

Exclusive: First Interview With the New Space Chief 06

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Tech Sgt. Herb Cintron via National Archives

A pilot from the 18th Tactical Fighter Wing boards an F-15 Eagle in preparation for takeoff at Misawa Air Base, Japan. The F-15 is being scrambled after the report that Korean Airlines Flight 007 has been shot down by a Soviet aircraft. See "The Near Nuclear War of 1983," p. 47.

ON THE COVER



SpaceX

A SpaceX Falcon Heavy, the world's most powerful rocket, is prepared for the U.S. Space Force USSF-44 mission at Kennedy Space Center, Fla., Oct. 31, 2022. Its Nov. 1 launch to geostationary Earth orbit was supported by U.S. Space Force Space Launch Delta 45.

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Truth & Consequences

Decisions lead to consequences, and at every echelon of leadership, the consequences grow. A flight commander worries about today's mission; a squadron commander's concerns might stretch to a deployment; the wing commander looks out 18 to 24 months; and so on. The higher you go, the longer the outlook.

For service chiefs and secretaries peering into the future a decade or more, the risk calculus gets evermore difficult. Blind spots, whether self-imposed or not, can lead to disasters. Misreading the future is like misplaying a move in chess: Once the move is made, there is no going back.

News that the Air Force has begun to draw down its two F-15 squadrons at Kadena Air Base in Okinawa, Japan, shows the cascading effect of decisions made years ago. Now approaching 40 years of age and restricted from the most extreme maneuvers, these once mighty airplanes have outlasted their anticipated lifetimes. The Air Force has already stopped training new F-15C/D pilots, so there is no longer a supply of new talent to fly those planes.

F-22s and F-16s from the other side of the globe will fill the gaps until new F-15EX aircraft and crews are available in sufficient number to move into place. That will take many years. Rotating units through Kadena means other combatant commands will have to gap fighter presence in their regions for long periods of time. This is a zero-sum game; when airplanes are removed from service and new airplanes aren't there to replace them, there's no escaping the shortfall. The trouble is, the Air Force has been doing this for years now and the problem will get worse before it gets better.

The Air Force still wants to retire 33 F-22A aircraft. These are not the latest F-22s, but the ones used for training.

Regardless, they are more capable than any other fighter in the world. The A models lack the full combat capabilities of the front-line F-22s. Link 16 and other capabilities would need to be added. The Air Force should have upgraded those airplanes to a full-up combat configuration years ago, but never did. Now the price tag and time to completion have gone through the roof. Estimates of the cost extend to \$100 million per airplane—more than a brand-new F-35.

All of this dates back to a bad judgment call. Then-Defense Secretary Robert Gates famously accused the Air Force leadership of "next-war-it is" for its unwavering commitment to building F-22s. He lambasted the service for betting the farm on "exquisite capability," setting up today's ugly irony: The U.S. now sees the People's Republic of China as America's pacing challenge, yet it no longer has the forces to keep two squadrons of front-line fighters in Okinawa.

The Air Force is working on regaining lost capacity, betting heavily that uncrewed Collaborative Combat Aircraft can become a new kind of force multiplier, enabling a single pilot to command a formation. These stealthy, autonomous aircraft would become extensions of a crewed fifth-generation fighter, expanding the portfolio of weapons and tactics available to each pilot. Once operational, this combination will complicate the sight picture for an adversary, putting fewer lives at risk and more warbirds in the air.

Air Force Secretary Frank Kendall seems encouraged, suggesting last month that these weapons programs are maturing fast enough that the Air Force will commit substantial funds for the concept in its fiscal 2024 budget request. That's a good sign. Kendall has set a

standard requirement—delivering meaningful operational capability to the warfighter—and the fact that he's ready to commit substantial funds means he sees the merit and a realistic shot at delivery.

Delivering meaningful capability from space is also the focus of Space Systems Command and Lt. Gen. Michael A. Guetlein. He is working to find new ways to take advantage of existing capabilities, whether military or commercial, before forging ahead with major new investment. The Space Force can do more with what it has, he argues. On the SSC campus in Los Angeles, threat briefings are now monthly. Banners on walkways declare "The Threat Is Real."

The need for such messaging is indicative of the challenge Guetlein faced. Was the former Space and Missile Command so out of touch that threats were not perceived? Perhaps. Guetlein says threat briefs were delivered only annually and success was measured by contract execution rather than capability delivered to warfighters. Now reformed as Space Systems Command, Guetlein is making clear his intent: "Exploit what we have, buy what we can, build what we must."

The concept is applicable to any military organization. Exploiting the untapped potential of existing capability is like prescribing medication off-label—finding a new way to use capabilities already available rather than buying or creating something new. It's efficient and fast. Buying what we need is a standard military operating procedure, but it's only recently that such a thing was possible in the space domain.


The Air Force's adoption of Agile Combat Employment is built on that same model. Developing multi-capable Airmen so that smaller

units can operate from distributed locations and flying tankers with extra crews to maximize tanker availability apply the same exploit what you have mentality. It's not always about getting more new

airplanes or other new hardware. Sometimes it's about making better use of the systems at hand.

In its own way, this is also a metaphor for the entire Space Force. Standing up a new military service offers not a blank slate, but an array of existing capabilities to be exploited, a market of commercial services that can be purchased and integrated, and a long list of known and still developing requirements that will have to be built for the unique circumstances of 21st century space operations.

The new Chief of Space Operations, Gen. B. Chance "Salty" Saltzman is on a mission to ensure his Guardians are not just capable space technicians, but warriors employing their tools and capabilities to stay a step ahead of their rivals in the domain, able at once to exploit their advantages for the benefit of joint force operations and also to deprive adversaries of those same kinds of capabilities. The decision to establish a distinct and separate Space Force three years ago was one of those consequential, no-turning-back moves that change the course of history. Enabling each service, the Air Force and the Space Force, to specialize benefits both. But it cannot and will not be enough to simply divide the pie. For these two services to attain the domination in their respective domains that will deter adversaries and win wars when they must be fought, that pie has got to grow.

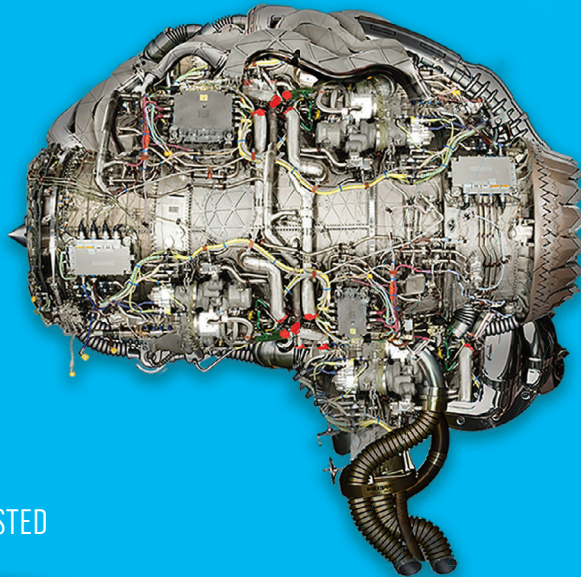
If the pie does not grow—if the nation gains a dominant Space Force without at the same time empowering the Air Force to achieve its obligation to achieve air dominance—we as a nation will have failed the test. What good is it to gain the heavens if we cannot dominate the skies? 

Misreading the future is like misplaying a move in chess: Once the move is made, there is no going back.



GO BEYOND

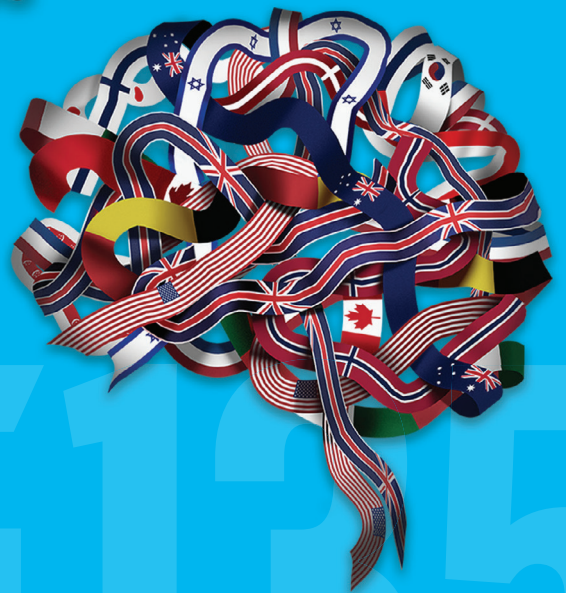
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Intelligence Needed

Re: the November article ["Refining the JADC2 Concept," November, p. 48] the statement, "No one knows what JADC2 is. It's just completely confusing," by Derek Tournear head of Space Development Agency. If Derek Tournear doesn't know what JADC2 is, I certainly don't.

However, allow me to make a few observations. First, let us agree that the need for interoperability is paramount. But that need is nothing new. The history of WWII certainly testifies to both joint service and multi-nation operations. Their were some successes and many failures.

As late as the Vietnam War we were still plagued by interoperability issues especially when it came to joint service close air support. And how many operations were compromised by ARVN forces spying for the Viet Cong?

Words have many meanings and sometimes the absence of a word is just as important. While I'm sure there are intelligence considerations going into the development of the concept, the absence of any mention in its title suggest it may not be given full consideration. I would add a big Capital I to JADC2, i.e. JADC2I and recognize the importance of intelligence and especially Signals Intelligence to battlefield management.

The history of warfare is replete with the importance of intelligence as a force multiplier. Consider, for example, the role of Ultra in WWII. A more specific example can be found in Operation Teaball during the Korean War where SIGINT and operational data were successfully merged to aid command and control.

As you go forward with concept development, I urge you to give due attention to the role intelligence can play.

Lt. Col. Jim Boyce,
USAF (Ret.)
Austin, Texas

The Eyes Have It

I read with interest Gen. Jacqueline D. Van Ovost's commentary on Tanker needs because I flew the airplane operationally from 1973, off and on until I retired in 1995. I draw your attention to one portion. She mentioned, as the article states, "... it has to be connected and have some sort of battlespace awareness."

Spoiler alert. When I took six tankers to Pisa, Italy, in support of Bosnia in 1993, we were shown a roll-board computer that displayed real-time locations of aircraft in the sector. Easy to read display, multi-ranging, and supposedly required minimal training for the nav. And voila!, the battlespace.

I don't know what aircraft General Van Ovost flew, but it's nice to know that Transportation Command is on it almost 30 years later. If I remember correctly, and before her time in the seat, someone at Transportation Command thought it a good idea to have a TV camera for the Boomer rather than eyes-on.

Is the KC-46 system EMP-hardened as well as the eye-patch was? I guess you have to be one of us dinos to remember that. And a single seat tanker? Let's just say I have my doubts. NKAWTG ("Nobody Kicks Ass Without Tanker Gas")—Nobody. It still holds true.

Col. Arthur E. Cole,
USAF (Ret)
Brevard, N.C.

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WRITE TO US

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

So what's it going to take for the USAF, and more importantly the AMC commander, to realize that the KC-46 is in trouble.

The recent incidents of class A accidents with regards to the boom operation are a fore shadowing of things to come for the stricken KC-46 tanker.

These pages have been full of reports of how this tanker was forced upon the USAF because it was built in America, and how the new boom system has had issues from the start.

Stop production now before we lose a tanker crew or worse.

The saying, "If it's not Boeing I am not going" no longer applies.

Col. Clarence Romero Jr.,
USAF (Ret.)
Marietta, Ga.

Back Burner

I found many of the articles in the October issue refreshing in what they did not contain. Absent was any mention of the terms that frequently appear when Air Force and Space Force leaders voice their priorities.

I'm talking about Diversity, Equity, and Inclusion, the infamous "DEI" permeating our culture, including the military services. None of these terms were mentioned in the editorial or in the many excerpts and interviews from the Air Space & Cyber Conference.

The only exception was Undersecretary Gina Ortiz Jones' call to recruit Chinese-Americans. But her point was not the need for diversity, it was the need for competence and expertise in the Chinese language. I hope this means that DEI has been put on the "back burner" in the list of Air Force and Space Force leadership priorities.

When it comes to people, they should choose CCU: Competence, Character, and Unity. And to further our goals of energy conservation—turn the gas off as well.

Col. Dennis Beebe,
USAF (Ret.)
Solvang, Calif.

BRAVO

Congratulations to Air & Space Forces Magazine, and in particular to author Tobias Naegele, on the series on the Chief of Staffs of the Air Force published over the last three (August-October) issues.

[Note: Part four appeared in the November issue.]

Collectively, the whole series was among the best reporting the magazine has ever put forward: A thorough, comprehensive, historical review of how each CSAF tackled the challenges they faced and how each sought to implement their vision in an ever-increasing joint environment.

The challenges were each different, driven by global engagements, budget constraints, and political-cultural influences. Together they shaped the Air Force into what it is today while also doing all they could to preserve the legacy Airmen have built and maintained over the past century.

As the articles pointed out, some of their ideas were well received, others not so much; some have endured, while many didn't. To a greater extent, the articles highlighted the challenges every CSAF faced at levels far and above that which 99 percent of the Air Force ever knew about; namely, their advocacy through testimonies to congressional committees and internal debates within DOD on how to present our forces, now and in the future.

They defined our character, mission, and values—the backbone of the closing lyric in the Air Force Song: "Nothing can stop the U.S. Air Force"

Col. Joseph Marchino,
USAF (Ret.)
Liberty, Mo.

Deja Vu

Rudyard Kipling once wrote that the wheel of the world passes through the same phases over and over again, and now I see that this has happened with the Air Force (AFSOC) acquisition of the Sky Warden, at the very point in time that the 6th Special Operations Squadron, the squadron that was built for just such an airplane, has been put on the chopping block.

Long ago, two colleagues and I stood up the 6th SOS following Desert Storm and advocated for just this type of platform for Foreign Internal Defense and other missions (including Armed Overwatch).

At the time we were told we would not be allowed to acquire such airplanes as the Sky Warden because the Air Force had no need for a gentleman's flying club or a junkyard Air Force along the lines of the Special Air Warfare Center during the Vietnam War.

Thus, I find considerable irony in the fact that at the very moment the ideal

squadron for this airplane and mission is being disestablished, the Air Force and AFSOC finally see the wisdom of alternative technology for such a mission. If your readers are interested in the story of the 6th SOS and the family of aircraft we tried to obtain for the squadron (e.g., the Ayres Vigilante, the forerunner of the Sky Warden) look up "Whither Aviation Foreign Internal Defense?" online and soak in how the U.S. Air Force and USSOCOM denied the tools necessary for the 6th SOS to perform its mission when it was fielded.

It is true that the 6th SOS got an old November Model UH-1 and some leased Russian aircraft from Ukraine as well as some cast-off aircraft from Europe, but the squadron never got what it really needed because neither the Air Force nor AFSOC nor USSOCOM could think outside their paradigms when it came to air power. I suppose just under 30 years isn't too long to wise up, but it's come too late for the 6th SOS.

Col. Wray R. Johnson, Ph.D.,
USAF (Ret.)
Fredericksburg, Va.

Fighting Fighters

I was saddened to read the "Raptor Rebellion" article in the September issue [p. 40]. The Honorable Dale White states that the Raptor was "built in a different era and that the threat has changed and the fight has changed!"

The F-22 is indeed extremely relevant and may be the greatest fighter design and platform. It may be realized that there was/is a developed detailed Total Life Cycle Logistics and Sustainment Plan for the F-22, inclusive of avionics upgrades and improvements with associated relative costs (and margins) over the air-vehicle life.

Philip L. Smeeton,
USAF (Ret.)
Flower Mound, Texas

OAY

Superb accomplishments listed for "Outstanding Airmen of the Year" [September, pp. 68-69]. Completion of four-year degree (if not already possessed), and immediate selection to Officer Training School should be offered Airmen meeting commissioning requirements. Impressive dedication and skills of individuals, as usual for our enlisted members.

Lt. Col. Steven L. Fuzzell, DBA,
USAF (Ret.)
Fleming Island, Fla.

The New Chief of Space Operations on Empowering the Force



Andy Morataya/USAF

Chief of Space Operations Gen. B. Chance Saltzman speaks at the transition ceremony for the chief of space operations at Joint Base Andrews, Md., Nov. 2, 2022. Saltzman relieved Gen. John W. “Jay” Raymond as the second CSO, the senior uniformed officer heading the Space Force.

Gen. B. Chance “Salty” Saltzman became the second-ever Chief of Space Operations Nov. 2, bringing with him a resume unlikely ever to be repeated. A space operator most of his career, he was the deputy air component commander at U.S. Central Command and the first Space Force S-3 operations czar. He spoke with Air & Space Forces Magazine Editor in Chief Tobias Naegele a few weeks after taking over as chief.

Q: Every new Chief brings with him ideas and concerns that grew out of personal experiences in the service over the course of a career. What was one of those for you?

A: I think one overriding thing that I was always frustrated by in the space community is how high up the chain decisions have to be made. Lack of trust, of lower-level [staff] ... Some of what I thought were the most simple decisions, you had to de-

fer up the chain. I thought that slowed us down. I thought that it didn't train our junior members to be a good decision-makers. And I just said, we have got to figure out how to empower our younger members—I'm thinking about the skills of officers here but this equally applies to the enlisted corps positions—how do we push this down? When we say Mission Command, do we mean it? Or is that just kind of the phrase of the day? And if you mean it, it's how you respond when they make bad decisions; it's how you respond to not being comfortable that you don't get to make a decision because it's more important that the right person at the right organizational level makes this decision—even if you think you might be able to make it better. ... Rather than pulling the decision and authority up, [leaders should] mentor down. Train them how to make the better decisions. It's the 'teach a man to fish' kind of thing. ...

There's a Thomas Jefferson quote that I have hanging on a placard back at home: 'I know no safe depository of the ultimate powers of the society but the people themselves; and if we think them not enlightened enough to exercise their control ... the remedy is not to take it from them, but to inform their discretion by education.' ... That's the way I see Mission Command. ... I'm going to delegate down, I'm going to empower ... and they're going to get some stuff wrong. They're going to do things not how I would do it. And I can respond one of two ways: I can pull those authorities away from them and pull them up. Or I can educate, train, build, and show them how to do better the next time and just live with the fact that it was not quite as good as I want them to be. And then hope they do that at the next echelon, and the next echelon after that. It's hard sometimes. When people make mistakes, I could be embarrassed. At some point, the Chairman's going to yell, or the Secretary of the Air Force, and I'm going to be embarrassed, probably in a public forum, for something that somebody else did, that I could have done better. ... And I think it would be a very human response to get mad down the chain and say, 'All right, you're never doing that, again, I'm doing it.' That's the real test. Do I have the conviction of this approach to say, 'Hey, I got embarrassed by this,' and use that as the training and mentoring opportunity [it should be]. ... I hope I have the patience to take the deep breath and have a mature response when that happens.

Q: Many Americans are still unaware we have a Space Force, or if they are aware, why we need one. How can you change that?

A: You know, I was at the Washington Commanders game [after Veterans Day] and they were doing a salute to service. All of the services are holding their seal with members of the service, and the Space Force was right there with all the others, and they played the medley, and they played the Space Force song. It wasn't a packed house, but it wasn't inconsequential either and it's on TV. You chip away, right? I can't educate 300 million people, but we can chip away at it. We just have to make ourselves available. ... One of the little things I like, is I'm gonna encourage our people to wear uniforms in the airports when they travel. It says Space Force. The times I've done it, people notice, they say, well, 'That's a real thing? I've never seen a Space Force guy.' ... So no big campaigns, just kind of keep chipping away.

Q: You're operating in a new sphere as a four-star and as a service chief. And I imagine there are still some who don't think the Space Force merits equal status. So you're challenge is to prove you belong on the team. How?

A: What I have working for me are facts. Over the last 20 years, the other services have been able to save money by buying different kinds of equipment in smaller numbers, because of space capabilities. Whether it's precision with weapons—you know how a B-17 drops 200 bombs and hits 0.5 targets, while one B-2 hits 80 independent targets because GPS. **You just don't either.** So that we will deliver force structure because they recognize now that our adversaries see the asymmetric advantage that space provides for the joint force. They are holding at risk our space capabilities. And they built their own space capabilities to do over the horizon targeting new capabilities to create this very defensive bubble for themselves.

I will argue that what we bring as a new service is focus. You don't have time to focus on how to get it right in space, because you're doing the air campaign, or you're doing the land campaign, or at sea. So don't worry about it. I've got you. We know

the nuances, and if we don't know, we're going to study, and we're going to dedicate ourselves to learning them. From the time you're a brand-new technician or a second lieutenant, we are thinking about the space domain, and where the vulnerabilities are, and how you could shore those up. It's just dedicated focus, and that's going to make the joint force better. ... Every time we say those words, nobody disagrees with us.

Q: So that makes you the indispensable force?

A: I don't think we're the indispensable force. I think they're all indispensable, because the problems we're gonna face are multi-domain problems. So the joint force has to collectively think about vulnerabilities, attack vectors, opportunities, weights of effort from all the domains to create problems. ... The bad analogy is like a cake. What's indispensable? The flour? The eggs? So my job is just eggs. That's what I do. But if we think about how it comes together when you mix it, is a joint force.

Q: Size is an issue. The Space Force is still too small to send the right level leaders to all the meetings and places they need to be, too small to fill all the jobs you probably need. What's the right size for the force? Do you have a hard number in mind?

A: There are still some substantial growth areas. ... I think our headquarters is still not the size that it needs to be to effectively integrate into the Department of Defense. There are still some gaps. I don't believe our general officer corps is the size it needs to be. The tip of that pyramid kind of starts to define what the rest of the structure needs to be. We have our service components that are going to the combatant commands, that are going to be responsible for integrating space capabilities and all of the command commands. We're talking about two dozen people right now in EUCOM. That's not going to be sufficient. ... We don't have the test community that we need. We don't have the training infrastructure that we need. Our institutional force is not the size it needs to be to maintain the quality of training and education, doctrine, and operational concepts. That's all new for us. We lived with Air Force operational concepts. Now we've got to build our own, we lived in the margins of Air Force tactics validation. Now we've got to develop our own. So these are all growth areas. Would it surprise me if five, six, seven years from now we're twice as big? No.

Q: Within your service, you have just two four-star general billets, the chief and the vice, and until you have someone commanding U.S. Space Command, you're not going to have a third. Do you have a picture of how many general officers you think you need?

A: I looked across all the services and said, OK, if you have this many general officers, what does a healthy pyramid look like? And it's actually pretty consistent. For two four-stars, you would need six three-stars, 12 two-stars, and 16 one-stars. That's kind of the planning factor the other services use, and if we had that, that would work. So that's 36 we now have 21. It would be a big increase.

Q: And that would build the structure to give you the numbers you need?

A: The problem is that Congress could throw billets at us tomorrow, but we've got to grow people to fill those positions. Everything I just mentioned, those are not entry-level positions. If you're going to be a tester, you've got to have some operations background. If you're going to represent space in the combatant commands, integrated into our plans, you've got to have an

operational background. So when the hole in your force is that mid-grade to senior grade, the only way out is either pull from other forces, other services, civilianize, or allow time to grow the force. And it's a combination of all three ... take a program manager in Space Systems Command, should that program manager be a GS-15 or an O-6? Because if it's an O-6, it's going to take me 18 years to produce one of those, because every O-6 starts as a second lieutenant. And if it's a GS-15, I might be able to pull somebody that's got program management experience from commercial industry or another place and pull them straight over.

Q: What is your guidance, then, to the force?

A: My priorities start with a resilient, ready, combat-credible force. And I know exactly what that means. But when I talk to some of the junior and senior officers, they don't necessarily know in detail what that means. My experience, from the Weapons School and employment of air power has given me a very, very clear understanding of what needs to be done. That means it's my job to make sure they understand, to train them, to document my guidance and help them understand. Because this is the shift to a mindset of contestability that most of these officers didn't grow up learning. They grew up in engineering—how do I make the system last as long as possible? How do I make decisions for longevity?—Not how do I make decisions for attrition, and attrition and other things you think about in a contested domain. So it's my responsibility to convey that ... so that they're ready.

Q: The Space Force is roughly 50/50, officers to enlisted. That's a very different model than what you see in other services. Do you anticipate it will stay that way?

A: This is where we have to go back and do some things that the other services haven't had to do for a long, long time: Ask what, exactly, is the purpose of your enlisted corps? ... The answer is that technical is always the bedrock of the enlisted force. We have a highly technical workforce. And if we can continue to give them the experience and longevity in certain areas, you create this technical competency, ... the systems operators ... the technical corporate knowledge. On the acquisition side, I think that the technical skills to accomplish the JCIDS [Joint Capabilities Integration and Development System] process can be heavily weighted on the civilians. Again, longevity ... grows over time. So you have these two technical skill sets: For operations, it's the enlisted. On the acquisition side, it's the civilians. And your officers, they are the leaders. They have to understand all of that, but they have to make decisions. And that's a fundamentally different skill set. You have to train them for that, to take all these inputs and [decide] ... this is what we're going to do. That's what the officers bring.

Q: At the Space Systems Command campus in Los Angeles, you see banners posted that say, 'The Threat is Real.' The implication is that people either hadn't believed it or weren't thinking about it. Your focus is similarly on warfighting. What are you doing to build that part of the culture?

A: I was with the 18th Space Defense Squadron—they're the ones that maintain the space catalog [of satellites on orbit]. And I'm talking to this specialist. He's great. And he is so excited about his job, right? He's tracking the mega constellations. So a StarLink launch is up and 60 spacecraft fly off. And I don't know if you know how they do that, but they just tumble the rocket body and ... because the velocities are slightly different, that's hard to differentiate quickly, when you're just using ra-

dar. So it's a processing problem. He says 'the last time they did this launch, it took us, you know, like 48 hours before we even saw 60. And this time, we did it like 16 hours, because we use a slightly different radar looking angle.' ... And I go, 'Hey, what can the enemy do to take advantage of this and hide their activities?' ... And he didn't know how to answer. So I say thanks, and then I grab the squadron commander, and I say, 'He doesn't understand the threat. He doesn't understand what I need from him, and that there's an adversary who is trying to prevent him from doing his job.' Because—I know, we don't have the simulators to simulate that, and I don't have the procedures and tactics to quantify that, and that's my job. But we've got to start having these discussions with these kids. That's the shift. It's not about the catalog—that's what it always was about before. It's about threat. It's about our need to understand the domain. And the adversary is trying to prevent us from understanding it.


Q: There's a great line in the movie "Dr. Strangelove" where the point is made that the Doomsday weapon cannot deter anything if no one knows it exists. The Space Force is ultimately playing a very high-level strategic game. How much do you let adversaries know? And how much does holding information secret limit you from getting the money you need to be effective?

A: So this is 'the Space Force Theory of Success.' I'm writing it. And you don't get to see it yet.

Q: It says 'unclassified.' You're not going to let me see it?

A: You're going to see it eventually. But not yet. Because if we don't describe what we're trying to do, how do we know what to build? How do we know where to go, where to put our resources? And this is so complicated, it's so technical. We have to be able to describe this in an unclassified way to say, 'This is what the problem is,' and 'this is our approach to addressing it.' And 'Here's what we need to focus on, and buy, and invest in.' ... Here's how I see my role in how we're doing the business of the Space Force. I've watched too many times the senior leader, issue guidance and direction and a strategy that becomes an action plan. And then some Director of Staff somewhere starts tasking it out. We've all seen this with varying degrees of success. ... I'm going to try to kill two birds with one stone, proving that the Pentagon supports empowerment and giving you [military and civilian Guardians] a broad understanding of where we're headed. I want to give some left and right guardrails. And then you owe me all of the activities that support it. The activities are going to be broad enough that it requires all of them to do something. There is a training and readiness piece to this, there is an operational piece to this, and an acquisition piece. I'm not going to write any big lines of effort that don't affect everybody. So therefore, now you come back to me. ... I want to see your plan for implementing my vision.

Q: So is it implicit that you expect your commanders to push that request down to the next level, and so on?

A: It's not implicit—it will be explicit. I have no reason to believe that you can do this if you hold the authorities to yourself. You have to pass this down. And [those subordinate organizations] organically determine the opportunities, activities, and investments that are needed at their level, for their piece of the puzzle, and that aggregates up under your vision, which aggregates up under my vision. So there's going to be buy-in because it's their ideas, their initiatives. We're going to provide enough guidance so that we're happy with whatever they come up with. 

Ain't No Mountain High Enough



Master Sgt. Jodi Martinez

"We've been here before. ...

To meet national defense objectives, we must adopt the mentality that challenge is not synonymous with impossible and contested is not the same as impenetrable. ... Yes, we will have to fight to get to the fight, but we will get there."

—**Gen. Jacqueline D. Van Ovost**, head of U.S.

Transportation Command, speaking on national security at the Airlift/Tankers Association Symposium in Denver [Oct. 29].



Ukrainian Military TV

Robotic Warfare

"Ukraine is the best test ground, as we have the opportunity to test all hypotheses in battle and introduce revolutionary change in military tech and modern warfare. ... We have been convinced once again the wars of the future will be about maximum drones and minimal humans."

—**Mykhailo Fedorov**, Ukraine's vice prime minister and minister of digital transformation at a NATO conference in Norfolk, Va. [The New York Times, Nov. 15].



Senior Airman Erica Webster

Hands Tied

"We said this a million times to the Hill.

[Continuing Resolutions] are really painful because we're losing buying power. It's already painful enough to plan for the budget without the CR freezing you to what you spent last year. No new starts. No ramp-up in production. And you wonder: if you're in a race against China, is it ... right to shackle ourselves? Why are we doing this type of thing to ourselves? It's crazy ... what happens ... in May ... you're obviously under-obligating, because you just got your money and you're just trying to award the contract.

But you're behind the power curve; therefore you can't spend all the money, therefore 'we're going to take half your money.' It's not at all logical, but that's the current process."

—**Heidi Shyu**, undersecretary of defense for Research and Engineering, George Mason University seminar on defense acquisition [Nov. 4].

The Big One



Chen Zhonghao/Xinhua via Ministry of Defense

"This Ukraine crisis that we're in right now, this is just the warm-up. The big one is coming. And it isn't going to be very long before we're going to get tested in ways that we haven't been tested [in] a long time. As I assess our level of deterrence against China, the ship is slowly sinking. It is sinking slowly, but it is sinking, as fundamentally they are putting capability in the field faster than we are."

—**U.S. Navy Adm. Charles Richard**, commander of U.S. Strategic Command, at Naval Submarine League 2022 Annual Symposium [Wall Street Journal, Nov. 6].

NOT IN MY BACKYARD

"Spacefaring nations must minimize the risks to people and property on Earth of re-entries of space objects and maximize transparency regarding those operations.

It is clear that China is failing to meet responsible standards regarding their space debris."

—NASA Administrator **Bill Nelson**, condemning China's practice of allowing uncontrolled spent rocket boosters to tumble back to Earth after days in orbit. [Washington Post, Nov. 4].

EYE OF THE TIGER



Wang Jiangbo/Xinhua via Ministry of Defense

The period of time in the transition into a great power, especially just before reaching there, is the time of highest risk in national security. ...

Now a battle has begun surrounding key military technologies to seize advantages in future wars. ...

We have to work hard on forging sharp offensive and defensive weapons and accelerate the development of trump cards to deter the enemy and win the war. ... We are more thirsty for talented people than at any other time in history!"

—Revisions made to the **Communist Party Constitution** in order to protect overseas interests [South China Morning Post, Nov. 6].

LOOK,... OVER HERE

"It puts this thing within range of Russia. We are intentionally trying to be provocative without being escalatory. ... We're trying to deter Russian aggression, expansionist behavior, by showing enhanced capabilities of the allies."

—**Lt. Col. Lawrence Melnicoff**, U.S. Special Operations Command Europe, on the launch of a long-range cruise missile in the Arctic from a C-130 as part of the Air Force's Rapid Dragon program, [Stars & Stripes, Nov. 9].

By John A. Tirpak

Production Matters

U.S. Air Force Airmen and Department of Defense contractors prepare to load munitions into a C-17 Globemaster III assigned to the 452nd Air Mobility Wing, March Air Reserve Base, Calif., on the flight line at Travis AFB, Calif., in April. The United States continues to reaffirm its unwavering support for Ukraine's sovereignty and territorial integrity.



Senior Airman Jonathon Carnell

American weapons have played a huge role in Ukraine's success at repelling Russia's invasion. But many of the weapons credited with that success—Stinger anti-aircraft missiles, Javelin anti-tank missiles, and the (HIMARS High Mobility Artillery Rocket System)—are out of production and drawing down fast, highlighting an Achilles' Heel in U.S. military power.

"Production is deterrence," undersecretary of defense for acquisition and sustainment William LaPlante said at a Potomac Officers Club acquisition conference in October. Production can't be an afterthought of development—"buying the minimum number we can get away with"—but must instead be the primary drive in acquisition. Production lines must be constantly humming, "And we're going to have to pay for it," he said.

A self-described "nerd," LaPlante said he loves prototyping and experimentation with new weapons; but if they don't make it to large-scale manufacturing, he noted, such efforts are pointless.

Adversaries are not deterred by "things in the lab," he said, but by "real live" weapons that can be put into the hands of troops quickly. He also said that while he's delighted with the surge in prototyping and experimentation since his last tour at the Pentagon, there's "an excess of it, really" and it detracts from production.

"All that matters is getting [hardware] to warfighters at scale," he said. "If you don't get into production, it really doesn't matter." Ukraine is not winning with quantum computing or artificial intelligence, but "hardcore production of really serious weaponry," according to LaPlante.

This, he said, has been the key lesson that has "hit home" from the Ukraine war, and it "amplifies" the approach he's been taking to the A&S job: an emphasis on production.

Moreover, LaPlante thinks Congress is ready to adopt the same position and put money toward warming up production lines and allowing multiyear buys.

At a November streaming seminar hosted by George Mason University, LaPlante said Congress has been alarmed at the difficulty of replacing weapons supplied to Ukraine and is ready to give the Pentagon more room to stock up.

"They are supportive of this," he said. "They are going to give us multiyear authority and ... the funding" to put billions into the industrial base "to fund these production lines. That, I predict, is going to happen." In October, there was a bipartisan amendment from the Senate Armed Services Committee to the National Defense Authorization Act that would give the Pentagon power to conduct wartime procurements of in-demand munitions.

There's no question China is serious about becoming, first, a regional hegemon in the Indo-Pacific, and later the world's top superpower, LaPlante stated in the October address. Ukraine also teaches that "a real, high-end fight" with a peer adversary is not just something that could happen "five or 10 years from now" but "next year, next month." That's why the U.S. needs to change its sine-wave pattern of boom-and-bust munitions buys, and get to a routine pattern that will both build stocks and diversify their sources, LaPlante said.

Deterrence stems from "three C's," LaPlante said: "Communication, capability, and credibility." The U.S. has to have the goods to back up its credibility for deterrence to work, he remarked.

"The other side ... has to understand what you mean and intend," he said. Healthy stockpiles or the ability to replace what's used send that message.

In Ukraine today, deterrence "is working," he insisted. NATO and Russia are not at war and "hopefully ... will not be" and that is due,

"All that matters is getting into production, at scale!"

—William LaPlante, undersecretary of defense for acquisition and sustainment

he asserted, to production lines.

The idea applies across the spectrum of capabilities, LaPlante said. If an enemy knows that the U.S. can produce “smallsats off the line in a couple of days” such that “if they take out a hundred of them, you can put up another hundred of them in three weeks,” the enemy probably won’t bother to try taking them out in the first place. “That’s deterrence,” he said.

STOCK THE PILE

Russia is watching to see if more weapons are waiting to backfill those used, LaPlante said. If “a country can keep going into its magazine and has production, that’s deterrence,” he repeated.

Steady production is essential because “you can’t predict ... what you’re going to need. You can try, but you’ll be wrong half the time.” LaPlante added, “You have to hedge your bets.”

The Stinger production line ended in 2008, and the HIMARS ended production in 2017. The weapons going to Ukraine are being provided from U.S. stocks, and it has taken diligence to round up all that are available, LaPlante noted.

“The Army never throws anything away,” he observed, and many rounds have been found, forgotten in warehouses. When a service “tells you they’re ... out, ... tell them to look again,” he said. But that’s no substitute for being able to place a quick-turn order for more.

“If you can’t get something in three years, nobody cares,” he said.

LaPlante is banishing the “WalMart” model of just-in-time delivery schemes.

“Remember all this?” he asked, citing management models that “‘inventory is waste,’ ‘cut out redundancy,’ ‘tooth-to-tail.’” That system couldn’t “go wrong ... until we have Ukraine.” The solution is to keep production lines going at some level even when stockpiles are healthy, LaPlante said, and the resulting cost is one the U.S. must simply bear in a quasi-Cold War environment.

“You have to pay for it; you have to plan for it,” and accept the cost of creating capability that may never be used, he indicated.

In September, LaPlante chaired a meeting of NATO armaments directors, and the consensus of the attendees was that NATO and partner nations must not only have warm production lines of staple weapons, but that there must be multiple, redundant production lines, and probably in multiple countries. Moreover, the weapons produced must not only be interoperable but “interchangeable,” LaPlante said after the meeting.

There’s “great power” in having multiple lines that can surge production on fairly short notice, he said. This was a consensus of the 45 NATO armaments directors, who were not only trying to plan a way forward for Ukraine, but also a long-term munitions plan for the alliance.

In recent years, acquisition officials have learned that many NATO partners expect to rely on U.S. stocks in a contingency and reimburse the U.S. afterward. This came into high relief during the 2011 Libya operation, after which the U.S. urged its allies to stock up for themselves, as it could not guarantee an alliance-wide supply in a future conflict.

The NATO group also agreed to jointly address single-point-of-failure supply chain issues that affect all members. These include ball bearings, microprocessors and solid rocket motors, among others, LaPlante reported. Smaller working groups were set up to address how these supply chain issues could be mitigated, possibly by setting up multiple public-private partnerships in a number of countries to produce components.

“Not for everything,” LaPlante said, but “where it makes sense.”

Contractors won’t like multiple production lines because “they are ... setting up” their own competition and “lowering the barrier for entry” into the market, LaPlante acknowledged.

He told the November audience that the Pentagon will have to come up with incentives to persuade companies to do just that, but the biggest one will simply be a “clear demand signal” from the Pen-

tagon showing that it’s worth companies’ while to facilitate for scale production. With the up-and-down munitions buys of the past, there was a reluctance to do that. The Pentagon and NATO allies broadly need to show “we’re serious,” he said.

Many companies have told him “ ‘sure, you’re going to put a lot of money against this now ... but two years from now, you’re going to leave me holding the bag.’” They can point to times when “‘you’ve done that to me before,’” he added. Multiyear contracts will go a long way toward easing those concerns, he said. It will also be “in the contract.”

The industrial base, “both in our country and around the world, want to know there is a sustainable longer-range plan for ... production” so it can invest appropriately, he explained to reporters after the NATO armaments director’s meeting. The directors agreed they no longer want to buy “in panic mode,” going back to “minimal production when the crisis is over.”

The European Union and NATO want “more stable” buying plans “looking at the world ahead.” All the partners have “made commitments” to this, LaPlante reported.

ACCELERATE

In a post-meeting summary issued by the Pentagon, the U.S. delegation to the armaments directors “outlined the Department’s analytical approach to identifying supply chain constraints for major components and sub-components, and plans to increase production of ground-based long-range fires, air defense systems, air-to-ground munitions, and other capabilities” for Ukraine.

“Nearly 20 other countries briefed plans ... to expand their nations’ industrial base to accelerate production,” according to the summary.

Both to help Ukraine and themselves, the participants “recognized the importance of standardizing requirements, thereby creating more interchangeable and interoperable systems.” In addition, they discussed building “sustainment capacity in Ukraine, including forward repair activity, access to spares, and other sustainment enablers.”


LaPlante also emphasized that the “defense industrial base” is now simply part of the national—and even international—industrial base, and changing this mindset will allow the Pentagon to broaden its sources of innovation as well as production, he said.

The NATO nations and their partners have wearied of highly complex weapon systems that take forever to get to the field, LaPlante voiced at the GMU forum, and they are collectively of a mind to embrace what others have done, in order to save time and not reinvent the wheel. He held out as an example the E-7 Wedgetail AWACS-type aircraft developed by Boeing for the Royal Australian Air Force. The U.S. Air Force has decided to adopt the E-7, after it is modified to better operate with USAF units.

“It’s in production. Imagine that,” he said. The allies “are going to want to do more of that.” With that sentiment goes a commitment from the U.S. to share more technical information. He said potential adversaries will “pay a whole lot of attention” if production lines “showed up in Australia and Japan for capabilities that had previously only been produced in the United States.”

Pentagon Undersecretary for Research and Engineering Heidi Shyu, also at the GMU forum, said that the collective response to the invasion of Ukraine—and the coordinated response of providing materiel and weapons—has worked surprising well. The U.S. also shared tightly held intelligence with its partners ahead of the invasion, and “everything” that was predicted “came true,” she said. That “builds trust,” she affirmed.

It should be pointed out, too, that “the stuff works,” LaPlante told the Potomac Officers Club.

“For all the criticism we give ourselves,” about the byzantine acquisition process and the ordeal of bringing weapons into production, “the stuff works, and it works really well.” That, too, is a strong deterrent, he noted. 



F-22 Raptor Demonstration Team commander and pilot Maj. Joshua Gunderson put the power of his jet on display at the Orlando Air and Space Show in October. Despite its unparalleled flight characteristics, the Air Force intends to soon retire 33 F-22As like this one because upgrading them to the full combat configuration would cost up to \$100 million each.



A special operations Airman rappels from an MH-139A Grey Wolf, at Eglin Air Force Base, Fla., in the first test of the new aircraft's fast-rope system. The Air Force is buying up to 80 of the MH-139As, which are faster and more survivable than the UH-1Ns they will replace, and also offer greater range, endurance, and payload capacity. Testing will continue for the next year.



A U.S. Air Force 44th Fighter Squadron F-15C Eagle took on fuel from a KC-135 Stratotanker over South Korea in November. The Air Force announced it will gradually draw down the 44th, as the service is no longer training new pilots on the F-15C and must now begin to retire those airplanes. The Air Force acquired its first F-15s in 1979, and the planes now average 39 years of age; the KC-135s are even older, averaging 60. Few Americans realize the heroic work of Airmen and civilians required to keep these warbirds flying.



Flying Together for 75 Years

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For more than seven decades, U.S. Air Force pilots have taken to the skies, and Rolls-Royce has proudly supplied thousands of engines to keep them aloft. From the early V-1710 engines powering P-51 Mustangs, to the current fleets of C-130J, CV-22 and Global Hawk aircraft, as well as the modernized B-52s soon to be powered by Rolls-Royce engines, our facilities in Indianapolis, Indiana, have kept those aircraft soaring.



(From Left) P-51 Mustang, powered by the V-1710; C-130J, powered by the AE 2100; and B-52, soon to be powered by the Rolls-Royce F130.

Even before the Air Force was established in 1947, aero-engines to power U.S. military aircraft were manufactured at our Allison Engine Company factories in Indianapolis, which continue to support the Air Force. These factory locations produced the power plants for the iconic fighter aircraft of World War II: P-51s, P-38 Lightning, P-39 Airacobra, P-40 Warhawk and others.

These were the most powerful and advanced engines of their time.

Following the war, skilled engineers and mechanics began producing innovative and powerful jet engines for the first Air Force jet fighter, the F-80 Shooting Star. By the mid-1950s, the mighty T56 turboprop engines were powering the new C-130 transport planes for the Air Force. The T56 engine line proved to be one of the longest running engine types in history, and T56 engines are still being produced at Rolls-Royce Indianapolis.

Today, Rolls-Royce produces the powerful and efficient AE family of engines in turboprop, turboshaft, and turbofan variants. The AE 1107C powers the CV-22, the AE 2100 powers the C-130J and the AE 3007H powers the Global Hawk. Altogether, over 7,000 engines in the AE family have been produced, totalling more than 82 million engine flight hours of dependable service. And we will soon begin assembly and test of the F130 engines in Indianapolis for the iconic B-52.

While our history unites us, it's our future with the U.S. Air Force that inspires us day in and day out, including our work on hypersonics, directed energy, micro-reactors, and sustainable propulsion solutions. So from us to you, congratulations for 75 years of aerospace innovation. We are happy to continue the ride into the wild blue yonder!





Senior Airman Jessi Roth

An F-15C Eagle assigned to the 44th Fighter Squadron approaches a KC-135 Stratotanker to receive aerial refueling as part of Exercise Southern Beach over the Pacific Ocean, Sept. 15, 2022. Bilateral training builds trusting relationships among foreign and domestic forces.

Fifth Air Force Eyes a Future Without F-15s

By John A. Tirpak

The Air Force began bringing home the first of 48 F-15C/D Eagles from Kadena Air Base, Japan, in November—without permanent replacements available. Kadena, located on the Japanese island of Okinawa, is 450 miles from Taiwan.

The Air Force is no longer training new F-15C/D pilots and is phasing out the aircraft, which are approaching 40 years old. While USAF once planned to replace all its F-15s with F-22 Raptors, it never acquired enough F-22s to fulfill that dream. The Okinawa F-15s at the base are the last C/D models in the Active-duty force; the remainder belong to the Air National Guard.

Kadena officials said the phase out of the Kadena F-15s will take place over two years, during which the base will backfill with “newer and more advanced

“We need to buy fighter aircraft capacity now ... to reverse the decline in fighter force structure, as what is happening at Kadena today is the tip of the iceberg.”

—Retired Lt. Gen. David Deptula, dean of AFA’s Mitchell Institute for Aerospace Studies

aircraft” from elsewhere. Those will include F-22s, the F-35 Lightning IIs, new F-15EX Eagle IIs, but also could include F-16s or F-15Es from other bases.

Air Force officials said F-22s from Joint Base Elmendorf-Richardson, Alaska, will be the first to deploy to Kadena. F-16s from Spangdahlem Air Base, Germany, could also be in the mix.

The Air Force declined to comment on future plans to backfill the F-15s at Kadena. “We don’t discuss deployments until the aircraft arrive at their deployed locations,” said a spokesperson at the Pentagon, who could not immediately say whether the 44th and 67th fighter squadrons at Kadena, which are giving up their F-15s, will be inactivated.

Air Force officials have said the preferred approach is to replace the F-15Cs in Japan with new-build F-15EXs. However, having reduced the planned buy of F-15EXs from 144 aircraft to 80, there won’t be enough of the new aircraft to replace the

Kadena jets as well as Air National Guard jets based around the U.S.

The Air Force funded 24 F-15EXs through fiscal 2022 and has requested funds for 24 in both fiscal 2023 and '24. Deliveries will lag funding by several years, however.

Until then, the Pentagon will use the “Global Force Management process to provide backfill solutions that maintain regional deterrence and bolster our ability to uphold our treaty obligations to Japan,” the Air Force said in a release from Kadena.

The Global Force Management process apportions forces based on theater commander need, not necessarily the service providing the capability. It was not clear if Navy and Marine Corps aircraft could also be used to fill in from time to time.

In a March streaming event with AFA’s Mitchell Institute for Aerospace Studies, commander of Pacific Air Forces Gen. Kenneth S. Wilsbach said the Air Force is eyeing the F-15EX for Kadena.

“What we intend to use it for, there, if we’re so fortunate to get that replacement, is air superiority, and some long-range weapons capabilities that you can conduct on the F-15EX,” Wilsbach said. Unlike the F-15C/D, which is an almost exclusively air-to-air platform, the F-15EX retains all the range and ground-attack weapons-carrying capabilities of the F-15E on which it is based. The EX can carry the stealthy AGM-158 Joint Air-to-Surface Standoff Missile, he noted, which will be an important force-multiplier for the units equipped.

Wilsbach said, “You will be able to see some of that as we unveil” plans in upcoming budgets.

The Air Force has had F-15s at Kadena since 1979, when its first A/B models arrived. The Kadena-based F-15s of the 44th and 67th fighter squadrons were the first operational Eagles to be equipped with an active electronically scanned array (AESA) radar, the AN/APG-63(V)3, between 2007 and 2010; and in 2020, they were the first to be operational with the Lockheed Martin “Legion Pod,” which is the first infrared search-and-track system compatible with the Eagle.

Retired Lt. Gen. David A. Deptula, dean of AFA’s Mitchell Institute for Aerospace Studies, said the retirement of F-15s from Kadena is the inevitable result of the “consistent underfunding of the Air Force over 30 years.” The lack of an immediate, ready-to-go successor for the aged F-15s, he added, shows the “neglect and shortsightedness [of] presidential, congressional, and Department of Defense leadership decisions made over the past three decades.”

Depending on rotational replacements, Deptula said, will “stress those aircraft, maintenance personnel, the deployed aircrews, and their families—exactly at a time when pilot retention is a serious problem.” Worse, it exacerbates a shortage of Air Force fighter aircraft that are in high demand by all the combatant commands.

“We need to buy fighter aircraft capacity now at a rate to reverse the decline in fighter force structure, as what is happening at Kadena today is only the tip of the iceberg if we don’t,” Deptula said. “There will be insufficient capability and capacity to execute the new National Defense Strategy,” he added, noting unless the Air Force starts buying and building more aircraft, deterrence is “only an aspiration, not a reality.”

Air Force Touts Unity of Effort Pushing Toward New Collaborative Combat Aircraft

By John A. Tirpak

The Air Force will make a “significant investment” in uncrewed, collaborative combat aircraft, or CCAs, in the fiscal 2024 budget, a quartet of generals announced at the Pentagon. They insisted that the technology is mature enough to move aggressively toward a program that will yield operational capability in a few years.

Air Force Secretary Frank Kendall has previously said CCA technology is mature enough that the concept can proceed to becoming a program of record, and that it will first appear in the '24 budget request.

The four generals—Maj. Gen. Heather L. Pringle, commander of the Air Force Research Laboratory; Maj. Gen. R. Scott Jobe, director of plans, programs, and requirements for Air Combat Command (ACC); Brig. Gen. Dale R. White, program executive officer for fighters and advanced aircraft; and Brig. Gen. Joseph D. Kunkel, director of plans and deputy chief of staff for plans and programs—collectively made the case that the push toward CCAs is well coordinated within the service, that the operational side of the service is onboard with the concept, and that experimentation so far has shown that it will be, in the words of White, “a game-changer.”

The presentation seemed arranged to show unity within the service about the desirability of adding uncrewed airplanes to the crewed aircraft fleet, with buy-in from operators, technologists, budget planners, and sustainers.



USAF/courtesy

The unmanned XQ-58A Valkyrie releases the ALTIUS-600 small unmanned aircraft system in a test at the U.S. Army Yuma Proving Ground test range, Ariz., March 26, 2021.

In recent months, some current and retired senior leaders, including ACC commander Gen. Mark D. Kelly, have cautioned that introducing CCAs must be done iteratively, so that aircrews can build trust in their autonomous teammates and be comfortable with the technology before taking it to war.

CCAs “bring you a lot of opportunity for tactics, techniques, and procedures development, with different kinds of scheme of maneuver [and] with a different firepower that’s really not been seen before,” Jobe said.

“If you think of these things as an extension of our crewed aircraft, and the ability to manage risk in a different way, it brings

a lot of potential capability, at a lower price point,” he said.

White said that an “enormous amount of analytical work” has gone into the concept, and that along with the science and technology done to date, “it’s instilled a level of confidence in us that this is a capability to pursue, that we need to pursue quickly, and we believe that it’s a game-changer.”

In order to “move the needle to get the capability faster,” White said companies were brought in early to “show us the art of the possible,” and “they have answered the call.” This was a different way of approaching a new capability, he said, and “we have worked with many vendors.”

It’s a “very collaborative relationship,” White said. “I think that’s what’s really key.” There has been “user involvement” since the beginning of the program, he said.

The CCAs will build directly on work done with the Skyborg program, one of the Air Force’s “Vanguard” technology incubators, which has created an artificial intelligence that can fly an aircraft. Skyborg has demonstrated that the technology is “portable,” Pringle said, having been shown to work in a number of different uncrewed aircraft, both solely and in concert with crewed aircraft. More demonstrations are still to come and are underway, she said.

The capability “in and of itself is critically important,” White said. The speed to ramp is really important, because this capability is something that we do believe will change the nature of the fight.”

While they would not characterize the level of funding planned for the program, “what I can say is, when our budget goes across the river, you’re going to see a significant investment” in CCAs, Kunkel said. He’s under orders from Kendall to “field an operational capability as soon as possible.”

Jobe added that the time to a usable capability must be “on a relevant timeline,” but he didn’t elaborate, except to say it’s “not something that’s going to take 10 years.” The timing of CCA introduction is “sensitive,” he admitted.

Capability development is taking place in “five distinct areas,” Jobe said, to apply CCAs to a highly complex threat.

This, in turn, requires “teaming across the entire Air Force, [which has] been fairly unique to this exercise, at least in my experience.”

He said there’s been “a lot of analytical support that shows that this actually changes the way that we fight, and it makes us more effective in the way that we engage in combat operations. And it’s been in multiple independent studies, which makes us feel highly, highly confident that we’re on a solid path forward.”


He assured reporters that “there’s the requirements part to include concepts of operations, concepts of employment on how we plan to do crewed/uncrewed teaming, and bringing that all together.” Moreover, “we have to get the organization right,” he said, and there has been work done on developing doctrine for CCAs, as well as planning for how they will be maintained and organized.

Work has also been done determining the “legal authorities” required. The goal is not to create killer robots, he said, and a lot of work is yet to be done with the FAA to even allow armed, uncrewed aircraft to operate in civilian airspace.

“And you’re probably going to see us do operations in a different way than we’ve done in the past,” he said. “Again, this is a different capability.”

The “requirements and attributes” of CCAs have been defined, Jobe said, but a significant amount of modeling and simulation remains to be done to see how those play out in various scenarios.

No one would describe the acquisition strategy for CCAs. Though cooperation with other countries—notably Australia—has been touted in the development of CCAs, he said, “We know we’re going to do our own competition in our own industrial base for a CCA.” That will change if Kendall directs a more internationally collaborative approach, he said.

Though not a joint program, the generals said the Navy has been involved with CCA development from the beginning, and they suggested that the Navy may lend some of its expertise, as well. It’s already working with an uncrewed tanker, the MQ-25 Stingray. 

Guam Needs Layered Missile Defenses

By Chris Gordon

The U.S. plans to significantly improve Guam’s defenses against long-range missile strikes, a senior defense official said Nov. 3, days after the Pentagon released a new Missile Defense Review.

“Missile defense of Guam is a big deal,” said John F. Plumb, the assistant secretary of defense for space policy, at an event hosted by the Center for Strategic and International Studies. “It’s going to require persistent layered defenses. We have cruise missile threats. We have ballistic missile threats, general air threats. So doing that is a big issue, and we are very clearly committed to it.”

A U.S. territory in the Western Pacific, Guam is a major military and logistical center and is within the estimated range of Chinese missiles. The 2022 National Defense Strategy, released jointly with the Missile Defense Review, calls China the nation’s “pacing threat” over the coming “decisive decade.”

“The defense of Guam, it’s clearly about China,” said Plumb. “That’s what it is. Guam is a power projection hub for us. We have military forces there. We have U.S. citizens there, and we’re going to protect it.”

Guam’s Anderson Air Force Base has recently hosted B-1 bombers and A-10 close air support aircraft, and the island is also home to a major naval base. Though Guam is a U.S. territory, not a state, the Missile Defense Review makes clear the U.S. does not draw a distinction in terms of sovereignty.

“An attack on Guam is, in fact, an attack on the U.S. homeland, in case there had been any misunderstanding about that by the adversary,” Plumb said.

But unlike the continental U.S., Guam does not have fixed air defenses. Instead, it is primarily protected by an ad-hoc system of Army Terminal High Altitude Area Defense (THAAD) systems and Navy ships equipped with Aegis radars off the coast.

THAAD “gives us protection from ballistic missiles, and some of the other missiles as well, but it is somewhat limited in scope,” Navy Rear Adm. Benjamin Nicholson told Air & Space Forces Magazine in June.

U.S. commanders have expressed a desire for a comprehensive system that can detect and destroy ballistic missiles, cruise missiles, drones, hypersonic weapons, and other threats. If the U.S. Air Force is to fight a high-intensity conflict in the Pacific, Guam will be crucial to stage, refuel,

repair, and rearm aircraft. To counter threats to major hubs such as Guam, the Air Force hopes to adopt what it calls agile combat employment (ACE), or distributed operations. But the vastness of the Pacific Ocean means constructing new airstrips in the region will not be easy and that Guam will play a significant role as the Air Force moves forward with ACE.

Better defenses top the priorities list for Chief of the Pacific Air Forces Gen. Kenneth S. Wilsbach. “I can’t get it soon

enough,” he said. “I need them to push it up—hurry up and field those capabilities for them and for us.”

The Department of Defense proposed investing more than half a billion dollars in fiscal 2023 to build a 360-degree, integrated air and missile defense system for Guam. “We are going to fund that, and we’ve addressed it kind of head-on,” Plumb said. “That is new because it’s the difference between saying we should do things and actually doing them.”



Chad McNeely/DOD

First Space Force Chief of Space Operations, Gen. John Raymond (left), thanks Gen. B. Chance Saltzman, incoming Space Force Chief of Space Operations at the conclusion of the Space Force Change of Responsibility ceremony at Joint Base Andrews, Md., Nov. 1, 2022.

SPACE

Saltzman Succeeds Raymond as Space Force Chief

By Greg Hadley

Gen. B. Chance “Salty” Saltzman succeeded Gen. John W. “Jay” Raymond as Chief of Space Operations in the first-ever leadership change atop the U.S. Space Force.

At just three years old, the Space Force is still in its infancy, its formation having taken place under the watch of Raymond, who retired after 38 years in uniform. He hands the reins to his hand-picked successor, Saltzman, who at 53, will be the youngest, most junior officer to lead a military service in decades.

Saltzman spent the past two years as deputy chief of space operations for operations, cyber, and nuclear. A Weapons School graduate and career operator, he pledged to “work relentlessly to make the Space Force the combat-ready force that our nation needs.”

To the Space Force’s 15,000 Guardians, civilians, and supporting Airmen, he said, “my goal will be to provide you the resources, tools and training, and experiences needed to unlock your massive potential.”

Defense Secretary Lloyd J. Austin III praised Saltzman as perfectly suited to his new role. “There’s no one

“There’s no one better to take the helm than Gen. B. Chance Saltzman. He knows his way around the space domain.”

—Secretary of Defense, Lloyd Austin III

better to take the helm than Gen. Chance Saltzman,” Austin said. “He knows his way around the space domain. He’s operated satellites. He’s spent many nights at the Joint Space Operations Center during ICBM alerts. And for the past two years, he’s helped this new service get off the ground.”

He will also fill big shoes. Chairman of the Joint Chiefs of Staff Gen. Mark A. Milley said, “Raymond literally wrote the plans, literally wrote the doctrine, and literally developed the capabilities that we see deployed today.”

For his part, Raymond joked that he was now “homeless, unemployed, but humbled and grateful,” and called his time as CSO an “absolute privilege.”

“In establishing the Space Force, the United States capitalized on an opportunity to elevate space to a level that’s consistent with its importance to our national security, and to ensure U.S. and global leadership in the domain,” Raymond said. “And just as the space domain was critical to winning the Cold War, the Space Force represents our nation’s best opportunity to secure peace and deter great power conflict today and into the future.”

SDA Envisions 250 Data-Transport Satellites

By Greg Hadley

The Space Development Agency's (SDAs) warfighter council will set requirements in March for some 250 satellites in the "Transport Layer" of a planned National Defense Space Architecture.

These low-Earth orbit satellites would be part of a solicitation SDA director Derek M. Tournear anticipates making in spring 2023.

While the agency is still waiting to hear from the council before it finalizes the minimum viable product and exact force design structure for the Tranche 2 Transport Layer, Tournear indicated that the tranche will include "250-ish" satellites for data transport.

That's about twice the number of satellites included in the Tranche 1 Transport Layer. SDA awarded contracts for that tranche's 126 satellites in February. The number would also well exceed how many satellites the Space Force currently has in orbit.

SDA's warfighter council meets twice yearly and guides the agency's process for determining what capabilities are most important. The council's next meeting is in March, Tournear said, during a webcast hosted by the National Security Space Association, and the goal is to release a request for proposals for the Tranche 2 Transport Layer "shortly thereafter."

After that, a contract award will likely follow in the summer of 2023, enabling the program to "hit that September 2026 launch date," Tournear said. Meanwhile, the architecture's Tracking Layer won't be far behind, he said.

"We're looking at on the order of 50 tracking satellites," Tournear said. "And the mixture between wide-field-of-view and medium-field-of-view will be determined during the warfighter council ... and that will come out later in summer or early fall of 2023, is when the Tranche 2 Tracking solicitation will go."

Like the Transport Layer, the second tranche of the Tracking Layer, responsible for missile tracking and missile warning, will be roughly double the size of Tranche 1. SDA awarded contracts for 28 satellites for the Tranche 1 Tracking Layer in July.

For both the Transport and Tracking Layers, Tournear said, the second tranches will expand coverage after the initial tranches generate initial warfighting capability.

Tranche 1 "will allow us persistence over given regions of the globe," Tournear said. "Tranche 2 will give us complete global persistence. So we don't have to do any kind of prioritization over different areas of the globe. It'll also give us enough satellites to where we have built-in resilience just because of the numbers of satellites."

Tranche 1 is scheduled to begin launching in September 2024 and should be finished by mid-2025, Tournear indicated. And that timing could be key as Pentagon officials continue to warn that China is building up its capabilities, with the goal of having the ability to invade Taiwan by 2027.

Tranche 1 will be "ready for the fight in that time frame," Tournear said. "That will give you the persistence over INDOPACOM for those real-time tactical data links," Tournear noted. "So that means we will be able to tie in their existing fielded radios ... so



SDA illustration

The Space Development Agency announced two contract awards for the first generation of the Transport Layer. These satellites will be able to communicate with Link 16 communications systems, directly connecting them to the internet.

those tactical radios that our warfighters use on the ground, on ships, and in the air, they'll be able to talk to the satellites. They'll be able to communicate targeting data back and forth within each other. Even though they're outside of what would traditionally be supported by a tactical data link, the space layer will be able to make that global, will be able to tie that back to targeting cells located anywhere in the globe, to be able to move that data in real time in a theater."

SDA's next industry solicitation is for an "app factory" for battle management/command, control, and communications (BMC3).

Jim Steinberg, dean of the Johns Hopkins University School of Advanced International Studies, with U.S. Space Force Col. Niki Lindhorst, Space Delta 13 commander. The U.S. Space Force will partner with the JHU's SAIS program for service-specific, in-residence Intermediate and Senior Developmental Education in Washington D.C., scheduled to be implemented in 2023.



Staff Sgt. Adam Shank

USSF Bypasses AU for Senior Officer Education

By Greg Hadley

The Space Force is partnering with Johns Hopkins University to develop service-specific, in-residence programs at Hopkins' School of Advanced International Studies in Washington, D.C.—part of the service's new "independent" approach to Professional Military Education (PME).

Unlike the Air Force, which looks to its own Air University for Professional Military Education programs and sends few officers to graduate or fellowships at civilian institutions, the Space Force is forging a new path. Its partnership with Johns Hopkins sets aside 62 seats in 2023 and will grow to include 85 over time. Both military and civilian Space Force staff, as well as international students and officers representing other military services could fill those seats.

Existing Space Force faculty will transfer from Air University to Johns Hopkins, the service noted in a release.

Guardians won't need to complete distance learning courses to receive credit, Maj. Gen. Shawn N. Bratton, head of Space Training and Readiness Command, told Air & Space Forces Magazine in an exclusive interview. Calling the program "unique" within the military, Bratton said it is based on early direction from the Space Force's founding Chief of Space Operations, Gen. John W. "Jay" Raymond, who wanted an independent PME program.

"Early on—before there was a STARCOM—Gen. Raymond had written in his planning guidance for the service that we'll develop independent PME by 2023," Bratton said. "When I came in to stand up STARCOM, it's one of the few things that was kind of [a] directive and a specified task, like, 'You will

"Basically, it's the software that will be used by performers on the ground to build the apps and test out the apps in a secure environment to basically do uploads onto the satellite, so that we can upgrade the BMC3 processors on orbit," Tournear said.

The battle management function of the National Defense Space Architecture is still being fleshed out, and contractors that don't win the deal for the app factory will still be able to build and offer applications developed for BMC3 in the coming years, Tournear explained. A draft solicitation was released Nov. 9 and the final solicitation is expected in February.

go do this."

Bratton said his staff considered establishing a Space War College to mirror institutions from the other services, but opted not to. "But we're so small compared to the other services, it just seemed like that would be a lot of bureaucratic growth to develop an independent program," he noted. "And so early on, we started to talk about partnerships and how we think about that."

Universities around the Washington, D.C., region, were of primary interest to minimize permanent change of station (PCS) moves. "In about 60 percent of the cases, people will come out of school, and they go to work in the Pentagon," Bratton said. "That is a pretty common career path when you come out of both intermediate and senior developmental education. So if we can ... avoid those moves for kids in school, spouse careers, and [get] a little bit of cost savings for the government in the PCS moves, we thought there was benefit there."

Avoiding sending Space Force officers to Maxwell Air Force Base, Ala., was also a concern. Many officers and families "voiced concerns about the location at Maxwell Air Force Base in Alabama," particularly with regard to the quality of local public schools and employment options for spouses, according to a 2021 study by RAND's Project Air Force.

At Johns Hopkins, Guardians will obtain a master's in international public policy from one of the top such programs in the world. Foreign Policy magazine recently ranked Johns Hopkins' master's in international relations program No. 3 in the entire world, and U.S. News & World Report placed the program in a tie for fourth nationally among Global Policy and Administration Programs.

“As long as you meet the prerequisites, we think there’ll be an opportunity for some Guardians who are pursuing STEM electives, that perhaps they can go up to the Applied Physics Lab and do some work there,” Bratton said. “And so, for sure, we have a huge elective catalog to choose from. It really gives a lot of opportunities for Guardians that wouldn’t be available, certainly, if we had tried to stand up our own school. We just wouldn’t be able to support that with faculty.”

Intermediate developmental education (IDE) and senior developmental education (SDE) mark the top two rungs of

the Department of the Air Force’s developmental education program, above primary DE—and include graduate programs, internships, and fellowships. IDE is typically for majors, while SDE is for lieutenant colonels and colonels. The first Guardians to enter the new program will start school in the summer of 2023.

“We’ve made a good choice here in avoiding creating a big bureaucratic institution,” Bratton said. “Hey, we’re a small service. Because of that, we’re able to do things differently than the Army, Navy, and Air Force.”

USAF Setting Up Components for INDOPACOM, CENTCOM, Korea

By Greg Hadley and Amanda Miller

By the end of 2022 the Space Force will have established space components in three critical unified commands. Brig. Gen. Anthony J. Mastalir will fill the first of these at U.S. Indo-Pacific Command, with similar commands to be formed within U.S. Central Command and U.S. European Command “very soon,” a Space Force spokesperson confirmed.

Col. Chris Putman will fill the role at U.S. Central Command, and another officer will be appointed to lead SPACEFOR-Korea within at U.S. Forces Korea, a sub-command within INDOPACOM.

These are the first such commands to be established, with the exception of Space Operations Command, which is within U.S. Space Command.

Speaking at the Mitchell Institute for Aerospace Studies’ Spacepower Security Forum, Vice Chief of Space Operations Gen. David D. Thompson said these commands will ensure that the Space Force can collaborate “closely with other combatant commanders to make sure that not only can we understand what they need in terms of space capabilities, but they truly and deeply understand the full suite of capabilities available to them in the United States Space Force, from other military services, to our IC (Intelligence Community) partners, and through the commercial sector.”

‘SPACE TROOPERS’

Inside U.S. Space Command, meanwhile, Space Force Brig. Gen. Dennis O. Bythewood assumed command of Joint Task Force-Space Defense on Nov. 4. In that role, he now leads nearly 400 “Space Troopers” at Schriever Space Force Base, Colo., replacing Army Maj. Gen. Thomas L. James, the outgoing commander and simultaneously U.S. Space Command’s director of operations.

James characterized the task force’s “unique and absolutely critical national mission” as “protecting and defending our access to key space systems.” The mission includes space domain awareness, warning satellite operators of threats, and “space superiority,” which is to ensure “the conduct of operations at the time and place of our choosing.”

Some of James’ contributions included the “fusion” of commercial and Missile Defense Agency remote sensing data into the military’s space domain awareness; and the creation of new



Col. Anthony Mastalir, outgoing Space Launch Delta 30 commander, addresses the SLD 30 Hawks, expressing his gratitude to Team Vandenberg for supporting the mission during his time as commander.

response options to counter a range of threats. Bythewood now moves up, having been James’ deputy task force commander.

Army Gen. James H. Dickinson, the commander of U.S. Space Command said Bythewood is ready to fill those shoes. “He knows the business and the stakes that are involved today,” said Dickinson. “Dennis displays an intense dedication to the mission and genuine care for his people. Because of his warfighting focus and high integrity, Dennis is ready to assume command of this organization.”

Bythewood said the task force would “continue to innovate as we have the last couple of years to better understand our area of responsibility and execute our space superiority mission.” He said the command is “developing the foundational intelligence needed to maximize our capabilities, and when new ones are delivered, we will synchronize those with support from USSPACECOM.”

Dickinson warned that space is critical to U.S. national security. “We all know when we see the news every day that the Chinese and the Russians are developing and demonstrating capabilities that can hold our space assets at risk,” he said. “Our freedom of access and action in the domain is not guaranteed.”



Anna Paulina Luna/Facebook

(L to r) Anna Paulina Luna (R-Fla.), Zach Nunn (R-Iowa), and Donald Davis (D-N.C.) are newly elected Air Force members to Congress.

WASHINGTON & POLITICS

Meet the New Air Force Veterans Elected to Congress

By Greg Hadley

The 2022 midterm elections produced several major surprises, with the Democrats holding their razor-thin margin in the Senate and the Republican's winning a slim lead in the House.

But for national security and defense watchers, the election produced more definitive results. Here's what it means for the Pentagon and Air Force.

AIR FORCE VETERANS

The current Congress includes 15 Air Force veterans—13 in the House and two in the Senate. In the new Congress, both the Senate's USAF vets—Sen. Roger Wicker (R-Miss.) and Sen. Lindsey Graham (R-S.C.)—remain (neither faced an election in 2022) and a dozen Air Force veterans won re-election, along with three newcomers: Anna Paulina Luna (R-Fla.), Zach Nunn (R-Iowa), and Donald Davis (D-N.C.).

Luna enlisted at 19 and served as an airfield manager, according to media reports. She earned the Air Force Achievement Medal, was honorably discharged, and subsequently joined the Oregon Air National Guard. Davis is an U.S. Air Force Academy graduate and served for eight years, including time as a mortuary officer; as an operations coordinator for "Air Force One" at Joint Base Andrews, Md.; and as an ROTC instructor in North Carolina.

Nunn, a retired lieutenant colonel, served both on Active duty and in the Guard. He deployed multiple times to Iraq and Afghanistan, amassing nearly 1,000 combat flight hours in reconnaissance aircraft.

INCUMBENTS

Of the 26 members of the Senate Armed Services Committee, only two were up for re-election: Sen. Tammy Duckworth (D-Ill.) and Sen. Mark Kelly (D-Ariz.). Both won their races.


Of the 59 members of the House Armed Services Committee, 50 were on the ballot Nov. 8, with the remainder departing the House. And of those 50, 45 held their seats, including Rep. Mike Rogers (R-Ala.), who will likely take charge of the Housed Armed Services Committee, swapping seats with former chair Rep. Adam Smith (D-Wash.), who will likely become the ranking member.

Rep. Elaine Luria (D-Va.), who had been a powerful advocate for the Navy, lost her seat. She is seen, however, as a potential future Navy Secretary.

Composition of the Senate and House Armed Services Committees is still to be determined.

With a 222-213 advantage in the current Congress, Democrats held a 31-28 advantage in seats on the HASC, but the Republicans are expected to have a smaller majority and may hold fewer seats than the Democrats in the next Congress.

For the Senate, a perfectly divided 50-50 chamber in this past Congress led to an even 13-13 split on the SASC. That margin split is likely to remain.

Control of the House and Senate will likely go a long way in shaping debates in the next few years about the budgets the DOD and the Air Force get. Republicans have argued that President Joe Biden's proposed funding doesn't keep pace with inflation and needs to be increased, while some Democrats have expressed reluctance to do so. 

Kendall Doesn't See NDS as Calling for Larger Air Force

By John A. Tirpak

The Air Force won't get larger but will get more modern, Air Force Secretary Frank Kendall said.

"I do not expect major changes in force structure" as a result of the new National Defense Strategy, Kendall said at an Aviation Week defense conference. "What you should expect is major changes in ... equipment and modernization."

The new NDS did not define a force-sizing construct as some past versions did. It doesn't name the number of wars the nation must be able to fight at once, for example. But it does say the U.S. to be able to defeat one peer adversary while deterring others from taking advantage of that conflict.

"We have to go through a transformation," Kendall said. Space is of particular concern. "Imagine you have a Merchant Marine, and you woke up one day and discovered you needed a Navy," he said. "That's essentially what the Space Force's situation is."

For the Air Force, "it's really about getting on to the next-generation set of capabilities. It's about transforming ... to what we're going to need for the future."

"We have a lot of commitments around the world, [and] we need a certain-sized force to meet them," Kendall said. But he didn't define what that requirement is. Rather, he reiterated the Air Force's need to divest aging aircraft that with limited versatility and survivability. "We are doing some divestitures," he said. "We'll do more of those to free up resources as we transition and modernize."

That means that in the near term, the Air Force will shrink further. But, he said, "If I try to look down the road five, 10, 15 years, it's possible to imagine a larger force structure."

More planes in the future does not necessarily mean more

Airmen. He anticipates manning levels being "fairly stable," while today's gear is "swapped out for next-generation equipment."

He sees a future in which as many as five uncrewed combat aircraft would complement a single crewed fighter.

In the NDS, Russia is referred to as an "acute" threat, Kendall said, because "it still has a formidable military. It's demonstrating a lot of shortfalls right now, but in the next few years, I would expect it to recover." Also, "the propensity for aggression has been demonstrated pretty clearly ... I don't expect that to change anytime soon."

China, however, is a different situation, and without an easing of diplomatic tensions, competition with China could grow into a new kind of Cold War, he said. "It could become something like that," he explained, but because China's economy is so intertwined with America's and that of the West in general, that is less likely.

"There is a lot of economic dependency between China, in particular, and its customers in the world and ... its sources of raw materials, as well. ... So I think it would be harder to decouple, economically, than during the Cold War," he said. In that era, there were "two distinct spheres" of economic activity, one dominated by the West, the other by the Soviet bloc.

Another difference: China isn't trying to export a Communist revolution, as the Soviet Union did during the Cold War. Rather, he said China's military objectives are "more about control of things in their region, to be the hegemon there."

China is seeking to expand its influence around the world, however, through its Belt and Road Initiative and to export its "state control ... one-party, autocratic rule. ... That's their model, and they're trying to push it." ✪

Secretary of the Air Force Frank Kendall makes remarks during the Senior Leader Orientation Course at Joint Base Andrews, Md., in April. The course provides training for newly selected brigadier generals and senior executive service members.



Eric Dietrich/USAF



Secretary-General António Guterres addresses the Security Council meeting on peace building and sustaining peace, while also confronting the ethical dilemma and risks associated with autonomous weapons.

US Backs Limits on Autonomous Weapons

By Amanda Miller

The U.S. became one of 70 countries to favor limiting autonomous weapons in a Joint Statement on Lethal Autonomous Weapons Systems issued by the U.N.'s First Committee on Oct. 21. The statement urges "appropriate rules and measures, such as principles, good practices, limitations and constraints" to allay "serious concerns from humanitarian, legal, security, technological, and ethical perspectives" over the use of autonomous weapons.

Meanwhile, the Stimson Center published "Bolstering Arms Control in a Contested Geopolitical Environment," a policy brief by Michael Moodie and Jerry Zhang that argues disruptive new technologies such as artificial intelligence, "heightened competition" among world powers, and a "rapidly deteriorating security environment" have combined to constrain arms control talks over the past decade.

The authors said "plausible scenarios" can be seen in which AI "plunges the world into a devastating war by error," and concluded that lethal autonomous weapons "could exacerbate competition and make conflicts more destructive." Already, "the risk grows that they will fall into the hands of terrorists, criminals, warlords, or other malign actors."

The U.S. opposed a treaty to govern AI-driven weapons in 2021, but signed the joint statement, which stresses the need for "human beings to exert appropriate control, judgment and involvement in relation to the use of weapons systems in order to ensure any use is in compliance with International Law, in particular International Humanitarian Law, and that humans remain accountable for decisions on the use of force."

In remarks to the U.N. Security Council on Nov. 3, Secretary-General Antonio Guterres warned that the "world is transforming at breakneck speed" and that lethal autonomous weapons together with cyber warfare "are presenting risks we barely comprehend and lack the global architecture to contain."

Former Deputy Secretary of Defense Robert O. Work said in a call with reporters in September that Western militaries

"see AI primarily as a means to help humans make better decisions"—that autonomous weapons are not being "designed to supplant the human decision-maker."

Work was vice chair of the National Security Commission on Artificial Intelligence, which completed its work in 2021. He now serves as a member of the Board of Advisors for the AI-oriented Special Competitive Studies Project and is listed as chairing the board of AI contractor SparkCognition Government Systems.

"In the U.S. conception, our AI systems will be able to create their own courses of action to complete a task assigned to them by a human and choose among them," Work explained. "But we are staying far away from any system that could choose its own goals and choose among them."

However, he acknowledged that a weapon's ability to "set its own objectives" is "going to be central to competition. "We don't know how authoritarian countries will view this. Perhaps they will assign more decision-making authority to machines than the West would be comfortable doing ... and it might be a fruitful area for discussion among all the competitors."

Arms control talks could help "make sure we don't get to the most dangerous systems that I think of," Work said—"and those are systems that might be able to unilaterally order a preemptive or a retaliatory strike. That would be extraordinarily destabilizing, and I think it would be in the interest of all competitors to stay away from those type of systems."

In a speech to Air Force Academy cadets in February, the Space Force's Vice Chief of Space Operations Gen. David D. Thompson told cadets the U.S. will need machines that decide to kill—and that confronting the inherent ethical dilemmas "can't wait."

The Vatican's Archbishop Gabriele Caccia, permanent observer of the Holy See to the United Nations, delivered a statement to the First Committee on Oct. 12 arguing that lethal autonomous weapons "cannot maintain compliance with International Humanitarian Law" if they separate "the unique human capacity for moral judgment from actions that could result in bodily harm or even death." ❖

10 DFCs for Afghanistan Evacuation Mission

Air Force Airmen assigned to the 621st Contingency Response Wing pose with Gen. Mike A. Minihan, Air Mobility Command commander, after being awarded the Bronze Star Medal at Joint Base McGuire-Dix-Lakehurst, N.J., Nov. 1, 2022, for their part in the Afghanistan evacuation.



Senior Airman Joseph Morales

By Greg Hadley

Ten Airmen, including the C-17 crew who flew a record-breaking 823 people to safety during the noncombatant evacuation out of Afghanistan last August, received the Distinguished Flying Cross on Nov. 1.

Every member of that famous C-17 flight, call sign REACH 871, received a DFC with a “Valor” device, denoting “an act or acts of heroism by an individual above what is normally expected while engaged in direct combat with an enemy of the United States ... with exposure to enemy hostilities and personal risk.”

Air Mobility Command boss Gen. Mike A. Minihan awarded the Distinguished Flying Crosses, the military’s fourth-highest award for extraordinary aerial achievement, along with eight Bronze Star Medals in a ceremony at Joint Base McGuire–Dix–Lakehurst, N.J.

The awards are part of a larger batch of medals and decorations approved by AMC in October for Operation Allies Refuge, the name given to the evacuation from Hamid Karzai International Airport in Kabul, Afghanistan, as the Taliban seized control of the government and thousands of desperate Afghan nationals, American citizens, and individuals from partner nations scrambled to leave the country.

Members of the 621st Contingency Response Wing, who received the Bronze Star Medals given Nov. 1, helped to restore order and secure the airfield, and began directing air traffic, with the help of other units. The 621st Contingency Response Group will also receive the Gallant Unit Citation.

At HKIA, chaotic scenes unfolded Aug. 15, as Afghan citizens breached the airfield, with some attempting to climb onto U.S. Air Force C-17s.

Before that, however, the crew of REACH 871, from the 305th Air Mobility Wing, made the decision to take off with as many Afghan evacuees as possible, despite the lack of an official manifest, due to the deteriorating security situation.

The flight quickly made international headlines—audio of the crew informing an Air Force control center that they had 800 passengers on board circulated on social media, as did a photo showing hundreds of evacuees crammed into the C-17’s cargo bay.

AMC initially said 640 people had been rescued, before revising that number to 823 after counting the children on board the flight. That far exceeded the previous record of 670, and more than doubled the typical maximum of about 300 people when the C-17 is outfitted for large passenger loads.

The flight also produced the photo of a young Afghan child sleeping beneath an Airman’s jacket—a powerful image that went viral and has been highlighted by many Air Force leaders as symbolic of the service’s contribution to the evacuation.

The Airman to whom the jacket belonged, now-Senior Airman Nicolas Baron, was one of seven crew members on REACH 871 who received the Distinguished Flying Cross. The others were aircraft commander Lt. Col. Eric Kut, pilots Capt. Cory Jackson and 1st. Lt. Mark Lawson, loadmaster Tech. Sgt. Justin Triola, and flying crew chiefs Staff Sgt. Derek Laurent and Senior Airman Richard Johnson.

Three other Airmen involved in the evacuation received DFCs from Minihan, all with the “Combat” device: Capt. Andrew Perrella, a C-17 pilot, Capt. Jedd Dillman, a flight nurse, and Master Sgt. Matthew Newman, a respiratory therapist.

Dillman and Newman are the first aeromedical evacuation Airmen in AMC history to receive the Distinguished Flying Cross, and Laurent and Johnson are the first two flying crew chiefs, according to an AMC release.

The following Airmen from the 621st Contingency Response Wing received Bronze Star Medals, which are awarded to those who distinguish themselves “by heroic or meritorious achievement or service, not involving participation in aerial flight, in connection with military operations against an armed enemy:”

- Col. Colin McClaskey
- Lt. Col. Joshua Johnson
- Maj. Michael Sattes
- Maj. Adam Cooper
- Master Sgt. Dustin Sanderlin
- Master Sgt. Bryan Masters
- Master Sgt. Brian Cantu
- Tech. Sgt. Gabrielle Di Clementi.



AMC Investigating Class A Mishap That Damaged KC-46 Boom, Fuselage

By Greg Hadley

Air Mobility Command is investigating a potential Class A mishap involving a KC-46 Pegasus tanker that left the plane's boom and fuselage damaged in October.

The Oct. 15 incident involved a KC-46 from the 305th Air Mobility Wing from Joint Base McGuire-Dix-Lakehurst, N.J., which was returning to the base from the United Kingdom when the "in-flight emergency [was called] after experiencing a problem with the refueling system, causing damage to the boom and fuselage," an Air Force spokesman said.

The incident reportedly involved an F-15. The cause is under investigation. The Air Force defines Class A mishaps as those that result in a death or permanent disability, cause more than \$2.5 million in damage, or result in the destruction of an aircraft. No injuries were reported from this mishap.

The Air Force determined several years ago that the KC-46's boom was too stiff, meaning it "would not extend or retract during flight-testing unless subjected to more force" than some aircraft could manage, according to a Pentagon inspector general's report. ❖

Air Force Fails Audit, But Kendall Sees Progress

By Greg Hadley

The Department of the Air Force once again failed its audit but, according to a report announced Nov. 16. The Pentagon has been conducting full-scale audits since 2016, and the Air Force has financial statements dating back to at least 2008.

The Air Force has never produced a clean audit for either its General Fund, which supports its core missions and overall operations, or its Working Capital Fund, which provides maintenance services, weapon system parts, and base and medical supplies in support of core functions. Prior to fiscal 2017, these disclaimers were all based on the department's financial records not conforming to standard accounting practices.

Last year, however, the Air Force touted its progress in reducing the number of major issues identified by independent public accounting firm Ernst & Young—called material weaknesses—from 22 to 19.

This year's audit reduced that further to 18. Air Force Secretary Frank Kendall said in a letter that the department continues to be among DOD's "leaders in audit remediation and material weakness reduction."

The Air Force's own management identified 17 material weaknesses in internal control, chalking up the difference between their number and the 18 identified by auditors as a "function of timing."

In a briefing with reporters, comptroller Michael J. McCord acknowledged that he was not seeing "the progress I would have hoped for." Kendall noted that "though our progress has been considerable, we cannot take our hand off the throttle."

Technically speaking, the auditors looking at the DAF's General Fund and Working Capital Fund issued a "disclaimer of opinion," indicating that they could not formulate an opinion on the department's financial statements.

The basis for that disclaimer, the auditors wrote in their re-

port, is "unresolved accounting issues and material weaknesses in internal controls," meaning the Air Force could not provide the necessary documentation for "complete and accurate" financial records on a timely basis.

The department's material weaknesses in internal controls range from problems with the integration and reconciliation of financial systems to inventory count procedures. Generally speaking, the issues involve the need for IT and systems modernization, improvements in assessing costs, and better documentation.

The Air Force's previously stated goal is to get a clean audit opinion on its General Fund by fiscal 2026 and for its Working Capital Fund by fiscal 2028.

"We [continue] to push the Department of the Air Force closer toward a clean audit opinion by following our Audit Roadmaps and prioritizing activities that correct high-impact material weaknesses," Kendall wrote. ❖

AFSOC Commander Slife Nominated to Be CSAF's Operations Deputy

By Greg Hadley

Lt. Gen. James C. Slife was nominated to move from commander of Air Force Special Operations Command to become the Air Force's next deputy chief of staff for operations. Slife, who has commanded AFSOC since June 2019, will succeed Lt. Gen. Joseph T. Guastella, who retired over the summer. In his new role, he will be primarily responsible for providing policy, guidance, and oversight for operations, training, and sourcing Air Force capabilities and personnel to support joint operations.

The deputy chief also assists the Chief of Staff in "providing and allocating operationally ready ... forces and capabilities in response to the needs of the combatant commanders."

With more than 30 years in uniform, much of it in special operations, Slife has served consecutive assignments as chief of staff and vice commander for U.S. Special Operations Command in addition to stints as a top planner for U.S. Central Command. He has also commanded special operations Airmen at the squadron, group, and wing levels.

He inherits the Air Force's new Force Generation Model in which Airmen cycle through four six-month readiness "bins," over a 24-month cycle. At the Air & Space Forces Association's September Air, Space & Cyber Conference, Slife extolled the benefits of the new system, saying it helped him articulate risk to combatant commanders at AFSOC by simplifying terminology and timelines.

"We've been unable to talk about our capacity in a way that resonates with the joint force. It becomes too technical and complicated. And so when we migrated to a four-cycle force generation model, it allows us to have these conversations very unemotionally and very fact-based and allows us to articulate risk and capacity in a way that has really eluded us," Slife said.

Slife now awaits confirmation in the Senate. ❖



Commander AFSOC,
Lt. Gen. James Slife

Master Sgt. Jarad A. Denton

Crewed-Uncrewed Teaming

The 5 Keys to Achieving Highly Collaborative Combat Aircraft.



Tech. Sgt. James Cason

Crewed Air Force F-22 and F-35A fighters fly in formation with an uncrewed XQ-58A Valkyrie over the U.S. Army Yuma Proving Ground testing range. Collaborations between crewed and uncrewed fighters could help a smaller U.S. force be more effective in deterring peer threats.

By Heather Penney

After years of downsizing, today's U.S. Air Force lacks the capacity, lethality, and survivability to win a decisive victory in a peer-level conflict with China. To address these shortfalls, Air Force leaders today are making significant decisions about the future force, betting on the promise of autonomous collaborative combat aircraft (CCA) as a means to increase the Air Force's combat capacity, create a more attrition-tolerant and resilient force mix, provide theater commanders with a strategic reserve for surge operations, and enable complex operations that complicate adversaries' defenses.

While this approach has great potential, CCA development efforts to date have focused primarily on mission tasks, not the collaborative nature of systems operating together, some crewed, the others not. The effectiveness of CCA in combat will be driven by how well they team with humans. It's very important that highly experienced warfighters are integrated with skilled technologists to structure teaming dynamics, using human flying formations as models. Doing so will ensure CCA are optimally configured to achieving the effects desired in the battlespace in conjunction



Heather Penney is a senior resident fellow at the Mitchell Institute for Aerospace Studies.

Download the entire report at <http://MitchellAerospacePower.org>.

with inhabited aircraft.

Unlike familiar remotely piloted MQ-9 Reaper or RQ-4 Global Hawk, which are controlled by human pilots using satellite datalinks, CCA will be autonomous, capable of navigating and flying themselves and of managing their own their sensors. They will make their own decisions and execute mission elements independently. They will team with human operators operating nearby in the battlespace and acting as flight and mission commanders, managing CCA much as they would lead a crewed formation.

The key to fielding effective CCA will be developing well-attuned human-CCA teaming software. This cannot be developed after CCA are fielded, because the teaming software must interact with all the other core elements of the CCA "brain." For CCA to be successful, *human factors must be integrated into teaming algorithms and software concurrent with all other autonomy development.*

Fortunately, existing human formations can serve as established, high-performing models for technologists to emulate as they develop CCA teaming features. Conventional aircraft formations, whether a two-ship of fighters or an entire mission package, have proven processes, procedures, interactions, and other teaming and control structures. Decades

of real-world experience have molded these teaming norms to human behaviors.

Yet in developing CCA, Air Force researchers, engineers, and defense industry technologists have largely focused their efforts on removing the human from the machine. This focus has enabled autonomy teams to make progress on important, foundational challenges related to CCA development, such as autonomous flight control dynamics, flight safety, battlespace awareness, and sensing and maneuvering. Therefore, it is imperative that operational combat pilots be involved in the process of determining how CCA should interact with humans and what information humans need for those interactions to be effective in real-world operations. According to Brig. Gen. Joe Kunkel that involvement is already underway.

Failure to develop CCA teaming concepts of employment and an understanding of related teaming functions will undermine their potential to transform the Air Force's future battlespace operations. Therefore, warfighters involved in the early stages of the Air Force's CCA development programs are critical to shaping how these autonomous aircraft will operate alongside humans in the battlespace.

Given the magnitude of strategic challenges Air Force leaders face and the faith and resources they are committing to developing multiple CCA variants, the stakes are too high to risk deferring questions of how crewed and uncrewed systems will work together. Involving operators early on in developing an understanding of CCA teaming dynamics is crucial to their future operational effectiveness.

THE AIR FORCE AT A CRISIS POINT

The Air Force is committed to developing collaborative combat aircraft transform the service's force design to be able to fight and win against a peer competitor. Air Force leaders are making significant—and possibly irreversible—decisions about their service's future force structure based on the promise of CCA technologies that are not yet mature. The Air Force is shrinking its current combat forces, retiring weapons systems before replacements are available, and even slowing procurement of new aircraft to fund this future vision.

It is a risky strategy. Today's Air Force is now the oldest, smallest, and least ready in its history, the result of decades of

deferred modernization. Two decades of high-tempo counterterrorism and counterinsurgency operations fueled declining aircraft mission capable rates and soaring operations and sustainment costs. Even now, demands on the Air Force remain undiminished. Combatant commanders increasingly ask for Air Force capabilities to respond to the aggressive actions of China and Russia, but the Air Force is no longer sized to meet those demands. For too long, Air Force leaders have claimed that the Air Force would continue to get smaller as it became "more capable." Despite a handful of high-profile recapitalization programs, the Air Force acquired too few advanced aircraft over the past 30 years.

Today, 84 percent of the Air Force's aircraft inventory were designed before the end of the Cold War for a very different set of threats than now exist in the Indo-Pacific and Europe. Upgrading the Air Force's legacy aircraft have enabled them to remain effective, but only for operations in permissive environments. Most of the Air Force's inventory remains vulnerable to modern air defense systems. As a result, the Air Force does not have the resilience or survivability needed to prevail in a highly contested, peer conflict. The "smaller but more capable" objective yielded a brittle force without the capacity to maintain a robust operational tempo, execute operations with sufficient concentration and mass, present complexity to an adversary, or tolerate attrition.

A NEW FORCE DESIGN

Chinese capabilities and warfighting strategies now present unprecedented challenges to the U.S. military's legacy capabilities and operational concepts. High-tempo, large-scale military operations against China in the Indo-Pacific will require greater force capacity. Very long transit distances and expansive combat areas are the first of the Air Force's challenges. Distance is time; even at high subsonic speeds, it takes an hour to transit from Kadena Air Base in Japan to targets areas around Taiwan; flights from Guam to Taiwan take four hours. The time it takes to get to the fight defines the numbers of aircraft needed to achieve and sustain high-tempo, large-scale operations.

Faced with too few aircraft, commanders must either reduce operational tempo or pause between attacks, creating opportunities for an enemy to gain or maintain an advantage.



The Skyborg autonomy core system launches aboard a Kratos UTAP-22 tactical uncrewed vehicle at Tyndall AFB, Fla. The aim of the Skyborg program is to integrate full-mission autonomy with low-cost, attritable uncrewed air vehicle technology to enable crewed-uncrewed teaming.

USAF

DARPA's LongShot program is developing an air-launched uncrewed aircraft that could deploy multiple air-to-air weapons. General Atomics, Lockheed Martin, and Northrop Grumman all have preliminary development contracts.



DARPA

Similarly, the greater the size of the combat area, the more aircraft are needed to create massed effects simultaneously in multiple locations. Without sufficient capacity, planners must choose between diluting their attack coverage or narrow their target lists to mass effects in one area while neglecting others.

This is why defeating Chinese aggression in the Indo-Pacific is now the pacing threat to U.S. national security. Clearly, trading capacity for more capability is no longer a valid force design approach for the Air Force. What's needed is more capabilities and greater capacity. No matter how technologically advanced a U.S. weapon system may be, conflict in the Indo-Pacific demands sufficient quantity. No aircraft can be in more than one place at one time.

This is not a theater where the U.S. military can afford to have "fewer but more capable" aircraft. Augmenting piloted aircraft with more affordable CCA may be a crucial way for Air Force leaders to achieve the capacity the Indo-Pacific demands. Industry studies have indicated that tethered CCA could increase a piloted formation at a ratio of six or seven CCA to one piloted aircraft. If CCA are untethered—operating in support of the broader mission package and not dedicated to a single flight lead—the multiplying effect could be even greater. Whether tethered, untethered or swarmed, CCA hold the promise to be force multipliers for the future Air Force, providing the numbers needed to achieve high-tempo operations at the scale the vast ranges of the Pacific demand.

The Department of the Air Force's Scientific Advisory Board is investigating options for CCA with "a distributed, mission-tailorable mix of sensors, weapons, and other mission equipment" to be part of the NGAD family of systems.

Such mission packages could present targeting conundrums to the adversary and simultaneously augment crewed aircraft to deliver operational tempo and mass. They could also be controlled and deployed in different ways, said Dr. Tim Grayson, Special Assistant to the Secretary of the Air Force and former director of DARPA's Strategic Technologies Office.

"You might take a CCA platform capability inspired by some of the [Next-Generation Air Dominance program] work, but not deploy it with an NGAD. It might actually be launched and, at least for initial deployment, operated by some other additional entity. And then, later on in the fight, reform a new

formation ... reform even a new team, where you know the command and control might fall over to a different platform. We've seen some of this in some of the studies that have been done between NGAD and B-21 ... where there could be a little bit of ... dynamic mix and match of who's going to form the offensive line, so to speak, and who's going to be the quarterback."

Air Force Secretary Frank Kendall is intrigued with CCA. "The technology is there now, where we can talk about a formation of a crewed aircraft controlling multiple uncrewed aircraft," Kendall said during a Jan. 19 forum with the Center for a New American Security. "There's enough technology in existence from programs that we've already conducted, it convinces me that's not a crazy idea." Not long after, at a different event, he said: "It is reasonably clear to me that we are poised to go ahead and take a significant step forward in that area."

Both phases of DARPA's ACE (Air Combat Evolution) program concluded that humans must be able to trust CCA to conduct "complex combat behaviors" in order to progress to the kind of "hierarchical framework" that would define human-CCA interactions.

To support his objective, technical efforts appear to remain focused on building human trust through consistent and dependable autonomous maneuvering. Lockheed Martin's Have Raider I and II demonstrations sought to display the ability of an AI-controlled aircraft to credibly navigate through a dynamic environment. According to program manager Shawn Whitcomb, Have Raider "put a fully combat-capable F-16 in increasingly complex situations to test the system's ability to adapt to a rapidly changing operational environment." In its first demonstration, the AI-controlled F-16 flew in formation with its crewed flight lead, executed a strike, and then rejoined the formation of the human-piloted aircraft. In the second, the Have Raider AI autonomously responded to its changing threat environment during an air-to-ground strike mission.

Boeing's MQ-28A Ghost Bat, Australia's Loyal Wingman pathfinder, is intended to "investigate factors such as the level of automation and autonomy, use of artificial intelligence, and human machine teaming concepts." But Boeing program managers appear to have a much broader vision: to prove not just the airframe, but the entire system—including command interfaces, modular sensor packages, maintenance regimes,

datalinks, and software. Ghost Bat completed its second phase of basic flight test series in late March 2022.

The Air Force Research Laboratory's Off-Board Sensing Station (OBSS) developmental aircraft effort also has the potential to move beyond its demonstration phase. AFRL's statement of objectives seeks to "develop and flight demonstrate an open architecture aircraft concept to achieve the goals of rapid time-to-market and low acquisition cost ... [and] designed for limited life ... no depot maintenance and limited field maintenance considerations." General Atomics and Kratos have one-year contracts that come with options to continue Skyborg technical development.

CREWED vs. UNCREWED

The Air Force does not have the capacity to train and absorb pilots at the rate needed in a peer conflict. Combat losses would require the Air Force to replace downed pilots, but, even now, with too few aircraft, the service has been unable to overcome a years-long pilot shortage. Diminished aircraft inventories and readiness rates challenge the Air Force's ability to provide new pilots the training hours needed to survive and be successful in combat. The high attrition rates of a peer conflict would only stress these dynamics more.

Meanwhile, recent advances in computer processing, datalinks, software programming, and autonomy offer an alternative. The Air Force could now field teams of collaborative combat aircraft that can solve major gaps in the Air Force's force design, multiply the combat power of its mission packages, and counter China's system destruction strategy. CCA will also be able to execute mission-essential roles, maintain high-levels of execution through attrition, increase complexity, and impose cost on an adversary. For CCA to do these things at scale, they must operate without the crewed control stations and limitations of conventional remotely piloted aircraft. Rather, uncrewed aircraft must become effective in complex environments without the need for direct human control of either flight systems or sensors, while also teaming with humans in spectrum-contested battlespaces. This will enable the Air Force to scale to meet the requirements of future warfare.

CCA will enable the Air Force to create new operational concepts combining the respective strengths of crewed and uncrewed aircraft to achieve mission objectives. Human intuition, cross-domain thinking, and intelligence will remain essential to mission success, and partnering with CCA could allow humans to focus on critical cognitive tasks, such as dealing with unforeseen events and managing battlespace operations.

Human-CCA teams can reduce risks to humans, increase the potential to create war-winning mission effects, and disrupt adversaries' warfighting strategy. Because planners and mission commanders can accept higher CCA losses, they can think differently about risk tolerance. Teamed with crewed aircraft in force packages, collaborative combat aircraft can be employed more aggressively, for instance by acting as "missile sinks" that soak up enemy air-to-air or surface-to-air missiles. CCA losses in combat—even at scale—need not have as dire an impact on specific missions, the long-term viability of the force, or the overall campaign, provided CCA are acquired in sufficient volume. The attrition tolerance that CCA offer may have the added benefit of imposing cost on the adversary, an important feature in any competitive strategy.

CCA can fundamentally alter the attrition equation for commanders because they reduce risk to highly experienced aircrew. Human cognition, insight, intuition, and other unquantifiable elements will continue to be key to successful combat operations. An underappreciated problem of combat attrition is the loss of experience in the front-line force. By absorbing losses, CCA forces can protect experienced human warfighters that often make the difference in operational and tactical outcomes. Moreover, when a CCA is lost, its replacement can be fielded with the exact same levels of competence, because unlike humans, where skill varies by training and experience, machine skills are based on program updates.

NECESSARY ELEMENTS

Without question, the Air Force's research labs and industry teams are making progress on important, foundational challenges related to CCA development like autonomous flight



Boeing's MQ-28A Ghost Bat is Australia's Loyal Wingman pathfinder. The program seeks to understand how autonomy and the human-machine interface will work, while Boeing seeks to understand command interfaces, modular sensor packages, maintenance regimes, datalinks, software, and more.

Australian Ministry of Defense

A General Atomics MQ-20 Avenger uncrewed vehicle returns to El Mirage Field, Calif., June 24, 2021. The MQ-20 successfully participated in Edwards Air Force Base's Orange Flag 21-2 to test the Skyborg Autonomy Core System.



General Atomics

control dynamics, flight safety, battlespace awareness, tactical decision making, and sensing and maneuvering. The Air Force must deliberately prioritize human factor engineering as a first principle for developing CCA, with particular attention to five broad teaming concepts required to meet the needs of warfighters in complex and demanding battlespaces:

Create teaming concepts that will maximize the strengths of both CCA and piloted aircraft. The effectiveness of CCA in combat will be primarily driven by how well they team with humans, and not just the weapons and sensors they carry. The Air Force has yet to develop and articulate the operational concepts that describe the advantages autonomous CCA teammates may provide in the battlespace. As a result, it is unclear how CCA will operate, maneuver, and otherwise partner with humans to exploit their potential advantages. To harness the full potential of CCA, the Air Force must develop teaming operational concepts; teaming concepts of employment; and tactics, techniques, and procedures for how warfighters will work with CCA to exploit their unique attributes. Humans will then need robust, real-world training to master these tactics and develop confidence that CCA will provide them the combat edge they need in highly contested battlespace.

Include operators in CCA development to ensure they understand how they will perform in the battlespace. Autonomy and machine learning programs are notoriously opaque, making them inexplicable to warfighters. Without an understanding of how CCA think, make decisions, and why they take certain actions, warfighters cannot anticipate how these autonomous teammates will behave. Involving warfighters in CCA development can help inform and shape them while improving warfighter understanding of a CCA's agent and outcomes. It would also improve human pilots' ability to exploit the strengths and unique attributes of their teammates while mitigating their vulnerabilities in complex and contested battlespace.

Warfighters must be able to depend on CCA autonomy.

It will be difficult for warfighters to assess the dependability of their autonomous teammates if they lack the means to evaluate the real-time performance and accuracy of their CCA. This concern goes beyond the traditional DOD operational software tests for verification and validation or concerns regarding "hackability." Humans will need confidence that their teammates will consistently maneuver safely and effectively

as a teammate, have an accurate and shared understanding of the battlespace, share critical information in a timely way, maintain the same tactical priorities, defer to their human's control—just as a wingman defers to their lead in combat—and behave in ways that human warfighters expect and need.

Warfighters must have assured control over CCA in highly dynamic operations.

Human operators must have resilient and reliable means of controlling their CCA teammates in spectrum-contested environments where adversaries are attacking information networks to deny or collapse command and control across the force. CCA must continue to effectively operate to achieve their missions without communications in worst-case contingencies where datalinks are denied or breakdown. Moreover, humans must be able to dynamically adjust their level of control over their autonomous teammates based on real-time battlespace demands—especially when human task loads are high and the situation may be surprising, unexpected, or confusing.

Human workloads must be manageable.

Humans must be able to communicate, collaborate, and control their CCA teammates with the least amount of friction inside their own cockpits, even as their own task-loading increases in complex battlespace. Warfighters will not find CCA useful if managing their CCA teammates detracts them from performing their primary mission duties to the extent it jeopardizes mission success. These concerns extend beyond flight control mechanics to include communication, coordination, and other mission integration tasks.

RECOMMENDATIONS

As vital as autonomous teammates are to the Air Force's future force design, CCA technologies are not yet mature, nor are they fully embraced by the operator community. Defense industry and Air Force research labs have primarily focused on decomposing mission tasks in solving the many complex technical problems associated with developing autonomous CCA. Yet despite incredible progress, efforts to date have neglected developing an understanding of how CCA should team with piloted aircraft to achieve operational success.

By involving warfighters in CCA development, the Air Force can build trust and ensure CCA perform specific teaming functions and tasks effectively. The foundational teaming behaviors that will make CCA successful will also interact with

their other mission tasks and cannot be bolted on after fielding. Understanding, mapping, and decomposing how *humans interact and integrate with each other* in piloted formations can offer early and crucial insights to how these teaming dynamics may be structured, even as those collaborations and formations evolve.

To achieve this, Air Force leaders should:

1. Optimize the composition of human-CCA teams.

■ *Identify the key relative strengths and weaknesses of humans and CCA to build the right human-CCA teams.*

■ *Develop concepts of employment and tactics, techniques, and procedures to exploit these team strengths and mitigate their shortfalls.*

■ *Program teaming dynamics into CCA, modeled on proven human-human combat team interactions.*

■ *Build a mastery of CCA teaming through continual test and training.*

2. Include operators in CCA development and provide them the tools they will need to understand how CCA will perform in the battlespace.

■ *Involve warfighters in developing CCA explainable machine learning user interfaces.*

■ *Develop interactive mission planning, mission rehearsal, and debriefing tools to support continual learning and mastery of CCA performance and teaming operations.*

3. Build trust so warfighters can trust that CCA will consistently behave as expected.

■ *Develop methods and processes for warfighters to assess the real-time integrity, performance, and accuracy of CCA operations.*

■ *Provide warfighters feedback on CCA algorithm integrity and data security.*

■ *Human teammates should be able to monitor and assess CCA battlespace awareness to identify situations where actions are needed to compensate when CCA encounter situations they are not trained for.*

4. Ensure warfighters have assured control over CCA in highly dynamic operations.

■ *Teammates should flexibly and appropriately shift between different control paradigms over the course of a mission.*

■ *CCA must proactively and responsively communicate with humans to assure control.*

■ *The Air Force must prioritize resilient connectivity as a technical priority for teaming efforts and develop “comm-out” contracts for CCA.*

5. Ensure operational workloads remain manageable for humans.

■ *Technologists must collaborate with warfighters to develop intuitive human interfaces.*

■ *CCA command and control interfaces must be fully integrated into the warfighter’s weapon system operational flight program.*

Autonomous aircraft will *not* replace humans in the battlespace. Well trained, highly performing human pilots will continue to be the essential qualitative advantage in highly contested peer conflicts because of their cognitive flexibility, adaptation, intuition, and other ineffable human traits. Yet collaborative combat aircraft have the potential to do far more than simply augment human missions. CCA can become true force multipliers for the Air Force—as long as teaming operational concepts, software, interfaces, and other capabilities are developed correctly.

Human warfighters will be the keystone to this transformation. Only human warfighters can provide their exclusive insight into the demands of teaming operations in uncertain, highly dynamic combat environments. To exploit the full potential of CCA, Air Force leaders, policymakers, and technologists must focus on creating effective human-CCA *teams*—placing greater emphasis on building human-CCA teaming dynamics as they aggressively pursue the development of CCA. Failing to do so risks not just less-capable CCA; it risks losing the next war. ★



Lockheed Martin

Lockheed Martin is investing \$100 million in teaming technologies to enable crewed platforms like the F-35 and uncrewed assets, like SPEED RACER (left), to conduct missions collaboratively.



During Project Convergence 22, The Yorkshire Regiment—the ‘Experimental Company’ British Army—took the opportunity to take part in more experiments using a SkyDIO autonomous drone at Fort Irwin, Calif., Nov. 4, 2022.

Project Convergence

Exercise exposes the inherent complexity of cross-domain, joint service operations.

By Christopher Gordon

FORT IRWIN, CA.

As the U.S. and allied militaries carried out a series of experiments in the chilly California desert in November, airspace management emerged as a pressing challenge. The Blue Force, representing allied forces in Europe, was operating advanced autonomous, sensing, and data capabilities to counter a Red Team, which served as a general proxy for Russian forces.

With so many drones in theater, the airspace grew congested, making it difficult to deconflict blue air

“The biggest thing we learned was ... the network was the backbone, was the center of gravity.”

—Lt. Gen. James M. Richardson, previous acting head of Army Futures Command

and ground fire against the hypothetical foe.

In an enormous tent that shook as high winds swept across a training range the size of Rhode Island, Army Chief of Staff James C. McConville, an aviator by training, saw the problem clearly in the midst of a two-hour briefing. Airspace management for the joint force, he said, is mired in an “industrial age approach.”

What is the point of slashing the time needed to identify and engage targets if it then takes hours to clear the skies in order for air or ground forces to act?

Welcome to Project Convergence 22, an Army-led effort to help the military adapt to intensified competition with China and Russia. The 2022 iteration

began in September with a mock Pacific fight centered at Camp Pendleton, Calif., followed by a European scenario centered at Fort Irwin, Calif., the following month. In addition to U.S. Forces, British, and Australian units also took part.

“I think we all have the same vision of where we want to be,” McConville told reporters shortly before joining a convoy of SUVs and buses for a 30-minute journey along dusty roads to witness some of the new systems in action.

Getting there is the hard part. Army Futures Command, which runs the event, describes the experiments as a “campaign of learning,” meaning they are intended as much to identify future problems as to find solutions.

While the U.S. military fights as a joint force, each service has its own doctrine and systems for command and control. Even when the services do operate jointly, they previously looked at one domain at a time. For example, there might be a combined forces air component commander with responsibility for airspace and a combined forces ground component commander overseeing ground fighting. But linking the people and systems in each of those domains

together remains a highly complicated challenge and the fundamental objective of joint all-domain command and control (JADC2), the idea that targets identified and tracked by any system in any domain can be attacked by the best possible shooter in any domain.

“It’s not like we’re going to go back and start with a clean sheet of paper,” McConville said. “We’re bringing together forces that have been optimized, maybe to communicate from the air or communicate from space, or communicate from the sea, or communicate from the ground. And we’re bringing all that together.”

British Army Lt. Gen. Sharon Nesmith, deputy chief of the U.K.’s General Staff, noted that the conventional stove-piped view of each domain can be detrimental to success. “It’s slightly unhelpful to look at a particular domain on its own because we would always operate all-domain, joint, and combined,” she said.

Given that for more than 20 years, the United States has engaged as partners with allies in operations in Iraq and Afghanistan, Fort Irwin’s terrain still reflects those long

Military service members assigned to the 7th Air Support Operations Squadron, Fort Bliss, Texas, and 729th Air Control Squadron, Hill Air Force Base, Utah, conduct warfare operations at the Tactical Operations Center-Light (TOC-L) in October during Project Convergence 22 experimentation at March Air Reserve Base, Calif.



Sp. Brenda Salgado/USAF

wars. The demonstration took place on the outskirts of one of Fort Irwin's combat towns, a constructed urban center in the desert called Ujen. The road leading into the city was still marked with signs in Arabic.

While those wars turned into grueling ground fights, the airspace was permissive; the Air Force flew manned and unmanned systems with virtual impunity. But in combat with more sophisticated foes, American air power faces far more complex threats, and foreign powers will see more complex operations by allied forces, as well.

In the Fort Irwin scenario, the Blue Force sought to improve integrated air and missile defense, test unmanned platforms, and defeat anti-access/aerial denial defenses. They also explored the challenges of logistics in a "contested environment," where adversaries might use missile and cyber attacks to disrupt supply lines and the delivery of reinforcements.

An array of new systems, including unmanned technologies intended to free up crewed aircraft for other missions, were put to the test. In one demonstration, a swarm of unmanned systems quietly snuck up on a group of observers, ready to land and box-in an opposing force. In another, troops learned that something as simple as a GPS-guided airdrop could be disrupted if airspace was not sufficiently monitored and controlled.

For the Army, a hard lesson learned going forward was that they need a better solution to airspace management and that the Air Force will be heavily involved in finding a solution.

"That's kind of new to us having all these sensors and everything inside that space," said Lt. Gen. Charles R. Hamilton, the Army's chief of logistics, when asked about airspace management.

U.S. and coalition air power had difficulty deconflicting air strikes, artillery fire, and rocket attacks when the U.S. helped Iraqi forces retake Western Mosul in 2017, according to a report by the U.S. Army's Mosul Study Group. "For deliberate targeting, whether in support of deep shaping operations or a planned strike in support of the close fight, processing and approval took time," the report said. It criticized what it termed "sub-optimal integration and synchronization of

air assets with maneuver."

Now, more than five years later, new unmanned systems have only made managing the airspace more complicated. More aerial systems make the skies more congested and deconfliction harder than ever. But in the event of a confrontation against a major adversary like China or Russia, McConville said, the U.S. must be able to rapidly integrate its myriad air and ground forces—not merely deconflict their operations. The issue was especially acute in the more confined European scenario, but also came up in the Pacific one, despite its vast, maritime focus.

"What we have to do and take advantage of is the ability to use data and the ability to use sensors," McConville said. "Then we can operate with aircraft moving very, very close to each other. At the same time, we're able to use fires, because we have much better situational awareness of where things are and where we want to go, and where our enemy forces are."

The mission is easier said than done, and a host of technical problems remain, particularly in rapidly sharing data among Air Force and Army systems. The challenge is not merely to send data, but to come up with a software fix so that Air Force data is instantaneously translated into data the Army can use, and vice versa.

"From our perspective, when we do autonomous control, we're sending requests for fires machine-to-machine," said an Air Force officer supporting the event. "We're able to send data machine-to-machine. What we're not getting was closure that, No. 1, it was received on the other end, and No. 2, when they're going to take that action. So now we don't know if that implied task—clearing the airspace to allow that fire—is going to happen."

During Project Convergence, the services were able to solve the problems via secure chat, but a more permanent, automated, and reliable fix is needed.

"That two-way conversation is important," said an Air Force civilian involved in the tests. "The hindrance is the architecture that we had available to us and the data translators that we had available to us."

Some of the artificial intelligence-aided systems used for targeting at Project Convergence, were FIRESTORM

(short for FIRES Synchronization to Optimize Responses in Multi-Domain Operations) and SHOT (Synchronized High OPTEMPO Targeting), which help select targets and engage them from multiple platforms.

During Project Convergence, Air Force aircraft flying overhead engaged targets while ground troops looked at the FIRESTORM system. But FIRESTORM could not fully communicate with the Air Force aircraft, such as the close air support A-10 Thunderbolt II.

“From a FIRESTORM perspective, those A-10s were not shooters that were valid to be able to engage some of the targets that the tanks were seeing,” the expert said. “From a joint target pairing standpoint, FIRESTORM needs to be able to do those things.”

Project Convergence began in 2020 as an Army experiment applying new technologies to the future force. The annual exercise has since grown into a wide-ranging, joint exercise. The Army quickly learned its experiment needed to expand the network itself after the inaugural event. The 2021 iteration added service members and assets from Air Force, Navy, and Space force to expand its scope into something more applicable to how the U.S. military plans to fight future conflicts as a joint force. The 2022 version included allied participants as well.

“The biggest thing that we learned in Project Convergence 20, really, that the network was the backbone, was the center of gravity,” said Lt. Gen. James M. Richardson, then the acting head of Army Futures Command, at an event at the Center for Strategic and International Studies in February. “We also learned that a lot of our technologies don’t talk to each other. They’re not configured properly—the standards, the message formats.”

Instead of being a single service playground, Project Convergence now aligns with the Department of Defense’s overarching goals. The 2022 National Defense Strategy prioritizes the Indo-Pacific and Europe as the focus of America’s

military posture, with China as the “pacing” and Russia as the “acute” or more ephemeral challenge. It also states the U.S. will work toward a more integrated force and work more closely with its allies and partners.

The U.S. and allies are “very close to being able to feel an all-domain force,” Lt. Gen. S. Clinton Hinote, the Air Force deputy chief of staff, strategy, integration, and requirements said. “And Project Convergence has showed me that is possible.”

Project Convergence 2022 tests included partners from allied nations in the two scenarios, as well as a technology exhibition. The experiments included thousands of troops, multiple American bases in the continental United States, Hawaii, and Australian forces based in Australia.

“It’s a series of experiments, but we are each year increasing the complexity, increasing the scale,” Secretary of the Army Christine Wormuth said. “While it is Army-hosted at the moment, it is truly a joint series of experiments. We’ve got all of the services participating, and then it’s also now multinational.”

In 2020, the Air Force and Army entered into an agreement signed by McConville and Air Force Chief of Staff Charles Q. Brown Jr. to ensure data could be shared among the services. The effort is led by Army Futures Command, which hosts Project Convergence, and the Air Force’s office of strategy, integration, and requirements, led by Hinote.

The Air Force and Army will work together to address airspace management and data translation issues raised during the 2022 test, an Air Force spokesperson told Air & Space Forces Magazine.

Hinote expressed optimism that major progress could be made. “In the end, you’re going to see an all-domain force arise out of this, and it’s going to be incredibly compelling,” he said. That will not come easy, however. “We’ve still got a lot to do,” Hinote said. “We’ve still got a lot of data that we’ve got to figure out how to deal with. We’ve still got a lot of connectivity that we’ve got to figure out how to connect.”



Wendy Day/USAF

A U.S. Army UH-60 Black Hawk helicopter and a U.S. Air Force C-17 Globemaster III share hangar space at March Air Reserve Base, Calif., as the base hosts Project Convergence 2022, the Army’s campaign of learning designed to aggressively advance and integrate Army’s contributions, based on a continuous structured series of demonstrations and experiments.

Responding to Threats in Space

The growing frequency of intentional and unintentional incidents in space proves the case for resiliency.

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


“Both Russia and China have been building space systems to support their military, operationally and for strategic reasons, and they both have been working on offensive capability to counter our space systems. ... Preventing a conflict over space assets is going to become increasingly difficult due to the strategic value of satellites and the proliferation of technologies that can be used to destroy satellites. The United States wants space to be a peaceful domain for scientific and commercial pursuits.”

— Secretary of the Air Force Frank Kendall, September 2022

The U.S. military depends on a vast array of capabilities supplied from space: precise navigation and timing; wideband, protected, and secure communications; missile defense missile warning and missile tracking; intelligence, surveillance, and reconnaissance; and environmental and weather monitoring. Each of these is critical to the U.S. and allied defense, both in peace and war. Increasingly, there is also a vibrant international commercial economy built around satellites operating in a variety of orbits. All of these capabilities are now under threat from both intentional and unintentional interference. Threats range from permanent destructive attacks to the reversible effects of jamming. Meanwhile, China, Russia, and others are not only focusing on counter-space weapons, but developing their own space assets, as well.

Protecting and retaining U.S. space capabilities in this threatening environment is critically important. Both the military and civilian worlds now depend on capabilities such as the Global Positioning System, communications, and other systems must be secure and protected. Across the world we are dependent on missile warning and missile tracking to assure the safety of our society, infrastructure, and troops on the ground, U.S., and allies. If the space systems that we so depend on are interfered with and unavailable, the consequences could be dire.

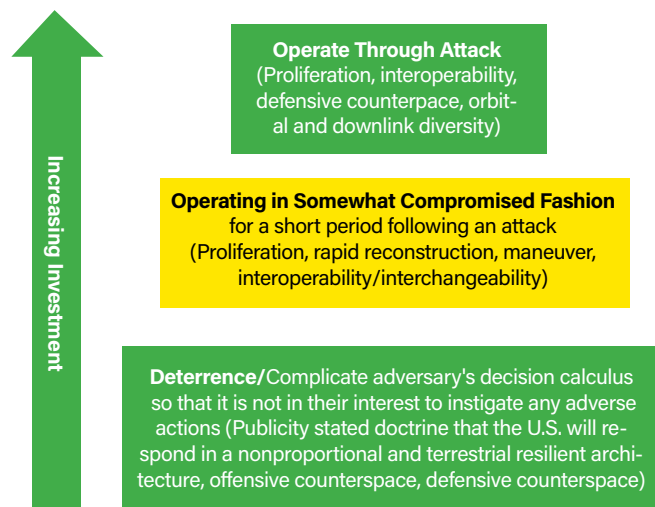
China and Russia have developed capabilities that threaten U.S. space dominance, including the ability to eliminate satellites. The Space Force, in response, has moved and adopted a strategy of af-



A SpaceX Falcon Heavy rocket launches from Kennedy Space Center, Fla., Nov. 1, the first National Security Space Launch mission on a Falcon Heavy. As the military becomes more dependent on space, the ability of networks and sensors to operate through attack becomes evermore critical.

Goals and Objectives of Resilience

There are three levels of operation ranging from deterrence to the ability to operate through attacks and continue to provide capabilities even through losses.



fordable resilience, using proliferation as its centerpiece. In addition to proliferation, however, there are many more strategies needed to support resilience. In this rapidly changing and evolving threat environment, the more options we have available, the better we can flexibly respond to new challenges.

MENU OF RESPONSES

What do we do about these intentional and unintentional threats? The solution is to apply multiple strategies to assure that we can provide resilience in space operations—that is, the ability to absorb losses and continue the mission, even if that capability is degraded. The most critical of these tools are:

- Offensive counterspace
- Proliferation, with large constellations of satellites
- Reconstitution, or the ability to rapidly replace satellites by launching existing ground spares
- Defensive counterspace
- Mission disaggregation
- Orbital diversity
- Downlink diversity

As Lt. Gen. John E. Shaw, deputy commander of U.S. Space Command has said, “Our adversaries see what space capabilities mean to modern warfare, and how dependent our terrestrial forces are on space. These capabilities are fundamental to how the U.S. does warfighting, and they are now under threat, and can be held at risk. The U.S. military now treats space as an ‘area of responsibility,’ territory that needs to be maintained and defended, not merely traversed by spacecraft, and to protect and defend our space capabilities against those threats and be prepared for a fight that may begin or extend into space.”

OFFENSIVE COUNTERSPACE

The definition of deterrence is “the action of discouraging an action or event through instilling doubt or fear of the consequences.” While increasing our adversary’s complexity of attack is indeed some level of deterrent—especially where the cost trade-off is unattractive—the ultimate deterrent is to be able to react in kind in a fashion such that our adversary cannot effectively respond.

Offensive counterspace can involve jamming signals; spoofing; using lasers to dazzle or blind optical satellites; using lasers

to damage the satellite; physical disruption, either by means of collision or the use of a robotic capability to grapple or “kidnap” a satellite; and kinetic attack by means of a projectile, whether launched from inside or outside Earth’s atmosphere.

Proliferation, including the availability of orbiting spares, is one way to counter offensive space. Moving to larger constellations of more affordable satellites is a cornerstone of resilience. Having more satellites on-orbit than necessary allows the constellation to absorb losses and still accomplish the mission.

Another approach is to use ground spares to rapidly reconstitute capability in the face of losses in battles of attrition. The U.S. Space Force must be able to rapidly replace satellites and retain resilience, requiring that replacement satellites be ready to launch, and that these can be launched quickly with a tactically responsive launch capability. The Space Force’s Space Systems Command (SSC) plans to demonstrate this capability sometime in the next year. Additionally, as threats to our satellites expand and change, agility—that is, the ability to reprogram hardware already in space—is far preferable to building and launching new hardware. All new systems must have the ability to be reprogrammable and to use this reprogrammability to the maximum extent possible to flex against new and changing threats.

DEFENSIVE COUNTERSPACE

Being able to negate attacks will be critical in the future. Defenses must be flexible and adaptable, lest adversaries change to attacks for which current defenses are not effective, leaving the U.S. vulnerable. But like proliferation, defense is a key element of any resilience strategy. Defenses can include active kinetic defense; cyber hardening; anti-spoofing; survivability; and the ability to maneuver out of the path of attacks.



A United Launch Alliance (ULA) Delta IV Heavy rocket carrying a critical payload for the National Reconnaissance Office (NRO) lifted off with the NROL-91 mission from Space Launch Complex-6, Vandenberg Space Force Base, Calif., on Sept. 24, 2022.

United Launch Alliance

The Growing Frequency of Orbital Events

Collisions and near collisions in space, as well as suspect activity by adversaries, are increasingly common occurrences. The events compiled here represent some, but by no means all, of the events that have occurred in the past 15 years. Events here are divided into two categories—in-
 intentional threats resulting from offensive activity in the space domain and unintentional threats, caused by congestion as the volume of satellites on orbit has increased.

INTENTIONAL/CONTESTED THREATS		
	September 2006	China used a ground-based laser to dazzle or “blind” a U.S. optical surveillance satellite. China has at least five sites that support China’s DEW (directed energy weapon) work.
	January 2007	China launched a ballistic missile from Xichang Satellite Launch Center. The payload was a kinetic kill vehicle (KKV) that collided with a non-operational Chinese weather satellite, the Fengyun-1C (FY-1C), at an altitude of 863 kilometers, destroying the satellite and creating debris that threatened all LEO satellites.
	September 2008	Shenzhou 7 deployed a small satellite (BX-1) to test maneuvering and control for co-orbital ASAT capabilities. The BX-1 imaging satellite came within 45 km of the International Space Station without providing prior notification.
	August 2010	China launched the SJ-12 satellite that maneuvered to bump into China’s SJ-6F satellite.
	May 2013	A likely test of a DA-ASAT (direct-ascent-antisatellite) that could reach higher orbits took place from Xichang. Technical analysis ... indicated that the test had an apogee of 30,000 km.
	August 2013	Three satellites were placed in orbit on the same launch (SY-7, CX-3, & SJ-15). The SJ-15 demonstrated close RPO (rendezvous and proximity operations) maneuvers with the CX-3 and SY-7. One of these satellites was equipped with a robotic arm, and once all were in orbit, that satellite grabbed one of the others with its arm.
	September 2014	Russian satellite ‘Luch’ maneuvered around the geostationary belt and came close to both French and Italian military communication satellites and parked itself between two Intelsat satellites in geosynchronous orbit for five months, alarming Intelsat executives.
	November 2016	Shiyan 17 launched by a Long March 5 demonstrated maneuverability around the geostationary belt, circumnavigated Zhongxing-5A (ChinaSat-5A), China Sat 1C, and made later approaches to Zhongxing-6B and Shijian-20.
	July 2017 to December 2019	A Chinese satellite SJ-17 made a series of maneuvers in the geostationary belt and conducted a series of space rendezvous that took SJ-17 past the U.K. MoD’s Skynet 5A satellite. The Shijian-17 is a Chinese satellite with a robotic arm. Space-based robotic arm technology could be used in a future system for grappling other satellites.
	October 2017	Russia launched the Cosmos 2519 satellite, the first of the “nesting” satellite demonstrations. A second sub-satellite Cosmos 2521 demonstrated the capability of maneuvering around other satellites. Cosmos 2521 demonstrated the ability to position itself near another satellite and to fire a projectile, deploying third object (Cosmos 2523) at the high relative speed of about 250 km per hour.
	August 2018	Russia demonstrated Russian Nesting Doll satellites. The Cosmos 2543 “birthed” a second, smaller satellite Cosmos 2542, that ejected a sub-satellite, Cosmos 2543. Experts believe the Cosmos 2543 is designed to release a guided munition or projectile to interrupt or destroy satellites in orbit.
	September 2018	A modified Russian MiG-31 fighter jet carrying an unidentified missile that some reports suggest could be a “mock-up” of an air-launched ASAT weapon (called Kontakt).
	September 2018	Russia’s Luch satellite approached Athena-Fidus satellite, a French-Italian satellite.
	December 2018	China’s counterspace satellite (TJS 3-Tongxin Jishu Shiyan) maneuvered around its rocket body/apogee kick motor in GEO.
	March 2019	India tested an anti-satellite system code-named Mission Shakti. The target of the test was a satellite present in a low-Earth orbit (Micro sat-R), which was hit with a kinetic kill vehicle at an altitude of 283-kilometre (176 mi) with a reported accuracy of less than 10 cm. Developed under Project XSV-1, the ASAT test utilized a modified anti-ballistic missile interceptor code-named Prithvi Defense Vehicle Mark-II.
	July 2019	Again a Luch came within approximately 1.8 km of Intelsat 36.
	March 2020	China’s Aolong-1 (Roaming Dragon) again demonstrated use of a robotic arm that can kidnap or significantly disrupt the satellites operation.
	July 2020	Cosmos 2542 (like Cosmos 2519), was sent to check out both Cosmos 2535 and the U.S. military satellite USA 245 (KH-11). They also released a second satellite, Cosmos 2543 (similar to Cosmos 2521), that chased the U.S. satellite for a while.
	October 2021	A Long March 3B launched from the Xichang Satellite Launch Center and put a Shiyan 21 “Debris removal” satellite in orbit; space debris mitigation technologies are “dual-use,” having both civilian and military ASAT applications.
	November 2021	Russia again testing its Luch ASAT system, launched from Plesetsk, this time against an actual target (a long defunct Tselina-D electronic signals intelligence (ELINT) satellite launched on Sept. 16, 1982). Of the 1,783 pieces tracked from this event (though likely many smaller untrackable pieces are in orbit), approximately 683 remain, and it may be until 2033 before all re-enters.
	January 2022	China demonstrated orbital rendezvous and capture. This technology has a use in cleaning up space debris and potentially as an offensive counterspace/kidnapping capability. The Chinese Shijian-21 captured the inoperative Beidou-2 G2 navigation satellite, towed to 3000 km, and returned to GEO.

	July 2022	We discovered a new ground-based LASER capability (Kalina Program) at Krona Space Facility for a high-powered laser that can damage space-based EO payloads.
	August 2022	Russia launched Cosmos 2558 on a Soyuz 2 rocket to match the trajectory of an American satellite, USA-326/NROL-87 a probable reconnaissance satellite. Cosmos 2558 (like Cosmos 2519 & 2542) is likely an 'inspector' satellite meant to check out USA 326. The two satellites had a relatively close but not dangerous flyby at ~67 km. Most of that distance (about 64 km) was in altitude.
	September 2022	Eutelsat detected jamming on two of their satellites. This affected radio and TV broadcasts of Persian-language programming on those satellites. Eutelsat engineers traced the jamming to Iran.
	October 2022	At a U.N. speech, a senior representative from Russia, Konstantin Vorontsov, stated proliferation of privately operated satellites has become a dangerous trend and that this quasi military infrastructure will become a legitimate target for retaliation.
UNINTENTIONAL/CONGESTION THREATS		
	January 2007	Debris created from a Chinese intercept demonstration still threatens active satellites.
	February 2009	A collision of a Russian communications satellite (Cosmos 2251) with a U.S. commercial satellite (Iridium 33), also creating debris that threatens active satellites.
	February 2015	A U.S. DMSP satellite exploded in sun-synchronous polar orbit creating at least 43 pieces of debris.
	September 2019	ESA was required to perform a collision-avoidance maneuver of its Aeolus satellite due to a potential collision with a SpaceX satellite.
	January 2020	An Infrared Astronomical Satellite (IRAS) came within 7 meters of the GGSE-4 satellite.
	March 2021	China's Yunhai-1 (02) satellite, launched in 2019, suffered a breakup event. It was concluded that this was caused by impact with a small piece of a Zenit-2 launch vehicle that launched the Russian Cosmos 2333 military signals intelligence satellite in 1996.
	April 2021	An unexpected object reached orbit with nine Chinese satellites, dubbed Object K, which is likely a piece of a long March launch vehicle.
	In and throughout 2021	SpaceX's Starlink satellites alone are involved in about 1,600 close encounters between two spacecraft every week
	December 2021 to today	pLEO (proliferated LEO) Conjunction squalls linked to ASAT debris. In August 2022 SpaceX Starlink satellites had thousands of close approaches of debris, for which they had to perform nearly 7,000 collision-avoidance maneuvers.
	January 2022	China's Tsinghua Satellite had a close encounter with debris from Russia's November 2021 ASAT test that came within 14.5 meters of the satellite.
	April 2022	A defunct Russian Ullage motor from a space tug that put a Glinda's satellite in orbit in 2007 broke up creating at least 16 pieces of trackable size.
	June 2022	The International Space Station (ISS) to fire its thrusters for more than four minutes to shift itself out of the path of the moving debris from the Russian anti-satellite missile test.
	February 2022	A launch of 49 satellites—SpaceX Starlink satellites—were launched straight into a solar storm. At least 40 satellites have already fallen out of orbit and re-entered in an uncontrolled fashion. Solar storms can also disrupt satellite operations or even damage components. This could affect pLEO smallsats in particular, which have often used commercial-off-the-shelf (COTS) electronics that are more susceptible to solar activity than radiation-hardened components that are more expensive and can take longer to order.
	October 2022	The ISS had to maneuver to get out of the way of debris from the Russian 1408 ASAT test. The debris was projected to be within 5 kms of the ISS before the maneuver.
	November 2022	A Longmarch 6A broke up shortly after deploying a Yunhai-3 payload. This created approximately 50 new pieces of space junk at approximately the altitude of SpaceX Starlink satellites, and above the ISS. This space junk will remain for years and at some point put the ISS in danger.

MISSION DISAGGREGATION

The ability to accomplish the mission across more platforms through separating out, breaking up missions into smaller mission bites, and having systems designed for other missions being able to support disparate missions, increases resiliency, decreasing the effectiveness of eliminating satellites.

ORBITAL DIVERSITY

As national security and commercial space evolves to include proliferated constellations, a variety of orbital options (both in altitude regimes and in orbital inclinations) are available. Each has advantages and disadvantages.

Orbital diversity complicates the calculus of adversaries because it is more difficult for an enemy to defeat a complex and multi-layered system than to attack a single homogeneous element. Orbital diversity forces adversaries into multiple attack approaches, complicating their ability to negate U.S. advantages in space. As the Space Force moves toward resilient constellations, it should continue to seek diversity in orbital regimes, diversity in orbital inclinations, and ground diversity.

The rapid evolution of the capability to launch many small SVs on a single launcher seems to be increasing the opportunities of having highly proliferated and orbitally diverse systems, each of which is relatively inexpensive, so long as the commu-

Thousands of satellites and more than 27,000 bits of orbital debris, from dead satellites to small components are tracked by the U.S. Space Force; tens of thousands more bits of space junk are too small to be tracked. Traveling at speeds in excess of 15,700 mph, even tiny orbital scraps can destroy systems in space. This illustration, though not drawn at scale, illustrates the growing risk of collisions in space.



European Space Agency illustration

nication challenges posed by this diversity can be addressed. The Space Development Agency (SDA) is actively taking on this challenge with a “Transport Layer,” adding evolving Optical Inter-Satellite Links (OISL), which link satellite to satellite, in-plane and cross-plane, with high-rate downlinks that exponentially increase the utility of these proliferated systems.

DOWNLINK DIVERSITY

As the SDA implements this Transport Layer, using high-rate optical links, there is also significant future potential for high-throughput optical technology to exceed data rates possible today with radio-frequency links, not just for space-to-space connections, but also space-to-ground. In addition to the potential of higher data rates, there is also a case for diversity and redundancy in ground network systems, as well as in space sensing and networks. Optical links to the ground are dependent on weather, but optical communications terminals (OCT) can be incorporated into Ground Entry Points (GEPs). Like with orbital diversity, single-GEP solutions are more vulnerable to outages than the diversity of multi-GEP solutions.

SPACE SYSTEMS & DOMAIN AWARENESS

Lt. Gen. Michael A. Guetlein, commander, Space Systems Command, stressed the need for improved space systems and domain awareness in September 2022. “With space essential to military operations, better understanding of what objects are in orbit and the threats they may pose is foundational for space security,” he said. “It’s incumbent on the service to better track potential threats to those assets. The days of us focusing only on maintaining the space catalog of knowns is over. Not only are we focusing on what we know is out there, we’re searching for new objects. We are identifying where those objects came from, why they are there, and what their intents are.”

Space Systems Awareness (SSA) and Space Domain Awareness (SDA) require the ability to detect and track man-made (intentional) and natural (unintentional) threats. It means determining the capabilities of the objects, the intent behind their launch, and the vulnerabilities of U.S. and allied assets to potential attacks. It also requires the ability to predict and assess the risks involved, and to maintain custody of threats

and potential threats, and to implement appropriate mitigation measures in order to protect space and ground assets.

As Army Gen. James H. Dickinson, commander of U.S. Space Command, put it in an interview with reporters in August 2021: “Space Situational Awareness (SSA) is more than simply reporting on where something is in space—but also characterizing it that way. Space Domain Awareness (SDA), is a little bit more complicated, requiring observers to try to understand and assign motive, the ‘why’—the intent—behind having something in space and where it is. SDA gives us insight into activity throughout the space domain, including potential adversary activities, but perhaps more importantly, insight into the intent of those potential adversaries, too.”

SSA/SDA must provide the effective identification, tracking and custody, and characterization of threats to U.S., ally, and commercial space systems. The goal is to understand any factor, passive or active associated with the space domain that could affect U.S., ally, or commercial space operations and thereby impact the security, safety, economy, or environment of our nation. These systems can be space based or terrestrial, government or commercial, radar or optical.

Before retiring from the Air Force in 2021, then-Vice Chairman of the Joint Chiefs of Staff Gen. John E. Hyten emphasized how essential space resilience is to American forces in every domain. “Our No. 1 priority,” he said, “is to get the Soldiers, Airmen, Guardians, Sailors, and Marines deployed in harm’s way all around the world the space capabilities they need—every minute of the day—because everything they do is critically dependent on space. We cannot fail that mission.”

Space no longer is an arena of free and open operations. However, there is a growing threat environment, and missions must continue despite these threats, even when they can successfully eliminate satellites/nodes of our space systems. There are various approaches to achieve resilient architectures, and while proliferation is the primary cornerstone, we must also assess and implement other resilience options where they are appropriate. ✪

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



Mike Tsukamoto/staff; USAF; White House; National Archives; TASS

(ILLUSTRATION) Left to Right: President Ronald Reagan; Brig. Gen. Leonard Perroots; Gen. Billy Minter, commander, USAF; Gen. Charles Donnelly Jr., commander, 5th Air Force; Lt. Col. Stanislav Petrov, Air Defense Forces, Soviet Union; and Yuri Andropov, chairman, KGB.

The Near Nuclear War of 1983

How the Air Force helped avert a nuclear catastrophe and save the world.

By Brian J. Morra

"This is not a bluff." Russian President Vladimir Putin's warning in September 2022 made clear his apparent willingness to use "all weapon systems available to us"—including nuclear ones—in the war in Ukraine. Decades after the end of the Cold War and 60 years after the Cuban Missile Crisis, the serious specter of nuclear war was once again in the popular consciousness.

Weeks later, President Joe Biden told Democratic Party faithful at a fundraiser, "We have not faced the prospect of nuclear Armageddon since Kennedy and the Cuban Missile Crisis." What Biden was forgetting—along with politicians, pundits, and reporters across the political spectrum—was that America and the Soviet Union teetered on the brink of nuclear war far more recently than 1962. Most Americans are unaware that in 1983, in the midst of President Ronald Reagan's first term, the world came close to nuclear Armageddon.

The 1983 incident was at least as dangerous as the Cuban Missile face-off in October 1962. Yet the 1983

"There were no rules about how long we were allowed to think before we reported a strike. ... But we knew every second of procrastination took away valuable time."

—Lt. Col. Stanislav Petrov, Air Defense Forces, Soviet Union, the accidental watch commander

scare remains largely unknown and unexamined, a missed opportunity given that the events of autumn 1983 offer policymakers, military leaders, and intelligence officers significant lessons for current challenges, especially in regard to how to prevent the war in Ukraine from escalating into a nuclear conflict.

Unlike the 1962 event, when President John F. Kennedy's televised speeches received blanket coverage and alarmed the world, the 1983 crisis played out largely out of public view. Americans are well familiar with how Kennedy and his administration were in formal and informal contact with the Kremlin throughout the crisis, and the dramatic confrontation between the United States and the Soviet Union in the United Nations Security Council played out on live TV.

Classification kept the most of the 1983 events in the shadows, however, until around 2015, when some government papers were finally declassified. Another difference from 1962 is that the 1983 events were not concentrated in anything like the 13 days of the Cuban crisis. Rather, the events played out over a much longer time frame. In 1962, the White House publicly trumpeted its resolution of the crisis. But in 1983, the White House didn't even realize it was

dealing with a nuclear crisis until after it had passed.

Indeed, the full scope of the 1983 crisis was not understood at the time by the Intelligence Community (IC). The various sub-crises were resolved quietly, out of the public eye. The interconnectedness of the 1983 crises was better understood in Moscow than in Washington, mainly because of a global KGB-led intelligence collection program.

To understand this history, it's important to appreciate the mindset of the Kremlin at the end of the 1970s. The aging Communist Party leadership in Moscow worried that the global correlation of forces was moving inexorably in favor of the West. The Soviets judged that they were falling behind on many fronts—economic growth, technology development, and geopolitics. Because of those factors, the Kremlin also feared that its ability to keep pace with the West in military terms was threatened.

Moscow's geriatric leaders obsessed about a potential surprise attack from the West. Most of them had personal memories of the shock of Germany's Operation Barbarossa, a devastating surprise attack on the USSR in 1941. They feared the West could launch a Barbarossa-like nuclear first strike. To prevent a repeat of 1941's strategic surprise, the KGB initiated Operation RYaN in May 1981, the largest Soviet intelligence-collection effort of the Cold War. Its purpose: to uncover secret Western preparations for a nuclear first strike. The Russian acronym RYaN translates to "nuclear missile attack," implying a surprise attack.

In effect, the KGB had concluded that the West was likely to execute a first strike, and tasked intelligence officers around the world to find facts to support that conclusion. The chief architect of the operation was KGB Chairman Yuri Andropov, who in November 1982 was named General Secretary of the Soviet Communist Party. Andropov feared the West's ability—and suspected its willingness—to launch a decapitating nuclear first strike.

General Secretary Andropov viewed President Reagan with deep suspicion, and his distrust seemed justified when Reagan dubbed the Soviet Union the "Evil Empire" in March 1983, asserting the Russian government was the "focus of evil in the modern world." Soon after, in the same month, Reagan first revealed the existence of the Strategic Defense Initiative (SDI), an ambitious

plan to defend the Earth from intercontinental ballistic missiles with space-based defenses. The concept was immediately dubbed "Star Wars," drawing from the movie franchise which had not yet released its third installment. Those two speeches raised Andropov's concerns to a fever pitch, and he ordered a redoubling of the RYaN effort. The Western press may have been Star Wars skeptics, but the Soviet leadership believed it could be built, and that it would be a singularly destabilizing advantage for the West. If SDI were successful, the Kremlin concluded, the United States would possess the ability to launch a nuclear first nuclear strike with impunity.

Kremlin worries also focused on NATO and on planned U.S. deployments of new Pershing II nuclear-armed ballistic missiles in West Germany and new nuclear-armed ground-launched cruise missiles in the United Kingdom. The Kremlin viewed both weapon systems as first strike threats that could decapitate the Soviet leadership with virtually no warning. To the Politburo, NATO was an inherently offensive alliance. (Today, Vladimir Putin echoes much the same sentiment about NATO.)

With this as a backdrop, the Soviets saw a series of events in 1983 that seemed to validate Operation RYaN's premise and the Kremlin's paranoia. The same month as Reagan's "Evil Empire" and "Star Wars" speeches, the U.S. Navy's Pacific Fleet initiated a massive exercise in the North Pacific. Called FleetEx '83, it would both alarm and embarrass the Soviet military. The exercise was winding down on April 2, 1983, when U.S. Navy carrier-based fighters overflew Soviet military facilities in the Kurile Islands. To Moscow, the Navy overflights fit the RYaN pattern. Were these violations of Soviet airspace an attempt by the Americans to create a predicate for a nuclear first strike? Moscow issued a formal diplomatic reproach to the United States decrying the overflights and immediately raised air defense alerts in the Soviet Far East to alarming levels.

Soviet Air Defense officers in the Far East were fired for failing to respond to the U.S. Navy overflights. Across the Far East, Soviet air defense units maintained a maximum, hair-trigger alert through the summer months of 1983. No Soviet colonel wanted to be the one to fail to respond should another violation of Russian airspace occur.

In Japan, Air Force Intelligence assessed that the Soviet alerts

posed a grave potential threat to American intelligence-collection flights in the Far East. In July, 5th Air Force Intelligence warned Adm. William J. Crowe, the chief of the U.S. Pacific Command, that any aircraft deemed a border violator by the Soviets—even a civilian airliner—would be at grave risk.

The Soviets were still on high alert on Sept. 1, 1983, when Korean Air Lines flight 007, flying from New York to Seoul, via Anchorage, Alaska, flew off course over the North Pacific due to a navigational error. The Korean plane violated Soviet airspace, inadvertently flying over the Soviet nuclear submarine base at Petropavlovsk and crossing the Sea of Okhotsk, a bastion for Soviet ballistic missile subs. The Soviet Air Defense system was uncertain of the aircraft's identity and attempted to intercept the intruder several times. As KAL 007 was about to exit Soviet airspace, a Soviet Air Defense Su-15 fighter finally intercepted and shot down the Korean Air Lines 747 near Sakhalin Island, killing all 269 people on board, including 62 Americans.

To the Kremlin, the KAL incident fit the RYaN pattern. It was either a clever American intelligence-collection flight, or it was a deliberate provocation designed to create a pretext for a nuclear war. To this day, many Russian leaders believe the KAL flight was a deliberate act of American aggression.

Air Force Intelligence concluded that the Soviets were confused about the mystery aircraft's identity during the early morning hours of Sept. 1. Inadvertently, KAL 007 flew through the orbital path of an Air Force RC-135 Cobra Ball mission that

was monitoring a predicted Soviet ICBM test launch. But when the ICBM launch didn't occur, the RC-135 returned to base, while the Korean 747 flew blithely on toward the Kamchatka Peninsula and Soviet airspace, well to the north of its planned route. The mystery flight confused and confounded Soviet commanders.

The KAL shootdown took the already frayed US-Soviet relationship to a breaking point. Official communications between Moscow and Washington essentially ceased—quite unlike what happened 21 years before during the Cuban Missile Crisis, when President Kennedy exchanged frequent official communiques with General Secretary Khrushchev, and directed an unofficial communication channel be established through his brother, Attorney General Robert Kennedy, with the Soviet ambassador to the United States. But in the fall of 1983, Washington and Moscow were not talking.

On Sept. 3, 1983, a U.S. Navy EP-3 intelligence-collection aircraft was orbiting near the KAL 007 crash site when the Soviets wrongly determined the Navy plane had violated Russian airspace. Two MiG-23 fighters were ordered to shoot down the U.S. aircraft.

Gen. Charles L. Donnelly, commander of U.S. forces in Japan and the 5th Air Force, ordered a flight of four F-15s to intercept the MiG-23s. Simultaneously, 5th Air Force warned the EP-3 of the threat. The EP-3 pilot dove for the wave tops to evade the Russian fighters and after a tense period, the EP-3 reached Japanese airspace, safe from Soviet attack. As the F-15s com-

Korean Air Lines 747



Ado Haafke

SEPTEMBER 1, 1983
Korean Air Lines Flight 007

The Soviets were still on high alert Sept. 1 when Korean Air Lines flight 007 flew off course over the North Pacific due to a navigational error. The Korean plane violated Soviet airspace, inadvertently flying over the Soviet nuclear submarine base at Petropavlovsk and crossing the Sea of Okhotsk, an operations area for Soviet ballistic missile subs. Mistaken as a threat, a Soviet Air Defense Su-15 fighter intercepted and shot down the Korean Air Lines 747 near Sakhalin Island, killing all 269 people on board, including 62 Americans and U.S. Rep. Larry McDonald (R-Ga).

SEPTEMBER 27, 1983
False Launch

Early on the morning of Sept. 27, Russia's National Missile Defense Center received warnings from its new missile detection satellites that the United States had launched intercontinental ballistic missiles from Grand Forks Air Force Base, N.D. Soviet watch commander, Lt. Col. Stanislav Petrov of the Air Defense Forces, was subbing for a sick comrade. He was a signal processing engineer—not a typical watch stander. Petrov knew of the strengths and flaws in the Soviets' satellite warning system, and assessed that the launch reports must be false alarms. Petrov advised his leadership against a retaliatory attack. Had the USSR ignored Petrov and acted on the phantom ICBM attack, the world would have been plunged into global nuclear war.



A member of the 321st Strategic Missile Wing, Grand Forks Air Force Base, N.D., at a control panel inside a Minuteman III ICBM silo, June 15, 1983.

Staff Sgt. Louis Comeger via National Archives

On the Brink of Disaster

False assumptions, incomplete intelligence, and technical errors combined with simple accidents to put the world's two great nuclear powers on the brink of all-out war in 1983. Patience and calm prevailed on both sides, despite overwhelming personal risk, defusing the crisis.



TASS/Soviet Life

Former KGB chairman, Yuri Andropov. A year later he became General Secretary of the Soviet Communist Party.

MAY 1981
Operation RYaN

Operation RYaN (Raketno-Yadernoe Napadenie — "Nuclear Missile Attack"). The purpose was to collect intelligence on potential contingency plans of President Ronald Reagan's administration to launch a nuclear first strike against the Soviet Union. The program was initiated by Yuri Andropov, then chairman of the KGB.



U.S. Navy via National Archives

A bow view of the aircraft carriers USS Midway (CV-41), left, USS Enterprise (CVN-65), and USS Coral Sea (CV-43), underway with a task force during CINCPAC Exercise FleetEx '83.

APRIL 1983
FleetEx '83

The U.S. Navy's Pacific Fleet initiated a massive exercise in the North Pacific called FleetEx '83. This exercise alarmed and embarrassed the Soviet military. The exercise was winding down on April 2 when U.S. Navy carrier-based fighters overflew Soviet military facilities in the Kurile Islands. To Moscow, the Navy overflights fit the RYaN pattern. Moscow issued a formal diplomatic protest to the United States, decrying the overflights and immediately raised air defense alerts in the Soviet Far East to unprecedented levels.



USAF

In the aftermath of the KAL shootdown, Gen. Charles Donnelly's cool judgment prevented the escalation into war.

SEPTEMBER 3, 1983
U.S. NAVY EP-3 intercept

On Sept. 3 a U.S. Navy EP-3 intelligence-collection aircraft was orbiting near the Korean Air Lines flight 007 crash site when the Soviets wrongly determined the plane had violated Russian airspace. Two MiG-23 fighters were ordered to shoot down the U.S. aircraft. Gen. Charles L. Donnelly, commander, U.S. forces in Japan and 5th Air Force, ordered four F-15s to intercept the MiG-23s. Simultaneously, 5th Air Force warned the EP-3 of the threat. As the F-15s completed their intercept, Donnelly ordered them to break off without engaging and to return to their combat air patrol orbit. When another general officer on the scene questioned Donnelly's decision not to engage, Donnelly responded, "I don't think I'll start World War III this afternoon."

NOVEMBER 1983
Able Archer 83

NATO staged a nuclear war exercise called Able Archer 83. It was designed to practice nuclear command, control, and weapons release procedures. The Soviets believed the exercise was a cover for a real nuclear first strike. They placed their theater and strategic nuclear forces on high alert. USAF Brig. Gen. Leonard H. Perroots, chief of intelligence for U.S. Air Forces, Europe (USAFE), noted the Soviet preparations and became deeply concerned. Briefed by Perroots, USAFE Commander Gen. Billy M. Minter considered whether to order a reciprocal nuclear alert. Perroots, fearing any such action would further inflame an already fraught situation, advised against it.



A pilot from the 18th Tactical Fighter Wing boards an F-15 Eagle aircraft in preparation for takeoff at Misawa Air Base, Japan. The F-15 is being scrambled after the report that Korean Air Lines Flight 007 has been shot down by a Soviet aircraft.



Tech Sgt. Herb Cintron via National Archives

pleted their intercept of the MiG-23s, Donnelly ordered them to break off without engaging the Soviet fighters and to return to their combat air patrol orbit. When another general officer on the scene pointedly questioned Donnelly's decision not to engage the MiGs, Donnelly responded, "I don't think I'll start World War III this afternoon." [The author was an eye-witness to this exchange].

Maj. Gen. James C. Pfautz, the senior intelligence officer on the Air Staff—analogueous to today's Air Force A-2—supported the 5th Air Force Intelligence analysis, which assessed that the Soviet shootdown of KAL 007 was a tragic mistake, not a deliberate act of murder. Pfautz prepared a briefing detailing his assessment that the Soviets had made a series of critical errors leading to the shootdown. But the Air Staff briefing failed to gain traction with the Intelligence Community leadership in Washington, including Director of Central Intelligence William J. Casey. In official Washington, the narrative that emerged was that the KAL shootdown was an intentional atrocity. On Sept. 5, in a nationally televised speech, President Reagan termed it "the Korean Airline massacre ... a crime against humanity."

In the days and weeks that followed, U.S. intelligence continued to analyze the event, eventually concluding that Air Force Intelligence had gotten the story right from the outset. While not absolving the Soviets of responsibility for the deaths of 269 people, the IC agreed that the shootdown resulted from months of hair-trigger alerts, fear of reprisals for not acting against a border violator, and confusion about the identity of the aircraft.

Yet at the highest levels, competing American and Soviet narratives became entrenched, and the battle lines were drawn in Washington and in Moscow. Secretary of State George P. Schultz gave an impassioned presentation before the United Nations Security Council, during which he presented classified evidence of the Soviet attack on KAL 007, raising global tensions to a fever pitch.

Weeks later, early on the morning of Sept. 27, the USSR's National Missile Defense Center received warnings from its new missile detection satellites that the United States had launched intercontinental ballistic missiles from Grand Forks Air Force

Base, N.D. (one source cites F.E. Warren Air Force Base, Wyo.). The Soviet watch commander that night, Lt. Col. Stanislav Petrov of the Air Defense Forces, was a signal processing engineer—not a typical watch stander—and he was subbing for a sick comrade. Petrov possessed unique knowledge of the strengths and flaws in the Soviets' new satellite warning system, and assessed that the launch reports—which came in several, harrowing waves—must be false alarms. Petrov advised his leadership against a retaliatory attack.

Petrov—the accidental watch commander—was truly the right man in the right place at the right time. It took Soviet technical experts months to determine what went wrong that night. Eventually, they concluded that a highly unusual set of atmospheric conditions over the northern tier of the United States caused sunlight to be reflected off high clouds in such a way that the satellites' sensors mistook the reflections as ICBM launches. Petrov had to make an assessment in minutes, not months. Had the Kremlin ignored Petrov and instead acted on the phantom American ICBM attack, the world would have been plunged into global nuclear war.

The Petrov incident remained unknown in the West until the late 1990s, after the fall of the Soviet Union. Word began to leak out as former Soviet officers felt free to speak and even write about the harrowing event. In a 2013 interview with the BBC, Petrov recalled how the monitors on his watch lit up with the warning first of a launch, and then and impending strike. First one missile, then another, and another, ultimately counting five incoming strikes. "There were no rules about how long we were allowed to think before we reported a strike," he recalled. "But we knew that every second of procrastination took away valuable time; that the Soviet Union's military and political leadership needed. And then I made my decision. I picked up the telephone handset, spoke to my superiors, and reported that the alarm was false. But I, myself, was not sure, until the very last moment. I knew perfectly well that nobody would be able to correct my mistake if I had made one."

Unlike Donnelly, who would ultimately earn a fourth star following his deft handling of the KAL 007 tragedy, Petrov was punished for not following protocols; he was never promoted

again. But he was eventually awarded the Dresden Peace Prize and became the subject of a 2014 film, a documentary-drama, "The Man Who Saved the World."

The final chapter of the war crisis occurred in November 1983. NATO had conducted a series of interlocking military exercises beginning that September, culminating in a nuclear war drill called Able Archer 83. It was designed to practice nuclear command, control, and weapons release procedures—including for the new generation of ballistic and cruise missiles being deployed to Europe. To the Able Archer exercise planners and participants, the drill was robust but routine. But to the Soviets, the exercise appeared to be a cover for a real nuclear first strike on Soviet territory. They reacted by placing their theater and strategic nuclear forces on, a system-wide Soviet nuclear forces alert of massive proportion.

Brig. Gen. Leonard H. Perroots, chief of intelligence for U.S. Air Forces, Europe (USAFE) at the time, noted the Soviet preparations and became deeply concerned. Briefed by Perroots, USAFE Commander Gen. Billy M. Minter considered whether to order a reciprocal nuclear alert. Perroots, fearing any such action would further inflame an already fraught situation, advised against it. Informed by deep knowledge of the Soviets, Perroots reasoned the smart approach was to de-escalate the situation by having U.S. forces do nothing unusual. The most dangerous moment came when Able Archer 83 reached its climax: a simulated request to the national command authority for nuclear weapons release.

Perroots urged his leadership to continue the Able Archer exercise, and to wind it down as if nothing unusual was happening across the Iron Curtain. Minter agreed.

Yet the full extent of Soviet preparations for nuclear war had not been understood by the Americans, and it took months to assemble the intelligence and create a complete assessment. Even then, there were disagreements within the IC about how close we had come to a nuclear conflagration. Nonetheless, Director of Central Intelligence Casey became convinced that we had nearly stumbled into a nuclear war and briefed President

Reagan and the National Security Council principals accordingly. The President noted in a June 1984 diary entry how shocked he was to learn the Soviets believed the West was planning to launch a nuclear first strike.

The almost-complete lack of communication between Moscow and Washington had proved fertile ground for catastrophic miscalculation. In 1983, the two nuclear superpowers were like blindfolded boxers careening toward a death match. Almost no one on the U.S. side realized it.

Remarkably, however, the Soviet people were given a clue. Soviet Politburo member Grigory Romanov gave a national address in early November 1983, in which he described the geopolitical situation in dire terms. Soviet citizens were ordered to participate in civil defense exercises, including evacuations to nuclear fallout shelters in Moscow and other major cities. Factories, offices, and schools conducted civil defense drills. The Soviet General Staff canceled the annual fall employment of Soviet Army troops to help with agricultural harvests, keeping those forces in garrison instead. In East Germany, Soviet infantry units were sent to the field with two weeks of rations and ammunition loads, and Soviet Air Force fighter bombers in East Germany and Poland were loaded with nuclear weapons, a highly unusual action.

Soviet nuclear forces remained on varying degrees of alert through the early months of 1984. Andropov died in February 1984 and Operation RYaN wound down later in the year.

Perroots was promoted to major general and became the senior intelligence officer on the Air Staff, relieving Jim Pfautz. In short order, Perroots was promoted to lieutenant general, and he became director of the Defense Intelligence Agency in 1985. Upon his retirement, he wrote a classified end-of-tour report that recounted the events of the Able Archer 83 crisis from his unique perspective. His 1989 report prompted the President's Foreign Intelligence Advisory Board (PFIAB) to launch a full-scale investigation of the 1983 events. The PFIAB's report, which praised Perroots' actions, was completed in 1990 and was finally declassified in 2015. According to the PFIAB



A view of a Soviet FROG-7 tactical nuclear surface-to-surface missile and crew.

DOD Via National Archives



Mary Anne Fackelman/White House via National Archives

President Reagan, left, meets with Soviet Union KGB defector and double agent Oleg Gordievsky in the Oval Office at the White House in Washington, D.C., July 21, 1987. Gordievsky is the spy the CIA called, “the West’s sole source of information on the Soviet war scare during the early 1980s.”

study, General Perroots cited serious concerns about the inadequate treatment of the Soviet war scare by the Intelligence Community. The Perroots report itself was declassified by the State Department in February 2021, but after the CIA sued to have it reclassified, a federal judge ruled on Oct. 4, 2022, that it should indeed be reclassified.

Several lessons can be drawn from the near nuclear war of 1983 for leaders navigating today’s conflict in Ukraine:

- Meaningful communication between adversaries is essential. It was present in 1962 and helped ensure war was avoided; it was lacking in 1983 and that absence nearly led to a nuclear war as a result. Absent such communication, it was left to the personal judgment of a few individuals to assess threats and risks and to have the courage to take prudent action.

- Calm and patience are crucial. Donnelly understood when to apply pressure on the Soviets and when to withdraw it. He acted logically and did not allow his emotions or those of his senior staff to sway him. He patiently waited for situations to unfold, while taking appropriate action to be able to responsibly defend American interests, if necessary. When it was appropriate to deescalate, he didn’t hesitate to do so, despite some advice to the contrary.

- Knowledge of the enemy and of your own forces is critical. Colonel Petrov knew it was highly unlikely that the United States would launch a nuclear first strike with a handful of ICBMs from one Air Force base. He understood that an American strike was more likely to be a general onslaught, designed to overwhelm the Soviets. Petrov used his expertise of the strengths and weaknesses of the USSR’s surveillance capabilities to assess incoming reports from all available sources rather than relying on satellite collection alone. Likewise, Perroots relied on his experience and gut in response to the Soviet reaction to Able Archer 83. His commander, in turn, trusted Perroots’ judgment and experience.

- Mirror imaging of one’s adversary is extremely dangerous. The commonly held view in Washington during the crisis was that the Soviet leadership could not possibly believe that NATO would launch a nuclear first strike. The notion seemed patently

absurd and was widely discounted. As a result, the IC downplayed numerous indicators of a massive Soviet nuclear alert. ‘Groupthink’ took hold in Washington in 1983 and the 1990 PFIAB report charged that it inadvertently put “our relations with the Soviet Union on a hair trigger.

As grave as the stakes were in 1962, they were far greater in 1983. By then, the size and capabilities of U.S. and Soviet nuclear forces dwarfed those of 1962. Had both sides’ nuclear arsenals been fully employed in 1983, nuclear Armageddon would have been inevitable. It was only the expertise and judgment of Air Force general officers, in Japan, in Washington, and in Germany—and the similar expertise of a Russian lieutenant colonel—that brought the world back from the brink of a nuclear war.

Confronting Russia’s current nuclear threats requires knowledge of the adversary, active communication, sound judgment, and the courage to make tough decisions that prevent escalation. By saying “this is not a bluff,” Putin demonstrated classic brinkmanship—an example of the Russian doctrine of “escalate to deescalate.” A firm, yet measured response is required, one that offers Moscow off-ramps to enable it to withdraw from the brink. If Putin believes backing down creates an existential threat to his regime, he will be less likely to compromise.

Today, as in 1983, open communication between Washington and Moscow is too rare. As of October 2022, Secretary of Defense Lloyd J. Austin and his Russian counterpart, Minister of Defense Sergei Shoigu, have spoken only twice since the Feb. 24 invasion of Ukraine. History suggests more frequent contact would be prudent. ❏

***Brian J. Morra** is a former Air Force Intelligence officer and retired senior aerospace executive. He is the author of the historical novel, “The Able Archers,” published by Koehler Books, which dramatizes the real events of the 1983 Soviet war scare. The Able Archers has been optioned by Legendary Entertainment to create a feature film or television series. An audio book was recently released by Blackstone Publishing. Learn more about The Able Archers at www.brianjmorra.com.*

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AFA Repatriates 600-Year-Old Japanese Sword, Reinforces U.S.-Japan Alliance



Courtesy

Colonel Ikeda, center, holds the sword that was successfully returned to the Osafune Japanese Sword Museum in Okayama. Standing alongside: Mrs. Omote; General Fuke; Ikeda; the museum's president, and a Japanese sword authority with the museum.

In a private ceremony at AFA's 2022 Air Space & Cyber Conference a 600-year-old Japanese Sword which had been in American possession for six decades was repatriated. The momentous ceremony was attended by prominent U.S. Air and Space Force leaders including Chief of Staff of the Air Force Gen. Charles Q. Brown, Jr., and then-Chief of Space Operations Gen. John W. "Jay" Raymond, in addition to a Japan-America Air Force Goodwill Association (JAAGA) delegation representing the Japan Air Self-Defense Force (JASDF); then-AFA Chairman of the Board, CMSAF #14 Gerald R. Murray; AFA President retired Lt. Gen. Bruce Wright, USAF; and President of JAAGA, retired Gen. Sugiyama, JASDF.

While the origins of the sword and how it came to the United States are uncertain, the story of how it came to AFA is clearer. Retired Lt. Col. Bob "Buck" Kershaw, USAF, an AFA member, received the sword from his father who served in Japan during the U.S.' post-war occupation of the country in 1945.

Kershaw had been trying to ensure the sword got to Japan for years before his passing. His wife, Jenny, and AFA President Wright have worked closely with JAAGA leadership for the last three years to find a way to transport the ancient weapon safely back to Japan. As of Sept. 19, after decades of being away from its homeland, it is finally on its way to the Bizen Osafune Japanese Sword Museum in Okayama.

The ceremony reinforced a profound friendship that has flourished between the two nations since their bitter rivalry some 75 years ago.



Courtesy

The museum's authority confirmed the sword's origin, era, and swordsmith.

"In the wake of that war, our countries did something almost unheard of in human history. We laid aside our differences. We helped each other rebuild. We forged a new and enduring partnership. More than that, we became enduring friends," Wright said to the delegation. "Today we repatriate this sword to the land where it was forged some six centuries ago. And in doing so, we turn this instrument of war into a lasting symbol of friendship."

"The Japan-U.S. alliance is now one of the oldest—and also the cornerstone of peace and stability in the Indo-Pacific region. This is because U.S. and Japan have been working hard to overcome a sad history of war. Returning the sword is not only a symbol of our friendship, but also the proof of strong allies," said Sugiyama. "The spirit of the samurai warrior in this Japanese sword is finally going back to its home by the hands of Air and Space warriors of both the United States and Japan."

The collaboration to secure the sword's changing of hands also represents a steadfast friendship and synergy between AFA and JAAGA, two associations that promote dominant air and space power in their respective nations while fostering a powerful alliance with one another.

"This is also the proof of a great relationship between AFA and JAAGA," Sugiyama said. "We are very proud [to be part] of the U.S.-Japan alliance and always pleased to support Active-duty members of both the U.S. Air and Space Forces and [the Japan Air Self-Defense Force]."

Susan Mallett Receives NAA 2022 Frank G. Brewer Trophy

Susan Mallett, a Life Member of the Air & Space Forces Association, who has held many positions including Board Member, Central Area National Director, and Vice President of Aerospace Education, was selected to receive the National Aeronautic Association's 2022 Frank G. Brewer Trophy for excellence in Aerospace Education to honor "significant contributions of enduring value to aerospace education in the United States." As an elementary school teacher in Alabama, Mallett was first introduced to aviation. In 1986 she began her journey into aviation education when she participated in a new program sponsored by the Alabama Department of Aeronautics, which led her to planning orientation flights for students and teachers. She has continued with what became her passion by helping her school gain recognition nationally and internationally for their aviation program. She also conducted space programs at her alma mater, Auburn University.

Mallett has received many awards for her advocacy from the Civil Air Patrol (CAP), NASA, FAA, and the Air & Space Forces Association. One of her favorites is the A. Scott Crossfield Teacher of the Year Award, presented by the National Aviation Hall of Fame. She still provides support and mentorship to its award recipients.

In 2004, she helped bring a STARBASE Academy to Maxwell Air Force Base, Ala., a DOD Youth Program, designed to promote STEM education at the elementary and middle school levels and also provide educational resources for the academy teachers.

Upon retiring after 31 years as a teacher and administrator, Mallett went on to work at CAP, and in 2007 she created an aerospace-themed program called Aerospace Connections in Education (ACE). The curriculum is a free online program for teachers that covers academics, physical fitness, and good character behavior, with the intention of building early interest in STEM and aviation careers.


Mallett's AFA involvement includes being on the Aerospace Education Council; as leader of the AFA/Rolls-Royce National Teacher of the Year Award; coordinating programs between AFA and CAP; and promoting AFA's CyperPatriot and StellarXplorers programs. She also assisted the Air Force STEM Outreach Office to originate CAP's national K-12th grade STEM Kit program,

which are provided at no cost to teachers, youth organizations, libraries, museums, aviation organizations, CAP squadrons, and Air Force Junior Reserve Officer Training Corps programs nationwide.

NAA recognized Mallett for "her passionate and sustained aviation education, leadership, and ambassadorship to create enduring collaborative partnerships, programs, and products, which have impacted and inspired over 2 million American youth since 1986." Mallett said she was humbled and honored by the award. "Aerospace education has been my passionate work for 36 years.

I have been able to serve alongside and be mentored by the most amazingly dedicated and passionate like-minded people and organizations, col-

laboratively working toward the common mission of inspiring our nation's youth onward and upward." While currently working at CAP National Headquarters, she has created an online repository for aviation resources, an ACE Plus Program for virtual and in-person instruction for 5th-8th graders, and a new national STEM challenge for cadets, the High-Altitude Balloon Challenge. Col. Joe Kittinger, the balloon challenge's national ambassador, credited Mallett with bringing true expertise to the program.

"I volunteered to do this due to the professional expertise I knew Susan would bring to a new national STEM program," he said. "As a high-altitude balloonist and scientist, I see this program as another avenue to build student interest in science and a huge success for CAP!" 



Susan Mallett makes a point with a model plane during an aerospace education presentation to Maxwell Air Force Base, Ala., Elementary/Middle School students.

CAP

FACES OF THE FORCE



New Hampshire Dept. of Education

In a surprise celebration in late October, **Lt. Col. Christian Cheetham**, a teacher and Air Force Junior ROTC leader at Alvim High School in Hudson, N.H., was named the 2023 Teacher of the Year for the state of New Hampshire. A former intelligence officer while on Active-duty, Cheetham now teaches science in addition to leading the AFJROTC program, and in his application essay, he wrote that he strives “every day to bring the humanity back. ... In my opinion, our students are desperate for real mentoring relationships.” Cheetham is now in the running for National Teacher of the Year.



USAF/courtesy

Staff Sgt. Christopher Veach, an instructor loadmaster with the 415th Special Operations Squadron at Kirtland Air Force Base, N.M., was honored by the Airlift/Tanker Association in October with its Gen. Robert “Dutch” Huyser Award for loadmasters, for sustained excellence in Airmanship. As an instructor, He ensures future loadmasters are prepared for evaluations. He has served as lead loadmaster for numerous operations and was previously selected as deployed operations superintendent role for the 79th Rescue Squadron. He also completed his Community College of the Air Force associates degree while deployed.



Courtesy

After 10 years and six races, **Maj. Gen. David Smith**, director of Air Force Reserve Plans, Programs and Requirements, finally made it to the Ironman World Championship race in Kona, Hawaii, in October. Ironman triathlons consist of a 2.4-mile swim, 112-mile bike ride, and 26.2-mile run. Only 6 percent of participants worldwide qualify for the World Championships. Smith first began participating in Ironman triathlons in 2012 and said the same qualities that help people complete the grueling races are those the Air Force looks for in leaders: resilience, dedication, time management, and goal-setting.



Royal Thai Air Force/courtesy

For the first time ever this past October, the Royal Thai Air Force Air Command and Staff College admitted women—including USAF **Maj. Jessica Padoenthontaweekij**. As an intelligence officer, she will be joined by five female RTAF officers after the Department of the Air Force conducted a review of gender-specific policies led by undersecretary Gina Ortiz Jones and identified the RTAF ACSC as an opportunity to promote equal opportunities for female Airmen and Guardians, after previously only sending men to the college for Professional Military Education.



Airman 1st Class London Gunsauls

Staff Sgt. Kristen Witherspoon, a member of the 890th Missile Security Operations Squadron at F.E. Warren Air Force Base, Wyo., became just the second woman to join the base’s 90th MSOS Tactical Response Force. The TRF at Warren is the quick-reaction force for convoys and base emergencies, also conducting armed air patrols over the base’s 9,600 square-mile field of ICBM missile silos. In order to join the TRF, Witherspoon passed a baseline test of running an 800-meter sprint, dragging a 150-pound mannequin 50 meters, performing five or more dead hang pull-ups, climbing a 14-foot rope, and rucking four miles.



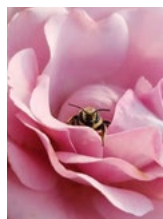
Master Sgt. Tamara Dabney

In the midst of the COVID-19 pandemic in 2020, **Lt. Col. Richard Paul Mastalerz II** of the Connecticut Air National Guard was diagnosed with Stage 3 colorectal cancer after doctors discovered a tumor in his large intestine. A United Airlines pilot who volunteered to fly C-130s full-time when the pandemic decreased air traffic, Mastalerz stayed on as commander of the 118th Airlift Squadron while undergoing treatment. After 18 months, eight rounds of chemotherapy, 28 rounds of radiation therapy, and a six hour-long surgery, Mastalerz was declared cancer free.



USAF

(L-r): Lydia Brown (Youth 6-8) of Mountain Home Air Force Base, Idaho; **Layne Knowles (Youth 9-12)** of Fairchild Air Force Base, Wash.; and **Rylan Jack Mims (Youth 13-17)** of Joint Base Charleston, S.C., each won first place in their respective Youth categories in the Department of the Air Force’s 2022 Photo Contest, while **Jackie Lundgren** from the U.S. Air Force Academy, Colo., and **Grace Hong** from Wright-Patterson Air Force Base, Ohio, won the Adult Novice and Adult Accomplished categories, respectively. More than 400 photographers submitted work to the competition, the theme of which was “Celebrating Traditions” for the Air Force’s 75th birthday, encouraging photographers to share their family and cultural traditions. A panel of three judges evaluated the entries and awarded first, second, and third prizes in five categories.



2nd Lt. Cullen Drenkhahn

The Tampa Bay Defense Alliance recently honored **Larry Wilson**—chairman, president, and CEO of First Arkansas Bank & Trust—with its Tampa Bay Trophy, given to a civic leader whose lifetime achievement and distinguished service to the Air Force and Air Mobility Command epitomizes the cooperation between civilian and military communities. Wilson has fostered relations between Little Rock Air Force Base and Jacksonville, Ark., for decades and has championed state-level legislation that provides Active duty and retired pay income tax exemptions for military personnel in Arkansas.



Courtesy

Florida Air National Guard **Maj. Bradley J. Vaughn** was headed through Florida with his family on Oct. 9, when they encountered a house on fire. Vaughn’s reactions helped an elderly woman in the yard to safety and U.S. Army Chief Warrant Officer 5 Nigel P. Huebscher was assisting an elderly man out of the house. As the two stumbled out of the house and into the yard, an explosion rocked the house, and Vaughn run back in to help pull the elderly man out. “Watching Vaughn go into that fire was probably the bravest thing I’ve ever seen,” Huebscher said.

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

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