sky instantly, but at relatively close ranges to their intended targets.

After a two-year experimental campaign, the AFRL team “has learned a lot about the benefits of the technology and how it can be improved,” said Amber Anderson, THOR program manager. The Mjölnir will be the follow-on system using the same technology, with improved capability, reliability, and “manufacturing readiness,” AFRL said.

The goal is a deployable system that can be “economically

produced in large numbers,” THOR deputy program manager Adrian Lucero said, and to “grow a fledgling industry that will become critically important as the U.S. strives to maintain our electromagnetic spectrum superiority,” he said.

The announcement comes a week after AFRL published a paper on potential future directed-energy systems called “Directed Energy Futures 2060.” The paper said the Air Force is looking for systems that can destroy swaths of UASs at once, rather than individually pointing directed-energy systems at them and destroying them one at a time.

AFRL is partnered with the Joint Counter-UAS Office and the Army’s Rapid Capability and Critical Technologies Office on the project, which is being managed out of Kirtland Air Force Base, N.M., by AFRL’s Directed Energy Directorate, High Power Electromagnetics Division.

The solicitation specifies that AFRL wants “a single, near-production representative, cost-effective counter-unmanned aerial system (cUAS) that is suited to operational environments and performs at levels equal to or greater than” the THOR prototype. The program will capitalize on the earlier work and “enable future transition to a program of record.” A cost-plus, fixed-fee award is anticipated. AFRL estimates it will spend \$14 million on the program in fiscal 2022 and \$6 million in 2023, for a total of \$20 million. Although one award is anticipated, more may be made.

Responses to the solicitation are due Sept. 13.



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KC-46 refuels A-10 during Milestone C test.

KC-46 Cleared For More Refueling Missions

By Brian W. Everstine

Air Mobility Command on Aug. 6 announced it is freeing up the KC-46 for more operations, allowing the tanker to refuel C-17s, B-52s, and other KC-46s in some circumstances.

It is the second “interim capability release” for the troubled tanker, which AMC cleared last month to refuel aircraft with its centerline drogue. In February, AMC said allowing KC-46s to pick up some of the tanker load in non-combat taskings can free up legacy KC-135s and KC-10s.

AMC boss Gen. Jacqueline D. Van Ovost, in announcing the plan in February, said, “under this new approach, if AMC is tasked to provide [aerial refueling] support for an operational coronet mission to move F-18s overseas or an operational B-52 mission, the KC-46 is on the table, which frees up KC-135s and KC-10s to execute other combatant command deployments that the KC-46A is presently unable to support.”

As of July, KC-46s have flown more than 5,000 sorties, with 2,700 of those this year. The command reviewed the tanker’s operational criteria in recent months and determined it was ready for more taskings from U.S. Transportation Command, said Brig. Gen. Ryan R. Samuelson, AMC’s deputy director of strategy, plans, requirements, and programs and the KC-46 cross-functional team lead, in a release.

“Though a fully-mission capable aircraft is a few years away, releasing capability our KC-46 bases have demonstrated they can safely and effectively support and employ is a large part of how AMC is accelerating the KC-46 on the path to becoming fully operational and combat-ready,” Samuelson said.

There’s no timeline for the next announcement, according to AMC. The capability releases come as the command and other leaders determine the tanker can conduct more operations, based on the abilities of the crews and data from recent operations.

Since October 2020, KC-46s have conducted more than 4,700 refueling contacts with C-17s, B-52s, and other KC-46s, according to AMC.

The command, in announcing the ICR plan, said it aimed to pick up the refueling load in taskings for training, exercises, and some “coronet” deployments—carrying fighters or other aircraft on their deployments outside of the U.S. The KC-46s will not deploy for combat operations until fully operational.

There are still several Category 1 deficiencies on the tanker, defined as those that may impact the safety of flight. The most

notable ones are with the tanker’s troubled Remote Vision System, which is being overhauled with a 2.0 version expected to become operational in 2023, and with the tanker’s “stiff” refueling boom, which is blocking it from refueling A-10s.

The Air Force in June announced two more Category 1 deficiencies, which are being fixed at Boeing’s expense. These center on instability with the aircraft’s Flight Management System software and its receptacle drain tubes. Boeing has a design fix in place and is “working through the process to get that finalized and then get it through the system,” said Paul Waugh, the Air Force Life Cycle Management Center’s executive officer for mobility and training aircraft, during an Aug. 3 virtual event. “I think those two latest fixes ... are well on track to be in resolve.”

Superintendents Get Retitled as Senior Enlisted Leaders

By Greg Hadley

The Air Force is changing how it refers to the top enlisted Airmen in detachments, squadrons, and groups.

Starting Oct. 1, superintendents will instead be referred to as senior enlisted leaders, or SELs, according to a memo from Air Force Chief of Staff Gen. Charles Q. Brown Jr. and Chief Master Sergeant of the Air Force Joanne S. Bass.

The memo, dated Aug. 4, which was posted to the unofficial Air Force amn/ncs/snco Facebook page and confirmed by Air Force Magazine, states that the change “better synchronizes us with joint force doctrine, practices, and culture.” The Navy and Army both use the title.

“Today’s modern threats call for a new level of teaming and partnerships to defend the security of our nation,” the memo added. “To support this mission imperative, it is important that our duty titles reflect the key leadership roles many of our senior noncommissioned officers serve in.”



Senior Airman Cameron Otte

Chief Master Sgt. Stephen Scofield, 60th Maintenance Squadron superintendent, inside the control tower during Leadership Rounds at Travis Air Force Base, Calif., in 2020.

Superintendent as a title has usually been given in the Air Force to a chief master sergeant or a senior master sergeant who serves as the top enlisted leader in a division or unit. There are more than 770 group superintendents in the service.

There will be no change in pay as a result of the title change, and no enlisted evaluations closed out prior to Oct. 1 will need to be modified, the memo added.

“We intentionally chose to avoid waiting to make this decision,” Brown and Bass wrote in the memo. “As a service, we will keep accelerating positive change, when and where it’s needed, to align us toward our Air Force goals and priorities.”





Christian Turner/USAF

The Variable Stability In-flight Simulator Test Aircraft (VISTA) flew from Hill Air Force Base, Utah, to Edwards Air Force Base, Calif., in 2019. The aircraft will be used for testing AFRL's Skyborg program.

Here's USAF's Newest X-Plane

By Brian W. Everstine

There's a new X-plane in the Air Force's fleet.

The Air Force Test Pilot School in June redesignated the NF-16D Variable In-flight Simulator Aircraft as the X-62A, allowing the aircraft to be used for testing the Air Force Research Laboratory's Skyborg program.

The aircraft, originally a Block 30 F-16, has been heavily modified and upgraded since its first flight in 1992 to give pilots a way to simulate different flying conditions as well as the characteristics of other aircraft, according to a USAF release.

"For more than two decades VISTA has been a vital asset for the USAF TPS [Test Pilot School] and the embodiment of our goal to be part of the cutting edge of flight-test and aerospace technology," said William Gray, VISTA and TPS chief test pilot, in the release. "It has given almost a thou-

sand students and staff members the opportunity to practice testing aircraft with dangerously poor flying qualities, and to execute risk-reduction flight-test programs for advanced technologies."

The Air Force is now replacing the aircraft's VISTA Simulation System with the System for Autonomous Control of Simulation, the release states.

"The redesignation reflects the research done on the aircraft over the past almost 30 years, as well as acknowledges the major upgrade program that is ongoing to support future USAF autonomy testing," said Chris Cotting, USAF TPS director of research.

AFRL's Skyborg is a suite of hardware and software aimed at developing the Air Force's use of teaming manned and unmanned aircraft, also known as a "loyal wingman." The system made its first flight on a Kratos UTAP-22 Mako air vehicle in April. In December 2020, the Air Force awarded Kratos, Boeing, and General Atomics contracts to continue with the effort.

Skyborg is one of four Air Force "Vanguard" programs—top research projects that USAF believes will be unique and useful. Others include the Golden Horde weapons swarm, Navigation Technology Satellite-3, and the "rocket cargo" space mobility effort.

The famed "X" designation is for aircraft that are designed for "testing configurations of a radical nature," Edwards said in the release. The X-62 is now part of an exclusive club that has helped shape cutting-edge aeronautical research for decades, including the Bell X-1, which was the first airplane to break the sound barrier, and the hypersonic X-15. Other more recent examples include the X-37 space plane, the hypersonic X-51 Waverider, and the second-most-recent X-61 Gremlins. ★

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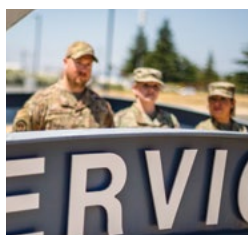
Air Force Academy athletics

2nd Lt. Mahala Norris, now a USSF officer, continues to rack up awards for her performance with the Air Force Academy as a distance runner. Norris is the first Falcon woman to win an NCAA national title in a running event. She went on to compete at the U.S. Olympic Trials, and in July, she was named the Mountain West Female Athlete of the Year for the 2020-21 season, becoming just the second Academy athlete in any sport to win that honor.



Wright-Patterson Air Force Base

Jacqueline Fisher, a civilian employee at Wright-Patterson Air Force Base, Ohio, was honored with the National Public Service Award for outstanding contributions to her community. Fisher's positions at the base included BRAC office director for the 88th Air Base Wing, deputy of the Agile Combat Support directorate, and deputy of the Sensors Program Office. She volunteered with a food pantry and as a Court-Appointed Special Advocate and guardian ad litem for kids.



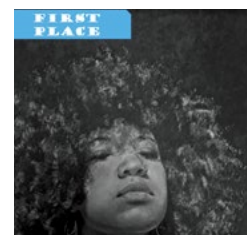
Nicholas Plich/USAF

Tech. Sgt. Adam McDonough, Tech. Sgt. Kelly Manibusan, and Tech. Sgt. Paola Fay, members of three different squadrons at Travis Air Force Base, Calif., separately stopped at the sight of a car crash on June 16, jumping into action to help both drivers involved. They used a fire extinguisher to put out a blaze and rendered medical aid until paramedics arrived. Though all from different squadrons, "training kicked in for all three of us—every piece mattered, no matter how small," Manibusan said.



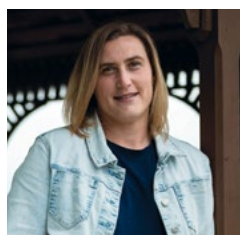
USAF

Master Sgt. Jose R. Pagan Jr. was selected as the Air Force's First Sergeant of the Year for 2021. In January 2020, Pagan was deployed in Iraq when he urged top commanders to evacuate after hearing reports of a potential ballistic missile attack, according to the Buffalo News. They did, shortly before missiles fell, potentially saving the lives of 255 Airmen. He also founded the First Sergeant Council at Al Asad AB, Iraq, mentoring acting first sergeants from eight squadrons.



USAF graphic

Air Transportation Superintendent **Tony Rodriguez**, Homestead Air Reserve Base, Fla., took home the top prize in the Adult Novice category at the annual Air Force Art Contest for his work labeled "Nai." **Erin Shaffner**, MacDill Air Force Base, Fla., and **Lauren Sutton**, Eglin Air Force Base, Fla., were second and third place in that category. Elsewhere in the contest, **Lt. Col. Francis Becker's** three children (Hill AFB, Utah), each picked up awards in the youth categories.



Staff Sgt. Tristan Truesdell

Lori Waddell, spouse of Master Sgt. Mitch Waddell, Malmstrom Air Force Base, Mont., was named 2020 Air Force Spouse of the Year. In a year upended by the COVID-19 pandemic, Waddell helped families arriving at Malmstrom by explaining the area and resources available, organizing to provide produce to families on base, helping organizations oversee emergency response for communities, and also writing articles detailing the benefits available to military spouses.



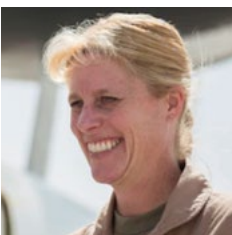
Air Force Academy Baseball/Twitter

1st Lt. Griffin Jax, Air Force Reserve, became the first-ever Air Force Academy graduate to play Major League Baseball when he was promoted by the Minnesota Twins in June. Jax, a pitcher, was drafted in 2016 and has fulfilled his Air Force duties while rising through the minor leagues. During his stint in the majors, Jax made more history by becoming the first Air Force Academy alum to pick up a win and start a game, making his first start during the July 4 weekend.



Michael Peterson/USSF

Maj. Gen. DeAnna M. Burt, head of Combined Force Space Component Command, was sworn into the Space Force on June 1, but what really got social media's attention was the scene behind her—members of the 501st Legion, a film-quality "Star Wars" costume club, volunteering as part of International Space Day festivities. Burt's swearing-in ceremony was added to the celebration but Darth Vader, Boba Fett, and stormtroopers weren't actually involved in the ceremony.



Staff Sgt. Zade Vadnais

Col. Kristen Thompson made history June 22, becoming the first woman to take command of the 55th Wing at Offutt Air Force Base, Neb. The Wing is the largest in Air Combat Command and the second largest in the entire Air Force, and Thompson is the 65th commanding officer in its 80-year history. Thompson replaces Col. Gavin Marks, the wing's first-ever African American commander—Marks and Thompson have known each other for years and both flew the E-3 AWACS aircraft



Kelly Moise

Kieran Moise, an Alabama teenager headed to the Air Force Academy, shaved his 19-inch afro over Memorial Day weekend in the first haircut he said he'd had in roughly six years. But in doing so, Moise raised more than \$30,000 for St. Jude Children's Research Hospital and donated his locks to Children With Hair Loss, which provides human hair replacements to children and teenagers facing medically related hair loss. Moise's actions were in honor of a middle school friend who died from cancer, he said.

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

New PT Gear, Updated Uniforms

By Greg Hadley

Dozens of changes are coming to the Air Force's dress and appearance standards as the service prepares to implement initiatives recommended by the 2020 Air Force Uniform Board.

The changes will become official when Air Force Instruction 36-2903 is republished in early October 2021, but on Aug. 10, USAF released images of some of the new uniforms that will be rolled out over the coming 15 months and previewed some of the appearance changes.

On the appearance front, hosiery will now be optional for women in all variations of the dress uniform and hair accessories, previously limited to 1 inch, can be up to 2. The Air Force recently made several changes to its regulations on women's hair grooming.

Men will now be allowed to grow their hair to a bulk of 2.5 inches from the scalp, up from the previous 2 inches and double what was allowed up until September 2020. Men will also be allowed cosmetic tattoos on their scalp, but no change was announced to the service's beard policy, which has been a point of contention for some Airmen who wish to grow out facial hair.

However, wing commanders now will be allowed to authorize the wearing of approved morale patches on Fridays and special occasions.

"We remain committed to maintaining an iterative approach with our dress and appearance standards," Lt. Gen. Brian T. Kelly, deputy chief of staff for manpower, personnel, and services, said in a statement. "During this most recent review we approved several updates fully aligned with our

"We remain committed to maintaining an iterative approach with our dress and appearance standards."

—Lt. Gen. Brian Kelly, Air Force deputy chief of staff for manpower, personnel, and services

Air Force standards and culture that maintain our focus on warfighting while providing options to meet many of the needs of our Airmen."

The biggest uniform changes are coming to the Air Force's PT gear. On March 2, the Air Force Life Cycle Management Center revealed the updated design for the athletic wear, the first PT uniform update in nearly two decades. On Aug. 10, the service announced that the new gear is expected to be available in October 2022, with a four-year transition period following.

Tweaks to the service uniforms were also announced. Shirts and blouses will be made with a material that is stain- and wrinkle-resistant and also moisture wicking.

For men, the shirt body will be lengthened and tapered and have a redesigned armhole and shoulder.

Men's trousers will have redesigned pockets, and women's trousers will have a lower waistband and be straight cut, as opposed to a tapered fit. The front darts will also be removed to create a flat front shirt, the tuck-in style blouse and the new maternity blouse are all expected to be available in October 2021. The updated semi-formfitting blouse will follow in January 2022, followed by the updated trousers and slacks in May 2022.

In August 2022, women will be able to buy dress mess slacks, two years after the Air Force announced it would no longer require floor-length skirts. Since then, women who have wanted to wear pants have had to buy men's mess dress trousers and have

them altered.

The Space Force will continue to follow Air Force guidance until the service develops its own grooming and uniform policies, expected to be released in late 2021. ★

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By John A. Tirpak

The Next 10 Countries Combined ...

The Senate Armed Services Committee in July added \$25 billion to the Biden administration's \$715 billion defense budget request. Opponents of bigger military budgets quickly responded, their criticism predictably peppered with variations of the bromide, "The U.S. already spends more on defense than the next 10 countries combined."

The lament suggests that it's self-evident that the U.S. overspends on its military; why spend so much more than adversaries and partners? This view hasn't been voiced just by think-tanks and commentators, but also President Barack Obama in his 2016 State of the Union address, and by presidential candidate Sen. Bernie Sanders in 2018.

But is the assertion true? And, even if so, is it relevant, given the unique defense needs and responsibilities of the U.S.?

The go-to source for impartial international military spending data—used by think-tanks, fact-checkers, the media, and even the Pentagon—is the Sweden-based Stockholm International Peace Research Institute (SIPRI), which annually tabulates the self-reported military budgets of most of the nations of the world. Its 2020 figures—the latest available—do indeed peg the U.S. total of \$778 billion (SIPRI includes Department of Energy nuclear weapons spending) as outweighing the military budgets of the next 11 countries combined, which amounts to \$760 billion.

In 2019, SIPRI's estimate of China's military spending was \$240 billion; roughly 40 percent higher than the self-reported level of \$183.5 billion, and close to the London-based International Institute for Strategic Studies' estimate of \$234 billion.

China's 2021 self-reported defense budget, announced in March, comes out to \$209.2 billion, a 6.8 percent increase over fiscal 2020. Its previous budget marked a 6.6 percent increase, continuing more than 20 years of steady growth.

While SIPRI accepts most self-reported figures, its numbers for China and Saudi Arabia are SIPRI's own estimates. Saudi Arabia doesn't reveal its numbers, and China's numbers, SIPRI admits, are less than transparent. China doesn't count a lot of its military-related spending—on space, military intelligence, cyber operations, industrial base, its Coast Guard, military police, military-related R&D and the like—as part of its defense budget. China's military also owns corporations that sell equipment and other goods, and the proceeds of those enterprises are not counted by Beijing, either.

Perhaps more importantly, SIPRI also acknowledges that the cost of military items and personnel is different for different countries. With a command economy, China can set the prices its military pays for domestic materials and equipment; it also pays its troops far less than their western counterparts. Amenities enjoyed by U.S. troops—such as golf courses, discounted commercial goods, and child care centers—are not features of Chinese or Russian military



Chengdu J-20 stealth fighters. China's military budget is vastly underreported.

Emperornie

The World's Biggest Defense Spenders

COUNTRY	SPENDING IN BILLIONS	SHARE OF GDP PERCENT
U.S.	\$778	3.7
China	\$252*	1.7
India	\$72.9	2.9
Russia	\$61.7	4.3
United Kingdom	\$59.2	2.2
Saudi Arabia	\$57.5*	8.4
Germany	\$52.8	1.4
France	\$52.7	2.1
Japan	\$49.1	1.0
South Korea	\$45.7	2.8
Italy	\$28.9	1.6
Australia	\$27.5	2.1

Source: Stockholm International Peace Research Institute. *Estimates.

life, where conscription is still the main source of manpower.

According to a March paper from the Center for Strategic and International Studies (CSIS), based on China's July 2019 Defense White Paper, China's spending on equipment rose from 33.2 percent annually to 41.1 percent from 2010 to 2017.

The U.S., by contrast, spends fully 40 percent of its military budget on compensation such as pay and bonuses. The Pentagon spends just 18 percent of its money on procurement, with another 24 percent on operations and maintenance, and 13 percent on research, development, test, and evaluation.

Joint Chiefs of Staff Chairman Gen. Mark A. Milley weighed in on this disparity in June testimony, flatly declaring that "Combined, the Russian and Chinese budgets exceed our budgets, if all the cards are put on the table." This trend is "disturbing," he said.

It was not the first time Milley offered such an observation. When he was Army Chief of Staff in 2018, he told the Senate Appropriations Committee that "I've seen comparative numbers of [the] U.S. defense budget versus China, [the] U.S. defense budget versus Russia." And

"what is not often commented on is the cost of labor. We're the best-paid military in the world, by a long shot. The cost of Russian soldiers or Chinese soldiers is a tiny fraction" of what the U.S. pays its troops, he added.

"Take out the MILPERS (personnel costs) accounts for both the Chinese, Russians and/or the U.S., and then compare the investment costs," Milley continued. "I think you'll find that Chinese and Russian investments, modernization, new weapons systems, etc.—their R&D, which is all government-owned and also is much cheaper—I think you'd find a much closer comparison."

This disparity in pay and cost of materiel is usually discussed in the context of "purchasing power parity," or PPP. SIPRI acknowledges that a yuan doesn't necessarily translate to a dollar in terms of capability obtained for resources expended, and that PPP can be a better measure of capability obtained for money spent, but SIPRI doesn't use PPP in its overall rankings.

The use of PPP rates based on gross domestic product (GDP), SIPRI explains, tends to elevate the relative buying power of less-developed countries, where manpower is cheap, but it weighs against them when buying advanced weaponry, which they typically must import.

"The price of conscripts can be assumed to be lower than the price of a typical basket of goods and services, while the prices of advanced weapon items" and their support "can be assumed to be much higher," producing a distorted and subjective comparison, SIPRI notes on its website. Because that effect can't be equalized across all nations, each with a different GDP—and military spending as a factor of it—SIPRI doesn't use PPP to adjust its estimate. Instead, it sticks with "market exchange rates to convert military expenditure data into U.S. dollars, despite their limitations."

In its 2020 report on Russian military spending, SIPRI noted a strong PPP disconnect between Russia's reported military budget and its "superpower" status.

"There are strong indications that military goods and services cost less in Russia than in the USA or Europe," SIPRI acknowledged, giving Russia higher purchasing power. Making a PPP calculation, SIPRI said Russia's 2019 spending likely was around \$166 billion, versus its reported budget of \$65.1 billion. It noted that Russia, too, "spent nearly 40 percent of its total military expenditure on arms procurement. This is a much larger share than most other states, including all members of ... NATO." In fact, SIPRI said, "Russia's spending on procurement was more than twice that of France, Germany, and the U.K., although its total military spending was just 30 to 34 percent higher in 2019." Those other states, though, may "invest more in ... more qualitative components of military capability," such as training and personnel.

Senate Armed Services ranking member James M. Inhofe (R-Okla.), in a May editorial for RealClearDefense, called the "Next 10 Combined" rubric "a myth often repeated. ... That must be removed from our vernacular."

Citing Heritage Foundation research, he said that SIPRI's 2017 estimate of Chinese military spending was \$228 billion, but when PPP calculations are applied, it was really about \$467 billion. Taking the Chinese at their word about percentage increases in the four years since then, he said China's fiscal 2021 budget is actually closer to \$604 billion.

Likewise, Russia's spending is reported by SIPRI to be about on par with that of the U.K., around \$60 billion. But given the country's size, readiness, and less-than-transparent nature, the true figure is probably closer to \$200 billion, Inhofe said.

There are likely "tens of billions in additional off-the-books or hidden spending in China and Russia," he asserted. Added together, that's \$804 billion, he wrote, and this well outspends the U.S. defense budget of \$741 billion.

Moreover, while Russia and China tend to focus their military

activities on their near-abroads, the U.S. has worldwide allies and partners, and when it fights, it's in the adversary's front yard, and not close to home. That fact alone imposes cost in platforms, people, logistics, and support.

"The U.S. military has extensive commitments around the globe to protect our interests," Inhofe wrote. "By contrast, the Chinese and Russians focus almost all of their defense spending and military forces on limited regional objectives in close geographic proximity."

CSIS noted that, using SIPRI's figures, China's military spending dwarfs that of "the combined expenditure of India, Russia, Japan, South Korea, and Taiwan." It also said that adjusting for PPP, China's purchasing power increases "by well over \$100 billion."

Todd Harrison of CSIS—a seasoned analyst of defense spending—said the comparison of military budgets is "analytically difficult and strategically unimportant."

It's difficult because "it involves a lot of assumptions about ... relative purchasing power," and that makes the result suspect because "these assumptions ultimately drive the result."

But it doesn't really matter, strategically, either. "What we need to spend on defense is not just a function of what others are spending," he said. U.S. defense spending should be driven by its strategy and the threats it faces.

"Our current strategy calls for us to be engaged around the world," defending our network of allies and partners, Harrison said. And we rely on playing an 'away game'—being able to project power around the world rather than fighting near our own borders. That inherently costs more to do."

China and Russia don't have the same security commitments—or benefits—of alliances in far-flung places, and focus "much more on their immediate periphery."

"So, it really doesn't matter that much what others are spending," Harrison observed. "What matters is our strategy and what we want and expect our military to be able to do."

Retired Air Force Lt. Gen. David A. Deptula, head of AFA's Mitchell Institute for Aerospace Studies, offered a more forceful criticism of the "next 10 countries" chestnut.


"It's a ridiculous comparison," he said, and reflects "ignorance of U.S. strategy commitments." The next 10 countries "do not have the same national security objectives as does the U.S."

He noted that in the past 30 years, "There have been two tenets of U.S. national security strategy that have remained constant ... regardless of the political administration in power." One is that the U.S. seeks to secure peace around the world because "that ultimately benefits the U.S." The American military is active on all seven continents "to conduct engagements to shape and promote stability and security." It takes a large number of troops and platforms to maintain that worldwide presence so that the U.S. military doesn't "drive its forces into the ground accomplishing these tasks."

The second tenet, Deptula said, is that the U.S. has tried to maintain a force that can "fight and win more than one major regional conflict in overlapping time frames." This capability is required to deter an aggressor from taking advantage if the U.S. is already engaged in a war in another region. The nation must avoid being "stretched to the point of not being able to fight and win" that second conflict.

Recently, Deptula said, that second tenet "has come into question" because of "neglect in adequately resourcing the U.S. military."

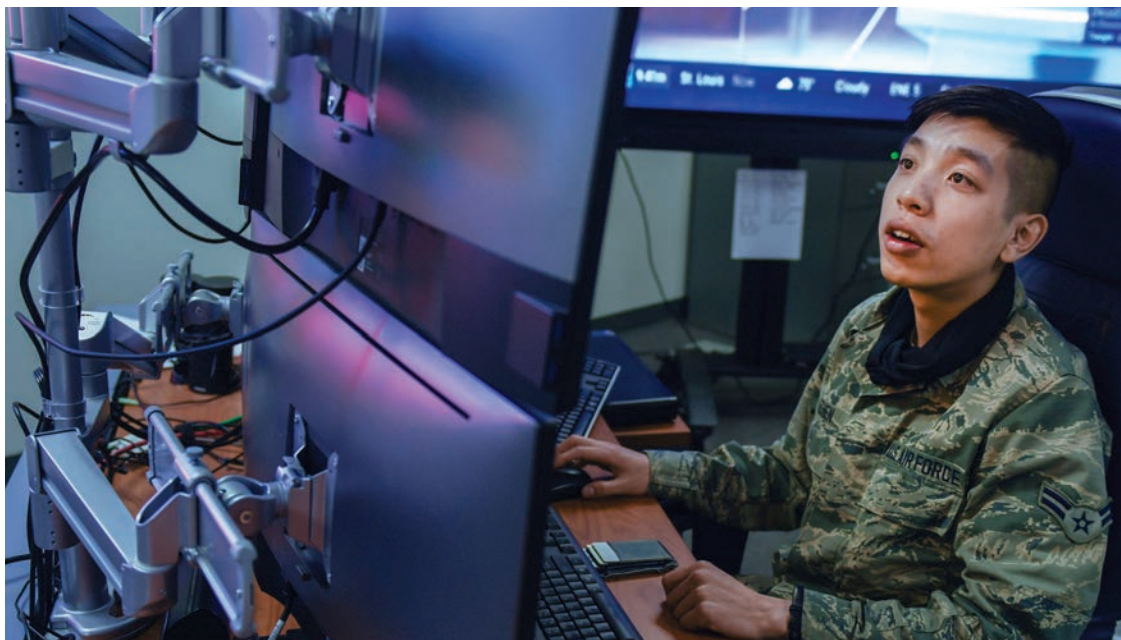
But broadly, no other nation "undertakes these responsibilities," and doing so is not only "in the best interest of the U.S., but also the best interests of the rest of the world ... and that is why the U.S. defense budget is what it is."

To be valid, any comparison of military budgets has to take into account the reasons nations spend what they do and what their strategies and objectives are. Absent that, Deptula said, "the simple arithmetic comparison is meaningless and vacuous." 



SAIC Enterprise IT As-a-Service Works for Airmen and Guardians

A cyberspace squadron Airman monitors his workstation for activity at Buckley Space Force Base, Colo.



Staff Sgt. Timothy Kirchner

Imagine if every time you moved to a new home, you had to connect the electricity, plumbing, and internet all over again. All the wires, pipes, and switches connecting you to the world were your responsibility. That's how the Air Force operates its information technology. For generations, it's managed everything itself.

Now that's changing. The Department of the Air Force is pursuing a future in which it buys all its IT as a service, from cloud computing to networking and from email to the help desk.

Enterprise IT as-a-Service (EITaaS) is a far-reaching vision intended to modernize IT services and keep them updated by putting the onus on the provider to offer best-of-breed technology solutions so Airmen and Guardians can focus on what counts most: Deterring war and fighting and winning, if necessary.

The Air Force is about a year into perhaps the biggest test yet of that concept: a three-year, risk-reduction program on nine bases involving help desk and on-site support and service. Ultimately, EITaaS could encompass everything from desktop equipment and network connectivity to software and network services ranging from email and video conferencing to accounting, personnel, and logistics systems. All of this falls under commercial IT construct of managed services which will lead to cost efficiencies and ensure that the AF and USSF have a 21st century network which paves the way to JADC2/ABMS in the future. EITaaS helps enable the DOD vision of true interoperability.

Basic computer services should be so routine they're automatic, says retired Air Force Col. Jose Rivera, the program director who leads the EITaaS End User Services program for prime contractor SAIC.

"The aim is to be invisible," he says. "You don't want anyone to notice you're there because the services and tools you're providing should just work."

When Airmen show up at their "battle stations," he said, "they should just sit down and do their job without thinking about the technology."

Airmen and Guardians today grew up as "digital natives," Rivera says. They can't conceive of a world without smart phones and instant internet connectivity. They're used to downloading an app themselves and having it work right away. They expect technology to work on demand. Having that modern, seamless experience also means attracting and retaining top talent for the Air Force and Space Force.

"So with EITaaS, the idea is to give them that same kind of experience, just like they're used to with their phones," Rivera says.

CUSTOMER EXPERIENCE — THE 'HOLY GRAIL'

"Delivering that positive user experience for Airmen and Guardians on the ground, that is our Holy Grail," Rivera says.

Put another way, it's about giving users a high-end consumer experience. "If you think about Genius Bars with Apple, how do

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Staff Sgt. Trenton Piel, 55th Intelligence Support Squadron senior signals analyst, completes a work order in May at Offutt Air Force Base, Neb.

you build that next generation of service desk that is artificial intelligence-enabled, tier zero?" asked Bill Marion, then the Air Force's deputy chief information officer, in a Federal News Radio interview in 2020. "That went live for about 70,000 Airmen with a ServiceNow platform ... work[ing] trouble tickets with speed and agility."

Moving to an Enterprise IT as-a-Service construct for all IT services in the Air Force that is based on commercial best practices and performed by a commercial vendor allows Airmen and Guardians to move focus on defending our country. Commercially operated IT support provides the AF with trained and knowledgeable IT professionals who can help remedy any problem thereby increasing Airmen and Guardian productivity.

For Rivera, it's about treating Air Force customers as individuals, not trouble tickets. "This is a retail business, not a wholesale business," he says. "Every interaction is measured. We're constantly looking at data about how the customers feel about how we're doing. You win it one customer at a time."

SAIC is partnering with the USAF on the Risk Reduction Effort (RRE) for End User Services. Ranked by Gartner as the top provider in the U.S. for services in the government vertical in the categories of infrastructure implementation and managed services, and application managed services, SAIC is providing commercial services in an enterprise environment for nine bases:

- Spangdahlem Air Base, Germany
- Joint Base Elmendorf-Richardson, Alaska
- Buckley Space Force Base, Colo.
- Offutt Air Force Base, Neb.
- Cannon Air Force Base, N.M.
- Hurlburt Field, Fla.
- Maxwell Air Force Base, Ala.
- Gunter Annex, Ala.
- Pope Field, N.C.

In addition to 24/7 on-call support, SAIC has field services teams at each location. "We think of these guys as 'contract Airmen,' Rivera says. "They are on the front line, every day, and they are fulfilling the operational mission imperative—making sure everything just works."

The company also has a liaison team embedded with the

16th Air Force to work on cybersecurity issues.

Rivera says it's important his "contract Airmen" maintain a strong personal touch. "If someone answers one of our surveys and records a bad experience, we follow up with that customer," he says. "Why was the experience unsatisfactory? How can we make it better the next time? We are very focused on those details."

The feedback and personal touch are essential because the hardest part about moving to an approach like EITaaS is helping users through the challenges of change.

"The Air Force is nearly 75 years old, and for the longest time, the service provisioned its IT organically," Rivera says. "IT was provided by Airmen within the chain of command." Getting used to a different paradigm is difficult, but necessary.

"Commanders grew up with these young officers—I was one of them—managing the IT network and they only needed to pick up the phone to get those folks to jump up and run through walls for them," Rivera says. To be confident in EITaaS, they have to imagine the same level of commitment. Even better, they need to be confident the system will work whenever, wherever they need.

"As the Air and Space Forces shift focus to mission assurance functions, improved enterprise IT services will allow Airmen and Guardians to maximize time spent on the mission and minimize delays due to inefficient IT," stated Brig. Gen. Chad Raduege, Air Combat Command Director of Cyberspace & Information Dominance during the opening of the first USAF Tech Café.

Rivera said SAIC applied organizational change management expertise to make the transition as seamless as possible. The company never stops measuring its progress, he said.

"We meet regularly with different stakeholders in the Air Force, from the very senior level all the way down to the Airmen and Guardians in the field. We needed to make sure that we understood their concerns, and addressed them in a positive fashion to make sure that every single one of my customers understands the value that we bring to the mission," Rivera said. "We reinforce that with every communication."

The teamwork between the Air Force and SAIC builds brick by brick. "It's an iterative process," Rivera said. "It's not one conversation. It's every contact. We build trust in our services one customer at a time, one contact at a time."



The Future is Now

The U.S. cannot wait for a crisis moment to address China's pacing threat.



Melanie Rodgers Cox/USAF

USAF needs to consolidate messaging and look strategically at the future. Here, Air Force Chief of Staff Gen. Charles Q. Brown Jr., speaks with senior leadership and Air University faculty on his vision for AU in 2020.

By Brian W. Everstine

Air Force Chief of Staff Gen. Charles Q. Brown Jr. began his tenure as the service's top officer with an order and a warning: Accelerate change—or lose (ACOL).

One year later, Brown sees a modicum of progress and a tightening timeline to achieve that imperative. Airmen and commanders must break from the status quo, as must lawmakers on Capitol Hill who have been unwilling to let the Air Force retire older aircraft.

"I think FY23 is the year. If we, as a department and as an Air Force, don't make a big shift in '23, then I'm concerned," Brown said in an interview. "That's the time we've got to make a shift."

The Air Force faces mounting bills for a host of new aircraft: KC-46 tankers, F-35A, and F-15EX fighters, T-7A trainers, the B-21 bomber, the Next-Generation Air Dominance (NGAD) aircraft, and an all-new nuclear ballistic missile, all at once. Brown needs bill payers and he and others are looking to jettison

"It's not just a hodge-podge. ... You've got to step back from this and look at it a bit more strategically."—USAF Chief of Staff Gen. Charles Brown Jr.

aircraft that are costly to maintain and that deliver less than optimum utility. Lawmakers, however, are hesitant.

"You hear the discussion," Brown says, eyes darting between his interviewers. "China's a pacing threat ... our adversaries are moving at a pace, and we've got to make sure we're moving as well. That's why I wrote 'Accelerate Change or Lose.' That's why I'm doing all this engagement. Because if you don't fully appreciate what the future is going to look like—or what the future threat [is], or where our adversaries are going—it's hard to make that shift. You don't want to wait until you have a crisis moment to go, 'God, I wish we had done something.'"

ROADBLOCKS TO CHANGE

The Air Force has muddled its message over the years, laying out a priority and then changing its tune. Though there can be wisdom in changing one's mind, the lack of a clear, consistent and coherent message raises doubts among those who can't keep up with the changes.



Last summer, for example, the Air Force sought a modest cut to the A-10 fleet, then backtracked on some basing announcements after lawmakers moved to block the plan during the markup of the 2022 defense bill.

“The reason we announce things, and then pull it back, is all these things are interconnected,” Brown said. “Once you make one decision, it impacts the others. What we’re trying to lay out is: Actually, we do have a plan. ... It’s not just a hodgepodge of looking at different bases and the like. You’ve got to step back from this and look at it a little bit more strategically, about how we look to the future.”

The A-10s are a good example. The Air Force wanted to cut one operational squadron at Davis-Monthan Air Force Base, Ariz., and another in the Indiana Air National Guard. Indiana would get an F-16 unit, positioning Airmen there to shift to F-35s as they come on line. Davis-Monthan, meanwhile, would get A-10s and HH-60s from Nellis Air Force Base, Nev., and create “centers of excellence” for close air support and search and rescue, which in turn would open space at Nellis for newer aircraft. But if those A-10s stay, as expected, all those moves are on hold.

“Bringing on new systems ... it’s not only the platform, but it’s the Airmen,” Brown said. “The Airmen that I have operating and maintaining this capability are the same Airmen that I have operating and maintaining these [other] capabilities in the future. I’ve got to make a transition. And so if they’re all tied up in this area, and we have things coming off the production line, I’ve still got to train those Airmen. It’s not a flip of a switch.”

Brown said he seizes every opportunity to engage with lawmakers, blowing up his schedule to be on hand for visits or meetings, and has “made due effort” to engage with Capitol Hill, and express that failing to give up some aircraft now will present “undue risk” later.

In these discussions, Brown said he lays out: 1. How the Air Force plans its future force; and 2. Here’s what the Air Force cannot do if it isn’t funded. “I don’t want to lay out a hollow force, right?”

“I’m not going to give up,” he said. “You hear rumors, but it’s not over until it’s over with the NDAA. I want to continue on with our plan. And will we have to adjust? I’m sure we will have to adjust. But I want to do it in collaboration with our key stakeholders.”

FUTURE FIGHTER FLEET

Brown made waves in May when he disclosed his “four plus-one” plan to narrow the fighter fleet from seven to five platforms, notably dropping the F-22 Raptor from the lineup. Too many aircraft, each with its own logistics tail, infrastructure, and personnel, is unsustainable for an Air Force desperately trying to modernize. Brown ticked off his long-term vision—F-35A, F-15EX, F-16 (or its eventual replacement), and the Next-Generation Air Dominance platform—plus a smaller fleet of re-winged and upgraded A-10s.

The F-22 will be replaced by NGAD in the 2030 time frame, he said. It may still have life left in it, but “it’s among our most



Ethan Wagner/USAF

The F-15EX Eagle II is part of Browns “four plus-one” vision for the fleet.

expensive fleets to operate.” He committed to continue to modernize those jets for now, but added, “what we want to do is get to something that, across the board, is our sustainment to be able to operate at a reasonable rate.”

The secretive NGAD will then be able to directly fill the F-22’s air superiority role after the Raptor’s siren song, but not on a one-for-one basis. Just how many NGADs the Air Force wants is undetermined. “I don’t want to come out and say ‘Here’s what the number is,’” he said. “Things might change. But I want to have a range of things that we can look at to go ‘OK, here’s roughly where we need to be.’”

The Air Force has a total of 186 Raptors; plans indicate thus far that NGAD might yield a rolling series of disparate aircraft, but no more than 100 or so each.

Additionally, Brown said the average age of the fighter fleet is 29 years and growing, with the F-22 becoming one of the older aircraft by 2030 as F-35s and F-15EXs come on line. New systems such as NGAD, developed with open architecture and agile software, can also be upgraded much faster using software updates as opposed to more hardware-driven upgrades for F-22 systems.

All these changes flow out of detailed analysis and wargaming in which the Air Force took tough losses against a high-end adversary. That’s what’s driving the need for rapid change.

“We’ve had strategy in the past of where we wanted to be, but I don’t know that it’s been to the level of depth and analysis and wargaming that we’ve been doing for the past couple years,” Brown said. “And so I feel pretty good about what we’ve laid out as a future Air Force design, that we’ve put some good thought into it.”

The budget discussion is driven by costs and impacts to individual bases in many cases, and Brown said he is worried these concerns aren’t taking into account—enough of—what the rest of the world is doing.

“You’ve got to do it through the lens of the threat. Realize we look at things from a budget, but you’ve also got to look at the threat. What’s the threat doing? And I don’t know that we do that as much as we probably should,” he said. “We could slow down, but you’ve got to take a look at what the adversary is doing. Are they speeding up? And is our slowing down, in some cases, is it going to compete, is it going to deter, and will it win?”

CSAF Brown on Making USAF Look Like America

The Air Force is actively trying to make its rated career fields more diverse, by identifying and removing barriers that have blocked underrepresented communities from progressing in USAF cockpits, but also simply giving younger people more opportunities to see what the career could be like.

"People only aspire to be what they can see," Air Force Chief of Staff Gen. Charles Q. Brown Jr. said in an interview. "If they've never had the opportunity, then they're not inclined to go, 'I want to do that.'"

Brown is speaking from his own experience. He said he knew about the possibility of military pilot training, but never seriously considered it until a Reserve Officer Training Corps summer camp in Texas when he got a ride in a T-37.

"It changed everything I wanted to do," Brown recalled. "I said OK, now I want to be a pilot."

The Air Force in the past year has increased its outreach to give younger people, especially those from underrepresented backgrounds, that sort of view at what a flying career in the service could be. Using resources like junior ROTC and summer camps as ways to provide "those opportunities to experience what it's like to go fly. We've done it episodically, but we're much more committed this past year to bringing young people in so they can see well before they get into college and have that opportunity."

"Once they've had a chance to do this, I mean they fall in love with it," Brown said.

For those who are in service, the Air Force is looking at identifying and removing barriers to make the service's cockpits more diverse. Just 2 percent of USAF pilots are Black. About 6 percent are women.

Brown said recent reviews and studies into addressing these issues have brought to light barriers. For example, the Air Force's process for assigning slots for rated officers would include a higher score for Airmen who had prior pilot time. This meant Airmen with the means to have flown privately before joining would be more likely to get a pilot slot.

"I knew that would actually make you better, but it would also increase your score. And so that is a socio-economic barrier," Brown said. "I knew when I was coming through, I don't know if I could have asked my parents for money to go get a private

pilot's license. I don't know that we had the money to go do that, or I didn't even think about that."

Also, Air Education and Training Command is revising the old Air Force Officer Qualifying Test and the Test of Basic Aviation Skills because they have aspects that negatively impact minorities and women. For example, the height requirement for those interested in a flying career meant women did not qualify at the rate that men did. These changes don't "decrease the quality ... but it gives them more of a fair opportunity to compete."

The Air Force in 2020 and early 2021 started two reviews aimed at determining disparities in career progression and military justice negatively impacting different racial groups. The first review, focused on disparities facing Black Airmen, wrapped in December with the second, focused on those facing other racial groups and genders, was scheduled to finish in August 2021.

The first review included 123,000 survey responses, along with 138 in-person sessions, and 27,000 pages of other written responses. The resulting 150-page report outlined widespread issues, with Black Airmen reporting distrust with their chain of command and military justice, and data showing Black Airmen are much more likely to face administrative and criminal punishment compared to white Airmen.

Brown said data in the reviews "validated the impressions of our Airmen ... that there are some disparities."

The reviews show the Air Force needs to improve how it looks at data sets "to have a better sense of how different groups are being represented, how their opportunities are brought forward, and how they're treated from a discipline standpoint."

The Air Force has also stood up "barrier analysis working groups" looking at issues facing women, African Americans, Asian Americans/Pacific Islanders, Hispanics, and the LGBTQ community. These groups "give really good feedback on approaches we can take to change things." For example, recent changes to the dress and appearance regulations to allow different hairstyles came from these groups.

"One thing that I think our Airmen appreciate is that they have a voice," Brown said. "They had a voice with these two reviews, but they [also] have a voice through these barrier analysis working groups."

ACE?

One way the Air Force is accelerating its change is through the expanding adoption of Agile Combat Employment (ACE): The process of picking up aircraft quickly to operate from an austere location with a small footprint, a key capability if the Air Force needed to fight in an unpredictable way against a major power.

The process of ACE began with deputy commanders of Air Force major commands coming together, following the lead of Pacific Air Forces and U.S. Air Forces in Europe, who each started developing their concept of operations in 2017. Now, wings across all Majcoms are developing their ACE concepts along with an Air Force effort to create a "multi-capable Airmen" syllabus to train Airmen to be ready to do multiple jobs when needed.

This development is an embodiment of Brown's ACOL order, but it is developing differently depending on each Majcom or wing.

"Part of ACE is being able to be agile, so what I want to


do is provide the intent and the structure to do things, but each wing's going to do things a little different," Brown said.

It's a change in mindset that needs to take hold in the ranks, because if the Air Force gets into a major conflict and there are casualties, "you can't go well, 'no, no one's going to do this, and I've got a union card that says I'm not allowed to do things.' Yeah, it's a change in mindset. We're all capable, if given the opportunity."

Brown points to a December 2020 visit to Prince Sultan Air Base, Saudi Arabia, as an example. During a demonstration, the local F-16 unit put a Viper on the flight line, with Xs around it showing how many Airmen are needed to operate it. By having Airmen do multiple jobs, they told Brown they could still deploy and execute with two-thirds as many personnel.

"So what they had was empty Xs and two-thirds as many Airmen as they would normally take because we gave them an opportunity to kind of think and relook at how we do things," he said. ★





Choose Your PT Test

Airmen gain options as USAF drops its one-size-fits-all approach to measuring fitness.

Mike Tsukamoto/AFA staff

Airmen 1st Class Tiaera Philips and Austin Salmon run the cardio portion of the new test. Airmen will soon be able to choose between a 1.5 mile run, a 1-mile walk, or a 20-meter shuttle run. There will also be options for the strength and endurance portions of the test.

By Amy McCullough

The Air Force delayed physical fitness (PT) testing at least four times over the past year because of COVID-19, but PT assessments are back and things look quite a bit different.

Service leaders used the pandemic break to dig into the science of measuring fitness, rolling out a series of changes before testing resumed on July 1. More changes are coming soon.

“We are moving away from a one-size-fits-all model,” said Air Force Chief of Staff Gen. Charles Q. Brown Jr. “More testing options will put flexibility in the hands of our Airmen—where it belongs.”

“More testing options will put flexibility in the hands of our Airmen—where it belongs.”

—Gen. Charles Q. Brown, USAF Chief of Staff

We know not all Airmen maintain their fitness the same way and may excel in different areas. Alternate components provide choices while still providing a mechanism to determine overall fitness.”

The basic test now comprises three components: running, pushups, and situps. However, beginning in 2022, Airmen and Guardians will be able to choose alternatives to each of those three:

Cardio (60 points). 1.5 mile run, 1-mile walk, a or 20-meter high-aerobic multi-shuttle run (HAMR).

Endurance (20 points). 1 minute of situps, 2 minutes of cross-leg reverse crunches, or forearm planks for an as-yet-not-determined time.

Strength (20 points). 1 minute of pushups or 2 min-

Nailing the HAMR: 20-meter high-aerobic multi-shuttle run

The 20-meter high-aerobic shuttle run (HAMR) is a new alternative test of aerobic fitness authorized by the Air Force for its annual PT test.

1. Airmen run back and forth between two lines, 20 meters apart, accelerating progressively to the tempo of a recorded beep.

3. Failure to reach the destination in time results in a warning; three consecutive warnings terminates the test. If you get back on cadence, the warning count reverts to zero.

4. Scores are calculated based on how long participants can stay on pace before they either receive three warnings; voluntarily terminate; or achieve the maximum score.

2. At each beep, Airmen depart from behind the line, arriving at the opposite line just before the next beep. Airmen must touch the line each with one foot before the beep sounds and must wait if they arrive early until after the beep sounds before they can run back to the first line.

utes of hand-release pushups.

A perfect score is 100, but passing is 75. Those who score 90 or better may take the test only once a year, rather than twice.

"We constantly innovate," said Lt. Gen. Brian T. Kelly, deputy chief of staff for manpower, personnel, and services. "We constantly change. We constantly update what we do, in this case we're using scientific methodology to give our Airmen options without lowering standards."

Scoring varies based on age. Instead of adjusting for age in 10-year increments, the new system adjusts in five-year increments. Airmen and Guardians 25 and younger make up the youngest group and there are eight age groups in all.

"We felt that was a little bit more equitable based on the feedback we have received from Airmen that said, 'Hey, you know sometimes when I'm at the end of the table, if I'm 29, it's a little bit harder than when I was 21; when I'm 39, it's a little bit harder than when I was 31,'" Kelly said.

'NOT A STROLL IN THE PARK'

Kelly acknowledged there will be some who scoff at the idea of a 1-mile walk, but he promised it's "not a stroll in the park," and even predicted most people will prefer the run.



Larry Anderson (left), chief of Air Force physical fitness policy, reviews mock test results with Airmen after they demonstrated the new testing options. With him are (l-r) Airman 1st Class Tiaera Phillips, Airman 1st Class Austin Salmon, Senior Airman Gabriel Segarra, and Airman 1st Class Yoana Loreda-Benitez.

Each of the alternative exercises is designed to equally measure fitness. The walk, for example, "is a scientifically valid estimation of the member's aerobic capacity [also referred to as VO2 max]," that takes into account a member's age, weight, and heart rate at completion of the walk to assess aerobic power, according to the Air Force.

"You could have two people who walk the 1 mile together at exactly the same time, who are going to get different scores

because their heart rates are different, their ages are different, and their weight might be different. All those factors come together for your final score,” Kelly said. “I will tell you, because I know people sometimes, you know, raise an eyebrow on the walk, the walk is ... difficult. It scientifically provides the same measurement of your aerobic capacity as does the mile-and-a-half run or that shuttle run, and so if you’re not aerobically fit, you will not be able to walk that mile with your heart rate at a certain level in a certain time, and you will not pass that test.”

Kelly said longer runs can be more challenging for bigger, more muscular people, but that doesn’t mean they aren’t physically fit. The shuttle run, which measures aerobic fitness through shorter bursts of energy, might be a better fit for those Airmen. To complete the shuttle run, participants run back-and-forth, 20 meters each direction. Airmen and Guardians will leave the first line when a recording beeps, and must touch the second line with their foot before hearing the second beep. The longer you go, the faster you need to be. Your score is based off how many times you can run the 20 meters.

The alternative exercises will not be part of official testing until early next year, after a six-month trial period, but a cross-section of the force will begin testing the new exercises sooner:

■ **Air Combat Command**—Joint Base Langley-Eustis, Va., Shaw Air Force Base, S.C., and Tyndall Air Force Base, Fla.

■ **Air Force Materiel Command**—Edwards Air Force Base, Calif., Wright-Patterson Air Force Base, Ohio, Hill Air Force Base, Utah, and Tinker Air Force Base, Okla.

■ **Air Force Special Operations Command**—Mildenhall Air Base, U.K., Kadena Air Base, Japan, and Hurlburt Field, Fla.

■ **U.S. Air Forces in Europe**—RAF Lakenheath, U.K., Spangdahlem Air Base, Germany, and Aviano Air Base, Italy.

■ **Air Education and Training Command**—Columbus Air Force Base, Miss., Goodfellow Air Force Base, Texas, and Maxwell Air Force Base, Ala.

■ **Pacific Air Forces**—Kunsan Air Base, South Korea, Yokota Air Base, Japan, and Joint Base Pearl Harbor-Hickam, Hawaii.

■ **Air Mobility Command**—MacDill Air Force Base, Fla., McConnell Air Force Base, Kan., and Little Rock Air Force Base, Ark.

■ **Air Force Global Strike Command**—Minot Air Force Base, N.D., and Barksdale Air Force Base, La.

Kelly said feedback from Airmen and Guardians who take or administer mock tests and/or practice the exercises during unit PT will be used to inform any final tweaks before the regulations and scoring tables are finalized.

“The last thing we would do is lower warfighting standards, and certainly, we don’t think we’re doing that,” Kelly told Air Force Magazine. “But we’ll certainly learn some

Hand-Release Pushup

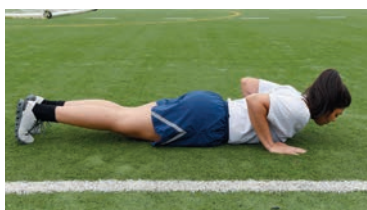
Airmen can choose between the traditional or hand-release pushup, completing as many as possible in the required time. Each has its own scoring system. How to perform hand-release pushups:



Step 1. Ready.



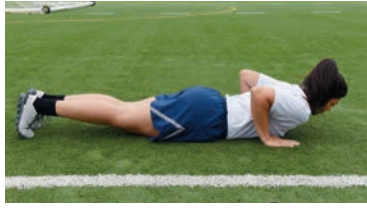
Step 2. Pushup.



Step 3. Return.



Step 4. Release hands, stretch arms wide.



Step 5. Return to ready position. Complete as many cycles as possible within 2 minutes.

things during the six-month trial period from our Airmen, and we’ll bring that in for adjustments before we release [final scoring charts] in early 2022.”

THE EVOLUTION OF PT TESTING

The Air Force has revised its fitness assessment several times over the past 40 years. Between 1981 and 1992, USAF used the 1.5-mile run to measure aerobic fitness, but it switched to a bike test in 1992 citing safety concerns. In 2004, then-Chief of Staff Gen. John P. Jumper reinstituted the 1.5-mile run in an effort to promote a warrior culture, and also introduced the pushup and situp components as the first muscular endurance components of the test, according to an April 2021 study from RAND Project AIR FORCE: “A Review of the Department of the Air Force Fitness Assessment.”

Prior to the recent addition of the five alternative exercises, only Airmen with medical waivers could substitute one of the three main exercises. In 2013, the service replaced the 1-mile walk for those with medical waivers with a 2-kilometer walk as an alternate for the 1.5-mile run. Kelly said there are no longer separate exercises for personnel on waivers. Instead, those Airmen will either be able to choose one of the alternative exercises, or they may skip that component of the test if they have a medical waiver.

“We didn’t design these things specifically with injuries in mind, but certainly the differences in the components allow us to help tailor, and allow us to account for medical waivers,” Kelly said.

Last year, the Air Force also introduced diagnostic testing, often referred to as the “no-fail PT test.” The change allowed Airmen to take mock tests to see how they score. If they are happy with the score, it counts as the official test, but if they fail or are not satisfied with their results, they can take another test without penalty.

Former Chief Master Sergeant of the Air Force Kaleth O. Wright first floated the idea of a “bad day” PT policy in 2019, saying there would be “no harm, no foul, no discipline” for not meeting the standards once. Giving Airmen time to regroup and then retake the test when they are ready offers a reasonable second chance, he said.

The Air Force made the policy official in March 2021.

“We allow our Airmen to understand that they can take the test, sometimes in a practice sense, without any of the potential anxiety or the nerves associated with having to take the test,” Kelly said. “We had already put that in play before COVID started and we wanted to continue that.”

ASSESSING THE ASSESSMENT

RAND found that the Air Force fitness program “is a practical assessment that measures critical components of

health-related fitness using well-supported assessments.” And while researchers found the situp and pushup components were an “acceptable measure” of muscular endurance, they concluded the Air Force’s PT test does not adequately measure muscular strength, which “should be considered to ensure that Airmen can perform common military tasks during deployment.”

The report also found that the Air Force “does not fully address the physical fitness of Airmen for advanced deployments, specifically to hostile or uncertain environments.”

RAND recommended:

- The Air Force conduct a trial study to explore alternative assessment methods.

- Use Air Force data to develop “meaningful cutoff scores directly tied to health risk and readiness”

- Consider developing a predeployment fitness assessment.

Kelly said the RAND report was “a valuable input” the Air Force considered when looking at the best way to modify the test, but “not everything we did was from that study, and certainly, we didn’t adopt everything from the study.”

For example, the service brought together 300 Airmen—both male and female—to test out the shuttle run and provide feedback, before it decided to make that one of the alternative exercises, but the Army is already doing hand-release pushups so it was able to observe its sister service and use the Army’s data to help it better understand that piece. It also used data from partner militaries, such as the British, to study other potential exercises.

“What we really care about is, with whatever methodology you’re doing, we want to measure the same way,” Kelly said.

Kelly said the Air Force is not likely to adopt a predeployment fitness assessment, as recommended by the RAND study.

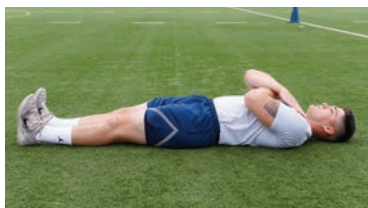
“We want to get to a culture where our Airmen are fit all the time, and so we think the testing regiment we put in place provides the right incentive to do that,” he said. “I don’t know that we will add a special fitness test right before you depart, but certainly as it exists today, our commanders and our supervisors have a responsibility, and I think do a good job, of making sure that those folks who are going to deploy are ready to deploy and are ready to go.”

A UNIQUE APPROACH

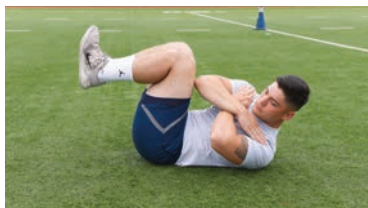
The Tier I physical fitness assessment, described above, is designed to ensure all Airmen and Guardians meet basic war-fighting standards, but there are some career fields that must meet higher fitness standards to be able to safely do their jobs.

Cross-Leg Reverse Crunch and Plank

Airmen may choose between situps, cross-leg crunches, or planks. How to perform cross-leg crunches:



Step 1. Ready.



Step 2. Lift legs, bending at hips and knees. Turn knees to right and rotate torso to left.



Step 3. Return to ready.



Step 4. Lift legs, bending at hips and knees, but this time turn knees to left and rotate torso to right.



Step 5. Return to ready. Repeat. Complete as many cycles as possible within 2 minutes.



Alternatively, Airmen may perform a forearm plank.

There are a total of eight career fields who currently use a Tier II test to assess physical fitness, most of those are in special operations, but it also includes explosive ordnance disposal.

Tier II tests are “performance-based fitness test[s] that are occupationally specific, operationally relevant, and independent of age and gender,” according to Air Force Manual 36-2905, which outlines standards and requirements for the Air Force Physical Fitness Program.

The typical 12 to 18 month process to develop and approve a Tier II test is not easy. First the career field must request the job-specific test, then they must go through a five-step process before they are able to officially take that test.

The goal is to identify the physically demanding duty tasks required to do the job, and then find exercises that will mimic those requirements as best as possible.

For example, air liaison officers (ALOs) and tactical air control party (TACPs) members still do the 1.5-mile run, but they must complete it in a much faster time than most other Airmen. Instead of the pushups and situps, the test for ALOs and TACPs assesses muscular strength with a medicine-ball toss, two-cone drill, a trap bar, pull-ups with a weighted extension, cross-knee crunch, a 4x25 yard farmer’s carry, and a 1,000-meter row.

“After the career fields request the Tier II test, there is a detailed study process—just as there was for the Tier I testing—to come up with those new components,” Kelly said. “We do an evaluation of the physical components of your job,” and then figure out how to certify the testing methodology to ensure that, in fact, “picking up this medicine ball and carrying this medicine ball is going to be equal to the task of having to pick up this bag of equipment and running with this bag of equipment 100 yards, or that the maneuver actions that are taken for Tactical Air Control Party” in the test actually mimic the “maneuvering they would do around the battlefield.”

Chief Master Sergeant of the Air Force JoAnne S. Bass said providing Airmen with options is a “step in the right direction toward developing an Air Force that is fit to fight, anytime, anywhere.”

For now, both Airmen and Guardians will take the same PT test, but the Space Force intends to develop its own fitness standards as well as a test that is unique for that service. Like the Air Force, the Space Force wants a holistic fitness policy that instills a “culture of daily health and wellness,” a service spokeswoman said. The new policy is expected to be released in late 2021 or early 2022.

The Asset Transfer Fight

There was an internal DOD struggle over which space capabilities and assets will leave the Army and Navy and become part of Space Force.



United Launch Alliance

The U.S. Air Force has been aiding the Navy and Army's space efforts for years. Here, a USAF space wing launches the Navy's third Mobile User Objective System (MUOS) satellite on Jan. 20, 2015, from Launch Complex 41 at Cape Canaveral Air Force Station in Florida.

By Abraham Mahshie

The transfer of space-related units and functions from the Army and Navy to the Space Force will begin by Oct. 1, but some space-related functions may never move over.

More than a dozen interviews with high-level Space Force officials and Pentagon insiders from the last administration indicate the Joint Chiefs struggled over space assets and personnel, with the Army and Navy resistant to giving up those forces. Spokesmen for the services declined to comment or to publicly reveal which units, functions, and missions will begin transferring to the Space Force at the start of fiscal 2022, but those most likely to remain behind are known.

The transfer of Air Force space-related assets was directed by the National Defense Authorization Act of 2020, Subtitle D, "United States Space Force Act," which redesignated the Air Force Space Command and gave the Secretary of the Air Force authority to transfer personnel to the Space Force.

That was the easy part.

But determining which personnel, units, and mis-

"We're just going to keep working on it. And some services may retain their own space capabilities. That may happen."

—Lt. Gen. Nina M. Armagno, director of staff, headquarters U.S. Space Force

sions would be removed from the other services was left up to the services and the Secretary of Defense to hash out.

"This has been a looming dispute for many, many years," said 25-year Air Force veteran and Heritage Foundation defense analyst John Venable. "As soon as the Space Force ... became part of the day-to-day conversation in the Trump administration, you could kind of see that each of the services had their own tepid response to that," Venable added.

Long lists of functions, units, and missions across the services started to pass through the highest offices of national security space at the Pentagon.

In the Army, space-related units listed include Army Space and Missile Defense Headquarters at Redstone Arsenal, Ala., and its associated satellites, the 1st Space Brigade in Fort Carson, Colo., and a battery of some 500 Army SA-40 space specialists.

For the Navy, space-related units include the Naval Information Warfare Systems Command in San Diego, Naval Satellite Operations Center in Point Mugu, Calif., and the space experts at the Naval Research Lab in Washington, D.C. The Navy operates about 13 satellites, including the five-satellite constellation known as the Mobile User Objective System (MUOS), an ultrahigh

frequency communications satellite that only became fully operational in 2019.

"I've seen charts in the past, lots and lots of lists of either units or missions or different ways of cutting it," a former high-level national security space official told Air Force Magazine recently.

"It depends on [what] you're counting," the former official said. "Ninety-plus percent were agreed [upon] to either stay or just don't go. It was really these handful of mission areas ... that were sticking points."

THE AIR FORCE WAS CLEAN

The Space Force's "birth certificate," as Chief of Space Operations Gen. John W. "Jay" Raymond often calls the 2020 NDAA, ordered the transfer of Air Force space assets to the Space Force. By the summer of 2021, that process was mostly complete.

"We transferred a bunch of U.S. Air Force organizations as well, some that were doing intel and cyber," Lt. Gen. Nina M. Armagno, director of staff at headquarters U.S. Space Force, said at a July 1 Air Force Association event.

"They came over from the Air Force within 180 days. Why so quick? Because Secretary [Barbara] Barrett told us to do it in 180 days. And, of course, we said, 'Yes, ma'am.'"

Armagno said the Space Force was only working on "a couple" of Air Force-related intelligence organizations that must still stand up, including a National Space Intelligence Center that will be co-located with the National Air and Space Intelligence Center at Wright-Patterson Air Force Base, Ohio.

The former Pentagon official said there is good reason for the transfer process to be deliberate.

"You're moving people and you're moving missions, you're building units. You don't want to mess that up," the former official said. "Air Force was clean. Everything would come over."

Raymond's task as the first Chief of Space Operations is to build a lasting service, to consolidate the space components once, and get the organization set.

"It's not going to be something strategic, it's going to be a thorn in their side, particularly for General Raymond because, I mean, he's the first guy, right?" the former official said. "Part of the argument for Space Force was to consolidate and so, if the Pentagon can't come to an agreement on what consolidation

looks like, Congress certainly isn't going to."

Armagno said the Space Force has the authority it needs to proceed. "We don't lack congressional authority. The services are working together," she said.

"There are a few units ... that we don't completely, 100 percent agree on with other services. Well, we're just going to keep talking. We're just going to keep working on it. And some services may retain their own space capabilities. That may happen."

THE NAVY

Heather Wilson, who was Air Force Secretary from 2017 to 2019, was the first to hash out the transfer of space assets from the other services, coming to an agreement with Navy Secretary Richard V. Spencer.

"There are about 13 satellites that are operated by the Navy there, special communication satellites, and while Richard Spencer and I were both in the Pentagon, we actually signed an agreement that the follow-on to those 13 satellites, that mission would shift over to the [Space Force]," Wilson said. "There was no reason for the Navy to have such a small satellite operation."

Wilson said the sizes of the satellites range from that of a refrigerator to a school bus, and add up to "less than 100 or so pieces of equipment."

"It is not a large piece of the budget, not a large amount of equipment, but it does have a significant impact on all of the other forces and on the joint force," she said.

"My guess is that is not in dispute," Wilson said. "[The] more likely issue is where to draw lines around ground-based operations that relate to satellites or use the products from them in some way."

The former Pentagon official said big-budget items like the MUOS constellation and follow-on will slide over to the Space Force, but "some gaps" remained in what will transfer over from the Navy.

"The Naval Research Lab had some space people," the former official said. "So, the question was, 'Do the space people at the Naval Research Lab go to Space Force?' and in the end, basically, General Raymond and the CNO struck a deal, 'just leave them there, because in the end, all the services need to be able to use space.' So, the theory was the Navy needs to maintain some level



1st Sgt. Steve Segin/USA

Where to draw lines around ground-based space operations may be one point of contention in deciding which Army and Navy space assets and missions transfer to Space Force. Army network management technicians test a Ground Antenna Transmit and Receive satellite communication terminal at Fort Carson, Colo., on Dec. 9, 2020.

The headquarters of Naval Information Warfare Systems Command (formerly Space and Naval Warfare Systems Command) in San Diego, is one Navy function that will move to Space Force. According to Gen. David Thompson, vice chief of space operations, more transfers will be announced soon.



Kara McDermott/USN

of capability to be thinking about using space, researching the use of space."

Wilson also suspects personnel issues are a factor in which Navy billets may change over to the Space Force in the future.

"It's very hard to keep entire career fields developing in a small service," she said. "It's a lot easier if people can be assigned from a larger service than having to manage careers with small numbers. [It] makes retention and promotion and assignment a lot easier."

Space Operations Command (SpOC) Commander Lt. Gen. Stephen N. Whiting told Air Force Magazine that the first units will start transferring into the Space Force at the beginning of fiscal 2022 in October.

"SpOC, because we're the 'fight-tonight force,' we're laser-focused on bringing over those Navy and Army satellite communications units at the beginning of FY22," Whiting said in a telephone interview.

"Per a direction from the Secretary of Defense, those capabilities will be transferring into the Space Force and they will come to SpOC, into Space Delta 8," he added.

The transfer of personnel is separate and voluntary.

"We will have personnel transferring from the Navy, the Army and the Marine Corps into the Space Force," Whiting said. "Those processes are ongoing, and we've had really good teamwork with the Navy and the Army to make that happen."

Associated personnel will continue doing their jobs in their home service and will be invited to join the Space Force, he said. Those who decline will rotate back to their parent service, while those who accept will continue a series of space assignments.

Whiting said the scheduled transfers of space-related functions and missions would constitute "the lion's share" of what has been agreed upon.

"Then, there'll be ongoing discussions in the Pentagon about any other missions as we move forward," he noted.

ARMY MISSILE DEFENSE HOLDS OUT

The Army is a massive consumer of space intelligence; ground forces rely on it for navigation and targeting and missile defense forces rely on it for early warning. While the Air Force launches satellites, the Army manages many payload operations.

So it should not be surprising that, in the waning days of the Trump administration, the greatest resistance to giving up space assets came from the Army over missile warning.

"Space Force said that is literally a space mission," the former Pentagon official said. "We fly those satellites, we operate those satellites. We provide the global warning for missiles. So, we should inherit that—move that mission over to us and we'll just provide you with the service."

Trust broke down. Arguments ensued. "That turned into all the Joint Chiefs fighting over whether they're going to pick the Army or the Space Force," the former official said. "That was the biggest single open festering wound ... between regional and national missile warning stuff."

The Army argued it needed to keep the assets to ensure mission success.

"There's a ... perception that sometimes the Army doesn't get the support it needs from the Air Force," the former official said. "They're concerned about the same thing [with] the Space Force, [that it] won't provide tactically relevant space capabilities that the Army actually needs, and wants to just focus on the sexy stuff that the space guys, the space nerds want to focus on."

Gen. James H. Dickinson, head of U.S. Space Command and former commander of the Army's Space and Missile Defense Command, told Air Force Magazine in a statement that he has all the Army satellites he needs.

"USSPACECOM is able to meet our mission by employing capabilities delivered to the combatant command by all of our

functional and service components,” he said. “Transferring the Army SATCOM assets to the Space Force will continue to provide me the capability to provide global communications to the Joint force.”

A NATIONAL SECURITY CONCERN?

The problem with refusing to integrate the Army’s space units, explained the Heritage Foundation’s Venable, is duplication and the risk that the Space Force fails to achieve its overarching objective: to consolidate the military’s space functions into one well-managed military service.

“This is a political football inside of DOD, and it’s going to take an act of the Secretary and likely the President to come in and weigh in and say, ‘Yes, you will transfer these assets,’” Venable said. “If you understand the parochial nature of this, you’ll understand why they want to do it. It’s power. It’s money. But it’s also feeding their respective teams the information and the collection needs that they need on a day-to-day basis.”

In the end, Venable said, a failure to consolidate America’s military space functions into one service is a national security concern. More than 60 federal agencies and organizations have a role that touches military space acquisition, he said. Consolidation was the main argument for creating a Space Force.

“The Chinese and the Russians will still be able to exploit the seams within that command and control matrix,” Venable said. Disparate command and control systems could put U.S. space assets in danger.

“When you say, ‘I have a threat, I need to move it,’ how many different chains on how many different sequences do you have to go through in order to make that move happen, in order to either collect or to defend, or in an offensive sense, to take action on another entity?” he asked. And the answer is inside of the [Office of the Secretary of Defense]. ... As long as the services continue to hold onto their individual assets, that’s going to continue to be a problem.”

The Army’s Space and Missile Defense Command at Redstone Arsenal, Ala., is a high-priority center of expertise that should transfer to the Space Force, Venable argued.

“There’s just a significant number of very talented folks, key organizations, and the assets are also very important,” he said. “The Army is going to do everything they can, including rename their organizations” to prevent anyone from assessing their functions and “pull ... out, lock, stock, and barrel,” the service’s space functions.

Venable calls for congressionally mandating all space experts in other services become part of the Space Force, “In order to make this truly a central hub for the Department of Defense, where they do it all, they know it all, and they can defend it all in space,” he stated. “To take action when action is due, then those assets need to move over.”

At a July event held by AFA’s think tank, the Mitchell Institute for Aerospace Studies, Space Force Vice Chief of Space Operations, Gen. David D. Thompson, said some Army missile defense functions will transfer, but he did not provide a timeline.

“We’re finalizing our transfer plans with the Army and the Navy for the transfer of missions and functions, some specific transfer of satellite communications missions and functions,” he said. “And we’ve begun early planning with the Army for some follow-on transfer of some missile warning functions.”

“When I left the Army,” the service’s position was, “No, we’re not going to transfer any” SA-40 space specialists, the former official said. But strategy hasn’t been the top priority at the highest levels of the Pentagon. “I see the flip side, the Army has got some legitimate points ... it’s not just the Army being obstinate,” he insisted. The Army legitimately needs to retain its ability to directly downlink missile warnings in the theater to defend ground forces.

“I don’t think the Space Force is going to fail,” if 10 percent of space operators don’t transfer from the Army, he offered, but admitted, “It may not be optimal, it may produce a little more duplication or inefficiency.” ✦



U.S. Army Sgt. Maj. Donnel Cabanos (seated center) teaches troops how to conduct operational exercises at Shaw Air Force Base, S.C., in April. The 32nd Army Air and Missile Defense Command is one of the Army’s space-oriented units.

SpC. Amber Cobena/USA

Let There Be Light

Will recent cyber attacks and severe weather effects on the energy grid be enough to wake up the Air Force—and the general public?

Airman 1st Class Clayton Wear

A 28-megawatt solar photovoltaic array was installed in 2018 at Vandenberg Air Force Base, Calif. The array generates 35 percent of the base's power supply, and is not vulnerable to cyberattacks.

By Greg Hadley

Widespread power disruption scenarios are forcing the Air and Space Forces to re-imagine critical threats. A storm bearing down on an Air Force base brings wind, rain, lightning, and the possibility of rolling blackouts, but backup generators may not be enough to keep operations going. Add a cyberattack on the electrical grid or nearby oil and gas pipelines, and the path to recovery could take weeks—or longer.

Such nightmare scenarios keep Michael Wu up at night. “A determined adversary ... would want to time those [cyber] attacks when you’re already recovering from what’s going to be a more tumultuous and different strategic environment,” said Wu, a senior Air Force adviser for energy resilience under the previous administration.

In such a situation, the Air Force and Space Force’s capabilities would face severe challenges. Without power, how can a digital service operate? Without electricity, can an advanced sensor network be as comprehensive as it needs to be?

“If you look at the core missions the Air Force executes, they are absolutely tied to uninterrupt-

“If you look at the core missions the Air [and Space] Force executes, they are absolutely tied to uninterrupted access to electricity.”

—Michael Wu, former senior Air Force adviser for energy resilience

ed access to electricity,” said Wu. “Whether that’s space, whether that’s unmanned aircraft, whether that’s any of our intelligence, surveillance, and reconnaissance capabilities—those are missions that are tied to uninterrupted access [to power] ... on domestic installations that are supporting operations worldwide.”

Several times in the course of the past few years, that access to uninterrupted power has been challenged, both by increasingly severe weather and bad actors in cyberspace. Experts are hoping these incidents will be a wake-up call for the Air Force and the public in general to make sure their power systems are resilient enough to bounce back from crises.

ENERGY IN A MODERNIZED AIR FORCE

“Every Department of the Air Force mission starts and ends on an installation,” wrote Mark A. Correll, deputy assistant secretary of the Air Force for environment, safety, and infrastructure, in May 19 testimony to the Senate Appropriations subcommittee on military construction. “Installations are weapon systems.”

As new technologies emerge and the Department

of the Air Force modernizes, more and more missions can—or must be—accomplished or supported from bases within the U.S., especially for a service like the Space Force.

“Nowadays, [with] intel, data-driven operations, UAVs—the installations in the United States and the global infrastructure that supports the forward deployed soldiers and Airmen and the planes and the infrastructure are actually operational assets, not strategic,” said retired Army Maj. Gen. John G. Ferrari, now a nonresident senior fellow at the American Enterprise Institute. “They are part of the warfight—for better or worse.”

As part of the warfight, installation’s strengths and vulnerabilities are amplified, especially in the context of a modernizing Air Force. One key vulnerability is USAF’s reliance on electricity.

“We are just simply more and more connected as a society,” Wu said. “And those connection points create new alliances and dependencies on electricity—in particular, communications networks, but on critical infrastructure generally.”

Disrupt any one of those connection points in a particular Air Force mission, and it “can have cascading impacts on other parts of the mission that may be miles away,” the service’s Installation Energy Strategic Plan, released in January 2021, acknowledged. And the threats to those connection points are becoming both more frequent and more potent, experts say.

SEVERE WEATHER

In particular, severe weather events, which scientists believe are becoming more frequent due to climate change, have wreaked havoc and caused billions of dollars in damages as of late. There was the near-total destruction of Tyndall Air Force Base, Fla., by Hurricane Michael in 2018, the massive floods at Offutt Air Force Base, Neb., in 2019, and most recently, Winter Storm Uri in early 2021, which impacted 28 Department of the Air Force installations across the U.S., including several that experienced interruptions to power or water service.

One of the bases affected during the winter storm was Minot Air Force Base, N.D. In his written testimony to the Senate Appropriations subcommittee, Correll said that the storm

caused a portion of the base’s missile field to lose power and rely on backup generators to operate. It’s not the first time Minot’s nuclear silos have been impacted by weather—severe flooding in 2011 prevented access to seven launch facilities.

Such events take money, manpower, and time to recover, and missions can be affected as equipment is damaged or units must relocate.

The threat of severe weather and climate change is particularly acute in certain areas, said David R. Haines, Senior Fellow for Climate Security at the American Security Project.

“Those [bases] that are most at risk tend to be those who are out West, where there is potential damage from wildfires and droughts, and those that are on the coast, where they can be damaged by rising sea levels, floods—including sunny day flooding—and, obviously, hurricanes,” Haines said. “Talking about Tyndall, that’s probably the poster child for climate damage—\$3 billion worth of damage.”

As required in the fiscal 2020 National Defense Authorization Act (NDAA), the Air Force conducted initial assessments of the threats posed by severe weather and other natural disasters at more than 90 installations, said Secretary of the Air Force spokeswoman Sarah Fiocco. As part of those assessments, the Air Force categorized the individual risk level from each climate threat to each base.

“Roughly 10 percent of the hazards identified as risks were categorized as Extremely High or High, 25 percent as Medium, and the remainder as Low,” Fiocco said.

Those assessments have already made an impact. The Air Force acting assistant secretary for energy, installations, and environment, Jennifer L. Miller, told a congressional panel in July that rebuilding plans at Offutt and Tyndall have been adjusted to account for the threats, and moving forward, each base will update its master plans with the results of the assessment within a planned five-year cycle.

CYBER THREATS

Nature isn’t the only threat, however. As the military has developed the capacity to strike globally from its home bases,



R. Nial Bradshaw/USAF

Contractors work on a solar array being installed at Hill Air Force Base, Utah, Dec. 14, 2020. The array increases the amount of renewable solar energy on base and provides an additional asset that will be incorporated into microgrid planning.

adversaries and bad actors have gained the ability to reach-back via the internet.

"We've now spent 70 years building the infrastructure [in the U.S.] under the assumption that nothing can happen to it," said Ferrari, who served as a branch chief for contingency operations for the Joint Chiefs of Staff. "And in many ways, our belief in that northern, southern, eastern, and western moats, if you will, is our Maginot line. It gives you the illusion of defense, and we haven't realized that really, the borders, they don't matter anymore."

France's Maginot Line was built as a bulwark against German aggression after World War I and was expected to be unbreachable. A generation later, Germans invaded by another route, and France surrendered in days.

When the Colonial Pipeline was shut down earlier this year by a ransomware attack that caused fuel shortages and panic up and down the East Coast, the Defense Department got a glimpse of what that risk looks like. While there was no impact on the military's mission capability at the time, Ferrari said it showed the risk of an "existential threat," especially when combined with other attacks or crises.

"If somebody's going to the trouble of taking out your electric grid, and hey, by the way, there's no electricity, and the fuel pumps, the pipelines don't work, and you can't move fuel, and now you've got Colonial Pipeline and now you don't have fuel, so how long are your generators going to last?" Ferrari said. "The outcome becomes exponentially worse when you're dealing with both of those at the same time."

'POSSIBLY MONTHS'

In 2016, then-Air Force Secretary Deborah Lee James issued Air Force Policy Directive 90-17, establishing a "framework for energy and water resources management." James made it Air Force policy that every installation should be able to "power any infrastructure identified as critical to the performance of mission essential functions independent of the utility grid" for at least seven days or until the mission could be relocated.

Five years later, the office for Energy, Installations, and Environment released its Installation Energy Strategic Plan, acknowledging that many of its planning scenarios were based on energy outages lasting one to seven days.

However, in the context of increasingly severe and potentially long-term threats, especially ones that can build off one another, experts and officials are expanding their time frames.

"Folks who are operationally planning in the Air Force and who are aware of, and really cognizant of, the potential risks and threats that the Air Force and the rest of our nation face, I think, are thinking on the weeks and possibly months scale," said Wu, who now runs Converge Strategies, aimed at promoting energy security with military and civilian partners. "Because that's real."

Air Force Instruction 10-208 Continuity of Operations (COOP), issued in 2018, establishes guidelines for continuity of operations plans and requires command-wide COOP programs to consider the possibility of primary power outages lasting "seven, 30, or greater than 90 days."

In the context of a few hours or days, diesel-powered generators are a viable backup option; but for long-term outages, fuel can become scarce.

"Backing up critical facilities with diesel generators is simply not up to the challenge in the long term of the widespread power disruption scenarios that we're now considering," Wu said.

Indeed, the service's Installation Energy Strategic Plan does account for the possibility of more long-term disruptions.

Both natural disasters and cyber attacks are listed as potential causes for outages that could last for upward of three months. In such scenarios, other courses of action will have to be employed.

POTENTIAL SOLUTIONS

As part of the fiscal year 2021 National Defense Authorization Act, Congress required the Secretary of Defense to ensure by fiscal 2030 that 99.9 percent of the energy load required for critical missions on installations be available.

Within that mandate, though, was no one particular way to accomplish that goal that the department will have to follow. That's as it should be, experts agreed.

"It's definitely got to be more tailored," Haines said, "which is, I believe, why the NDAA put the stipulation in that says you need to make your own energy on the base, but they didn't say, 'Here's how you have to make it,' because in different places you're gonna have different advantages."

As an example, Ferrari cited Marine Corps Air Station Miramar in Southern California which has harnessed methane gas from a nearby landfill to install a microgrid that allows the base to operate even when blackouts strike the area.

Microgrids—small energy systems connected to the larger utility grid but capable of disconnecting and running on their own when needed—are a key part of the energy resilience puzzle, many believe. A number of Air Force installations have already either installed microgrid controls to their energy systems or have plans to do so.

Another potential solution is small modular reactors (SMR)—nuclear power plants reduced in size to be more compact, less costly, potentially even portable. President J. Donald Trump issued an executive order in the final days of his term directing the Defense Department to promote SMR research and development for national defense, and Miller told a congressional panel that she has "great interest" in the idea.

"We're just getting underway on the pilot program but we're excited to see what capabilities that provides us for our CONUS installations and then the potential to have those be mobile for other locations," Miller said.

Solar and wind power remain options as well for some bases. In 2018, Vandenberg Space Force Base, Calif., then an Air Force installation, unveiled a solar array that generates 35 percent of the base's power supply. Nellis Air Force Base, Nev., also has a solar array that powers 25 percent of the base. At such bases, storing excess energy in batteries could be an area of development in the future, Wu said.

No matter the course of action, all Air Force energy and water projects must incorporate cybersecurity considerations, as part of Air Force Instruction 90-1701, issued December 2020.

OUTSIDE THE FENCE LINE

Many of the proposed solutions and ideas for energy resiliency involve some level of energy independence, where bases can disconnect from the larger utility grid and rely on their own energy.

But in doing so, experts and officials say, bases can't afford to totally disconnect from the grid, even if it does have vulnerabilities and a less standardized approach to cybersecurity.

"We're talking about electricity here, but electricity is extremely interdependent with other critical infrastructure sectors," Wu said. "Electricity and natural gas systems are extremely interdependent. The electricity and water and wastewater systems are extremely interdependent. So it's

not enough to make a microgrid that allows you to maintain access to electricity within the confines of the fence line. We do need to think about the critical infrastructure that feeds our installations in the defensive communities we have.”

Purely from a logistical perspective, every Air Force installation is currently connected to the grid in some way, Fiocco said. What the Air Force has been able to do is ensure those connections work for both the base and the community.

During Winter Storm Uri, Air Force bases in Oklahoma were able to run their own backup plants to reduce the strain on the public grid. Moving forward, Correll told a congressional panel in May, the service wants to deepen that relationship between base and community even more.

“When there are these kinds of outages, we don’t want to be the shining beacon on the hill. We want to work with the community,” Correll said. “So as we’re developing our [solar], our wind and our other types of microgrid-supported distributed generation, we’re looking for a capability to go two-directional with that, such that if the community needs power, we can push it from our installations to the community, but if we need power, they can push it back to us.”

‘LONG WAY TO GO’

On Nov. 19, 2020, the lights went out at Joint Base McGuire-Dix-Lakehurst, N.J. For more than 12 hours, nearly every building on the base was affected by the blackout.

But the loss of power wasn’t the result of a storm or a ransomware attack. It was an Energy Resilience Readiness Exercise (ERRE)—one of several the Air Force has conducted on bases in the past year or so to test itself.

ERREs, sometimes called “black start” exercises, involve pulling the plug on entire bases and seeing how units, commanders, and backup systems respond. The results are then incorporated into Installation Energy Plans.

“We can do all the tabletop exercises in the world, but when you actually pull the plug, the question is, what actually goes on,” then-Assistant Secretary of Defense for Sustainment Robert A. McMahon told a congressional panel back in 2019.

McGuire-Dix-Lakehurst was the third Air Force base to undergo an ERRE since the service started conducting them, along with then-Vandenberg Air Force Base, Calif., and Hanscom Air Force Base, Mass. Two more exercises are currently scheduled at Wright-Patterson Air Force Base, Ohio, and Eielson Air Force Base, Alaska.

Such exercises have helped Air Force leaders “determine where we have some installation energy vulnerabilities and water vulnerabilities that then lead to where we invest our resources and prioritize our resources to get after those vulnerabilities,” Miller told Congress. And outside observers like Wu pointed to them as signs of progress in the Air Force’s path to energy resilience.

But while there have been positive developments, Wu said, “there’s a long way to go.” In particular, he cited the need for the service to more rapidly and aggressively acquire and test new technologies.

Securing the funding for projects aimed at resiliency will likely fall under the purview of military construction, an area that “is typically the bill payer for higher priorities within the department,” Sen. John Boozman (R-Ark.) noted in the May 19 hearing.

As long as the issue remains a priority for leadership, though, Haines expressed optimism for progress.

“I think as long as the military is looking at this issue clearly and coming up with what it’s going to cost and how difficult it’s going to be to implement things like energy security and resiliency to issues like flooding and wildfires, then we’re on a good path,” Haines said. “Just got to make sure the next few years, we keep pushing in the right direction.” ★



The new SmartFlower solar energy device is an all-in-one solar device with petal-shaped solar panels that track the sun on a dual axis. The energy collected will help power the electronic marquee at the Walters Street Entry Control Point at JBSA-Fort Sam Houston, Texas, which is shown in the background. Solar and wind power options are working for some bases, but other energy resilience workarounds must also be developed.

Tristin English/USAF

Accelerating the Air Force's Ability to Adapt and Win



Tech Sgt. James Cason

Introducing unknowns to how adversaries understand U.S. operations can throw a wrench into adversarial decision-making.

An F-22 Raptor and F-35A Lightning II fly in formation with the XQ-58A Valkyrie low-cost, unmanned aerial vehicle. As unmanned and autonomous systems populate the fleet, machine-to-machine data exchange and collaboration becomes more critical.

By David A. Deptula and Heather R. Penney

Success in future conflict will largely depend on the ability to exploit information networks, automation, and machine learning. If used to their full potential, these capabilities can enable rapid adaptation, as well as enable complex multi-domain kill webs and decision optionality. These attributes are necessary to disrupt adversary strategies to defeat U.S. and allied operations.

U.S. forces must be able to quickly field new capabilities, modify existing weapon systems, and change weapon system and network configurations to rapidly adapt platform, network, and operational architectures to diminish or even negate adversary advantages. China and other global adversaries have observed U.S. capabilities in operation for decades; they understand both U.S. systems and its employment concepts. By introducing unknowns into their understanding of our weapon systems, U.S. forces can erode the speed and quality of adversary decision-making in the heat of an operation.

Complex, multi-domain kill webs, enabled by new technology, can help commanders undertake multiple, simultaneous courses of action in a dynamic and contested battlespace.



Lt. Gen. David Deptula, USAF (Ret.) is dean of AFA's Mitchell Institute for Aerospace Studies. Heather Penney is a senior fellow at the Institute. Download the entire paper at <https://mitchell-aerospacepower.org/speed-is-life-accelerating-the-air-forces-ability-to-adapt-and-win/>

Emerging warfare concepts like Mosaic, Joint All-Domain Command and Control (JADC2), and the Air Force's Advanced Battle Management System (ABMS) all rely on information networks and software integration as their operational foundations. Yet the Air Force is hampered in its ability to quickly develop, fund, field, and employ these mission integration tools because of outdated acquisition, development, and management structures.

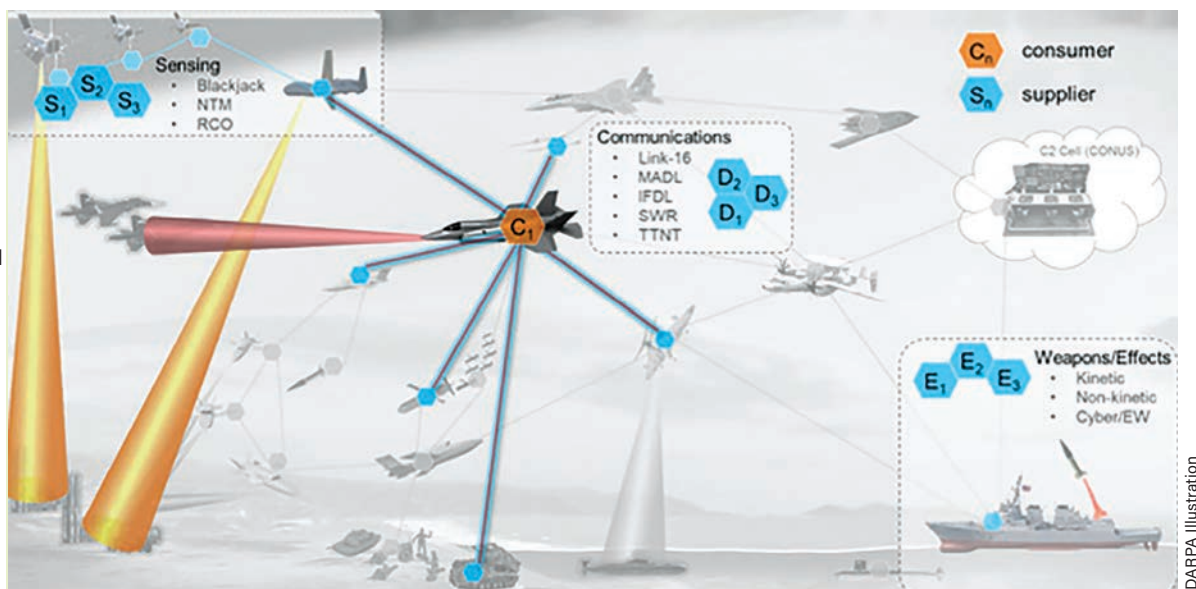
VALUE OF NETWORKS TO U.S. OPERATIONS

The incompatibility of data links and information systems in major weapon systems presents a significant barrier to realizing seamless, machine-to-machine data exchanges. Even major modernization efforts may not be able to retrofit interoperability and connectivity. Radio-specific waveforms and message-types and formats are generally immutable—especially in legacy data links. The Air Force's well-documented difficulties in connecting the F-22 Intra-Flight Data Link (IFDL) and the F-35's Multifunction Advanced Data Link (MADL) is a case in point.

Mosaic Warfare, JADC2, and ABMS are complementary approaches to achieving the same general warfighting concept. JADC2 seeks to maintain an advantage through sharing data across platforms and domains to offer commanders targeting options in

Adapting Cross-Domain Kill Webs (ACK)

ACK is a decision aide that creates and analyzes thousands of potential kill chains across the range of available platforms, systems, and weapons. Optional kill chains are evaluated based on availability, quality of network service, mission authorities, and "value" or "cost" of trade-offs. ACK then offers commanders prioritized options.



compressed time cycles. ABMS takes an "Internet-of-Things" approach to achieve high-speed, seamlessly coordinated combat operations. Mosaic Warfare is a force design approach to fielding and adapting JADC2 and ABMS as continuously evolving, tailorable, and scalable warfighting concepts. Mosaic seeks to help implement JADC2 with technologies to enable federated networks, links, and platforms to confound adversaries and ensure operational effectiveness.

Open mission systems and universal or common standards are unlikely to solve integration problems alone. It could take years to retrofit legacy systems to a universal standard, and the static nature of such a standard could render U.S. forces unable to implement state-of-the-art network and data link techniques later on. Future architectures must be flexible and adaptive enough to be both backward-compatible while equally able to embrace future standards.

MISSION INTEGRATION TOOLS

To help realize this approach, DARPA is developing mission integration tools (MIT) that can seamlessly connect and direct heterogeneous platforms and data links. These tools could include software-defined radios to serve as communication relays between disparate radios; autonomous networks to dynamically route and shape data loads to optimize performance; auto-generated, data-translation software patches to allow disparate systems to share data and mission applications; and real-time recommendations regarding potential cross-domain kill webs for emerging targets autonomously coordinating the subsystems on a weapon system with off-board assets, enabling the synchronization of mission effects in a dynamic battlespace.

Fielding these mission integration tools offers the potential to employ legacy platforms in a more unpredictable manner, and many of these tools are mature enough to transition to the warfighter today. Moreover, these tools will enable forward and backward interoperability across the force as new systems and technologies are fielded, accelerating the introduction of new operational concepts.

Three hurdles stand in the way:

- The bureaucratic lag in defining requirements, transitioning to a program of record, and establishing funding beyond initial development is too slow to on-board technologies at relevant speeds.

- The Air Force's program management structure requires a champion to drive development; mission integration tools, as program-agnostic software, lacks such a program executive office to champion, manage, and sustain them.

- The Air Force does not possess the structures, skills, and manning needed to employ these software tools operationally.

AMERICA'S WAY OF WAR: SYSTEMS OF SYSTEMS

The Air Force clearly recognizes the unique nature of operational software and is working to adapt software management, development, and sustainment across its enterprise. Leveraging the momentum of its software factories and maintenance reforms more broadly could enable future mission integration technology.

The U.S. military increasingly wields its combat power as a system of systems. Although they might be called "fighters," "bombers," and so forth, the Air Force officially refers to its combat platforms as "major weapon systems." Each weapon system, on its own, is an interconnected and interdependent set of sensors, processors, and avionics. As capable as each weapon system is, however, they share information and collaborate to achieve greater effects than any single platform could achieve independently. The dependencies and interactions between these major weapon systems combine in what is called an operational architecture, encompassing information flows, data links, functions, and weapon systems. This structure typically represents a kill chain, an OODA Loop (Observe-Orient-Decide-Act decision cycle), or some other specific mission. Weapon systems are engineered to fit into established architectures, predetermining its systems, data links, and radios. The original requirements for the F-22, for example, envisioned the aircraft operating stealthily, deep in enemy territory. While the Link 16 data link might have enhanced some aspects of mission performance, the omni-directional radio would act like an early warning siren and homing beacon to adversary forces. Thus, the Raptor was designed with a low-probability-of-detection/low-probability-of-intercept (LPD/LPI) intra-flight data link. Even now, three decades later, F-22s can still only "talk" to other F-22s.

Modernization upgrades have not substantially altered the F-22's inability to share information, because program offices steer modernization funds toward performance more than



Col. Jim Fabio, Staff Sgt. Cambria Ferguson, Tech Sgt. Daniel Asselta, SrA Danielle Charnichael

A hypervelocity gun weapon system shot down a surrogate cruise missile target as part of ABMS On-ramp 2 in September 2020. ACK and STITCHES were both key to the successful air defense scenario during the exercise.

communications. The Air Force explored giving its F-22s the Multifunction Advanced Data Link developed for the F-35, but dropped the plan due to cost and changing requirements. Upgrade Increments 2, 3.1, 3.2A, and 3.2B focused on advanced air-to-air missiles, air-to-ground attack modes, and air-to-ground weapons.

Adversaries have built counter-U.S. strategies around USAF's rigid and predictable mission hardware. Having grown familiar with our technologies, tactics, techniques and procedures, adversaries understand the relationships and interdependencies among our platforms and use that knowledge to develop the ways and means to counter U.S. operations.

DEFEATING US OPERATIONAL ARCHITECTURES

China is DOD's "pacing threat," posing the greatest and most credible threat to America's national security, according to the "Military and Security Developments Involving the People's Republic of China," a 2020 annual report to Congress. "Beijing will seek to develop a military by mid-century that is equal to—or in some cases superior to—the U.S. military," the report states. China's strategy is specifically designed to counter American operational architectures.

China is aggressively investing in advanced military equipment, but it does not plan to compete symmetrically with the United States. Instead, China's theory of victory exploits U.S. force's dependency on rigid operational architectures. China's key to seizing the initiative "is to create conditions which are friendly to us, to seize the war initiative, and to use favorable condition/posture to compensate the inferiority in equipment," according to the 2013 edition of China's Science of Military Strategy. "Control of information is the foundation of seizing initiatives in battle. Without information supremacy, it is difficult to effectively organize fighting for control of air and control of sea." By taking down data links and denying critical information, China will blind and paralyze U.S. operations.

Chinese intelligence operations expert retired Cmdr. Mike Dahm (USN) describes China's approach as maintaining "battlespace awareness ... to preserve information for one's own weapon systems, while simultaneously denying battlespace

information to one's adversary." Kinetic military operations, while important, do not form the foundation of Chinese operational concepts.

China's advanced air defenses are not simply about denying geography. They are also effective in denying information to U.S. and coalition forces. At the same time, China embraces the "application of information technology to all aspects of military operations," calling it "informatization." China scholar M. Taylor Fravel explains: "The 'informatization' of weapons makes them more precise and lethal, and—when networked together—enables the unified, simultaneous command of disparate units and forces."

RAND analyst Jeffrey Engstrom states, "The PLA has increasingly recognized that war is no longer a contest of annihilation between opposing forces, but rather a clash between opposing operational systems." China intends to use kinetic strikes and other "hard kills" to collapse U.S. information networks, depriving the system of critical sensors, gateways, and command and control nodes, while "soft kills" attack by means of electronic warfare, jamming, and cyber operations. Together, they seek to "paralyze and destroy the enemy's operational system of systems." This is the same approach used in the U.S. air campaign that crushed Iraq in Desert Storm. China learned from our success and now plans to use it against us.

To achieve the full potential of JADC2, ABMS, and Mosaic Warfare, DOD and the Air Force should seek to empower the warfighter to rapidly compose federated and tailored operational architectures that are mission-defined, not system-defined. "More kill chains faster" is a good initial goal, but it will not be enough. Unlike today's structures, success in any conflict will require ad hoc information networks, surprising operational architectures, and resiliency through complexity and adaptation.

THE JOINT INTERFACE CONTROL OFFICER

As data links proliferated and became more important to combat operations, the Air Force had to invent the Joint Interface Control Officer (JICO) to help overcome interoperability deficiencies. Link 16, has more than 12,000 terminals in use among U.S. and allied air forces, but other data links are also in

wide use, including Link 11, Link 22, MADL, and IFDL, among others. Taken all together, these make up the joint data network (JDN), which is built and managed by the JICO.

JICOs work to optimize the joint data link network to support the operational architecture, but there are limits on what they can do. The weapon systems they need to connect often constrain their options, because of incompatible data links or programming that limits which data is sharable. An F-16CJ and an F-15 both have Link 16, but can only share threat emission data if the F-15 was programmed to do so.

If a need wasn't anticipated during the requirements process, it won't be possible later on. Other limitations include frequency ranges and waveforms, firmware limitations, and the physical size of the antennae.

Software-defined radios have not made networks any more adaptive or flexible. Although the software can host more waveforms on a single terminal, the structure and standards of the data links they host have remained constant. This is why so much attention is focused on setting common standards for joint all-domain command and control: The logic, rule sets, and data link formats are the keys to machine-to-machine data exchange.

MISSION INTEGRATION TOOLS

There is a better way to approach this problem. Mission integration tools are software programs that can enable rapid, flexible operational architectures at the time and place of need. In future conflicts, when elements of the force may be disconnected and attrition is likely, preplanned architectures will have to adapt responsively. At the same time, weapon systems will need to be able to support the rapid integration of new capabilities. This could encompass everything from identifying and constructing new kill chains during a mission to programming subsystems on different platforms to collaborate autonomously, or to automatically identify network degradation and reroute message traffic in real time.

While JICOs can respond to changes at the headquarters level, they are ill-equipped to face the dynamic environment of peer competition at the unit level, where many of these adaptations will be needed. Mission integration tools could empower these skilled Airmen to integrate previously incompatible systems and networks, create innovative new solutions, and ensure operational resiliency in combat.

Two mission integration tools have already been proven during ABMS on-ramp demonstrations. DARPA's Adapting Cross-Domain Kill Webs (ACK) and System-of-Systems Technology Integration Tool Chain for Heterogeneous Electronic Systems (STITCHES) were both used by the Air Force to create novel kill chains in real time across previously incompatible networks.

ACK is a decision aide that creates and analyzes thousands of potential kill chains across the range of available platforms, systems, and weapons. Optional kill chains are evaluated based on availability, quality of network service, mission authorities, and even "value" or "cost" trade-offs, before ACK offers commanders prioritized options from which to select.

STITCHES expands and facilitates the integration of incompatible systems and subsystems. It supports message translation across systems without data loss or format changes. The STITCHES toolchain uses a library of prior translations and a technician-usable software tool to auto-generate software patches to support data exchange between systems that employ different coding languages. It is software that writes translation software.

STITCHES generates lightweight code that can be inserted in-line with other types of code without disrupting the original

programming or operational flight program and without adding discernible delay. STITCHES can virtually disaggregate a weapon system into its disparate parts, from a radar warning receiver to a targeting pod, and program them to collaborate autonomously. The system enables different systems with different languages and software to understand each other and to dynamically work together at a machine-to-machine level.

ABMS on-ramp 2 employed both ACK and STITCHES. While the four-day exercise tested many ABMS technologies, ACK and STITCHES were key to the successful air defense scenario of "shooting down a cruise missile surrogate with a hypervelocity weapon."

According to program manager Lt. Col. Dan Javorsek, "the ACK decision aid software analyzed thousands of options to form cross-domain kill webs and recommended the assets for the kill chain and the best command-and-control 'play' to the mission commander." Surveying all of the available capabilities in the battlespace, ACK was able to use nontraditional assets to build a resilient operating picture and provide the mission commander with prioritized kill chain options. These courses of action considered cross-service authorities and the interdependencies of how each kill chain could affect ongoing missions—a critical requirement for superior decision-making. Some of the thorniest problems in the JADC2 concept involve navigating across organizational and command boundaries. ACK helps do that.

The STITCHES tool chain was key to enabling the machine-to-machine data exchanges that made such battlespace awareness and kill chain options possible. By enabling extremely low-latency, high-throughput data exchanges among previously incompatible platforms and subsystems, STITCHES was essential to ACK's success. Gen. Mark D. Kelly, commander of Air Combat Command, said that one of the key takeaways from the ABMS demo was the need for speed and connectivity, "which really comes down to decision superiority."

DARPA further demonstrated the capabilities of its mission integration suite through a field test of the DyNAMO (Dynamic Network Adaptation for Mission Optimization) tool. This test, conducted by the Air Force Research Laboratory (AFRL), used DyNAMO to share information across disparate and incompatible tactical data links in a spectrum-contested environment. DyNAMO automatically routed data to the user who needed it most and managed the flow and prioritization of data, so that lower-priority data never interferes with delivery of higher-priority data.

Data links in the AFRL test included Link 16, Tactical Targeting Network Technology (TTNT), Common Data Link (CDL), and Wi-Fi networks. To simulate a contested environment, engineers disabled the TTNT network while data was being transmitted. DyNAMO automatically detected the degradation and autonomously transferred the messages to Link 16. Users at each node were unable to detect any operational impact. The DyNAMO program manager shared the warfighter's perspective that "from a user's point of view, they don't care if the data is coming to them from LINK 16 or TTNT or CDL; all they care about is whether they can send and receive a message."

The ABMS on-ramp and DyNAMO demos provide a small insight into the potential of how these mission integration tools can enable the construction of surprising and optimized operational architectures engineered to create the desired effects in any given scenario. Creating the ability of aircraft subsystems to autonomously communicate, collaborate, and synchronize actions through adaptive networks and among unrelated weapon systems is a crucial step toward creating the operational

architectures that JADC2 anticipates. As just three tools of a much larger mission integration suite, ACK, STITCHES, and DyNAMO provide powerful demonstrations of the potential these mission integration tools present.

FUNDING MISSION INTEGRATION TOOLS

The Air Force procurement system—or DOD’s, for that matter—is not structured to develop, acquire, field, or sustain combat software tools like ACK, STITCHES, DyNAMO, or the many technologies that will comprise the Advanced Battle Management System. Yet even as the Air Force recognizes the importance of software in mission effectiveness, it struggles to procure, sustain, and modernize software. Mission integration software will be the foundation of JADC2, ABMS, and Mosaic warfare, but unless current funding and management structures are changed, the development and fielding of these crucial enterprise-wide mission integration capabilities will falter.

The ABMS experience illustrates the problems: ABMS does not neatly fit into any established acquisition process, nor does it clearly belong to a single program executive office (PEO). That’s why Will Roper, former Air Force head of acquisition, designated the Air Force Rapid Capabilities Office (RCO) to act as the “integrating” program executive office for ABMS: “probably needs a new construct for how we manage and execute,” he said. GatewayONE, also referred to as the “Airborne Edge Node,” is the latest of many efforts to create an IFDL-MADL gateway and is not subject to either the F-22 or F-35 for sponsorship. As part of the Air Force’s ABMS family, gatewayONE is now managed by the RCO within the broader ABMS portfolio. ABMS is often described by service officials as a “military Internet of Things,” a suite of technologies that will form a data network to connect weapon systems, sensors, and command and control nodes across the Department of Air Force and the other services.

While some mission integration tools such as STITCHES and ACK have participated in ABMS on-ramps, it is not clear whether they will be folded into the ABMS portfolio. Many of these capabilities are ready to transition out of DARPA and are even mature enough to be operationally fielded to the warfighter. Air Force budget documents, however, do not describe these software tools in the ABMS budget documentation. Due to the unique and enterprise nature of mission integration tools, depending on a sponsor weapon system will not be a viable transition path. Still, ABMS may not be quite the right fit. It is crucial that the Air Force look to transition these software tools as their own individual programs of record and designate a program executive office to oversee and manage them.

RECOMMENDATIONS

The unprecedented integration of data will be the foundation of combat operations in the future. Operational architectures that link disparate weapon systems to complete missions and close kill chains can leverage mission integration tools to enable planners and operators to build the operational and functional relationships they need among available platforms to meet their combat objectives.

Air Force information and operational architectures could benefit from a series of changes to fully enable these tools:

1. Better enable research agencies like AFRL and DARPA to fund software efforts initiated under broad area announcements (BAAs). The defense federal acquisition regulations (DFAR) limit the ability to apply BA 8 (Budget Activity 8) funding to software programs that fall under a broad area announcement. Limiting software investment under BAAs slows development due to the annual nature of other funding

categories. Further, legal constraints on sole-sourcing during transition from development to production risks the loss of the very team and unique code that made a program successful. Congress, DOD, and the Air Force must find a way that enables research agencies to use Budget Activity 8, a category specifically designed to encompass the unique, dynamic, and spiral nature of software development to fund and transition software programs initiated by a broad area announcement.

2. Consolidate development, acquisition, management, and modernization of mission integration tools under a dedicated program office. Funding and management of mission integration tools should not be scattered across the acquisition enterprise or tacked on to a “sponsor” program’s modernization effort. Developing these tools as individual programs of record managed by a dedicated SPO will ensure interdependencies, gaps, and opportunities are addressed as they come together as a system. Unlike traditional systems of systems, where the architectures are fixed and require the simultaneous maturation of every element, each mission integration tool brings standalone value to the force. As such, the development and fielding of each tool should be managed as a separate program of record.

3. Train and resource JICOs as mission integration officers and embed them at all operational levels—especially at the unit level. Joint integration control officers already understand how to build network architectures in order to achieve operational integration. They often have operational experience and a background in battle management. These are foundational skills necessary to understand how to align information networks to support innovative, new operational architectures and kill webs. JICOs are natural candidates to develop into mission integration officers. These skilled Airmen, however, cannot remain isolated to air operations centers or network development centers. To truly provide rapid adaptation of weapon systems and architectures, these mission integration officers will need to be assigned to the point of need. These are not temporary assignments to install software but must be permanent personnel at the unit level. Mission integration officers should be a crucial component of every mission planning, training sortie, and large force employment—including in combat.

4. Experiment with and develop mission integration tactics, techniques, and procedures. To fully realize the combat potential of these tools, the Air Force must develop tactics, techniques, and procedures (TTPs) for their employment in both training and combat. Experimenting with how mission integration tools can enhance operations is essential to developing TTPs for effective employment. TTPs can serve to identify risk and provide techniques for managing and mitigating risk. Across the Air Force, TTPs serve as validated best practices for each weapon system community. Mission integration tools should be no different.

Mission integration tools and the officers who will employ them will have an outsized impact on revolutionizing combat operations. At the battlespace edge, they will provide resiliency to combat operations as they adapt operational architectures to changing circumstances and enable machine-to-machine data exchange and collaboration. The Air Force does not need to wait for the future. By beginning to transition already demonstrated mission integration tools; properly supporting their acquisition and funding; developing mission integration officers and embedding them at the point of need; and developing the tactics, techniques, and procedures to employ these tools, the Air Force can begin to migrate its legacy force structure into a future force design. ★

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AFA EMERGING LEADERS 2021-2022

By Gabbe Kearney

1st Lt. Ahna Arcturus

Home State: Colorado

Chapter: Space Coast Chapter #309 (Fla.)

Joined AFA: 2016

AFA Offices: Treasurer (present), VP of Communications

AFA Awards: Chapter Member of the Year; Volunteer of the Year

Military Service: USAF (Active duty, 2009 to present)

Occupation: Officer, Intelligence, Patrick Space Force Base, Fla., (prior enlisted)

Education: Master's degree, Homeland Security Geospatial Analysis, Penn State; Bachelor's degree, Political Science (minor Economics), University of Colorado



Courtesy photos

1st Lt. Ahna Arcturus

How did you first hear of AFA?

From my husband, who was serving as the President of our AFA chapter at Vandenberg Space Force Base, Calif.

What prompted you to join?

I initially joined for the leadership opportunities and to make a positive impact on and off base.

What do you enjoy most about your AFA membership?

The opportunity to lead projects and events that make a positive

impact on Airmen, Guardians, and STEM education in the local community.

What is your favorite AFA program, event, or project?

I love the Aerospace Education programs for students, especially those which support students from disadvantaged communities with limited STEM access.

How has AFA helped you?

AFA has provided me with leadership opportunities both on base and in the community. As a young NCO, I learned how to lead teams, raise money for Airmen and community projects, execute events that support local education, and foster stronger military-civilian relationships.

How do we build awareness about AFA?

We organize events and opportunities that Airmen, Guardians, and community members are interested in (gaming, robotics, technology, etc). We build a wider Community Partner baseline, to include both defense and non-defense industry-related business, nonprofits, government organizations, institutions, universities, etc.

1st Lt. Savannah Wheat

Home State: Alabama

Chapter: Gen. David C. Jones Chapter #135 (N.D.)

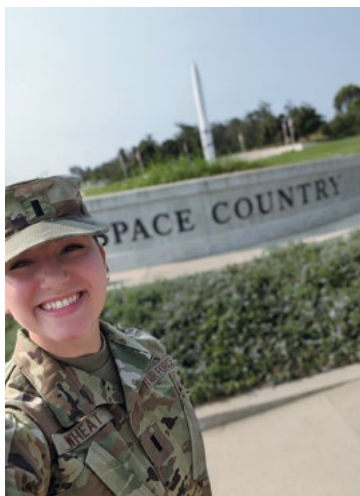
Joined AFA: 2013

AFA Offices: Chapter VP Membership; Chapter VP of STEM Outreach

Military Service: USAF Officer

Occupation: ICBM Maintenance Officer (Munitions and Missile Maintenance Officer), Minot Air Force Base, N.D.

Education: Bachelor's degree, Psychology, Auburn University, Ala.



1st Lt. Savannah Wheat

How did you first hear of AFA?

As an Arnold Air Society (AAS) cadet in ROTC.

What prompted you to join?

After AAS, I loved being part of the Aerospace Education mission. There is so much we, as advocates of the Air Force, can do to educate the general public on Air/Space Force capabilities. As they say, knowledge is power.

What do you enjoy most about your AFA membership?

I enjoy watching multi-functional individuals from around base and in the community join together with a common mission.

What is your favorite AFA program, event, or project?

I'm partial to STEM education. STEM outreach to the young kids in our community is a wonderful program to be involved with. They are our future and our future is growing technologically every day.

How has AFA helped you?

AFA has given me the opportunity to interact with leaders in the community and on base that I wouldn't have otherwise have crossed paths with. Networking and becoming a family that loves the

Air/Space Force had been a blessing.

How do we build awareness about AFA?

A pull to our organization is 'passion'. Passion for the Air/Space Force and general service to our nation. If we are passionate about our AFA mission, we will spread awareness and passion to our communities.



MSgt. Kristine Richardson

Home State: California

Chapter: John C. Stennis Chapter #332 (Miss.)

Joined AFA: 2020

AFA Office: Chapter Vice President

Military Service: USAF, Active duty (15 years)

Occupation: Biomedical Equipment Technician, Keesler Air Force Base, Miss.

Education: Two Community College of the Air Force (CCAF) degrees (Biomedical Equipment Technology and Human Resource Management); completing Bachelor's degree in Management (November 2021)



MSgt. Kristine Richardson

How did you first hear about AFA?

One of my mentors told me about AFA when I first arrived at Keesler Air Force Base, Miss.

What prompted you to join AFA?

Most private organizations do not have a STEM component in their mission. I thought this was amazing, and I wanted to take a deep dive into AFA and be a part of it.

What do you enjoy most about your AFA membership?

I really enjoy the camaraderie between members, interacting with people from all over the state, and learning from their perspectives.

What is your favorite AFA program, event, or project?

My favorite AFA event was when our chapter participated in the AFA Takeover on Instagram. I enjoyed the opportunity to showcase our members and highlight our activities.

How has AFA helped you?

AFA has given me the opportunity to learn from others and expand my network. There is so much history in this organization and listening to stories of how we have come to be is enlightening.

How do we build awareness about AFA?

I believe the best way to build awareness is through AFA's educational programs, CyberPatriot and StellarXplorers. By introducing AFA at an early age, students can perpetuate our mission by sharing their experience with friends and family and familiarizing them with the organization.

MSgt. Tim Tanbonliong

Home State: Maryland

Chapter: Langley Chapter #323 (Va.)

Joined AFA: 2018

AFA Offices: Chapter Aerospace Education Committee member; Chapter Secretary

AFA Award: VA State Medal of Merit

Military Service: U.S. Space Force (February 2021 to present); United States Air Force (2007 to 2021)

Occupation: Imagery Analyst, Air Force Distributed Common Ground System (DCGS) Training Manager at Headquarters, Air Combat Command, Readiness Division, Langley Air Force Base, Va.

Education: Master's degree, Psychology, University of Phoenix; Master's degree, Strategic Intelligence (China & East Asia Program), National Intelligence University, Bolling AFB, D.C.; Bachelor's degree, Information Technology, AMA Computer University, Philippines; Associate degree, Intelligence Studies, CCAF, Maxwell Air Force Base, Ala.



MSgt. Tim Tanbonliong

values were compatible with mine: sharing knowledge; taking care of people; and giving back. All these prompted me to become a lifetime AFA member.

What do you enjoy most about your AFA membership?

The unique opportunity to help others and learn from people hailing from diverse backgrounds.

What is your favorite AFA program, event, or project?

There are several programs, but first one that comes to mind is supporting local AFJROTC programs (Aerospace Education). The joy and pride of the cadets and their families upon graduation is something you cannot buy. I hope my children get to experience what I have witnessed.

How did you first hear of AFA? I first heard about AFA more than a decade ago through community announcements on base.

What prompted you to join? Circa 2018, a request for volunteers to attend a local AFA chapter-sponsored professional development seminar was sent to our unit. I was curious and made it a point to attend. The organization's mission and community programs resonated with me, and I was struck by the local chapter officials' relentless desire to serve and elevate others (the former eventually became my mentors). Through frequent seminar participation and interactions with local chapter officials, I discovered that AFA's

How has AFA helped you? AFA has been a professional and moral compass for me: reminding me of my purpose and mission within the U.S. Armed Forces.

How do we build awareness about AFA?

I believe the broader military community, academe, and industry are key in promoting AFA's agenda through major platforms (i.e. symposia, community programs, supporting base programs, and outreach). However, with the plethora of associations with competing interests out there, individuals may have difficulty discerning which organizations are worth their time and resources. I recommend that AFA ... continue to do what it does best: build strong, multilateral partnerships with other organizations (e.g. other service-oriented associations, local councils, USO, sporting events, welfare programs, etc.) and take an integrated approach on efforts that benefit our communities. ... AFA will continue to set the standard for others to follow suit, and perhaps attract future leaders and talent in the process.

TSgt. Damita Stevens

Home State: California

Chapter: Mile High Chapter #127 (Colo.)

Joined AFA: 2017

AFA Offices: Mile High Secretary; Mile High VP of Communications; Colorado State Secretary

AFA Awards: 2020 State Exceptional Service Award; 2019 State Medal of Merit

Military Service: USAF/U.S. Space Force (2012 to present)

Occupation: Flight Chief/Unknown Signals Analyst, Buckley Space Force Base, Colo.

Education: Bachelor's degree, Information Systems, Park University, Mo.



TSgt. Damita Stevens

How did you first hear of AFA?

Mark "Buster" Douglas briefed my [Airman Leadership School] class at Langley Air Force Base, Va., about AFA. At the time, I thought he was talking about Air Force Sergeants Association [AFSA], ... but then the local chapter funded the transportation to the Air, Space & Cyber Conference and my eyes opened, and that was it. I was sold.

What prompted you to join?

The ASC Conference is really what prompted me to join. I work in intel, and it can be hard to feel like you are involved in the "real" Air Force. Coming to that conference I got to meet CMSAF [Kaleth O.] Wright and all of these people from career fields I only remember hearing about from my recruiter.

What do you enjoy most about your AFA membership?

The real money in the membership is the relationships you build, the connections you make across the community, and the opportunities that grow from the cool work we do.

What is your favorite AFA program, event, or project?

ASC, no contest! It is such a cool event. No other service has another event that brings together nearly 15,000 people to get excited about their service!

How has AFA helped you?

AFA has helped me in many ways, but the biggest is in the mentorship opportunities.

Meeting people like Linda Aldrich and Stephen Gourley has been so invaluable.

How do we build awareness about AFA?

The Active-duty Airmen and Guardians don't know who we are. A lot of them get us confused with AFSA and while some know about our events, they don't necessarily make the connection that AFA is behind them. I went to the AFA Convention and the vast majority of everyone I saw appeared to be over the age of 50; I think we are really missing the modern piece. Social media and branding is essential, and I think we have some room to grow.

Roman Hund

Home State: Minnesota

Chapter: Gen. E.W. Rawlings Chapter #213 (Minn.)

Joined AFA: 1989

AFA Offices: Chapter President, Chapter VP

Military Service: USAF, Colonel (Ret.)

Civilian Roles: Director, RSM U.S.

Occupation: Cybersecurity, Minneapolis

Education: Master's degree, Strategic Studies, Air War College; Master's degree, Management Information Systems, University of Montana; Bachelor's degree, Mechanical Engineering, University of Minnesota; Bachelor's degree, Engineering, University of St. Thomas, Minn.



Col. Roman Hund, USAF (Ret.)

How did you first hear about AFA?

During an AFROTC program in college.

What prompted you to join AFA?

At that time, the free membership.

What do you enjoy most about your AFA membership?

The support AFA provided to Airmen across the various units I was a part of in USAF.

What is your favorite AFA program, event, or project?

The Air, Space & Cyber Conference.

How has AFA helped you?

The Rawlings Chapter was instrumental in helping me build my network from scratch in Minnesota after retiring from Active duty.

How do we build awareness about AFA?

Get involved with Active, Guard, Reserve, Civil Air Patrol units, their activities and priorities. Help the Air Force connect to communities, government, and industry.

AFA began the **Emerging Leaders Program** in 2013 as an avenue to secure AFA's future. The purpose of the program is to identify, motivate, develop, and encourage emerging leaders to serve actively in AFA by providing hands-on experience and unique insights into how AFA operates and is governed. Emerging leaders volunteer for a year. With guidance from a mentor, they participate on a national-level council, attend national leader orientations, and serve as National Convention delegates.

Caty Rozema

Home State: Colorado

Chapter: Lance P. Sijan Chapter #125 (Colo.)

Joined AFA: 2018

AFA Offices: Colorado State VP for Aerospace Education; AFA National AEC member; Strategic Plan Committee member; Air Force Ball Chairwoman

AFA Awards: 2018 Chapter Citation; 2019 State Exceptional Service Award; 2020 Colorado State Member of the Year

Occupation: Associate Director, AT&T Air Force and Space Force Programs, Colorado Springs, Colo.

Education: Bachelor's degree, English, Communications, and Art, Calvin University, Mich.



Caty Rozema

who currently wear a uniform and those who wore one in the past. I don't take that honor lightly.

What is your favorite AFA program, event, or project?

I have to pick just one? That's tough! I love that AFA's Aerospace Education programs like CyberPatriot and StellarXplorers make STEM accessible to young people around the country (and world!). I am overwhelmed by the outstanding service of our CAP cadets. I'm inspired by our Arnold Air Society and Silver Wings members. I'm in awe of our Outstanding Airmen, Teachers of the Year, and scholarship recipients. AFA puts the best of the best on full display!

How did you first hear of AFA?

I was introduced to AFA after I was recruited in the hallway of my office building to join the Air Force Ball committee. I had to Google what AFA meant!

What prompted you to join?

I loved the energy of everyone I met through the AF Ball committee, so I transitioned onto the AFA board to serve alongside many of the same people.

What do you enjoy most about your AFA membership?

Those with whom I serve are incredibly dedicated to our Airmen, veterans, and their families. Their dedication is infectious and makes me excited to be part of it. As someone who's never put on a uniform, I truly feel like my work with AFA allows me the honor of serving those

How has AFA helped you?

AFA has afforded me the opportunity to sit among giants, people who have dedicated their lives to service in one form or another. It is humbling and inspiring, and I am incredibly grateful for the opportunity to learn from and serve alongside them.

How do we build awareness about AFA?

Relationships, relationships, relationships! We have the opportunity to build relationships with the next generation of leaders through AFA's programs. We should preach the gospel of AFA to young people who attend CyberPatriot camps, participate in StellarXplorers, serve through CAP, receive a scholarship, and so on. We can learn from them where there are gaps in support, then enlist them to help bridge those gaps. We can forge connections across our community—from military members and their families to veterans hoping to serve or whom we can serve. We can connect talents and resources with areas of need. We need to be the eyes and ears of our community.

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~Col. Rick Greenwood, USAF Retired



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By George Leopold

GUS GRISSOM ANSWERED THE CALL

Air Force Captain Virgil I. "Gus" Grissom was at the top of his game, working in pilot paradise as an all-weather test flyer at Wright Air Development Center in Ohio when he was summoned to Washington, D.C., via top-secret teletype message, instructed to report in civilian attire, and to discuss the order with no one.

Reporting as directed, he was ushered first to a room full of test pilots and then into a separate room to field "all kinds of odd-ball questions." The new National Aeronautics and Space Administration was looking for volunteer test pilots to join something called Project Mercury, America's response to Sputnik. The aim was to put men in space.

Grissom was conflicted. He had one of the best jobs in the Air Force and worked with engineers who were just as competent and committed to their roles as he was to his. But Grissom also sensed the glory days of test piloting were over. "It wasn't really flight-test at all," he recalled later. "It was mostly testing new gadgets." The age of electronic warfare had begun. Grissom was ready for a different kind of challenge.

Grissom enlisted in the U.S. Army Air Corps right out of high school in 1944, hoping to fly. But by then, too many other aspiring pilots were ahead of him, and World War II was winding down. Private Grissom ended up as a clerk, flying a desk.

Returning home to Mitchell, Ind., Virgil (the more macho moniker "Gus" would come later), installed doors on school buses in a factory job before he finally decided to take advantage of the GI Bill. Married by then to his high school sweetheart, Betty Moore, Gus enrolled at Purdue University and earned a degree in mechanical engineering in just three and a half years.

But Grissom's urge to fly had not subsided, so Grissom enlisted in the newly independent Air Force. Receiving his pilot's wings in 1951, he deployed to Korea as an F-86 replacement pilot, flying 100 missions in about six months. He was then sent home to be a flight instructor, an assignment he viewed as dangerous as air-to-air combat.

A master's degree in aeronautical engineering followed, then test pilot school at Edwards Air Force Base, Calif., followed by a plum assignment as an all-weather test pilot back in the Midwest. That's where he was when the call came to report to Washington.

Unbeknownst to Grissom and the other astronaut candidates, NASA was looking for more than mere flying skills. The space agency wanted engineers—like Grissom. And it didn't hurt that at 5-feet-7-inches, Grissom was compact enough to be easily shoehorned into space capsules so tight they were practically worn, almost like an out-layer pressure suit.

The astronaut candidates traveled to the Lovelace Clinic in New Mexico, where military doctors poked and probed their unwitting subjects so mercilessly that aviator Wally Schirra concluded well patients were being tortured by sick doctors. When NASA made its final selections, it chose three candidates each from the Air Force and



Gus Grissom during training for the Apollo 1 mission.

Navy, and one more from the Marine Corps. They would be known as the Mercury Seven, and Gus Grissom was among them. Featured on the cover of LIFE magazine, they were an instant public sensation. Not only did the astronauts represent the hopes of a nation, but both the media and public expected one of these guys to be blown-up on live TV.

Even among this exclusive fraternity, Grissom excelled. He was the first to fly twice in space and earned the maiden flight of two spacecraft in the space of 18 months: Gemini 3 in March 1965 and the ill-fated Apollo 1, scheduled to launch in February 1967. These followed Grissom's first spaceflight, which came close to killing him when the hatch on his Mercury spacecraft detonated prematurely and the spacecraft started filling with water. Grissom escaped into the ocean waters and the capsule sunk.

The book and movie, "The Right Stuff," Tom Wolfe's telling of the astronauts' story, portrayed Grissom as uncharacteristically having panicked under pressure, but recent research vindicates the Airman-engineer-astronaut, pointing to a static charge traveling through the cutting device used by the helicopter rescue crew to clip an antenna prior to lifting it out of the water as triggering the explosive bolts that held the hatch.

After two spaceflights, Grissom was at the top of the test pilot pyramid, and the risks grew greater. No one knew better than he that the more trips he tried, the greater the chances he could "buy the farm," as he said himself. As commander of the first Apollo mission, Grissom now faced his toughest challenge: to achieve President John F. Kennedy's goal from 1961 "Landing a man on the Moon and returning him safely to the Earth" by "the end of this decade."

As mission commander, Grissom was responsible for making that happen, and he'd have to do it with a Block 1 Apollo command module that was rife with design flaws: Thirty miles of wiring, a heavy, inward-opening hatch, and a pressurized, capsule environment of pure oxygen that would doom his entire crew.

On Jan. 27, 1967, Grissom joined Ed White and Roger Chaffee in the Apollo 1 capsule atop a Saturn 1B booster in a full-dress rehearsal for the first Apollo launch. Strapped in, the countdown underway, a spark arced between the wires under the astronauts' seats, igniting the pressurized oxygen in the cabin; the immense internal pressure held the hatch shut as the astronauts, desperately trying to escape, were asphyxiated.

NASA regrouped and redesigned the Apollo command modules, which would ultimately deliver 24 men to the moon and back again. The deaths of Grissom, White, and Chaffee helped ensure their success.

During the Mercury days, Grissom and the others had agreed that one of them would surely die before any man reached the moon. He calculated the odds and concluded it was worth the risk. ★

George Leopold is the author of "Calculated Risk: The Supersonic Life and Times of Gus Grissom."

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