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October 2020. Vol. 103, No. 10

Tech. Sgt. Cory D. Payne

A "robot dog" provides security at a simulated austere base during the Advanced Battle Management System exercise on Nellis Air Force Base, Nev., Sept. 1. See "Moving From Situational Awareness to C2," p. 40.

DEPARTMENT

FEATURES

ON THE COVER

Airman 1st Class Gerald Willis

Two B-52H Stratofortress bombers fly over the Pacific Ocean. See "BUFF Up," p. 36.

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By Tobias Naegele

Inflection Points

Russian aircraft probe U.S. defenses in Alaska and Europe, and its cyber instigators prowl the Internet, fueling hate and discontent on social media, driving wedges into the cracks in our oft-divided nation. Confidence in our institutions continues to wane. Further south, China flexes its muscles, emboldened by what it wishes to believe: that America is atrophying, fading from preeminence, and that America's decline clears the way for China's ascent. After sending combat jets into Taiwanese airspace last month, China circulated an ominous Internet video depicting Chinese bombers destroying a U.S. base in Guam.

No wonder Air Force Chief of Staff Gen. Charles Q. Brown Jr. keeps saying, "Accelerate change—or lose."

"We're at an inflection point, and we can't defer change," Brown said in his first major address as Chief, a statement of intent at the Air Force Association's virtual Air, Space & Cyber Conference last month. "We have a window of opportunity, a window of opportunity to change, to control and exploit the air domain to the standard our nation expects and requires of its Air Force. If we don't change, if we fail to adapt, we risk losing."

Brown's predecessors prepared the way, he said, but now the pace of change must quicken. War may not be imminent, but the rising risk must be seen for what it is: a call to action. As a past commander of Pacific Air Forces, he knows the U.S. can't compete with China numerically. Capability, ingenuity, speed, and talent are our differentiators.

"Leadership without risk is called management. We don't need more managers in the Air Force."

—CSAF Gen. Charles. Q. Brown Jr.

China's rise, the birth of the Space Force, and even the COVID-19 pandemic are all forcing functions that can help shake up today's mature bureaucracy and awake it from its lethargy.

"We have two options," Brown said. "We can 'admire' the problem and talk about how tough it's going to be, how hard the decision will be to make, or we can take action. I vote for the latter."

Airmen take note: This is the example he wants you to follow. The American way of war has long leveraged the independent creativity of individual commanders. Ours is a matrixed military in which commanders are supposed to have leeway to apply judgment. In recent years, however, that philosophy has atrophied. Trust in subordinates waned. If your boss doesn't trust you, you won't trust those beneath you, and they won't trust their subordinates. The result is paralysis.

American forces are better trained, better educated, and generally better equipped than their peers. They must likewise be better trusted. Subordinates must be confident in their ability to make decisions and take action—and yes, to make mistakes. We learn more from our failures than our successes, but only if we survive to face a similar decision in the future. If every failure kills a career, no one learns a thing.

This goes back to the very root of the Air Force and the leaders who put their careers and their lives on the line as they invented air power. Pioneers such as Billy Mitchell and Jimmy Doolittle embraced risk in ways we can barely imagine today, betting it all on their instincts.

Now in its eighth decade, the Air Force's risk aversion is as great a threat as China and Russia. "Folks don't want to change once they're in their comfort zone," Brown told me in an interview following his talk. "You've got to have a forcing function that drives change."

The so-called frozen middle—those mid-career Airmen and civilians whose embrace of rules and regulations shrouds that underlying discomfort with change—slow-rolls innovation and dampens the enthusiasm of their subordinates. Worse, they drive away the innovators.

"'Leadership without risk is called management,'" Brown said, quoting retired Lt. Col. Rich Cole, whose father was Jimmy Doolittle's copilot for the famous Doolittle Raid. "We don't need more managers in the Air Force. We need more leaders. I plan to lead change. And by leading change, we're going to have to take some risks."

Airmen can't be afraid to speak up in meetings, holding their comments for the "meeting after the meeting." That's a leadership problem. "We must have 'the meeting after the meeting' in the meeting," Brown said. Get the ideas on the table. Invoking former Defense Secretary and Marine Corps Gen. James Mattis, Brown's boss years ago in U.S. Central Command, he advocated Mattis' concept of command and feedback as opposed to command and control. "It's the dialog that happens between different levels of command," he said.

Commanders in the field need not wait for direction from above. "In some cases," Brown said, "you need to figure out what to do on your own."

So, do what Brown does: Tell your boss what you intend to do. Wait for a response. If the boss doesn't say otherwise within a couple of days, act. Afraid that's no way to get promoted? It's how Brown made Chief of Staff.

"That's the same kind of approach I think our Airmen need to take," Brown said. "They need to be thinking about what they're doing, communicating what their intent is, and then wait a little bit of time, give their supervision a chance to respond. And if they don't respond, they need to move."

Brown himself is moving out on plans for a new deployment model and on finding ways to pay for essential modernization. Weapons and systems that won't make the Air Force better and more effective in a high-end fight against a Chinese force that will dwarf the U.S. numerically shouldn't be part of that equation. They'll need to go. Excess bureaucracy that doesn't add to the force's lethality should go, as well. There are lessons in what Gen. John W. "Jay" Raymond is doing with his leaner Space Force, Brown says. Maybe the Air Force can borrow from that model.

Will Roper, the department's chief acquisition executive, is likewise aligned. He's aiming to accelerate acquisition and to deliver supreme connectivity to the Joint Force—to create a secure "Internet of Military Things" that extends to the edge of the combat cloud.

Roper's vision for the Advanced Battle Management System is a network that connects the Joint Force in real time, worldwide. It's not easy. F-35s struggle to communicate with F-22s. But it's a workable problem. He's also accelerating the development and engineering of new systems and platforms through the service's embrace of digital engineering. Like Brown, accelerating change.

ABMS is to military systems what better communication is to Airmen in any fight: a key to faster, better informed decision-making. It is the digital analog to the human collaboration Brown seeks to unlock by empowering Airmen to speak up and think for themselves.

Not every new idea will be met warmly. Not all will be successful or even worth pursuing. But that isn't a failure. Trying and failing is better than not trying at all. ✪

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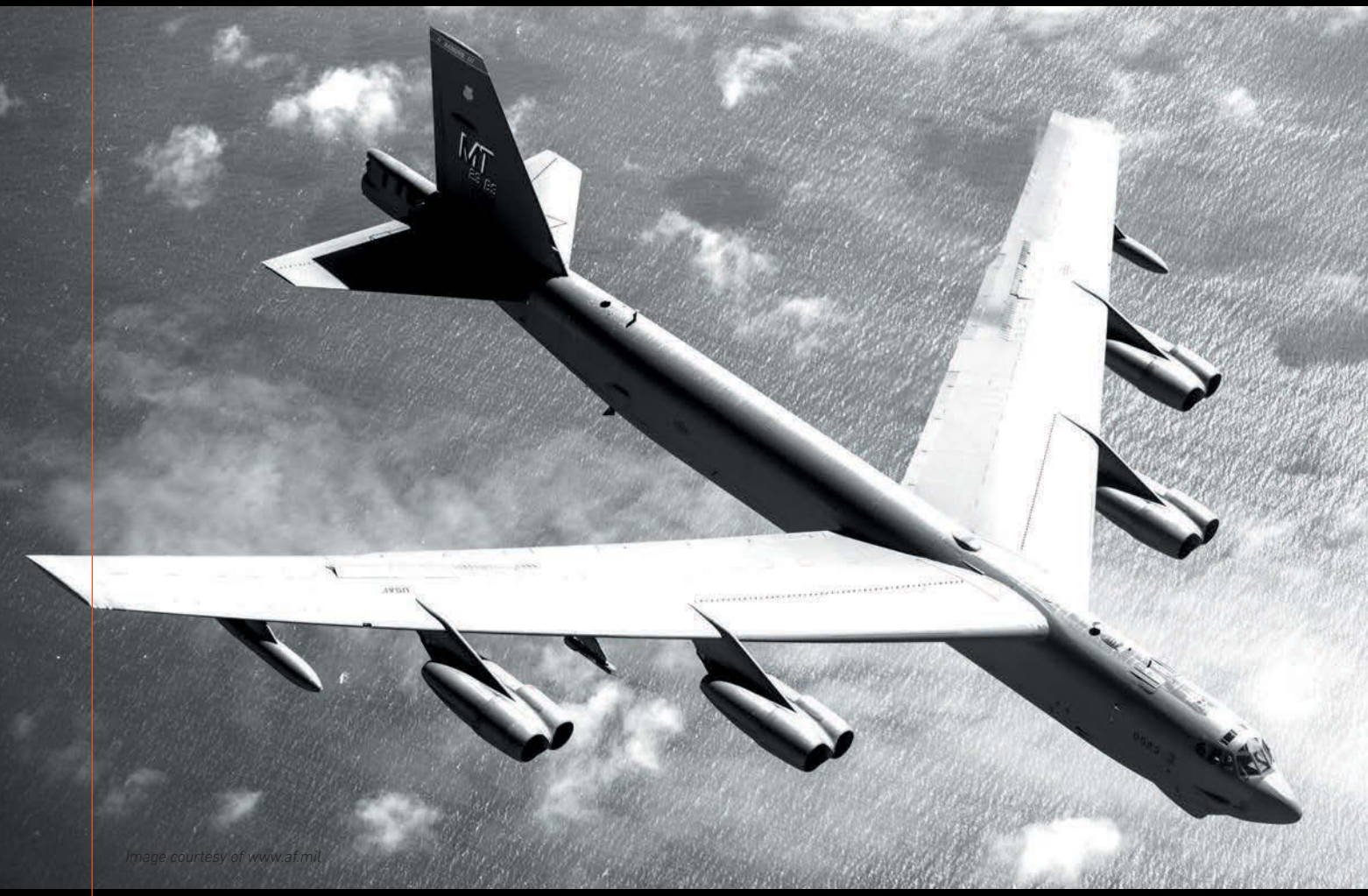

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LETTERS

Look in the Mirror, AFA

You have a cover story in the July/August 2020 edition titled, "Black and Air Force Blue." You then dedicate nine of 64 pages to the race issue in USAF, yet you can only muster 13 White men as AFA Nominees for the National Office and Board of Directors ["Airman for Life: Nominees for AFA National Officers"]. Do you even bother reading your own stories? Is AFA that monochrome and homogeneous? This certainly does not represent the USAF that I served in.

Col. James "Mookie" Sturim, USAF (Ret.)
Burke, Va.

I found the cover article "Leveling the Field" as well as the article immediately following it "Black Airmen Speak Out" to be well-written and very eye-opening, which is why I was stunned when I reached p. 60 and saw the nominations for the 2020-2021 Board of Directors, all of whom are older white males!

Might I suggest that you go back and revisit that nomination process to help address some of the issues you raised in the cover article?

Patricia A. Thomas-Fuller
Hudson, Mass.

Thanks for advancing the conversation on race relations in the July/August edition; this is long overdue. In the same edition, I noted that all nominees for National Office and Board of Directors share three characteristics: old, white, and male.

Lt. Col. Dennis W. Butler, USAF (Ret.)
Oakland, Calif.

WRITE TO US

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

Well, That Makes No Sense

Reading the article about the next Chief of Staff of the Air Force's top priorities and his measures to boost USAF readiness [June, p. 25], I became confused when I read that the Heritage Foundation's suggestion to "re-establish standing operational readiness inspection (ORI) teams." Did we disband ORIs from the duties of our Inspector General teams? The article goes on: Individual squadron readiness assessments throughout the Air Force are now conducted by the unit's squadron commanders themselves.

Are you kidding me? This is like putting the fox in the hen house. I believe it is this kind of lapse in judgment and decision-making that led to the Minot [Air Force Base, N.D.,] to Barksdale [Air Force Base, La.,] nuclear fiasco a few years ago. Whatever happened to the no-notice Phase I ORI and the follow-on Phase II ORI? A commander's career depended on what the IG team reported, and some were relieved of command based on what we used to call "less-than" performance.

I spent two years on the USAFE IG team, from 1986-88, and a couple more on the NATO TACEVAL [Tactical Evaluation] team from 1996-99, and I can tell you doing inspections the way we did resulted in a much better readiness to support our mission. We saw some commanders relieved, but others really were meeting or exceeding requirements. Also, our reports were shared across the command so others could learn from the errors, and be better at what they do.

Please tell me I am missing something in reading this article.

Col. Frank Alfter, USAF (Ret.)
Beavercreek, Ohio

Time to Speak Up

While the loss of two aviators in the T-38 crash last November was devastating and condolences go out to their loved ones, one of the worst "lessons to learn" is the wrong one ["World: Air Force Halts T-38 Formation Landings," June p. 31]. Almost 15 million flight hours in the past 50-plus years, and an average Class A mishap rate of less than 1.5 per 100,000 flying

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hours makes the T-38 one of the safest airplanes in the Air Force. It's time for a 1,000-plus hour T-38 Instructor Pilot (IP) to speak up.

One of the easiest things in the T-38 syllabus is "leading" a formation landing. It is a "straight-in" landing, except you land on one side of the 150 foot wide runway, three times as wide as the T-38. At Vance [Air Force Base, Okla.,] with a 9,000-foot long runway, there is plenty of room to "roll out to 100 knots" before aero-breaking, giving the trailing wingman a little extra room to get stopped. Since the landing was "straight-in" there were miles on approach to establish runway alignment, glide-slope, and power settings.

To blame the T-38 for acting with its predictable aerodynamic characteristics after "flying" it back into the air (touchdown should have been around 150 knots) at very low speed (premature aero-braking), turning the short wings into "speed brakes" by further raising the nose (loss of lift = high drag), applying 30 degrees of rudder and then not expecting bad things to happen is not the fault of the T-38. The student "holding right rudder" input was not something that would have allowed the T-38 to "save" the developing situation. Recovery procedure, by the IP if necessary, should have been lowering the nose and relanding the T-38 straight-ahead (little/centered rudder) or applying afterburners and doing a "lead aircraft go-around" for another landing. The wingman would then transition to a single aircraft landing. Sadly, this was an avoidable "landing" accident not a "formation" accident.

While on it, the T-38 Reserve IP program deserves another look. Undoubtedly they all have "impeccable reputations," but that's not the point. Mostly they come in one week a month, fly twice a day or three days with whichever students are available, once on the other two days, and then they are gone until next month. They don't get to recognize a "good" student's "bad" habits like their regular IPs do, so they aren't ready to "grab the stick" as soon as they should and take over when flying with a "good" student who is starting to go "bad."

In my T-38 flight room we had a photo over the door of a crashed T-38 at the end of some runway with the caption: "Aviation in itself is not inherently dangerous ... unless you get low and slow! Don't!"

John Conway,
Jackson, N.J.

I am here today because I had been trained to make formation landings.

In 1975, I was the squadron commander of the 75th Tactical Fighter Squadron at England Air Force Base [La.,] (an A-7 unit). We were going to deploy to Panama and needed to brief the 9th AF commander on our plans. The wing commander and I planned to fly to Shaw [Air Force Base, S.C.,] in A-7s for the briefing. When we got ready to penetrate at Shaw, the weather had gone bad, and my flight lead (wing commander) asked if I wanted to make a formation approach and landing on his wing. I said yes, and we started down.

The clouds were so thick that I had to overlap wing tips in order to keep in formation. As we let down, I noticed out of the corner of my eye that my flight instruments were spinning, but could not divert my attention to check because of the thick clouds. We broke out about 300 feet and a quarter-mile and made our formation landing. Then, I checked my instruments and realized my platform had dumped due to an electrical problem, and I only had air speed and altitude. If I had not made a formation approach and landing, my best option would have been to bail out. Formation landings do require good formation flying, but if done correctly can be beneficial.

Col. George Kennebeck,
USAF (Ret.)
Austin, Texas

Welcome to the New Team

Congrats Chief [JoAnne S.] Bass for working hard and being good enough to be selected Chief Master Sgt. of the Air Force. As a first sergeant and senior enlisted airman, I sat on lots of selection boards in the '80s [and] early '90s. I realized that the young women were outshining the guys. They were laser-focused, well-spoken, and very competitive. I told the guys, to be competitive they would have to step it up. If they didn't, the girls were going to win it all.

Well, they just did.

CMSgt. L.T. Jarrett,
USAF (Ret.)
Surprise, Ariz.

Different Times in Service?

There is another letter immediately following mine from a Lt. Col. David J. Wallace ["Letters: Minuteman and Service People," June, p. 6] that contains some questionable information. I served all of my 20 year career in SAC (Strategic Air Command), including 19 years in Minuteman operations and maintenance. Five of those years were at higher headquarters and on the SAC IG team. I consider myself to be well-versed in early Minuteman operations and feel it necessary to challenge some of the statements made by Wallace.

I have never heard that the Minuteman system was envisioned as automated to the point of not requiring a crew. Gen. Curtis E. LeMay was never at SAC during the lifetime of Minuteman. He left SAC in 1957 to serve as Air Force Vice Chief of Staff. He was made Chief of Staff in 1961 when Minuteman was being constructed and made operational. In fact, a lot of his history is centered on some of his questionable demands during the Cuban Missile Crisis in October 1962, and it was at this time that the first Minuteman wing at Malmstrom Air Force Base, Mont., was rushed to partial operational status to serve as a national defense, if necessary. So, I am also doubtful that General LeMay selected the first crew members from aircrew members or gave spot promotions to those who achieved "S" (Select status). I never met any of those people. I was on the first combat-ready crew at Ellsworth Air Force Base [S.D.,] Wing II, and my crew was the one to accept the first Minuteman flight made operational in early July 1963.

Wallace also states that, "Soon, the monotony and apparent simplicity caused boredom in the crew force—it's

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not fun, like flying. Aircrew members soon returned to the cockpits, never more to burrow underground in missile launch capsules."

Wow, talk about 180 degrees wrong! The Minuteman Education Program I described in my letter was supposed to be the solution to all that planned monotony. But the monotony NEVER arrived, nor did the simplicity. Crews working 24-hour shifts in the launch control center barely had time to do any study and were happy to get a few hours sleep. Otherwise, alarms were constantly going off and the security system on the missile sites themselves (each 3 to 5 miles apart) was so poor that they had to be manned 24/7 by armed guards. Usually, four guards per site were required, so that two could be in rest status. The two-man policy required two be on duty at all times. These people had to be rotated and fed while on duty, and that fell to our Mobile Strike Team whose primary duty was to investigate alarms from unmanned missile sites. But, with so many manned, the team did little more than act as a taxi service and meal delivery team. As best I can recall, that went on for several months. But, not all of the sites were yet operational, so it did become somewhat better as the newer sites were opened with improved security equipment.

The missiles themselves gave us various alarms that required maintenance response, and it was not unusual for a control center to have three to five maintenance teams working in their flight of 10 sites and requiring communication almost constantly. The point is that things were hectic, and certainly not monotonous. Our schoolwork did not get done on duty as was planned, so we did all that at home on our off days, when we also attended classes.

Crew members seldom left crew duty before three or four years in order to complete their master's degree requirements, and, by then, more young officers had been brought in while the original crews had gained experience, and the once younger crew members were now much more experienced and capable of commanding a two-man combat crew. So, while captains and majors were frequent crew commanders initially, it gradually became captains and lieutenants who were well-experienced. But, one thing that Wallace seems to have overlooked is that personnel picked for crew duty had to have the requirements to fit into the education program at the base where they were assigned.

There is much more I could disagree with, but I realize that Wallace was probably in the force much later than I was (I retired in 1981), so I did want to object to his characterization of the early days of Minuteman and set the record straight for those of us who lived through and experienced early Minuteman.

Lt. Col. Bill Norwood,
USAF (Ret.)
Ozark, Mo.

A Disaster, Certainly

General [Douglas] MacArthur's defeat in the 1941-42 Battle of the Philippines is one of the most ignoble chapters in American military history. You are so right in "Disaster in the Philippines" [November 2019, p. 46] that Short and Kimmel were hung out to dry after Pearl Harbor. The surprise attack on Pearl Harbor should have been detected, and there were a dozen errors made that could have placed the islands in a better posture to defend itself. It was different for the attack on the Philippines. MacArthur had a full 10 hours warning—that actually was days, given the Japanese attacks on Singapore and targets up and down the Asia coast.

It seems the general felt he knew

better, and waved off the warnings. Discord among the branches also did not help. MacArthur detested the Navy at Cavite, who in turn ignored him. The Navy was already making plans to pull out even before the attack. In the case of Air Force General Brereton, I think the main stumbling block was MacArthur's chief of staff, Sutherland, who discounted the Air Service and by not letting Brereton brief the general sealed the final fate of the Philippines.

I have read both War Plan Orange (WPO) and Rainbow 5, and they are indeed "offense" plans and, as a last resort, then go on the defensive. The plans were there, but not the will to implement. It seems that MacArthur, high atop his suite at the Manila Hotel, might have held out some dream that the Japanese would declare Manila an 'open city' and bypass the Philippines. No way. The Imperial Army's aggressive actions in China was a clear indicator that a scorched earth policy was the rule of the day.

And when MacArthur ordered the Christmas Eve evacuation to Bataan, the disaster was only compounded as a large number of troops were nearly cut off at San Fernando and Lubao. If WPO was deemed a defensive ops order, then they failed to read the fine print because this withdrawal was equally as disastrous. Lines of empty Army trucks pulled out of Manila for Bataan, leaving behind warehouses full of critical ammunition, food, and supplies.

As the commanders of Pearl Harbor were grilled, MacArthur was appearing on the cover of Time magazine and receiving the Medal of Honor (MOH). In one last footnote to history that is hard to explain, the general twice scuttled attempts to award the defender of Corregidor, Gen. Jonathan Wainwright, the MOH. After returning from POW camp in China in late 1945, Wainwright was called to the White House, and without asking MacArthur, awarded the Medal of Honor by President [Harry S.] Truman.

MacArthur may have had some brilliant military moments, but Philippines in late 1941-early 1942 was not one of them.

John Adams
Wellborn, Texas

On Race, Unrest, and USAF

If we want merit promotions without any bias (either for or against the candidate), sanitize the promotion file ["Leveling the Field," July/August, p. 28]. Promote a "random number" vs. a person's name. Just as the Air Force, and soon the Army, no longer require one's picture—to prevent "name and gender bias,"(either for or against), the Air Force should also scrap names.

Assign a random seven-digit numeric code to each file. The first three digits are the AFSC and the last four digits are random. The candidate is then evaluated against other seven-digit numbers and let the better candidate be promoted. This would remove ALL doubt of who presents the better package and deserves promotion.

Scrub all officer performance reports of name and gender and send up the files for a truly unbiased promotion board.

No discrimination, no bias, no quotas. A totally fair and unbiased board.

Problem solved, unless of course the powers that be actually want a biased board—and there's two sides to that as well.

Lt. Col. Dano Cotton,
USAF (Ret.)
Phoenix

I served as an enlisted Airman from 1968 to 1988, and I do remember seeing many examples of overt racism early in my career. Toward the end of my career this seemed to have morphed into more of a covert bigotry. I remember that as a staff sergeant in the late 70s, I was asked by a senior NCO to recommend a replacement to fill a position on a four-man team. The Airman I recommended was Black and the SNCO balked because this would create an all-Black team. I insisted, the SNCO relented, the Airman joined the team, and the team continued to perform their mission successfully. I always thought back then it was people who were racist and bigoted, but the Air Force as a whole was committed to equality.

Yet, here we are, 32 years later, and equality is still just a goal, not a reality. Was I really that naive back then? Maybe so. My Air Force, our Air Force, must do better and can do better. General Brown and Chief Bass have their work cut out for them. From what I have read and seen so far; I think they are both up to the challenge. Our 75th anniversary is just two years away. Let's hope that long before our 100th anniversary we will be able to say that the only important color in our Air Force is Blue.

MSgt. James W. Roosa,
USAF (Ret.)
Waterbury, Ct.

I abhor racism, and recognize the need for equal opportunity for—and treatment of—women and minorities, and assiduously attempted to apply that throughout my career.

However, I cannot help but note that "targeting" specific groups for special attention and awarding privileges to attempt to redress the imbalance is part of the problem as that, in itself, is 'reverse discrimination'!

Until those exhibiting racism and misogyny are weeded out, and individuals are recognized, judged, and accorded their positions on merit—i.e., by their abilities and the content of their character (to paraphrase Dr. Martin Luther King Jr.)—to do otherwise is mere 'tokenism' which only fosters more resentment in the ranks.

Easier said than done, I know.

Col. Ken F. Smith,
USAF (Ret.)
Honolulu

The article was based on single source data provide by the Air Force. Based on what I read, USAF is in for another round of social engineering. ... Bless your hearts.

If done internally, it will probably be about as productive as General [Merrill] McPeak's [Total Quality Management] and bicycle projects. General [Larry O.] Spencer's comments may have said it all. Apparently, his superiors told him that to get ahead he would have to work harder than his peers. When I was a lieutenant, that is exactingly what my squadron commander told me. In fact, my Dad also told me that at an early age. I'm sure many got the same advice. General Spencer and I took it, and some didn't. As far as having mentors, the AFMyVector and other online programs "aren't bearing as much fruit as the Air Force would like." That may say more about the individual than the program. Back in Texas they say, "You can lead a horse to water but you can't make it drink." Anyone who doesn't work harder than his peers and take full advantage of every opportunity offered just might not get promoted. There is a lot more to selective promotions than just doing

a good job, and to blame lack of promotions on race seems like a stretch. Individuals also need incentives, so taking away early promotion is really dumb! That will certainly level the field.

If the Air Force really wanted the answer to promotion disparity, they would contract an independent (outside) firm to study all the data and provide an unbiased report on the issue ... then we would see if the system is broken or needs to be social re-engineered to level the field.

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

I don't think you told the complete story. Most of the article was summary statistics of promotion rates for the past decade, presumably some sort of averages from 2009 to 2019. But, no data were presented to indicate how we are doing over time. For example, what were these averages during the previous decades? Has the Air Force improved? What trends have we measured over the past decade? Have the promotion percentages for minorities improved or not?

Also, choosing a parameter like past promotions is choosing to track the outcome, rather than the opportunity. Are the opportunities for promotion equal regardless of race? No way to tell from the few anecdotal interviews that accompanied the promotion data. Is the Air Force goal really to level the outcome as stated by Lt. Gen. [Brian T.] Kelly? Better to ensure the opportunities are equal rather than the outcomes.

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

The enlisted promotion data graphs are misleading because it does include the percentage of women promoted in their respective races. The Average Enlisted Promotion Rates: 2009 to 2019, for senior master sergeant are 10.5 percent White and 13 percent Black. To know how many women factored into the equation is valuable to see if more disparities exist. For example, if 10.5 percent are White and 5 percent of those promoted are female, this is a huge disparity considering women are 20.6 percent of the enlisted force. Without this data in the equation, you are painting an incomplete picture of the data presented.

SMSgt. Michael J. Nichols,
Deputy Fire Chief,
Kadena Air Base, Japan

I'm a 30-year Black retired Security Forces (air police, security police) Chief Master Sgt. (1966 to 1997), compelled to respond for the first time.

As a 43-year military and civilian law enforcement officer, no one is more dispirited than I am by the police actions seen in the Minneapolis video involving the death of George Floyd, no matter the final investigation and legal outcome. However, the succeeding violence, looting, and murder is just as abhorrent and counterproductive. As the widow of retired Black police Captain David Dorn stated, "Looting, destruction, and mayhem doesn't save Black lives, it destroys Black lives." Rev. Dr. Martin Luther King Jr. understood and later Malcolm X came to understand that these acts of violence, destruction, and murder were counterproductive.

Furthermore, I resent the implication that racism is systemic in America's police force. I know from personal experience that the majority of law enforcement officers are noble, valiant, and honorable. Their courageous and humanitarian deeds exponentially eclipse isolated unfavorable incidents.

The perception that systemic racism exists in the Air Force is also an insult to the many senior leaders who strive to uphold the laws of equality, oppor-

tunity, freedom, and justice. Every military individual has the same avenues for redress of grievance as their civilian counterparts. Where there is racial or other injustice, there is an absence or neglect of leadership.

During my career, I met two of the original Tuskegee Airmen: Lt. Gen. Benjamin O. Davis Jr., 13th Air Force Commander, while controlling entry to his command center on Udorn RTAFB, Thailand, 1968-69, and later years, stateside, hearing Gen. Daniel "Chappie" James Jr. during one of his speeches on Americanism and patriotism (subjects very dear to me). I later met the first Black Chief Master Sergeant of the Air Force, Chief Thomas N. Barnes, during his visit to Griffiss Air Force Base, N.Y. While I was proud of these Black military leaders, I was also proud of the many other senior Air Force commanders and noncommissioned officers of all races who inspired me through their demonstrative faith, leadership, and love of country. They taught me that when subordinates understand the standards expected of them and are given the opportunity to achieve and exceed those standards through common sense techniques of leadership and management (training, counseling, and follow up), then most subordinates will feel respected, excel, and earn promotions and commendations, no matter their race. I credit my successful and decorated career to programming others to succeed.

General [Anthony J.] Cotton mentioned "Ahmaud Arbery, Breonna Taylor, George Floyd, and Rayshard Brooks—and the list goes on ..." suggesting that murder by White police officers is systemic and commonplace. That is not true, and I would encourage him to research the FBI and NCIC (National Crime Information Center) statistics, and he will find the numbers do not support his claim. The mainstream media purposely distort and outright lie about the circumstances of many racial incidents to incite racial tension, and too many Black people have overreacted or fallen prey, during my lifetime. Cases in point include Florida's George Zimmerman/Trayvon Martin, Missouri's Michael Brown/ Officer Darren Wilson, Baltimore's Freddie Gray/six police officers, Atlanta's Rayshad Brooks/Garrett Rolfe, and Houston's Jazmine Barnes.

General [Richard M.] Clark mentioned his 18-year old son rode off one night for a Black Lives Matter protest in Washington, D.C. I encourage General Clark to explain to his son the distinction between supporting "Black Lives Matter" for legitimate, positive change and supporting the BLM, a movement aided by an embedded terrorist organization, Antifa. Both are avowed Marxist organizations with cleverly crafted names to deceive the public, yet are fomenting hate, chaos, and destruction. Their charter is dedicated to the destruction of the traditional American values: the nuclear family; religious institutions; American history; and independence. Their goal is to erect a Communist Utopia (all confirmed by Homeland Security Congressional testimony). Amazingly, many American corporations and notable celebrities contributed to their own demise by donating hundreds of millions of dollars to these groups, creating a revolving door for arrested criminals to continue the destruction of our communities.

I educated myself on the national media coverage of racial incidents while serving in Thailand and Vietnam, 1968-1971. Today's media coverage is very much like the agenda-driven coverage of the Vietnam War protests, embedded with radical leftists such as Students for a Democratic Society (SDS), Symbionese Liberation Army (SLA), Black Panthers, and several other anti-American organizations.

I was born and raised extremely poor in a segregated South in late '40s through the mid-'60s. Despite the racism and poverty, our faith and the family values of our community, churches, and schools instilled in us a sense of self-worth, taught us absolute rights and wrongs, and encouraged us to be positive and always judge other people individually by their merits. Most Black Americans share the same core values of faith, patriotism, freedom, and respect for the rule of law—values that guide our progress toward equality, tranquility.

However, the curriculum in schools and colleges today is embedded with "social justice" issues guided by a political agenda filled with anti-American, anti-military, and anti-religious bias and hate. I was inspired to join the Air Force when a recruiter visited our high school. Many schools and colleges today have banned military recruiters and ROTC programs.

When some students in my school opposed standing during the Pledge of Allegiance or reciting Christian prayers based on their religious beliefs, we respected them without bias or condemnation. However, we didn't eliminate the Pledge of Allegiance or ban prayers, nor modify the education curriculum or standards of conduct to accommodate them. People of the Muslim/Islamic faith believe in Sharia Law. However, we do not change our laws or Constitution to accommodate their faith or Islamic laws.

Today, military leaders are stifled and even paralyzed by a multitude of other social experiments thrust upon them by an ideological driven alliance of media, politicians, and educators. Leaders should be protected from these distractions in the interest of military readiness.

Therefore, it is impossible to sufficiently address racism in our military and civilian culture today unless we address the ramifications of politically correct bias and ideological hatred pervasive today in politics, education, and the media.

CMSgt. James Fullwood,
USAF (Ret.)
Puyallup, Wash.

Correction: In the September issue, two letters to the editor were inadvertently combined. Below is the correct, complete letter submitted by Col. David R. Haulman, USAFR (Ret.). We sincerely regret the error.—The Editors

I'm both encouraged and impressed by the superb credentials identified for each of the AFA candidates for National Office and the Board of Directors. I can't help but wonder, though, what a lot of others of us might be thinking: How can AFA get more former Air Force pilots involved at the highest levels of the AFA? It appears that only one of the thirteen nominees ever piloted Air Force jets. Our AFA founder, Gen. Jimmy Doolittle, might have wondered the same thing.

Col. David R. Haulman,
USAFR (Ret.)
Ridgeland, Miss.

VERBATIM

Voice Lessons

"None of you will be left out of the conversation. None of you will be treated like a number. None of you will face times when you're not included. None of you is more important than any other. Nobody in the Space Force has a reason to sit back and be unheard. Nobody in the Space Force has an opinion that I don't want to know. This really is your service, and our size and scale gives us an advantage, a level of intimacy that nobody else can have."

—Space Force Senior Enlisted Adviser **Chief Master Sgt. Roger A. Towberman** at vASC.

Subordinate's Intent

"One of the things I've always done as a senior leader and as a commander...[regarding] asking for permission ... [is tell the boss] 'Here's what I'm planning on doing. And here's when I'm planning on moving out.' So I don't have to wait for a response. If they don't respond—I'd give them at least 48 hours—if they didn't respond, I was going to move out. That's the same kind of approach I think our Airmen need to take. ... Communicate what their intent is, and then wait a little bit of time, give their supervision a chance to respond. If they don't respond, they need to move."

—**Gen. Charles Q. Brown Jr.,** USAF Chief of Staff, speaking with Air Force Magazine Editor in Chief Tobias Naegele after his speech at the Air Force Association's virtual Air, Space & Cyber Conference (vASC) in September.

Chill Out, China

"Those who play with fire will get burned."

—**Col. Ren Guoqiang,** Chinese defense spokesman, explaining why China sent jets into Taiwanese airspace during an exercise. He accused the U.S. of trying to use Taiwan to "control China," while Taiwan relies on "foreigners to build [itself] up." The flights were a protest against a senior U.S. State Department official's attendance at a former Taiwanese leader's funeral.

Howling at the Moon

NASA/GSFC/Arizona State University

"If you look at the orbits of the stuff that's going around the Moon, it looks like a drunken sailor wandering around as compared to the orbits that we're used to describing closer to the Earth."

—**Col. Eric J. Felt,** head of Air Force Research Laboratories Space Vehicles Directorate on the challenges of defining routine cislunar operations [Sept. 21].

Tia Dufour/White House

Peace Portal

"This could lead to peace, real peace in the Middle East for the first time. ... We've taken a very different path. You could say it's a backdoor, but I call it a smart door, not a backdoor."

—**President Donald J. Trump** after signing the Abraham Accords with Israeli Prime Minister Benjamin Netanyahu and the foreign ministers of the United Arab Emirates and Bahrain, entering into the normalization pact with Israel and regarding how the Palestinians may now also negotiate a peace deal [Politico, Sept. 15].

An Offer You Can't Refuse . . .

"The only thing that's going to be worse than fighting against AI is fighting without it."

—**Will Roper,** Air Force acquisition executive, on the imperative to employ artificial intelligence to accelerate decision-making in future conflict.

AI in Action

"You're not supposed to be able to shoot down a cruise missile with a tank. But, yes, you can, if the bullet is smart enough, and the bullet we use for that system is exceptionally smart."

—**Will Roper, t**elling reporters about the Air Force's most recent Advanced Battle Management System on-ramp held in early September.

Space Ops 101

Lt. Gen. B. Chance Saltzman, USSF deputy chief of space operations for operations, cyber and nuclear, is the first chief operations officer of the new service. He spoke with Air Force Magazine Senior Editor Rachel S. Cohen about Space Force planning. This conversation has been edited for length and clarity.

Eric Dietrich/USAF

Lt. Gen. B. Chance Saltzman, shown here as a two-star, is Space Force deputy chief of space operations for operations, cyber, and nuclear, effectively the Space Force's chief operations officer.

Q: What does your job entail?

A: That portfolio includes traditional space operations, cyber operations, and our nuclear operations, ... our role in providing capabilities that add to our strategic deterrence. ... What we've decided to do is designate that position a little bit like the corporate C-suite. So I'm the chief operations officer, and that's another one of those innovative twists that we're trying to bring to the military mindset. ... That name change is a reminder to me to not just fall into into old military staff habits, if you will, but to look through a different lens and see this as an integrated approach to operations.

Q: What role do cyber and nuclear operations play in your job?

A: Space operations cannot happen without cyber, ... the networks, data transport, data management, the electromagnetic spectrum, the ability to link to satellites 23,000 miles out in geosynchronous orbit and return mission data in real time. ... We are tightly integrating that by being under that chief operations officer.

One of the most valuable contributions to our nation for strategic deterrence is our missile-warning capability provided by space, not to mention the ground assets that also do the missile warning role. ... What adversary would launch a missile at us, knowing that we will see it in plenty of time to respond? They have to make the calculus of, what city are we willing to trade to launch an ICBM at the United States? ... The power of being able to see and attribute any kind of attack like that truly creates a strategic deterrent effect.

Q: What are some of your top priorities and action items right now?

A: [My whiteboard] says "start adding value." This is an imperative for us in the Space Force. ... We have to assess what are the most critical shortfalls, what are the best opportunities to enhance our position, and how do we focus those resources where things that matter require those resources? That's at the top of my list. Right behind that is, we've got to go faster. The security environment that we've been put into, both in the space domain and, really, across the globe—we've got to play catch up a little bit. The other sub-bullet on my "start adding value" [list] is to remove barriers that are slowing us down. There's a number of those. Some of them are just bureaucratic. Some of them are lack of resourcing and focus. Some of them are training- and readiness-related. I'm trying to first assess and do some root cause analysis of what those key barriers are, and then figure out mitigation strategies and start ticking them off.

Q: Are there any reports you have due soon?

A: We have an opportunity to now, as a service, look at how we describe and assess our readiness level. ... A lot of times, readiness is described as preparing to deploy or preparing to accomplish your mission at some point in the future, and so you do training, you perform maintenance activities, all to establish a level of readiness so that if called upon, you can do your mission at a high level. But, if you think about it, our space assets are largely doing their wartime mission on a day-to-day basis, and so we have to perpetually be ready. ... For us, determining exactly how we assess, describe, and report our readiness levels, so that it has meaning to us as a Space Force is one of those things at the top of my list.

Q: How are you focusing resources differently as part of the fiscal 2022 budget request?

A: How do we need to posture ourselves to protect U.S. interests in space? How do we make sure that we deter any activities or aggression in, from, and to space? And then, how do we continue to provide that warfighting capability that the joint force has come to just assume is there? ... That's really

what the resourcing team has focused on.

My job is also to identify where I'm struggling in my operations, so that they have a good set of requirements moving forward. I have not really looked at it yet in enough detail to answer the question in that regard. That's a part of that readiness and assessment that we're trying to get after early on.

Q: What role did space play in your time as deputy commander of Air Forces Central Command?

A: [At AFCENT, my learning opportunity was,] how much data can I get my hands on? How fast can I make sense of it, and how tight can I make my decision loop so that I can always provide guidance, provide direction to the forces, so that they can be in front of an adversary? This is the nature of competition. It's not nice, discrete battles anymore. It's about, they're trying to do something to achieve a strategic advantage, and we're trying to prevent them from achieving that strategic advantage. … The best way to mitigate an adversary from getting a strategic advantage is to rapidly see what they're trying to do, and then frustrate those efforts with our own activities. … It's really not about space or air independently, as much as it is about how we provide all that capability in an integrated, synchronized, and operationally fast way.

Q: Can you give an example of a time when space was critical in Middle East operations?

A: The Russians have done some things on orbit that have been very aggressive in the past. We would have maybe collected [intelligence] on those and kept those in super dark, secret channels and never really attributed what we knew about it. We recognize that there [are] capabilities that our adversaries have, that the other powers have, and our ability to see it and let them know that we see it, I believe has a deterrent effect. I saw the same thing overseas. … I can't tell you exactly what systems I'm talking about, but space-based capabilities, collecting on the maneuver of our adversaries, allowed us to then position forces that mitigated what they were trying to do, frustrating them. They thought they could move down a road unimpeded, and suddenly we're there. Why are we in their way? Well, because we knew what they were doing. We didn't have access to those areas via air or via ground-based sensors. The only way to see those movements is that persistence that we provide to those conflicted areas via space.

Q: What will Space Force deployments look like in the future?

A: I'm not sure it's going to change too dramatically. Right now, with our current capabilities, it's just one of our mission sets, or just a small handful of our missions that we actually need to go overseas to perform. The vast majority of the capabilities, we can do from our garrison locations. … Because the numbers are so small, we don't have to go through a radical shift in how we deploy. We still leverage the Department of the Air Force capabilities for assigning and determining what are the requirements, and then we deploy people as necessary, if they have to go to a forward location to accomplish their mission. … As our capabilities grow over time, we might need a new force-presentation model.

Q: How are you planning on bringing people from different specialties together in new ways?

A: When I started talking about space operations, cyber operations, nuclear operations, the tradition would be, I establish an S3, an S6, and an S10, and I copy the Air Force and the Army and those models where you have these stovepipes of subject-matter experts that attend to things in that realm. I'm trying to break that up. … Those subject-matter experts are going to be mixed across divisions in a unique way.

The three buckets that I've been putting people in, very colloquially, I describe as the "what," the "so what," and the "what next?" … The "what" bin, they're the ones that are collecting all the information. What's going on in the world? What are the conditions that are affecting us? What's the environment look like? What missions are going on? What are the people doing? What's the adversary doing? … So we have situational awareness about all of the activities that affect the Space Force and its mission. Then the "so what" is making meaning out of that. What are the impacts? If the Russians are conducting this exercise, what does it mean for the Space Force? What does it mean for the joint force? If there's an environmental condition, whether it's a hurricane or whether it's space weather that's affecting us, how is it affecting us? … The "what next" team [are] the ones developing courses of action, looking at mitigation strategies, determining through crisis action planning and better force management propositions—how can we both address the shortfalls that we're seeing and leverage opportunities to do better? I'm not looking at the badges they're wearing or what job they had before they came to the staff. I'm taking all of that expertise and dividing them along those three lines.

Q: You developed the initial multi-domain command and control concept for the Air Force. What do you think of the Pentagon's work on joint all-domain command and control (JADC2) so far?

A: I'm such a proud father. … They've taken all of that very small contribution that we made, basically creating that vocabulary, and they're running with it. There's tangible products that are being produced. There's prototypes that really get after the principles that we laid out. … The root cause of any of our challenges came back to how we managed our data. We were very loud about that, I thought, and I see that thread continuing through the JADC2 effect—cloud-based, accessible data; universal contribution to a library of data that then technology and artificial intelligence can pull from to help decision-makers make better decisions faster, and then use technology to link to the shooters on a real-time basis. … Space is right there, because we are contributors of the data, we are users and consumers of the data. We make critical decisions at orbital-velocity speed. So we have to be very loud and vocal proponents and customers of the JADC2 products.

Q: What needs to be done to best support U.S. Space Command and the other combatant commands?

A: We have the unique position of being a service focused on a domain that can work tightly with a combatant commander that's focused on the domain, and I'm not sure that relationship exists anywhere else in the department. … We are going to be in close formation linked tightly with [U.S. Space Command boss Gen. James H. Dickinson] and his entire staff. I'm going to talk to the [Joint Staff operations director] next week. I'm going to talk to him every day, probably, to make sure that there's this nice yin and yang, if you will. What you need is what we're working on. The training your team needs is the training I'm providing. My assessment is going to be based on his feedback on what he's trying to accomplish. This is a great hand-in-glove kind of a relationship that we have an opportunity to take advantage of, and we're not going to miss that opportunity. ✪

By John A. Tirpak

China's Expanding Military Power

Gao Hongwei/Ministry of Defense

Some of China's H-6 bombers are now equipped with nuclear cruise missiles, giving that country a "true" nuclear triad, the Pentagon said. Here, Chinese H-6 bomber air and ground crews prepare for an exercise in August 2020.

China is making steady and ominous gains in the quality of its military forces and its ability to project power—while making more open challenges to the U.S. in the Indo-Pacific and worldwide, according to the Pentagon's 173-page China Military Power Report released in late August.

China has surpassed the U.S. in the size of its naval force, its missiles, and air defenses, and is rapidly narrowing the gap in other areas of military competition, the report says. At the same time, China continues to pursue asymmetric means for neutralizing U.S. military strengths. The imbalance of power across the Taiwan Strait also continues to grow in China's favor.

As if to confirm those conclusions, China conducted large-scale military exercises near Taiwan and fired ballistic missiles into the South China Sea in September. It also released a propaganda video showing animated Chinese bombers attacking and destroying U.S. military facilities in Guam, promising in the video to hold any "aggressors" at bay.

Chad Sbragia, deputy assistant secretary of defense for China, told reporters on Aug. 31 that China sees the current world order as "antithetical to their socialist system and an intolerable constraint on their strategic ends." It views U.S. world alliances as "destabilizing and irreconcilable" with China's rise as a world military power and seeks "reform of the global governance system" in its favor. Toward that end, it's applying "all-of-government" means—economic, military, messaging, and diplomatic—to undermine the U.S. and become a "world-class military" by 2050.

While China has not defined exactly what that means, Sbragia said the Pentagon consensus is that "it is likely China will aim to develop a military by mid-century that is equal to, and in many cases superior to, the United States' military or that of any other great power that the Chinese view as a threat."

China's defense budget is now reported to be about $200 billion a year, up 6.1 percent since 2019. While China's economy is growing more slowly than 10 years ago, its defense spending has doubled. However, comparisons with the U.S. military budget are difficult, since China pays less for personnel costs and goods and services than the U.S., and continues to acquire advanced military technology through illicit means overseas, the Pentagon said.

The last defense white paper published by China noted the need to coordinate technology development between the military and commercial industrial base, and China is moving to accelerate improvements in joint warfare among its military branches, the Pentagon report stated.

As China looks outward, it is also pursuing new overseas bases, seeking basing rights in "Myanmar, Thailand, Singapore, Indonesia, Pakistan, Sri Lanka, United Arab Emirates, Kenya, Seychelles, Tanzania, Angola, and Tajikistan." China already has an established base in Djibouti, not far from the U.S. facility there.

The People's Liberation Army Navy (PLAN) is now "the largest ... in the world," according to the Pentagon, which tallies it as having 350 ships, including 130 major surface combatants, versus the U.S.

Navy, which deploys 293 ships. China's land-based ballistic and ground-launched cruise missile inventory, with ranges between 500 and 5,500 km, totals 1,250. The U.S. has just one ground-launched ballistic missile type, with a range under 300 km, and has no ground-launched cruise missiles (GLCMs), although the U.S. is considering mounting Navy Tomahawk GLCMs on trucks now that the Intermediate Nuclear Forces treaty with Russia is dead.

The number of China's air-launched cruise missiles, as mounted on the H-6 bomber, are increasing, and a growing number of bombers are fitted for aerial refueling, extending their range. The new H-6N bomber, with nuclear cruise missile capability, gives China a "true" nuclear triad.

Equipped with Russian-designed S-300s and S-400s, as well as a Chinese copy, the HQ-9, China's air defense system is "robust and redundant" and one of the best in the world, the Pentagon said. These systems will soon be able to intercept ballistic missiles as well as aircraft, and can also launch ballistic missiles themselves.

China already had the world's largest standing army, coast guard, and "maritime militia."

NUCLEAR ENTERPRISE

The report for the first time enumerates how many operational nuclear warheads China may have: Pentagon analysts estimate the number "in the low 200s," Sbragia said. They also project that the figure will double within the decade to more than 400—even without producing more fissile material. The U.S., meanwhile, has 3,800 warheads, plus thousands more that are retired and waiting to be dismantled.

Despite the lopsided U.S. advantage, however, Sbragia said the U.S. is concerned about China's trajectory, which he called "the most rapid expansion and diversification of its nuclear arsenal" in its history. This signals a move "away from their historical minimum deterrence posture," Sbragia asserted, and, by growing China's nuclear infrastructure, allows it to "grow their force beyond this number, which is part of the point." The lack of transparency about what China's nuclear program poses is worrying and "why we certainly included that in this year's report."

Much of China's rocket force could carry conventional or nuclear warheads and is becoming more precise as China increases its capabilities in space. A new intercontinental ballistic missile now in development could carry multiple independently targeted re-entry vehicles, and China's nuclear posture is becoming more aggressive, shifting to "launch on warning." Sbragia said that does not mean China is giving up its "no-first-use" nuclear policy, but he sees "some ambiguity" in its approach.

The U.S. wants China to be part of future discussions about strategic arms limits in part to increase transparency. The U.S. has told Russia it will not extend the New START Treaty unless it includes China. Russia, for its part, says it cannot compel China to participate, and China has said it's not interested. Sbragia said the U.S. is "willing to make progress with Russia while waiting on China."

Following U.S. lead, China is developing a civilian space launch industry modeled on U.S. firms such as SpaceX to build a competitive launch-for-hire enterprise. One of China's new space launch startups is even called "ExPace." China is also diversifying its range of launch vehicles and increasing its lofting capability, while also expanding its military and commercial satellites to "scientific endeavors and space exploration."

THE TAIWAN IMBALANCE

The implications for Taiwan are significant. China is developing both advanced capabilities and concepts and expanding its sheer quantity advantage, Sbragia said.

With more than 1,500 fighters, the PLA Air Force (PLAAF) will soon become "a majority 4th-generation force," the report said. The combined PLAAF and PLAN field the third-largest air force in the Indo-Pacific region. In addition to upgrading its H-6 bomber fleet—based on the old Soviet-era "Badger" types—Beijing is converting some into tankers and developing a stealth bomber believed to be called the H-20. The Pentagon report quoted unnamed "commentators" as saying that plane could take "more than a decade" to enter service.

STEALTH PLANES

China's J-20 indigenous stealth attack plane—with features clearly derived from the U.S. F-22 and F-35—is now in production, and the first squadron is operational at a base in China's interior. The FC-31/J-31, looking much like the U.S. F-35, is in developmental testing and expected to equip Chinese aircraft carriers and compete with the F-35 in the export market. China's J-10, analogous to the U.S. F-16, continues to get upgrades including new weapons, a new air inlet, new radar and other sensors, and thrust-vectoring.

To refuel its growing air fleet, China has Soviet-designed Il-78 Midas tankers purchased from Ukraine, and a tanker variant of its Y-20 cargo plane—an American C-17 lookalike—is in development. The PLAAF is also stepping up production of the KJ-500 airborne warning and control (AEWC) aircraft, an analogy to the U.S. E-3 AWACS. Without revealing details, the Pentagon said these and other AEWC aircraft are able to detect more aircraft "and at greater distances" than versions of a few years ago.

The report also noted that China is paralleling the U.S. in its organization of information warfare, consolidating psychological operations, cyber operations, and some cyber espionage into unified commands. Besides foreign militaries and defense companies, China is "targeting" media organizations, academic institutions, and think-tanks to shape its messaging. The Pentagon noted that China's most recent white paper called democracies such as the U.S. "more susceptible to influence operations" than other nations.

China's island-building campaign in the South China Sea continues, as once sand-and-concrete spits have bloomed into full-blown air and sea bases with aircraft and vessels deployed there full time. China continues to claim waters well beyond the 12-mile limit as its sovereign "internal" seaways.

Air Force Chief of Staff Gen. Charles Q. Brown Jr., who recently commanded Pacific Air Forces, said in a Sept. 22 interview with Defense One that China moves gradually and with subtlety. Its island-building campaign "happened so slowly and methodically," he said, "it doesn't really get your attention until it's already happened."

In hindsight, he said, the U.S. "could have been a little more vocal" in discouraging China's sea-grab, and said the U.S. will continue to conduct "freedom of navigation" flights through the area "despite the claims of the PRC (People's Republic of China)."

Secretary of State Mike Pompeo told The Washington Times in a September interview that the U.S. for decades permitted China to "engage in threatening or disruptive behavior…[and] expand their capacity and their footprint." China once promised not to militarize the South China Sea, he said, and has reneged on promises to allow Hong Kong home rule.

Pompeo said the U.S. will push back against Chinese expansion. For example, the U.S. recently approved a long-deferred, $8 billion sale to Taiwan of 66 new F-16s, upgrades for older ones, and standoff missiles. The new aircraft will be delivered through 2026. The U.S. does not want war with China, Pompeo said, blaming China for increased tensions. China, he said, must "reduce what they're doing." ✪

An electric, vertical take-off and landing "flying car" goes airborne at Camp Mabry, Texas. Developed by LIFT Aircraft in partnership with USAF's Agility Prime program, the eVTOL aircraft was piloted by LIFT CEO Matt Chasen during a demonstration for top Air Force leaders. LIFT is offering a commercial version, capable of landing on ground or water, for $495,000. Called HEXA, the new-age flying machine weighs just 432 pounds—28 percent lighter than the original Wright Flyer from 117 years ago.

Sgt. Sean Kornegay/ANG

Masked Airmen and military training instructors form up at a Basic Military Training graduation and coining ceremony Aug. 27, 2020, at Joint Base San Antonio-Lackland, Texas. The ceremonies remain closed to the public during the COVID-19 pandemic, with most livestreamed for family and friends. Not only has USAF continued BMT without interruption, it also opened a new BMT site at Keesler Air Force Base, Miss., to ensure continued training capacity.

Johnny Saldivar/USAF

A B-2 Spirit on the flight line at Naval Support Facility Diego Garcia, where it participated in a Bomber Task Force exercise, Aug. 24, 2020. B-2s also took part in a combined U.S.-Australian exercise with the U.S. Marine Corps Rotational Force-Darwin and Australian Defence Forces. A shift from continuous bomber presence to less-predictable dynamic force employment has boosted bomber readiness across the force, Air Force leaders report.

Tech. Sgt. Heather Salazar

A digitized Will Roper, assistant secretary of the Air Force for acquisition, technology, and logistics, animated into a fighter display, kicked off Roper's presentation at the Air Force Association's virtual Air, Space & Cyber Conference.

Roper's NGAD Bombshell

Digital engineering is real—and accelerating change right now.

By John A. Tirpak

Rebutting doubters that the Air Force is on the cusp of a new digital revolution, service acquisition chief Will Roper revealed at AFA's September virtual Air, Space & Cyber Conference that a secret prototype of USAF's next fighter—designed and built using the digital thread method—is already flying.

"If you think we don't care about physical world results, we do," Roper said in a slickly produced keynote speech. The Next-Generation Air Dominance (NGAD) program, meant to complement or succeed the F-22 and F-35, he said, "has come so far that the full-scale flight demonstrator has already flown in the physical world. It's broken a lot of records in the doing."

Roper disclosed no further details about when the aircraft flew, who built it, or what records it broke. Industry observers guessed that these were more likely related to the speed of contracting and prototyping than its physical performance.

"We're going to train on it, we're going to drill on it, until this is the way we do business."

—Will Roper, assistant secretary of the Air Force for acquisition

"We don't want our adversaries to know" NGAD's capabilities, Roper told reporters—or "when they'll show up." What he did want was to rebut those who've challenged the new digital approach to aircraft production.

"Many people in the Pentagon and elsewhere say, 'I can see how you could apply that approach to a trainer like the T-7, but you could not build a cutting-edge warfighting system that way,'" Roper said. "And I've had to listen to that and nod my head and say, 'Well, you may be right'"— even though he knew NGAD was already flying.

"There are too many possible futures for us to pick one," Roper said. The Air Force must "choose to be agile, or we can lose." The idea that the government spends 80 percent of research and development investment to commercial industry's 20 percent has flipped, he said, so the military must leverage

commercial capabilities to compete with China and Russia.

The digital revolution is one the Air Force can readily adapt, he said. But he also warned that the defense establishment cannot be satisfied merely adopting commercial technology—because those same solutions are also available to others.

Roper revealed the NGAD flights to gain "greater credibility in the process," and convince those members of the acquisition team not "read in" on the secret jet to understand the concept works—and that they need to "get smart on this technology."

"We're going to train on it, we're going to drill on it, until this is the way we do business," Roper said. "This is not just digital design. This is digital acquisition."

ACCELERATING ABMS

Roper's theme wrapped around the latest Advanced Battle Management System (ABMS) "on-ramp" experiment, which he defined as creating the "internet of military things" to enable joint all-domain command and control. Once fully established, ABMS will help the joint force "fight at machine speed," retaining decision advantage over adversaries, he said.

Case in point: Roper shared video of Army artillery shooting down a cruise missile with coordinates provided by Air Force assets. Solving this previously "wicked hard problem" that could not be solved without machine-to-machine connectivity and decision-making, Roper said, was a "watershed event" that will pay huge dividends for Air Force base defense. He credited the feat to joint efforts between the Air Force and the Pentagon's Strategic Capabilities Office, which Roper ran before moving to his current post.

The "human advantage" in warfare—having better-trained, more knowledgeable people—is not enough anymore, Roper insisted. "The only thing … worse than fighting against AI [artificial intelligence] is fighting without it." U.S. adversaries are already embracing such technology.

American military technology is going to have to become even more "amazing," because all comers will have access to commercial tech, he observed.

CHANGING WORLD

Digital design isn't new; it dates to the 1980s. What is new is that today's high-powered processing, enabled by cloud computing, can simulate performance to a greater level of fidelity than ever before. It can alert engineers to what other changes must be accommodated if, for example, they change the depth of the wheel well, or shift the aircraft's center of gravity. Advanced programs can also make some such changes automatically.

The new methods were used to design Boeing's T-7 trainer and Northrop Grumman's Ground-Based Strategic Deterrent missile. On the latter, it allowed dozens of whole-system design permutations when, in the past, only a few could have been explored in the time allotted. The technology also designs the production method as it goes, so that the transition from digital to physical model is quick and seamless.

The "learning curve is dead," Roper said of the period of production for a complex system during which workers have to correct initial mistakes. The two examples of the T-7 trainer which Boeing designed, built, and flew in the T-X competition are "the two most identical airplanes in the world," Roper asserted. Boeing has noted that the aircraft came together without shims to help fit structural parts together, and that the fitting of major structural components in the fuselage was completed in minutes, rather than multiple work days as in the past.

eSERIES

Air Force Secretary Barbara M. Barrett, in her keynote address during the event, said that systems developed in the new digital method will carry the preface of a lowercase "e" in their designation. The two T-7 demonstrators will be referred to henceforth as "eT-7A," but the production version will simply be the T-7A. She and Roper indicated that USAF will shift talking about such aircraft from Roper's initial coinage of a "Digital Century Series" to simply the "eSeries."

The eSeries is "so much more" than simply a digital rendering of something "we're going to build physically," Roper emphasized. "The ability to build an airplane the first time as if you had already built … 100" of them is "game-changing."

Roper said the Air Force is adopting the same technologies used in the design of Formula One race cars, which are designed digitally and go directly from the machine to physical production. New mass-produced cars are built the same way, he pointed out.

The revolution also demands a change in the mindset of how companies build the business case for defense work, Roper said. His goal is to "flip" the Air Force from spending 30 percent of a program's cost on design and fabrication and 70

David Torrence/Boeing

In 2017, a T-X with afterburners flies in tests in St. Louis. Now dubbed the T-7 Red Hawk, in tribute to the Tuskegee Airmen, the Boeing/Saab aircraft will replace the T-38 as USAF's premier fighter trainer.

USAF

An animation from Roper's presentation shows digital Airmen preparing to switch nose cone sections on a notional modular unmanned aircraft.

percent on maintaining the system for decades after. As long as the Air Force remains "trapped" in the model of prioritizing sustainment over introducing new systems, it can't win, he said.

Roper wants to abolish the "incentive" for companies to gamble their own money on designs in hopes of "getting their money back" through later support and modification work. The Air Force has to make the design part profitable, Roper said, and increase the frequency of projects such that no single program is an "existential … must-win" for any company. It will also expand the number of competitors by not requiring a designer to already be a traditional aircraft builder.

By making the new systems modular, with an open architecture, anyone will be able to compete for upgrades, Roper asserted. Then, by retiring airplanes after only 15 years or so, the Air Force can save tremendously on not having to rebuild them in depots for three decades or more; and only come out with a freshened old machine.

It's still unclear whether the secret aircraft that flew incorporates all of the NGAD characteristics, or just one or two elements thereof. At the 2019 ASC event, then-Chief of Staff Gen. David L. Goldfein said NGAD is an omnibus program to develop "five key technologies … that we don't intend" to have "all come together on a single platform." He said the term "family of systems" is often overused, but "truly, that's the next generation of air dominance." These technologies, he added, will likely proceed "and accelerate at different paces" and, as some become available, they'd be fielded onto "existing platforms."

Without itemizing the five key technologies, Goldfein alluded to new engines, sensors, weapons, and connectivity. He also referred to artificial intelligence making it possible to have manned combat aircraft escorted by unmanned aircraft to do especially dangerous missions, or as flying magazines of extra weapons.

Air Combat Command head Gen. Mark D. Kelly, in a press conference at vASC, said his understanding of the eSeries is probably best exemplified not by the Century Series of the 1960s, but the F-117 of the late 1970s. The F-117 was "unique, game-changing," Kelly explained. "We … fielded it, operated it for a specific amount of time, and then moved on to another rapidly emerging technology that we just couldn't adapt to that exact same platform;" presumably all-aspect stealth mated to high agility and low-observable radar emissions.

The F-117 process led directly to using the platform in war, to great success, Kelly noted. "And then, before it got to the life cycle spot of 15 years and beyond—when it was really going to be cost-prohibitive to operate—we moved on," he noted.

Roper reported over the summer that he had assigned a team to build the "business case" for the NGAD by comparing the costs of designing and building an aircraft the new digital way versus the old way, saying that even if the cost was higher, he'd push to proceed with the digital methods.

He reported in a vASC press conference that the NGAD acquisition strategy is finished, but has not yet been greenlighted by the top Air Force leadership.

Roper released a white paper to go with his presentation, "The New Digital Acquisition Reality." In it he provided a chart showing that the digital approach he is promoting—building more different kinds of aircraft, but buying only a notional 75 of each type—will cost 18 percent more to develop and 25 percent more to produce. Then, however, it will save 81 percent in modifications and 49 percent in operations and support costs. The chart suggested that after 50 years of this rhythm, aircraft would be introduced every six to eight years and have an average age of eight years.

A typical fighter's overall cost using the new system "would drop … by 10 percent over a 30-year life-cycle acquisition," with savings spread across RDT&E and O&S, the document said.

Roper also said the same principles being applied to aircraft and the ABMS is being applied to spacecraft, as well.

"You might be thinking … a replacement for a current system, like a trainer or … the Minuteman III, [means] it's going to be some time before the Air Force and Space Force can take on cutting-edge things like satellites and … weapons. I'm here to tell you that within the Space Force we're already working on the first two eSats."

The objective, stated Roper, is "taking on the vicious circle itself, trying to speed up the cycle in which we design things, by buying iteratively, improving, spiraling aircraft in a digital century series, or 'eSeries' approach. … It's the Formula One example crossing into defense and giving us power and agility we never had before. So, NGAD right now is designing, assembling, testing in the digital world, exploring things that cost us time and money."

Digital engineering "isn't a fluke," Roper insisted. "It's not a point, it's a trend. It is our future, and I'm excited to see where this trend goes and hopefully, see it end that vicious circle that we have been trapped in for so long." ✪

Holly Jordan/USAF

The Air Force Research Laboratory and Kratos Defense & Security Solutions completed the successful fourth flight of the XQ-58A Valkyrie demonstrator, a long-range, high subsonic unmanned air vehicle, at Yuma Proving Ground, Ariz., on Jan. 23.

The 'Vanguard' of Change

AFRL's top research programs get a lift with accelerated funding.

By Rachel S. Cohen

The Department of the Air Force's top three research projects are advancing toward tests of their real-life abilities as the military debates which ideas it might fast-track next.

Air Force and Space Force officials presenting at the Air Force Association's virtual Air, Space & Cyber Conference in September shed new light on the Air Force Research Laboratory's "vanguard" programs, high-profile ventures chosen for extra investment last year—and continued investment in 2021.

The department wants at least $157.6 million for vanguards in fiscal 2021, including:

- $72.1 million for the Golden Horde weapons swarm
- $40.9 million for the Skyborg wingman drone
- $24.6 million for Navigation Technology Satellite-3.

The programs promise not only unique and useful technologies, but also a model for accelerating development and fielding of new weapons in the future. One vanguard has already started flight-testing, while the others will begin real-world vetting within the next few years. In that time, the projects will prove whether they really are something special—or face the same struggles as any other research effort.

"We're looking at a whole variety of things, from small [UAVs] up to actual surrogates for the weapons themselves."
—Christopher Ristich, head of AFRL's Strategic Development Planning and Experimentation office

GOLDEN HORDE

Air Force researchers in October will test whether a software simulation of its developmental weapons swarm can maneuver through a combat mission and reroute itself as conditions change.

The demonstration is part of the Golden Horde vanguard, which aims to create munition swarms that autonomously work together when fired and "think" on their own to attack targets that match specific criteria.

Golden Horde assets could be used for traditional airstrikes, or carry sensors and other payloads for missions from reconnaissance to electronic warfare to aerial refueling.

"We're actually going to be demonstrating digital twin-enabled operations ... where we'll be using a software variant of a collaborative weapon flying out in a swarm mission, encountering some issues along the way that it did not expect, and collecting that data back over through an [Advanced Battle Management System] cyber-assured cloud, to then feed a digital twin model using some [artificial intelligence and machine learning] techniques to ascertain where we might put either some different playbooks or a software improvement into the weapon system," Craig Ewing of AFRL said during a Sept. 21 presentation on digital systems engineering in the Air Force.

Digital twins are virtual models of hardware that

Airman 1st Class Celeste Zuniga

Tech. Sgt. Skyler McCloyn loads a Miniature Air-Launched Decoy (MALD) ADM-160X onto a B-52 at Barksdale Air Force Base, La. The missiles are intended to distract enemies so that a real strike package can succeed. The Golden Horde program will test the system in 2021.

can be used in simulations to refine engineering work and speed up development of new military systems—without relying on physical prototypes. They are core to the Department of the Air Force's new push to leverage digital engineering more broadly across its inventory to accelerate weapons development.

Program officials will use technology developed for Gray Wolf, an earlier effort to develop a swarming cruise missile, as the model for the demonstration. The Air Force said last year it would abandon Gray Wolf in its early stages of development to focus on networking existing munitions through Golden Horde instead.

The data collected on Gray Wolf will help hone algorithms to simulate Golden Horde, a collection of Collaborative Small Diameter Bombs (CSDB-1). The effort was also using Collaborative Miniature Air-Launched Decoys, but Air Force Weapons Program Executive Officer Brig. Gen. Heath A. Collins said the service is questioning whether CMALD will be part of Golden Horde in the long run. Scientific Applications and Research Associates and Georgia Tech Applied Research Corp. are connecting those weapons together for the Air Force.

"We're looking at a whole variety of things, from small [unmanned aerial vehicle] systems to explore the behaviors of these collaborative weapons, up to actual surrogates for the weapons themselves," he said.

While the AFRL website notes that demos will begin late this year and "ultimately lead to an integrated capstone test event with ... weapons working together to prosecute simulated targets in the fall of 2021," Ristich said officials are rethinking aspects of the program as well as the schedule.

Defense News reported earlier this year that F-16 fighter jets would flight-test the CSDB-1 in 2020. The service now appears to be ditching tests of the CMALD on the B-52 bomber that were planned for next summer.

"The first flight-test scenarios will be simple, helping the Air Force gauge whether the weapons are properly communicating across the network and acting in accordance with the mission playbook," Defense News wrote. "For example, a team of CSDB-1s could come across a threat while en route to attack a target and would have to change trajectory to avoid it."

The Air Force may vet the concept as an integrated swarm in 2022.

SKYBORG

The Skyborg program has hit some snags in its quest to build an autonomous "wingman" drone that could scope out areas ahead of manned aircraft, add firepower to a strike mission, protect bases, and more.

Four companies are working on Skyborg platforms: Boeing, General Atomics, Kratos, and Northrop Grumman. They are competing for up to $400 million in future contracts as their designs mature and are gearing up for flight experiments next year.

USAF has said it wants a wingman drone to be ready for combat by the end of 2023.

The XQ-58A Valkyrie is the most public aircraft under consideration as part of the Skyborg initiative. A joint venture between AFRL and Kratos, which built the aircraft, Valkyrie suffered a fault with its rocket-assisted take-off system in July. Inside Defense reported that AFRL scrapped a July 29 flight-test, the second setback in less than a year.

"The incident occurred during morning pre-flight checks and resulted in the aircraft leaving its launcher and quickly coming to rest in front of the launch rails," AFRL spokesman Bryan Ripple told the publication.

Christopher J. Ristich, head of AFRL's Strategic Development Planning and Experimentation (SDPE) office, said Sept. 16 that he believes the drone was not extensively damaged and should be operational again by the end of October. The problem likely interfered with the Air Force's plan to use the XQ-58A in its second Advanced Battle Management System demonstration in early September. The service did not confirm by press time whether the Valkyrie participated.

NAVIGATION TECHNOLOGY SATELLITE-3

Navigation Technology Satellite-3 is AFRL's first space vanguard program, aiming to improve on the reliability and accuracy of location and timing data offered by the GPS

enterprise. The first experimental satellite will launch on a United Launch Alliance Vulcan Centaur rocket in late fiscal 2022 for a yearlong test on orbit and could expand to up to nine satellites.

L3Harris is now buying parts to begin building the spacecraft's components this fall, and the satellite itself within the next year. Joe Rolli, head of PNT (positioning, navigation, and timing) business development at L3Harris, said the challenge lies in combining a traditional navigational system with the new technology of a steerable, phased-array antenna in the same satellite.

Airmen are getting involved early as well, to smooth the eventual transition from development to operations. Two experimental ground control stations will provide data to AFRL at Kirtland Air Force Base, N.M., and to the Catalyst Campus software development hub that is close to major Space Force bases in Colorado Springs, Colo.

GPS operators at nearby Peterson Air Force Base, Colo., have already participated in test events and offered feedback about what they want to see from NTS-3, AFRL's NTS-3 Program Manager Arlen Biersgreen told Air Force Magazine Sept. 16.

"They would have a lot more opportunity for varying characteristics of the signal that was being sent down, power levels, parameters," he said. "All of that is really opening their eyes to the wide range of possibilities that a system like NTS-3 provides."

While the AFRL experiment will last only a year, the satellite could live longer. That opens the door for the military to temporarily use it in daily operations and learn even more about the system.

The SDPE office plans to build out infrastructure for air-to-ground experiments with NTS-3 software to explore how the military could use those satellites alongside their ground stations and other systems, such as GPS, in the long run.

"That's a practice that's emerging in the vanguards, is bringing the operational experimentation into the vanguards to help develop [concepts of operations] in parallel to technology," Ristich said.

Col. Eric Felt, who runs the Air Force Research Laboratory's space vehicles directorate, said the Space Force is considering three different options for how it could proceed with NTS-3 production and will recommend a way forward to Air Force acquisition boss Will Roper in about a year.

"One of those options is to buy more NTS-3s, but there's two other options in play, too," Felt said. "There's a cost, schedule, performance, and risk associated with each of those transition options that's being evaluated."

The level of military investment in NTS-3 is more significant than L3Harris usually sees for similar research programs, Rolli said. It's one of the company's first opportunities as the prime contractor on a leading space program rather than providing mission system software as a supplier.

The program is benefiting from being a higher priority from AFRL and working with more than the organizations at Kirtland, which hosts the Space Vehicles Directorate, Biersgreen said. For example, the team is collaborating with the Air Force Life Cycle Management Center early on to get the program up and running faster, which wouldn't be the case outside of a vanguard initiative.

Communicating with many different stakeholders across the Air Force and Space Force can be challenging, Biersgreen said, "but it also means there's that much more visibility and that much more focus."

"We have [SMC development experts] in meetings with us every single day, they participate in those major milestone reviews with L3Harris and the other contractors," he said. "We also interact with the portfolio architects on the basis of the actual transition planning itself, and then we are interacting with the enterprise corps when it comes to launch and operations, and then the production corps ... is what the [GPS system program office] itself has transitioned into."

The biggest change from a typical research and development program is greater involvement with satellite operators.

"We've seen in the major programs that if those things aren't well coordinated, you're not able to deliver capabilities on a tight and predictable time frame to the warfighter," Biersgreen said. "It's absolutely been a value-added exercise via vanguard."

LOOKING AHEAD

Military researchers have not pointed to specific air warfare initiatives that could become vanguards, but are eyeing multiple such projects for the Space Force.

The "Precise" initiative and the Cislunar Highway Patrol System (CHPS), which were recently selected in an internal competition for more attention, are top candidates to be vanguards, according to Felt.

The Precise experiment will be the lab's first foray into very low-Earth orbit, 200 to 300 kilometers above the planet, to study the ionosphere's effects on satellites and other space assets. CHPS will evaluate how objects move in cislunar space and new ways to track them.

"Those are two examples of some good potential future space vanguards, but we're not quite ready to nominate them yet," Felt said Sept. 16. They still have some homework to do on those, but there's lots of examples in every mission area."

He's found two concepts through AFRL's Warfighter-Technologist Summit (WARTECH) that could become vanguards, but did not provide details.

The department will pick its next vanguards—or none at all—at a meeting of the Capability Development Council in January. The Air Force Vice Chief of Staff and undersecretary chair that panel. Once work is underway, a new Transformational Capabilities Office will decide whether vanguards are good enough to grow into a formal procurement program.

AFRL scopes out its most promising ideas in two ways, Ristich said. The first tries to address what the military knows it will need in the future, while the other mines academia and industry for their best prospects.

"There's what we call the strategy-driven part. It's really looking at the future force design that is evolving out of [the Air Force Warfighting Integration Capability team], primarily, and also from the Space Force, and then distilling those into challenge problems that we introduce into this WARTECH process," Ristich said. "We have operational challenges that we identify, we bring together operators and technologists to look at the solution space. What is the art of the possible? ... Then we start to bring wargames."

Through modeling and simulation, Airmen show whether the technology in question can make a difference for military strategy.

"How do you find the disruptive capabilities that could be out there that change the landscape?" Ristich said. "We've got some both internal and external activities that are looking at trying to harvest those ideas." ✪

CSAF Plans a Better Deployment Model

Staff Sgt. David Owsianka

Air Mobility Command deployed the 39th Airlift Squadron en masse in 2019, rather than sending detachments from multiple squadrons downrange. The Air Force wants to follow this kind of deployment model more closely in the future.

By Brian W. Everstine

The Air Force is sprinting to solve a problem that has vexed the service for years: How to simplify downrange deployment rotations and simultaneously improve readiness at home.

Air Force Chief of Staff Gen. Charles Q. Brown Jr. expects to announce by the end of the year a new, force generation and presentation model he promises will be easily understandable and offer Airmen and their commanders a clearer view of their futures. "My goal is to get this done by the end of the year," Brown said during his keynote address at the Air Force Association's virtual Air, Space & Cyber Conference.

"We want to make our force generation and force presentation model easy for us to understand and articulate inside our Air Force, and easy to understand in our joint force," he said. Doing so will "ensure we provide the right capabilities at the right place, at the right time—while we maintain readiness for now and into the future."

Brown's is the latest effort to solve this puzzle, following on the heals of his predecessor's push to revitalize squadrons and the 2013 "AEF Next" program, which never really took root.

Among the challenges: Airmen in high-demand career fields whose frequent deployments leave little time at home to recover and train. "That's something we have to manage closely," Brown said. "We also have to talk to the joint force and say, we have a finite set of resources to do this. We can't wear them out so they're not ready for the future."

While the Air Force is flexible—Airmen and aircraft can deploy as individuals or in groups of every size up to an entire squadron—its lack of a consistent and clear deployment model makes it hard for theater commanders to understand the limitations the Air Force has. "Because if we don't have a good system … it's very easy for us to actually continue to commit forces, commit forces, commit forces," Brown said. "And then we don't have readiness in the future."

Brown said requirements differences within the service add to the challenge. "Our force presentation, force generation model is different across the Air Force," according to Brown. "What I want to do is make a 'one-size-fits-most' [solution]."

The "one-size-fits-most" approach aims to have Airmen build teams together, training at home as they would fight downrange—and to structure that model to be able to manage dwell ratios so that units aren't overtaxed.

Some parts of the Air Force have already shifted in that direction. At Air Mobility Command, Active-duty KC-135 and C-130J squadrons have been operating on a squadron deployment model for the past year. Squadrons deploy in their entirety, rather than sending detachments downrange. The shift promotes "unit cohesion and provides greater predictability and stability," an AMC spokesman said. KC-135s began deploying under this model in August 2019, and the first C-130J model a month later.

"How do we actually build teams that work together, and then deploy together? You've got to build a model," Brown said. "The key aspect of that is to ensure you know which part of the force is actually going to be deployed, which part of the force is getting ready to deploy, which force is back home getting ready in a cycle. We've got to build a cycle like that and then

be disciplined about it, so that we can maintain that level of readiness for our Airmen [and] a level of flexibility for them and their families."

Within the Air Force's bomber community, the end of PACAF's continuous bomber presence mission is partly intended to ease this burden. Now bombers are engaged in "dynamic force employment," in which fewer bombers deploy for shorter periods, conducting strategic deterrence missions in a less predictable way. Combined with a break from long-term bomber deployments to the Middle East, Air Force Global Strike Command (AFGSC) has been able to keep B-1s, B-2s, and B-52s at home more, giving maintainers more time to work on aircraft and crews more time to train for a variety of missions.

"Our ability now to be able to project power could be on a shorter duration, more focused, but I … have a lot more time at home, and … we can stay mission-ready," said AFGSC boss Gen. Timothy M. Ray. In recent weeks, he added, almost every B-2 that was not in depot was mission-ready, as were about 30 of 76 B-52s and more than 20 B-1s.

Meanwhile, the Air Force's agile combat employment (ACE) model, intended to ensure combat units can rapidly forward deploy with small groups of multi-capable Airmen to austere locations, is spreading across the force. First validated under Brown in 2017 when he was commanding Pacific Air Forces, ACE is now being used in Europe, as well. Wings across the Air Force are regularly hosting their own ACE exercises and proof-of-concept demonstrations.

Brown called ACE's adoption a "big win," so the Air Staff is now budgeting for it. Once the broader Air Force is fluent in ACE, he said, multi-capable Airmen will be expected, as opposed to a novelty, and the service can begin to plan on ACE as a deployment model. For example, if a regular C-130 squadron can be expected to set up and operate at an austere location, it might use maintainers to do security and communications, rather than pulling in specialty units.

"You talk about dynamic force employment," Brown said. "Agile Combat Employment is a key aspect of that, to be able to be light, lean, and agile. To be able to move very quickly to a location to assure and deter." ✪

COVID-19's Lessons Will Have Lasting Repercussions

By Jennifer Hlad

As the COVID-19 pandemic began to spread last winter, the Air Force and Space Force scrambled to improvise, maintaining operations while adopting new procedures to ensure Airmen stayed healthy. Although many of those changes will be temporary, service leaders now believe others could become permanent.

"COVID, as tragic as it may be, actually drove us to do some things we had planned to do for a while, particularly on our information technology systems," said Air Force Chief of Staff Gen. Charles Q. Brown Jr. at the Air Force Association's virtual Air, Space & Cyber Conference. "This is an opportunity."

Vice Chief of Staff Gen. Stephen W. "Seve" Wilson predicted "there'll be a portion of our workforce that never comes back to working as we knew it in the past." How big a portion? It could be up to 30 percent, he continued. "They may show up to work in a work environment once a day, once a week type of thing, but … because we've got everything connected, because we've got this workforce that can now work from wherever they are, whenever they want, it's changed the paradigm on how we're going to do work."

Maj. Gen. John E. Shaw, commander of Space Force's Space Operations Command and the combined force space component commander, said both services "experienced a hyperspace jump in digital proficiency during COVID." He called that the "silver lining" to the dark pandemic clouds and predicted, "We will emerge from this a much more proficient digital society and digital Department of Defense."

When the pandemic began in early 2020, the Air Force had just 20,000 remote computer connections for a 750,000-person workforce, said Lauren Knausenberger, the service's deputy chief information officer. Now, she said, the service has been "able to equip our Airmen to work wherever they are, which has been incredible."

Lt. Gen. Brian T. Kelly, USAF deputy chief of staff for manpower, personnel, and services, said that experience raises questions about the Air Force's long-term approach to temporary duty (TDY) travel and permanent changes of station (PCS). "Imagine us now being able to hire somebody in Arizona who works in the Pentagon, and then never leaving Arizona—maybe occasionally coming TDY to the Pentagon, but staying in their home," he said. For some staff jobs, he added, military members may not need to PCS.

Still, keeping operations going was not simply a matter of connecting Airmen to networks, and Shaw noted that a one-size-fits-all approach would not have worked. The

Airman 1st Class Jacob Stephens

Tech. Sgt. Steven Rucker, a Chief Master Sgt. Carl E. Beck Airman Leadership School instructor, conducts a course via a video conference at Davis-Monthan Air Force Base, Ariz., May 19.

needs and concerns at Thule Air Base, Greenland, are different from those of Naval Support Facility Diego Garcia in the Indian Ocean, he said, and both are different than Buckley Air Force Base, Colo.

Cheyenne Mountain Air Force Station, Colo., is "really a big ship under a mountain," so as reports emerged about COVID-19 ravaging cruise ships, "it didn't take long ... for us to realize, 'hey, if something took hold inside the mountain, that could be really bad.'"

Lt. Gen. Richard W. Scobee, commander of the Air Force Reserve Command (AFRC) at Robins Air Force Base, Ga., said AFRC was "already preparing to have a force that had more flexibility to participate using more of a virtual environment," but the pandemic hastened that work. The pandemic "tested our ability to operate, especially from remote locations," Scobee added, but it also provided valuable lessons for overcoming any event—from natural or man-made disasters to war—that "degrades communications."

"It's made sure that we've been able to practice and demonstrate resiliency, flexibility, empowering our commanders," he said. "And all of that has been critical to our success in the command."

Lt. Gen. Michael A. Loh, director of the Air National Guard, said he pushed decision-making authority "down to the squadron commanders and below, the command teams, the first sergeants, our senior enlisted leaders." Loh continued: "Those folks were making the mission happen. It takes about five people to change an F-16 engine, and those five people are not socially distanced."

Loh said leaders asked those Airmen what they needed, and then "gave them all the authority—and not just accountability."

Perhaps the biggest lesson learned from COVID-19 so far has been that of agility, leaders said. Air Force Materiel Command's Gen. Arnold W. Bunch Jr. recalled attending a senior leader conference awards banquet where he and the other attendees were "high-fiving, we're shaking hands, we're hugging, we're jamming together to [take] selfies"—all in early March. Two weeks later, about a dozen Airmen wanted a photo to commemorate a C-130 coming off the depot line at Robins Air Force Base, Ga., and the photographer "needed a wide-angle lens to be able to take a picture with everybody spaced out."

Bunch now keeps a photo from each event, as "a stark reminder of just how much our world changed in a really short time frame."

The pandemic has created challenges and opportunities, Bunch said, and working through those will "make us stronger and better for the future."

Lt. Gen. James B. Hecker, commander and president at Air University, said all of the university's courses can now "go from in-residence to virtual local to virtual remote" within a day.

"You know, normally when a hurricane would hit, we would send everybody home and it would be a couple days, and we wouldn't be able to teach," he said. Not now. When a recent hurricane threatened Maxwell this fall, the university simply pivoted to virtual classes.

Brown's imperative that the Air Force must "accelerate change, or lose" is that rising competition and potential threats from China and Russia demand a faster, more agile Air Force. COVID-19 added fuel to that fire, he argues.

"We're already making some changes, whether we want to or not," Brown said. "And so, don't fight the feeling," but go with it, he added. Likening the agility to adjust to change to a surfer catching a wave, he said, "That's the way I'm thinking about change: taking advantage of this window of opportunity. [COVID-19] is already driving change, moving ourselves in a different direction. And we need to accelerate."

Air Force Presses for Inclusion

By Jennifer-Leigh Oprihory

The Air Force is a broadly diverse institution, drawing members from every sector of American society—and beyond. But the service still has a long way to go before people feel fully included, Chief Master Sergeant of the Air Force JoAnne S. Bass said Sept. 16.

"Diversity [means] you ask somebody to the dance," she explained during a question-and-answer session at AFA's Doolittle Leadership Center. "Inclusion is, you actually ask them to dance."

That means leaders need to do more to reach out and help people become more engaged, she said. "We need to have people who are actually asking people to dance and be part of that culture, that organization, that mission, and that sense of belonging."

AFA's three-day virtual Air, Space & Cyber Conference (vASC) was an opportunity to expand that engagement, and leaders discussed the value of inclusion and plans for tackling it as a cultural issue.

During a panel discussion on diversity and racial challenges in the Air Force, Bass said the inherent power of an organization's diversity is the versatility with which its members' differences imbue the whole.

Mike Tsukamoto/staff

Chief Master Sergeant of the Air Force JoAnne Bass, left, told Air Force Association Chairman of the Board Gerald Murray, that diversity is "inviting others to the dance." Inclusion, she said, is "asking them to dance."

"It's critical to have that diversity in the Air Force that we have today because it is truly through that diversity that we can become ... more creative, more open, more innovative," she said.

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In the panel discussion, former Air Force Vice Chief of Staff—and former AFA president—retired USAF Gen. Larry O. Spencer said diversity brings numerous advantages. "Not only do you want to reflect the population that you serve, but you also want to throw a problem in the middle of the table and have all kinds of ideas come into it," he said. "That way, the decision-maker can maybe get ideas that he or she never would've thought about."

The overarching goal is not diversity, Spencer said, but maximizing combat capability and lethality. "It's not about, you know, getting one of these or two of those," Spencer said. "It's about making the organization stronger and better. And I think once people understand that, it becomes a different conversation."

Air Force Chief of Staff Gen. Charles Q. Brown Jr. said in a Q&A following his vASC keynote address that accepting there is an issue to discuss is a critical first step. "You know, [race] may not have been ... talked about as much, but because of the death of George Floyd and the other aspects across our nation, it's driving a conversation," Brown said. "So our Airmen feel much more comfortable talking about it."

Brown said the service has taken some first steps, but the path to greater inclusion won't be instantaneous.

"This is a long-term journey, and we didn't get here overnight," he said. "We're not gonna change overnight."

Bass said she's waiting on the results of a diversity- and inclusion-related survey that was open to Total Force Airmen and Space Professionals as part of the Air Force Inspector General's deep dive into racial disparities within the Department of the Air Force before coming up with a formal game plan for enhancing USAF inclusion. Response has been overwhelming, Bass said.

"We got hundreds of thousands of responses back on, 'Here are some of the challenges that our Airmen are experiencing,'" Bass said. Results are now being compiled but will be shared publicly soon. Then comes the hard part.

"The culture that matters to me most as an Airman is a culture that I have to experience every day."

—Chief Master Sergeant of the Air Force JoAnne Bass

"Once we have that, we have got to determine what are the lines of effort that we can do with it as an Air Force from the headquarters staff to each major command to each wing to each leader," Bass said. "What's actionable?"

Only then can the services start to lay out a way forward.

LITTLE CHANGES

Brown said USAF must look broadly at every aspect of its personnel systems. "We started to look at how we bring folks in and open up the candidate pool in certain areas and look to see if there are biases that we have in our promotion system, biases in our accession systems, and biases in the testing that qualifies you for certain career fields," he told reporters in a press conference. "Because some of those haven't changed in a long time."

During the same roundtable, Bass said success with "underrepresented groups ... getting promoted at great rates" in the enlisted force has her focusing on enhancing retention and inclusion to help more Airmen feel "like they belong."

"I've got a discussion in the next few weeks with a lot of my senior enlisted leaders across the force to talk about what does that mean for awards? What does that mean for recognition?" Bass said. For example, should award recommendations include photos?

While the Air Force no longer includes photos in promotions packages, Bass sees value in using them for awards to ensure Airmen are "in good order and discipline, making sure that dress and appearance is the way that it needs to go."

"We do have to make sure we're guarding against unconscious bias, but we still are in the United States military and we've got to have ... the dress and appearance that is appropriate for the profession of arms we serve in," Bass said. "So we're having those discussions right now."

But not every step on the path toward greater inclusion requires a systemic overhaul. Some just require greater awareness. Individual Airmen can work toward improved inclusion on a daily basis within their formations, Bass emphasized.

"The culture that matters to me most as an Airman is a culture that I have to experience every day, so when I'm in my duty section or my flight or my squadron, that's the culture that matters most to me," she said during her post-keynote Q&A. "So every Airman has a role and responsibility in being part of the inclusiveness, in making sure that our Airmen are heard, making sure that we understand their stories—the things that they've gone through—and making sure that we are including our Airmen."

TOP-LEVEL SUPPORT

When it comes to the fight for greater inclusion among Air Force ranks, Brown and Bass aren't going it alone.

The Air Force's Diversity and Inclusion Task Force, which launched June 9 to investigate the impact of demographic-related disparities on USAF and the Space Force, will transition into a new office dedicated to cultivating these qualities across both services, Air Force Deputy Chief of Staff for Manpower, Personnel, and Services Lt. Gen. Brain T. Kelly announced Sept. 16.

"This task force that's created now will transition to a new Office of Diversity, Inclusion, and Belonging that will work directly for the Secretary of the Air Force [and] service the two service Chiefs—both on the Air Force side and the Space Force side," Kelly said during a vASC panel on Air Force talent management and culture issues.

The Air Force is also bringing in experts from the corporate and academic worlds who possess "really detailed experience and track records in this area," he added.

Kelly suggested that moving the Department of the Air Force organization that manages these efforts out of the A1 portfolio may help win "more corporate buy-in and resources" for these endeavors, but he did not offer a timeline for such a transition.

A parallel Pentagon-level effort—the Defense Department Board on Diversity and Inclusion, chaired by Air Force Secretary Barbara M. Barrett—first convened on July 15 and is slated to transition into a permanent Defense Advisory Committee on Diversity and Inclusion, Kelly said.

The panel is trying to identify "those things that are unique for DOD to do that apply to every one of the services," he said.

Kelly said he sees these Air Force and Pentagon plans, as well as recent inclusion-minded policy changes—such as five-year shaving waivers, allowing diacritical accents on name tapes, and the creation of new Air Force scholarships for students attending historically Black colleges and universities—as concrete examples of programmatic change.

"All those things tell me we're on a good path to ... making permanent changes to culture and not and not just sort of repeating cycles from the past," Kelly said. ✪

Senior Airman Michael Murphy

U.S. Air Force and Navy aircraft perform an "Elephant Walk" at Andersen Air Force Base in Guam. USAF has RQ-4 Global Hawks, B-52s, and KC-135 tankers readied at the strategically crucial base.

China Propaganda Video Puts Guam in Crosshairs

By Brian W. Everstine

Pacific Air Forces is pushing back against a Chinese military propaganda video depicting an H-6K bomber targeting Andersen Air Force Base, Guam, calling it attempted intimidation in the region.

The video, released Sept. 19, shows the bombers flying alongside fighter aircraft, and firing a missile at a Google Maps-style picture of Andersen's flight line.

"It is yet another example of their use of propaganda in an attempt to coerce and intimidate the region," PACAF said in a Sept. 23 statement. "Maintaining the safety of our personnel and resources, as well as our allies and partners, is of the utmost importance and we remain committed to ensuring a free and open Indo-Pacific for all nations."

The video shows targeting crosshairs aiming at an empty portion of the apron on the south side of Andersen's flight line, where refueling tankers are typically seen at the base. In addition to the image of Andersen, the Chinese video uses footage from the American action movies "The Hurt Locker," "The Rock," and "Transformers" to dramatically show explosions.

Andersen was the home of the Air Force's continuous bomber presence mission, which the service ended in April in a shift to dynamic force employment. Now, smaller bomber task forces are sent to the region for shorter, more unpredictable deployments. A task force of B-1s from the 34th Bomb Squadron at Ellsworth Air Force Base, S.D., is currently deployed to the base.

The video comes as China is expanding its military presence in the Pacific, including building up airstrips on contested islands in the South China Sea to extend the reach of the People's Liberation Army Air Force (PLAAF). The Pentagon, in its annual report on China's Military Power, says the PLAAF is increasing the precision and numbers of air-based cruise missiles, similar to what is portrayed in the propaganda video.

The H-6 bombers have been modernized, with aerial refueling capability and a larger munitions capacity. The PLAAF and the People's Liberation Army Navy have the third-largest aviation force in the world, and the largest in the Indo-Pacific region, the report states. ✪

New Superintendent at USAFA

By Jennifer-Leigh Oprihory

Lt. Gen. Richard M. Clark officially took over as U.S. Air Force Academy (USAFA) superintendent and discussed priorities for his tenure during a Sept. 23 change of command ceremony at the USAFA campus in Colorado Springs, Colo.

"Today, as I step on this field once again, it is significant because I'm honored and privileged by the opportunity to give something back to the school that has given me so much, and it is my goal to prepare every cadet to make their dreams come true, just as my dream is coming true today," the 1986 USAFA alum said in his first address as superintendent.

Clark's assumption of command is historic for the Academy, since he is both its first Black superintendent and its first former commandant of cadets to serve in USAFA's top role, the Academy confirmed to Air Force Magazine via email on Sept. 23.

Clark, who succeeds fellow alum and now-retired Lt. Gen. Jay B. Silveria, most recently served as the Air Force's deputy chief of staff for strategic deterrence and nuclear integration. Silveria led the Academy for just over three years.

In his remarks at the event, Air Force Chief of Staff Gen. Charles Q. Brown Jr. called Clark "the right leader to develop the courageous officers we need to compete, deter, and win."

Chief of Space Operations Gen. John W. "Jay" Raymond also gave Clark a glowing endorsement, dubbing him "the perfect leader" to help mold future Airmen and Space Professionals into "the bold officers" the National Defense Strategy and current fight demand.

Clark told the attendees he plans to keep up several "priority efforts" of his predecessor, including:

- A continued commitment to developing "leaders of character;"
- Continuing the Academy's fight against the COVID-19 pandemic through "a reliance on scientific and mathematical expertise, extraordinary teamwork, unwavering perseverance, and strict adherence to guidelines;"
- Efforts to further foster a "culture of dignity and respect for all" at the school, which he said is necessary for the success of both the Academy "as an institution" and for its cadets as future leaders "in an increasingly diverse Air Force;"
- Building out the school's Institute for Future Conflict, an effort Clark said today's "strategic environment demands," since future USAF leaders will need to be able to solve problems

Joshua Armstrong/USAF

Lt. Gen. Richard Clark takes over as superintendent of the Air Force Academy during a Sept. 23, ceremony at Falcon Stadium.

they're not even currently aware of in order to compete and succeed in future conflicts. "These efforts are already underway, but we must find ways to move smartly and quickly in order to accelerate change, or else, we will lose," he added.

"I'm proud of you, I'm here for you, and I promise that I will leave it on the field for you," he told the assembled cadets. "Let's do this."

Staff Sgt. Magen Reeves

Airman 1st Class Keith Walton, left, and Senior Airman Cody Gregory, right, perform pre-flight checks with Capt. Nichole Ayers, at Tyndall Air Force Base, Fla. USAF is moving forward in making their "Base of the Future" concept a reality, beginning with Tyndall.

Big Data to Make Tyndall Safer

By Rachel S. Cohen

Tech firms SimpleSense and Novetta will take the lead in setting up a new kind of operations center for Tyndall Air Force Base, Fla., as part of its "Base of the Future" effort.

The Air Force awarded $9 million to startup SimpleSense in September month for the virtual "Installation Resilience Operations Center (IROC)," which will act as a central hub for base security and facility operations at Tyndall. The Florida Panhandle base is a proving ground of sorts for new infrastructure ideas as it rebuilds from Hurricane Michael, which destroyed much of the installation in 2018.

Tyndall sought ideas from four pairs of companies at a "Shark Tank"-style pitch competition on Sept. 14. SimpleSense, which pulls in emergency services data from civilian and military agencies to create a holistic picture of base security, and data-analytics company Novetta came out on top.

"The selection team determined SimpleSense/Novetta's innovative approach could have the most potential to reshape the way the AF manages [the Internet of Things] across the enterprise," Air Force spokesman Mark Kinkade said.

Their software will connect to sensors and systems across the base to gather information about building health, personnel safety, energy efficiency, and more.

"The installation of the future requires immediate awareness, response, and even prediction of major incidents, whether a 911 call or equipment failure," SimpleSense said in a Sept. 21 release. "The objective of IROC is to modernize response operations to enable real-time data collection and analysis of all operational technology systems, from smart buildings to physical security systems. Breaking down the stovepipes that separate data enables a safer, more productive, and resilient installation."

For example, in case of a shooting on base, sensors could detect gunshots and ping the ops center and first responders. More people would be aware of a dangerous situation earlier, and be able to respond faster.

Big data can help in less dire situations, too. If the IROC software notes that an air-conditioning unit is about to fail, or a structure is close to collapse, it can save the Air Force money by addressing issues sooner instead of waiting for things to break.

Working with the Tyndall Program Management Office (PMO), which is in charge of rebuilding the base, the companies will gradually mature their technology to be fully functional in three years. If the Air Force Installation and Mission Support Center likes what it sees, it could spread the concept to other bases.

"Every wing commander has a responsibility to think about these 'base of the future' concepts, anytime they look at implementing an infrastructure project or renovation, and take what makes sense for their situation to implement," Tyndall PMO boss Brig. Gen. Patrice A. Melancon recently said.

Moon Shot News

NASA/MSFC

NASA's Space Launch System (SLS) rocket in the Block 1B crew configuration as it is rolled out to the launch pad at NASA's Kennedy Space Center in Florida.

A "hot-fire test" to assess the Space Launch System (SLS) rocket's core stage and integrated systems is scheduled for early November. It is the last of eight crucial tests to ensure the massive rocket is ready for a manned mission to the moon.

The first mission, Artemis I, will send an Orion spacecraft on two unmanned trips around the moon, and is on track for launch in 2021. Then, in 2023, astronauts on the Artemis II mission will assess the Orion's handling capabilities and related hardware and software performance.

Artemis III, slated for 2024, will be humanity's return to the surface of the moon as astronauts step on the lunar South Pole.

FACES OF THE FORCE

USAF

National Guard Bureau Chief Gen. Daniel R. Hokanson recently tapped **Chief Master Sgt. Tony L. Whitehead** as the Guard's newest senior enlisted adviser. Whitehead has nearly 40 years in uniform—more than half of those with the Air National Guard. He most recently pulled double duty as command chief master sergeant for Air Forces Northern and the Continental U.S. NORAD Command Region and holds an associate degree in criminal justice and a bachelor's degree in criminal justice administration.

Staff Sgt. Marko Salopek

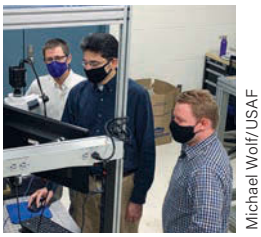
The daughter of the Air Force's first Sikh officer allowed to serve in a turban and beard followed her father into uniform. Now, she's helping ensure Airmen get to serve under equitable conditions. "The ... Reserve [allows] me to both serve my country and invest in my local community," said 310th Space Wing Director of Equal Opportunity **2nd Lt. Naureen K. Singh**. "I am inspired by the opportunity to serve in multitudes without having to give up on any part of me that makes me who I am."

Maj. Chris Bernard

304th Rescue Squadron Airmen successfully tracked down a father and daughter who went missing and became injured hiking in the Mount Hood wilderness area. Members of the **Oregon Air National Guard's 125th Special Tactics Squadron** helped move the injured hikers to the closest service road. "Technical rope systems were used at a number of locations ... to transport the two patients off the mountain," said Capt. Phil, who served as a liaison officer during the scenario.

178th Wing via Facebook

Seventy-two years after dying in an F-51 training crash, WWII pilot and Ohio ANG **Lt. Richard Dale Christman** got a headstone befitting his time in uniform. Springfield-Beckley ANGB historian **Tech. Sgt. Richard Herron** discovered Christman was buried without a grave marker denoting his military service, so a civ-mil fundraising effort raised money to replace it. "I think it important that we honor this young lieutenant because at some point, that could be us," he said.



Michael Wolf/USAF

AFRL researchers recently secured a patent for a novel design for a tunable radio frequency filter. Their innovation will let USAF create filters that are smaller, weigh and cost less, and demand less power than current alternatives. "If you are on the battlefield, your adversary will likely try to contaminate your signal, something that's not very hard to do," said project team leader **Michael Page**. "We have the ability in place right now to tune the filter to remove undesirable signals"

Staff Sgt. Anthony Small

113th Wing **Airmen Maj. Telisha Johnson, Capt. Lauren Sutherland, Chief Master Sgt. Mark Nicholas, Staff Sgt. Emanuel Morales, Staff Sgt. Jacen Vaughan,** and **Airman 1st Class Santiago Martinez Jr.** recently received Meritorious Service Medals for helping save a jogger's life after they collapsed on the National Mall in Washington. Though only one of the District of Columbia Air National Guard personnel had a medical background, the Airmen—who were honored by both Air Force Secretary Barbara M. Barrett and Army Secretary Ryan D. McCarthy—triaged, performed CPR on, and called in medical backup for the individual while serving on a civil unrest mission in the nation's capital. "Because of their swift response, an unconscious and injured civilian ultimately returned to their family," Barrett said. "Their teamwork is an example of the Air Force value of service-before-self."

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

Technicians ready an instrumented AGM-183A ARRW (Air-launched Rapid Response Weapon) for a captive-carry test flight on a B-52H at Edwards AFB, Calif., Aug. 8. The ARRW will be the first operational hypersonic missile fielded by the U.S., and the B-52 will be the first aircraft to carry it.

Kyle Brasier/USAF

BUFF Up

Another decade of enhancements will give the B-52 three more decades of power.

By John A. Tirpak

The nearly 60-year-old B-52 will be the workhorse of the Air Force's bomber fleet another 30 years at least, reinvigorated with upgrades to boost its range, power, sensors, and bomb-carrying capacity. Once complete, Air Force Global Strike Command's improvements to its 76 B-52s will provide the equivalent of an extra 22 bombers' worth of weapon-carrying capacity.

The multitude of upgrades are already well underway and will continue into the late 2020s, providing aircraft built in the 1950s and '60s—the last B-52 was built in 1963—with modern engines and radars, new capability to carry more smart weapons internally, new communications and connectivity, and the ability to deliver the most advanced missiles in USAF's inventory. B-52s will also remain a key part of the American nuclear deterrent.

The changes are significant enough that the upgraded bombers could be redesignated from B-52H to "B-52H+" or "B-52J." A new radar will mean a new nose, perhaps without the electro-optical blisters on the radome made obsolete by wing-mounted Sniper or Litening targeting pods. The aircraft's twin-engined pods on the swept-wing bomber will also look different, and the five-person crew will likely be reduced to four.

"It is going to... be a very different B-52 than what I flew as a lieutenant."
—Maj. Gen. Andrew Gebara, director of strategic plans, programs, and requirements for Air Force Global Strike Command

The Air Force has already spent some $1.4 billion in this round of B-52 upgrades and will invest another $3.8 billion over the next five years—and considerably more in the years that follow. Specifics are not yet available.

"It is going to ... be a very different B-52 than what I flew as a lieutenant," said Maj. Gen. Andrew J. Gebara, director of strategic plans, programs, and requirements for Air Force Global Strike Command in a September Air Force Magazine interview. In addition to its upgrades, the B-52 will also be able to launch the Air Force's most advanced missiles, the new AGM-181 Long-Range Standoff (LRSO) nuclear cruise missile and the hypersonic AGM-183 Air-launched Rapid Response Weapon (ARRW).

Over-engineered from its inception, the B-52 airframes remain remarkably viable, with decades of structural service life remaining, Gebara said. Even with combat systems largely unchanged since the

How the Engines Compare

Three companies have said they will pursue the B-52 re-engining competition. Here are a few of USAF's options:

Rolls-Royce BR725

THRUST: 16,100 pounds
FLYING ON: USAF RQ-4 Global Hawk and E-11 BACN

The BR725 (military designation F130) is already in the Air Force inventory and has 200,000 combat hours, plus more than 22 million hours overall. Rolls claims 21 percent reduced toxic emissions, four decibels quieter, and better fuel burn than current generation engines.

GE Aviation CF34-10

THRUST: 20,360 pounds
FLYING ON: Embraer E-series, Comac ARJ21

The CF34-10 flies on business jets with an on-wing time of 14,000 or more hours. Combined with earlier versions it has racked up 26 million flight hours.

GE Aviation Passport

THRUST: 18,900 pounds
FLYING ON: Bombadier Global 7000/8000

Developed by GE Aviation for large business jets, the Passport engine first flew in 2015. It has more than 4,000 hours of testing since 2010 and features an 8 percent better fuel burn than other engines in its class.

Pratt & Whitney PW815

THRUST: 16,000 pounds
FLYING ON: Gulfstream G600

Pratt claims 40 percent less on-wing maintenance than previous engines in this class and is touted as 75 percent quieter and producing 50 percent less toxic emissions than the existing engines.

1991 Gulf War, mission capable rates remain about 80 percent and the platform itself remains among the most versatile in the force, capable of firing standoff missiles, dropping gravity and precision-guided bombs, and laying mines.

In fact, the B-52 will long outlast the newer B-1 and B-2 bombers, both of which are expected to retire in the early 2030s when the new B-21 stealth bomber joins the force.

AFGSC Commander Gen. Timothy M. Ray wants only "must-have" upgrades, Gebara said, "Nice to haves" did not make the cut, he said. Among those that won't be added are the Large Aircraft Infrared Countermeasure System, or LAIRCM, which was dropped after the Air Force withdrew its B-52s from close air support and refocused them exclusively on dynamic force employment missions. The LAIRCM was primarily a defense against low-level infrared threats, Gebara said, and therefore not deemed a priority.

NEW ENGINES

Engines, however, are a must. Without new power plants, Gebara said, "it's not going to be an airplane anymore—it'll just be a static display."

The B-52 Commercial Engine Replacement Program seeks to replace each B-52's eight antique TF-33 power plants with modern, business-class jet engines. The goal: 30 percent more range or loitering time, reducing demand for aerial tanking, and increased reliability such that, once installed, the engines should never have to be removed for the remaining life of the airplanes.

Global Strike Command estimated in 2018 that the re-engining could cost $22 billion, but would save $10 billion in fuel, reduced maintenance, and personnel. The actual costs won't be known until the Air Force selects an engine. All of the major engine suppliers are competing, and a selection is expected next spring. Rolls-Royce, GE Aviation, and Raytheon Technologies' Pratt & Whitney are each offering variants of existing business-jet engines. Boeing, which built the B-52, will be the Air Force's integrator.

The project will be among the first competitions relying on digital models rather than real-world flight-tests to evaluate and select a winner. The Air Force shaved about three years off what might have been a 10-year acquisition process, thanks to streamlined Section 804 authorities. Gebara expects installations could begin in about five years.

Maj. Gen. Mark E. Weatherington, commander of AFGSC's 8th Air Force, said that once the upgrades begin, the command could see "30 to 40 refurbs," or engine replacements, per year.

Giancarlo Casem/USAF

Master Sgt. John Malloy and Staff Sgt. Jacob Puente secure an ARRW under a B-52H's wing during August tests at Edwards. The logo on the missile carries the Latin phrase "Celeri Responsio," or "Rapid Response."

CONNECTIVITY

While the engine replacement will take time, other changes are already well underway. Nearly complete is the CONECT upgrade, which adds Combat Network Communications Technology including data links, processing power, moving map and full-color displays, and the ability to retarget weapons in flight.

As of August, Gebara said, 69 of 76 B-52s had completed the CONECT upgrade, which began in 2014. CONECT replaces a series of Band-Aid solutions to improve targeting and connectivity that cluttered cockpits with laptop computers, connecting wires, and Post-it notes.

The Rube Goldberg solutions "show the innovation of our Airmen," Gebara said, "but it's also nice" to see the BUFF "come up to 21st century" standards.

NEW RADAR

The B-52's ancient AN/APQ-166 radar is slated for replacement, its analog/mechanical systems is prone to all

6 Critical Improvements

New investments in the historic B-52 will keep it flying for the next 30 years or more. What's changing:

Upgrade	Purpose	Cost
CONECT	Connectivity, in-flight re-targeting	$735 million
1760 Weapons Bay Upgrade	Internal carriage of smart weapons	$237 million
Radar Modernization Program (RMP)	Adds functions, reduces maintenance	$239 million*
Commercial Engine Replacement Program (CERP)	Adds range, reduces maintenance	$205 million*
Advanced Extremely High Frequency Communications	Improves communications	$6.2 million*
Very Low Frequency/Low Frequency Communications	Improves communications	$8.8 million*

Source: Air Force Global Strike Command and Air Force Material Command Life Cycle Management Center
*Amounts obligated as of Sept. 14, 2020, only. Substantial additional funds will be needed to complete each upgrade.

the shortcomings of older technology, said Gebara. He said the system was old when he first joined the Air Force nearly three decades ago.

"When I started flying the B-52, it was a 20-plus-year-old radar back then," he said. "It's a maintenance nightmare for those poor guys on the line."

The replacement radar still has no official designator. Selected in July 2019, it is based on Raytheon's APG-79/APG-82 family of systems used in the Navy's F/A-18 Hornet, with elements drawn from the F-15E Strike Eagle. "We wanted an off-the shelf" solution that would be "most useful to us for the least amount of cost," Gebara said. Boeing, as the integrator, chose the radar.

The active electronically scanned array (AESA) radar will go into low-rate initial production in 2024 and include improved mapping and targeting range and increased capacity to engage multiple targets simultaneously. The solid-state radar will have no moving parts—easing maintenance.

"We'll be operations-capable" with the new radar in 2026, Gebara said.

The radar is what could enable AFGSC to reduce B-52 crews from five to four Airmen. While no firm decisions have been made, Gebara said, "If we are going to put all these upgrades in the airplane, it does make sense that [crew size] would eventually come down." He added, however, that nothing is "imminent."

One concept floated in the early 2000s to justify re-engining the B-52 was to enable the aircraft to become theater-wide, standoff jamming platforms. New engines would generate the needed electrical power for jamming emitters to blanket a wide area. That remains an option, but Gebara said there are no near-term plans to turn the bombers into jammers.

"It's not an imminent program," he said. "The plane will be around to 2050, and one thing that's exciting about the B-52 is, you never know what's going to come next." But, he said, "that's not something you'll see in the next few years."

MORE CAPACITY

The key attribute of the B-52 has always been its ability to carry a large payload. Now, even that is being expanded. The 1760 Weapons Bay Mod will enable "smart" weapons—such as the AGM-158 JASSM and GBU-31 JDAM—to be carried inside the bomber on weapons racks and rotary launchers, as well as on wing pylons, where they're carried now.

"This increases the smart-weapon capacity by about two-

Senior Airman Lillian Miller

A crew readies a Common Strategic Rotary Launcher full of AGM-86B ALCMs for loading onto a B-52H at Barksdale AFB, La. The ALCM is long past its planned retirement and will be succeeded by the highly secret AGM-181 Long-Range Standoff missile. Upgrades will allow other smart weapons to be carried internally.

Airman 1st Class Duncan Bevan

A B-52H Weapon Systems Officer checks a display during a deployment to Europe in 2019. Upgrades now in the works may make it possible to eliminate one of the B-52's five-person crew from the bomber's "downstairs" stations.

thirds," Gebara said. "And, if you do the math, that's like an additional 22 bombers."

Without the mod, only "dumb" bombs without sensors or satellite guidance could be carried internally.

In addition to added smart-bomb capacity, the B-52s will be the only aircraft to carry the AGM-181 Long-Range Stand-off missile, or LRSO, and the AGM-183A ARRW (Air-launched Rapid-Response Weapon) hypersonic missile.

The LRSO is the successor to the AGM-86 Air-launched Cruise Missile, which is now more than two decades past its original planned retirement date. The new LRSO, which is expected to be operational in the late 2020s, will be a very long-range, stealthy weapon that can be launched far from enemy air defenses. The highly classified program—USAF will not say anything about its dimensions, performance, or loadout on the B-52—will be built by Raytheon, which was selected to build the LRSO two years ahead of schedule, in early 2019, thanks to a successful Technology Maturation and Risk Reduction (TMRR) program with competitor Lockheed Martin.

The hypersonic ARRW will likely be the first operational hypersonic weapon in the U.S. inventory. Gebara said the B-52 would be able to carry two ARRWs on each of its two wing pylons. Little has been revealed about the ARRW, which uses a booster rocket to accelerate to hypersonic speed, then glides to impact.

"This thing is going to be able to go, in 10-12 minutes, almost 1,000 miles," Gebara said. "It's amazing."

Gebara said the CONECT mod made it possible to add ARRW to the B-52.

With CONECT, "we get all the advanced target handoffs," he said, "as opposed to the bombardier in the bottom of the plane typing in [coordinates] and hoping he gets it right."

The Air Force is also pursuing a scramjet-powered, air-breathing hypersonic missile—called "Mayhem"—which would likely be smaller than the ARRW and could be carried on fighter-sized aircraft, as well as big bombers. It will build on the Hypersonic Air-breathing Weapon Concept, or HAWC, that the Air Force is developing with the Defense Advanced Research Projects Agency.

"I believe that the near-term solution that we can succeed with and field quickly is ARRW," Ray said at a press briefing during the Air Force Association's virtual Air, Space & Cyber Conference. "And we can do that [with] the B-52 and the B-1. We need to do that soon. And I believe, broadly, the Air Force has got it right that we want to [pursue] a scramjet missile configuration that can be launched from other platforms, as well. … We should do both."

ARRW could achieve initial operational capability within "the next couple of years," Ray said.

Not yet clear is how to upgrade the defensive management system for the B-52. Gebara said that capability may not be characterized for some time.

TESTING, TESTING

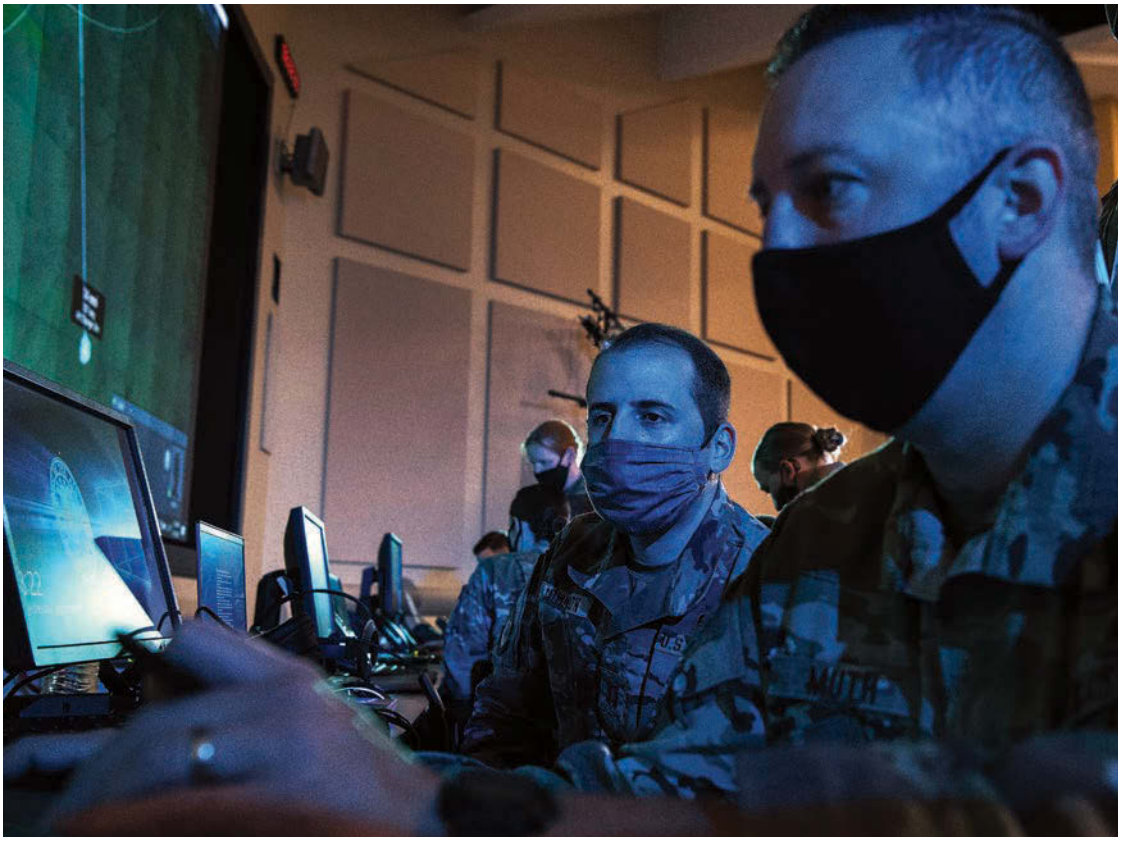
In order to get so many new systems tested in a timely manner, Gebara said the B-52 test force will expand from two to eight aircraft: two each to test the radar, engines, new missiles, and other improvements, such as the weapons bay. That way, Gebara said, if there's "a delay on the engine for a month or two, because they find some unknown issue, that doesn't slow down the radar and the rest."

Ray said he is confident AFGSC's plans for testing and depot-level upgrade work will be effective. "I'm not concerned about the ability to do that," he said. "I think …we've got a good game plan."

AFGSC restored two old B-52s from the Davis-Monthan Air Force Base boneyard in Arizona, but Gebara said he does not anticipate any more resurrections and that other test aircraft will be diverted from operations to complete tests.

No major changes are needed to equip B-52s to launch either the ARRW or the LRSO, and because the Air Force is determined to create an open-mission systems architecture for all its aircraft, it should be able to keep refreshing the B-52 throughout its remaining lifetime.

"That's what's wonderful about the B-52," he said. "It's like an iPhone: There's always an app that you can add to it and make changes. That's pretty exciting." ✪



Capt. Matthew Johnson, a targeting liaison officer, and Maj. Jonathan Muth, a land kinetic effects controller, monitor a computer in support of the Advanced Battle Management System (ABMS) on-ramp, Sept. 2, at Joint Base Andrews, Md. The effect ABMS is attempting to achieve is joint all-domain command and control.

Senior Airman Daniel Hernandez

Moving From Situational Awareness to C2

The second ABMS on-ramp experiment offers a peek into the future of JADC2.

By Brian W. Everstine

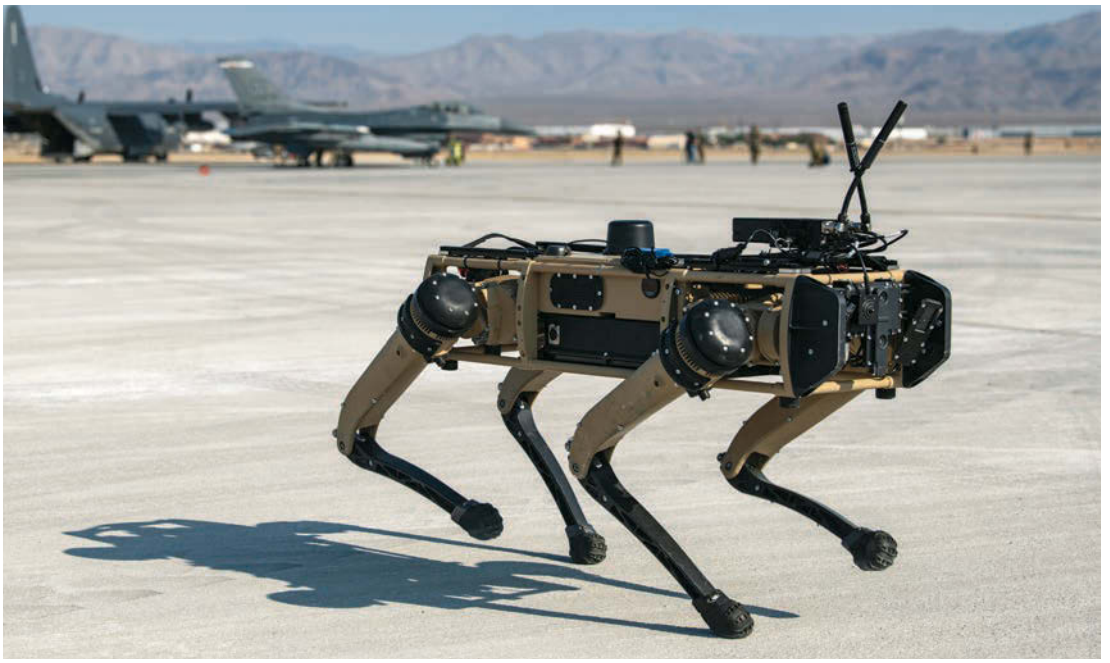
This is the future: On a large a screen in front of lines of young Air Force experts and industry coders, data feeds from dozens of sensors—as small as body cameras on ground forces and compact radars the size of a loaf of bread, and as large as Aegis cruisers and E-8 Joint STARS aircraft—converge with real-time readiness information from across the services. Linked with a 5G connection, the data feeds can also be viewed on tablets shared with observers, including congressional staff, who are here to watch this experiment play out in this makeshift nerve center.

This is the second "on-ramp" evaluation of the Air Force's proposed Advanced Battle Management System. ABMS began as a potential replacement for JSTARS, but has morphed into a massive, game-changing software-based approach intended to replace phone calls and PowerPoints and to accelerate data sharing, communication, and decision-making in the heat of battle. During the one-day exercise that followed, dozens of aircraft and more than 60 different sensors took part, a cruise missile was knocked out of the sky by a "smart" bullet, and the head of U.S. Northern Command said he saw capabilities he wants as soon as possible. Contracts are possible within months, not years, to help make ABMS a reality soon.

"The focus is showing we really are building an internet for the military that feels like the internet that we use when we go home."
—Will Roper, the Air Force's assistant secretary for acquisition

"The focus is showing we really are building an internet for the military that feels like the internet that we use when we go home," said Will Roper, the Air Force's assistant secretary for acquisition. The difference: "The things that we're connecting are very different than the refrigerators, televisions, smartphones. They are warfighting systems. And the operational need to move data quickly in a way operators understand really came out" during the experiment.

Gen. Glen D. VanHerck, commander of NORTHCOM and North American Aerospace Defense Command put that in context: "If you have an information advantage over the adversary, you're able to quickly posture yourself and make decisions at the strategic



Tech. Sgt. Cory Payne

A robotic dog prototype patrols a simulated austere base at Nellis Air Force Base, Nev., Sept. 1, during an Advanced Battle Management System exercise. The unarmed robot provides situational awareness, allowing security forces to stay closer to the aircraft they protect.

level to the tactical and operational level. For me, as an operational commander moving forces, that would then deter any potential adversary in a more timely manner."

THE BATTLE

This one-day exercise in early September took place across four test ranges and multiple operating locations, including the nerve center set up at Joint Base Andrews, Md. The scenario crafted by NORTHCOM and U.S. Space Command focused on a notional, but realistic, threat: Russia acting against U.S. interests abroad. Three days of "tensions" in this scenario played out in a morning, spanning across all domains.

Today's commands were "designed to match up against a world that didn't have a peer threat ... able to hold the homeland at risk," a NORTHCOM official involved in planning the event said. "And so, we have a contested environment inside of our area of responsibility for NORAD and NORTHCOM. ... Space is rapidly becoming a contested environment that needs a combatant command with the capabilities to deal with those threats."

In the scenario, Russian actions prompt the U.S. military to shift its posture, for example changing forces' alert status and gearing up deployments. As the scenario progressed, Russia opened up with a cyber attack, then moved on to space. For the exercise, real-world U.S. military space assets were both jammed and "dazzled" by lasers to limit their effectiveness. At sea, ships playing bad-guy roles harassed U.S. Navy and Coast Guard assets. On the ground at Nellis Air Force Base, Nev., a convoy from U.S. Strategic Command was on the move and "attacked" by small unmanned aerial systems.

In response to adversary air threats, U.S. Air Force fighters scrambled, supported by tankers, an E-3 Sentry, and the E-8 Joint STARS. Intelligence, surveillance, and reconnaissance assets used in the exercise included satellites, MQ-1s, MQ-9s, and an RC-135. A C-17 and C-130 brought in a Marine Corps M142 High Mobility Artillery Rocket System, as well as contingency-response Airmen to seize and defend an airfield, including by using a Ghost Robotics "robot dog" outfitted with sensors to help on patrol. Every sensor and shooter fed live data into the cloud-based command and control system, with commanders and operators watching the scenario playing out in real-time—thanks to satellites, landlines, and mobile 4G and 5G networks.

"Future battlefields will be characterized by information saturation," Roper said. "One of the key objectives of this on-ramp [exercise] was to present a dizzying array of information for participants to synthesize, just like they would see in a real operation."

The cloud-based software fed screens at Joint Base Andrews, called "OmniaONE," that combined all of that sensor and tracking data into a single accessible screen resembling a real-time video game. Artificial intelligence fused live sensor feeds with readiness data from Air Force bases across the country, providing options to commanders that could just be clicked to enact.

For example, by zeroing in on a map of Joint Base Elmendorf-Richardson, Alaska, commanders could see how many F-22s were currently on alert, how many were fully mission-capable, and also what fuel and weapons was available. Commanders could order a scramble with a pull-down menu, rather than a phone call. Redirecting the map to Russia showed their bases, along with intelligence showing the most recent reports on how many aircraft might be available there, plus the recent pattern of life on the base, hinting at what their course of action could be.

LIVE FIRE

The live-fire part of the exercise took place at White Sands Missile Range, N.M., where six BQM-167 targeting drones launched to simulate a cruise missile threat. Several legacy and new sensors tracked the BQM-167s, providing real-time altitude, speed, and heading information into the ABMS system. A series of shooters lined up to take a shot, to test if they could be repurposed for future base defense missions against a cruise missile threat. Among them: AIM-9Xs from an F-16, an MQ-9, a ground-based launcher, and the new Hyper Velocity Projectile (HVP)—a small "smart bullet" that can track a fast-moving target—fired from a U.S. Army M109 Paladin howitzer and a U.S. Navy deck gun. The projectile was developed by the Defense Department's Strategic Capabilities Office, which Roper ran before taking his current post.

Senior Airman Daniel Garcia

A prototype fire-control radar used to track threats and pass information to weapons systems being tested during the Advanced Battle Management Systems on-ramp at White Sands Missile Range, N.M., on Aug. 27.

While legacy systems showed promise, including the MQ-9 and ground-launched AIM-9Xs finding their targets, Roper was quick to announce the newly developed howitzer-launched HVP successfully downed the BQM-167 cruise missile threat.

"Just for the record: tank shooting down cruise missiles," Roper said. "That's just awesome—that's video games, sci-fi awesome. You're not supposed to be able to shoot down a cruise missile with a tank. But, yes, you can—if the bullet is smart enough. And the bullet we use for that system is exceptionally smart."

The test showed how a relatively small howitzer round could have massive implications for defense from a relatively high-end threat. That suggests howitzers could become part of a "raid-breaking system to defend a base against hundreds of incoming cruise missiles," Roper said, which could "completely change the calculus of how we go to war in a contested environment and defend critical assets for power projection."

"It took a lot of selling to the Pentagon and to Congress, that hypervelocity guns could take on a variety of threats at a very low price point with a very high magazine to be a disruptive defense mechanism," Roper added. "We were able to put it at center stage today, and it was successful."

HOW IT IS TODAY

Compared to ABMS, today's PowerPoints and phone calls are positively archaic. If an early-warning radar tracks a possible Russian bomber force flying toward Alaskan airspace, NORTHCOM officials said, someone watching radar sees the threat approaching North America, and picks up the phone to report its speed, altitude, heading, and whether it's squawking a code. Someone else keys information into a chat service, and others report what they are seeing and what assets are available to respond. Each is operating in isolation.

"None of them are looking at the same picture, none of them have a visual display of what's going on," said a NORTHCOM official who helped plan the ABMS event.

NORAD pulls together recent tanker data from U.S. Transportation Command in a PowerPoint to determine what tanking support is available for a scramble, then presents the information to an O-6 by phone so that he or she can decide whether the homeland is actually at risk. By then, about 12 minutes may have elapsed.

"There's no live collaboration in any common environment," the official said. "The data is stovepiped. The sensor data doesn't talk to the Blue Force readiness data, the number of aircraft on alert, how much fuel is at certain locations. The only time all of that data comes together is in the mind of the O-6."

Added another NORTHCOM official: "Isn't this how DOD works already? No. We have PowerPoint slides." That's literally how these kinds of decisions would be made. Right now, PowerPoint slides will be generated for commanders and for operators" and it can take days. "What we showed … was the first time that combatant commands were in the same data cloud architectures and made decisions about posturing forces, and we did it in seconds."

Another example: The Combined Air Operations Center at Al Udeid Air Base, Qatar—the nerve center of air power in the Middle East—where real-time data is fed to dozens of analysts through a massive wall of individual screens, each with its own different data set.

"It takes 100 people to make sense of all those different feeds. And because it takes 100 people, you have to play 100 different telephone games to be able to go: OK, I've got a threat," the NORTHCOM planner said. "If you've ever worked in a large organization, or [with] a huge staff, decisions don't happen quickly because it takes a long time to get that information together."

For the ABMS demonstration at Joint Base Andrews, however, that same kind of data was fused into one screen, accessible on the wall and via tablets.

"This capability did not exist six weeks ago," the official said. "And as we are putting in more and more courses of action based on what the adversaries are doing, it is starting to learn how the humans like to do these things. And, over time, we create kind of a collaboration between man and machine on the best courses of action."

A team of all-domain operators—known as "13-Os," for the new Air Force Specialty Code—watched the feed to monitor progress and give shooters the "go." A line of software coders from participating companies were on standby, ready to jump in to fix or patch problems, such as latency issues. In one practice run, the flood of data coming into the classified SIPRNet caused delays of up to five minutes on some, until programmers patched the system and solved the problem.

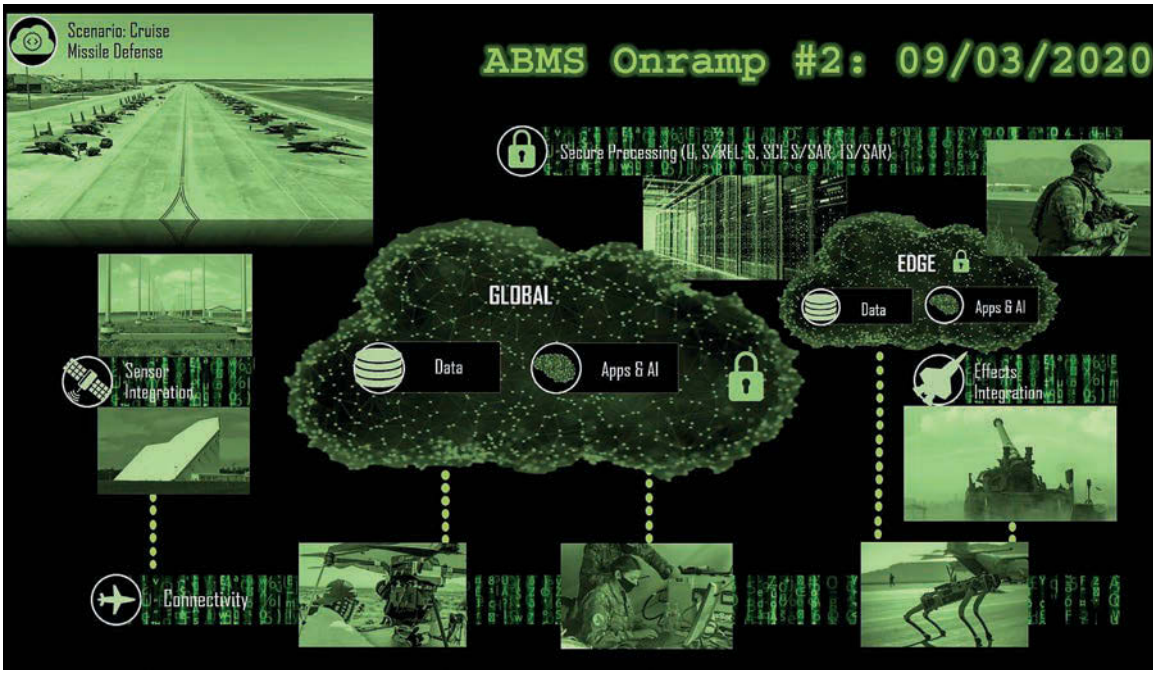
To be able to participate in the ABMS on-ramps, and possibly move forward with actual programs of record, companies needed to play by the Air Force's rules, programming for a single common architecture. This enabled the Air Force to bring in data from old systems, such as Link 16 communications, as well as new ones, such as AT&T and SpaceX, which are developing their systems to speak the same language.

"We are building a common architecture, and we want to plug in both legacy sensors, legacy C2 systems, and be able to plug in future procedures," the NORTHCOM planner said.

Two more ABMS on-ramps will follow, building off the first two.

Preston Dunlap, the chief architect and manager of the ABMS program, said it was almost impossible to compare the first two events because of the progress made from one to the next. The first event was "joint all-domain situational awareness," he said, not "joint all-domain command and control."

"This is so many more challenges, so many more dimensions," Dunlap said of the second event. "One of those was being able to push more to the defeat side and the command and control. And what that means is … sensing and understanding and exploiting the information, and then you make a decision, and then … execute. "



Will Roper's slide presentation on the ABMS test, presented at the virtual Air, Space & Cyber Conference on Sept. 15.

Will Roper/courtesy

The system uses machine learning to develop options, which could be as simple as clicking on a link to give the command to launch a missile.

"It's now, to them, an additional menu item in the Command-One layer of the application, which then allows us to either select suggested courses of action or simply decide your own action to be able to pick a defeat mechanism, or just say leave it alone," Dunlap said. " In about half the cases ... that decision to go 'use this platform, use this weapon to go strike' was done in a way that we will call machine to machine. And what that really means is instead of doing a phone call to somebody, or a chat room which is often the de facto approach, ... [the] platform and the operator ... [were] actually inside the same common operating environment ... so they could accept the tasking and then execute digitally. And that latitude, longitude ... targeting track was automatically provided to them. So, there's no mistakes. No human error."

GOING FORWARD

The third on-ramp, a pared down version in U.S. Indo-Pacific Command, was held later in September and the fourth will be held in U.S. European Command in early 2021. The first events included increasing joint participation, which needs to be a reality for ABMS to be effective. Navy and Army data, for example, can't be stovepiped within their services if ABMS is to effectively provide a real-world picture of what's happening.

"What we're really agreeing to do across the services is say 'Yeah, let me share my data with you, and you are going to share your data with me, and we are going to work together more effectively,' " Dunlap said. "And that really comes down to connecting networks, knowing how you speak and I speak."

In Europe, Air Force officials want to bring in allies, which will be limited to "Five Eyes" partners Australia, Canada, New Zealand, and the United Kingdom.

"We want the 'family of one system' eventually to not just be within the joint force, we want them across a combined force," Roper said.

Following each event, evaluation reports examine what worked and what didn't, with the results informing the next on-ramp event. Activities or programs that don't prove valuable can be dropped, and new solutions tried.

Some of the capabilities demonstrated in the second on-ramp had been in development for a while; CloudOne, for example, has been in the works for two years, Roper said.

That effort seems to be picking up steam. VanHerck praised the ability to utilize a cloud to share information. "We need to move quickly and rapidly down that path," he said. "I was very encouraged by the status, if you will, of those systems and the capability. I think they can be brought online within a year or less. It's a matter of getting through the challenges with the Department to field them."

The same could be true of new sensors, VanHerck said. The sensors would be fielded alongside current programs of record to supplement existing capability and build trust and confidence in the new technology.

The on-ramp showed the Air Force can "project forward" its detection capabilities, with sensors currently available from commercial vendors, and combine that information in a way that enables the military to quickly decide if there is a threat and how it can be killed, VanHerck said. Having those advanced sensors fused into a common operating picture as developed in the on-ramp will translate to more effective deterrence and alert missions within NORTHCOM, as some of the ideas and capabilities can come to fruition.

Some capabilities can be brought on using indefinite-delivery, indefinite-quantity contracts, while others—including tools using artificial intelligence, need more development. The potential OmniaONE common-operating picture programs show promise, but aren't ready for the big time, yet, experts said. Data links in remote areas failed in some cases, identifying challenges to be solved. If nothing failed in the on-ramp, Roper said, it would mean they weren't trying hard enough.

Future conflicts won't play out exactly like the cruise missile scenario in White Sands, according to Roper, but the lessons are opening eyes to the potential of these new approaches.

"I was happy to see senior leaders focused on all of the things that led up to the fireball," he said, calling those technologies " the real heroes that ultimately will " help us win the next war. "

What will that war look like? Roper said there's no telling exactly right now. But this much is clear: "Whoever brings the best analytics that have been connected to most flexibly designed future warfighting systems ... that side will win." ✪

Photo illustration: DashParham/staff; Johnny Saldivar/USAF; Matthew W. Jackson

Move Out!

Relocating is hard for everyone, but for service members, it's a way of life. COVID-19 challenged even the pros.

By Rachel S. Cohen and **Jennifer Hlad**

Packing up and moving was hard under normal circumstances. Then came the coronavirus.

For thousands of Air Force families, routine relocations in 2020 became a series of decisions that could separate Airmen from their spouses and kids, upend career moves, and interfere with unit cohesion and everyday work.

"It's like a house of cards—you pull one card out at the wrong place, and your entire house falls. We just threw the cards away," Col. Jennifer Allee, the Air Force's military force policy division chief, said of revamping relocation policy during the pandemic. "When you put your weapon on and you deploy, … it was almost that kind of feeling, working this policy."

More than 30,000 Airmen and their families moved between March and mid-August, during what is already the busiest time of year for permanent changes of station (PCS) around the world.

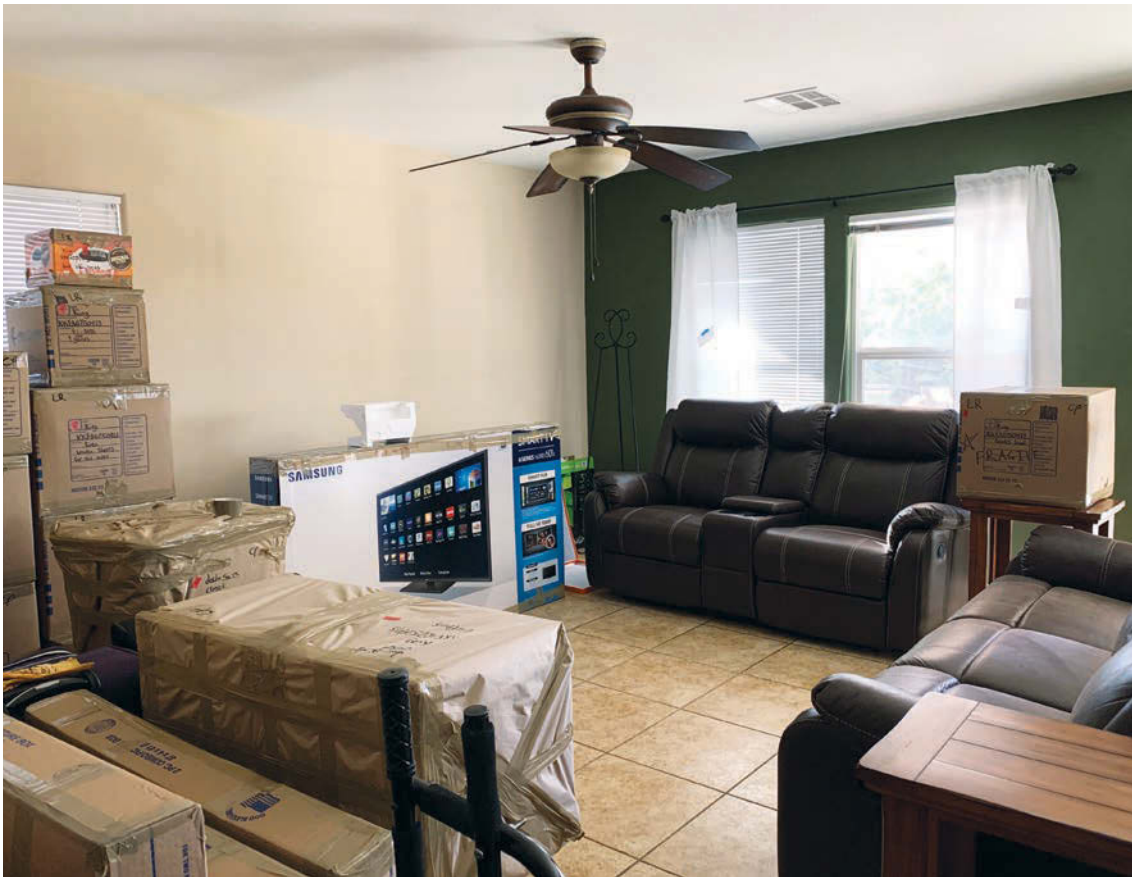
"It's like a house of cards—you pull one card out at the wrong place, and your entire house falls. We just threw the cards away."
—Col. Jennifer Allee, the Air Force's military force policy division chief

Delays and health precautions are stretching that hectic summer season into December. It usually ends in September.

Around the end of February, as COVID-19 spread to every continent but Antarctica and the U.S. reported its first coronavirus-related death, the Air Force started thinking about precautions Airmen would need as they started to move en masse.

There wasn't much time to prepare, Allee said. Countries around the globe had started to close their borders to halt the virus's march. The Defense Department (DOD) on March 13 put a 60-day ban on all travel to, from, or through places where COVID-19 was widely taking hold, like China, Iran, South Korea, and most of Europe. By April 1, that encompassed all nonessential international travel.

The global stop-movement order froze foreign and domestic permanent changes of station in place. Some people were left stranded after selling their homes or



USAF/courtesy

Moving boxes sit in the old Las Vegas home of Capt. Anthony, logistics flight commander for the 432nd Support Squadron. Anthony was scheduled to PCS from Creech Air Force Base, Nev., before the COVID-19 response began, and had already started the move when policies were enacted, but the Traffic Management Office was able to assist him in getting his home goods shipped despite the flood of changes taking place.

ending a lease, or without household items that had already shipped to their next destination. Others in limbo had to postpone their plans entirely, or saw their assignments rerouted from overseas to a base in the U.S. instead.

The Department of the Air Force needed to act fast to keep its people pipeline moving.

"We had people leaving, we still had some form of trainees coming into the Air Force and needing to go to their first duty assignment, and we were going to cause a backlog," Allee said. "We very quickly had to adapt."

A task force of about 25 colonels and civilian employees met daily to draw up policy exceptions that would help commanders move people as needed. Each installation posed different considerations, depending on COVID-19 caseload, testing, hospital capacity, and foreign travel requirements such as a 14-day quarantine period.

Letting commanders decide whether to greenlight a move helped some whose bosses were flexible—but waiting for a decision frustrated others.

"It's so frustrating to have your whole PCS in the hands of one person, whether or not they thought it was justified," said Kerri Burrows, an Air Force spouse who moved from South Korea to Texas.

The Air Force's first priority was allowing anyone leaving the service to separate or retire. The second was bringing new Airmen into basic training. Initially, the service decided to keep those graduates within the U.S. for their first jobs instead of moving them overseas, but now new Airmen are again traveling to foreign posts.

To ease the load on U.S. Transportation Command, which oversees the flow of service members and their belongings around the world, the Air Force started prioritizing who it wanted to move most urgently. That became more critical once DOD began rolling back travel restrictions in early June.

Airmen had options: Some wanted to leave on time, while others chose to move a few months later than originally scheduled. Others asked to stay in place for a year because it better fit their personal or family needs, with regards to schooling or health issues. Some moved to their new job, but temporarily left their families behind.

Airmen overseas saw their tours extended in cases where the service couldn't get their replacements in, or those already in-country, out. Others had their time abroad cut short. The service tried to consider everyone on a case-by-case basis.

"We did allow Airmen to think about their 'report no later than' days, and some people with children opted to move their families over the Christmas holiday, where they felt like their children would have a natural break in school," Allee said. "We tried to be very accommodating, one, for health and safety reasons, and two, for Airmen to take care of their families and keep them together."

Summer months saw a wild swing in the number of people allowed to move, from about 500 in June to 13,000 in July once more places were cleared for travel. Around 6,000 to 7,000 people typically PCS, on average, during the Air Force's busiest months of June, July, and August.

Pressure mounted to find moving companies, airline seats, and housing in time to report to the next job. Airmen could also opt to pack up themselves and drive to their next duty location.

TRANSCOM directed its network of more than 900 moving and storage providers to abide by public health guidelines when helping service members move, by wearing face coverings and shrinking crews to aid in social distancing.

Moving companies must attest that they screened all crew members for illness and equipped them to deal with new hygiene practices before starting to pack or deliver belongings, TRANSCOM spokesman Micheal L. Walton said.

Air Force spokeswoman Col. Holly Hess, who transferred

from Texas to Virginia, said a quality-assurance inspector was present at her home during the move. Her crew wore masks despite the San Antonio heat, and Hess said the process went smoothly.

"There's an added layer of stress because you don't want to expose your family, you have these strangers in your house, any of the concerns that I think a mother or any person would have, because there's a lot of unknowns about the pandemic and about the virus," Hess said.

Maj. Nate Amsden, commander of Detachment 5 under the Space Force's 544th Intelligence, Surveillance, and Reconnaissance Group, moved from Ohio to Virginia. He was looking forward to a smooth transition after a previous move proved particularly stressful.

The pandemic canceled his plans to see family and friends across the country before house hunting. The family of five, with three children aged 6 and under, briefly panicked when the Air Force approved their move two weeks early. They thought they had only two weeks to find renters for their Ohio property as well as a new home in Virginia. Amsden worried DOD policy would change again and further complicate things.

"The most stressful thing for my family was the uncertainty of finding a house, because we had planned to go house hunting in April so we could do the door-to-door to door move," he said. "When those plans were canceled, ... it was, OK, when are we going to be able to travel to find a house, or when am I even going to move?"

But Amsden's group commander was understanding, and granted him more time to find a home and start the new job in mid-June as planned.

Friends from work at Wright-Patterson Air Force Base, Ohio, helped pack Amsden's belongings for ABF Freight to ship to his door in Virginia. He said they felt comfortable enough with each other's precautions not to wear masks while packing. The kids needed to be out of the way, so sending them to sleep at a friend's house was a risk they had to take, he said.

"It was kind of like, let's do the best we can and just hope nothing bad comes out," Amsden said.

An Airman at McConnell Air Force Base, Kan., who spoke on the condition of anonymity, said he was reassigned to Kansas in the middle of moving from Guam to Italy, home to one of Europe's worst coronavirus outbreaks.

He and his wife headed to McConnell; their household goods and his vehicle kept going to Italy instead. The Airman said he shipped his belongings in January and received them in mid-August. A TRANSCOM spokesman acknowledged that delay could happen because of misdirected packages, travel restrictions, and other COVID-related shipping issues.

The McConnell Airman said he paid about $5,000 out-of-pocket to buy a new refrigerator, washer and dryer, and other appliances that he could have brought from Guam to Kansas, but ditched them because he thought he was going to Italy. European electrical outlets are incompatible with American appliances without an adapter.

"Imagine rental car expenses, then housing expenses ... from kitchenware to the fridge and the washer/dryer and the mattress," he said. "I can't imagine for a newer Airman that came to the Air Force, or somebody that's not in a stable situation financially or something, how that would have affected them. For me, I was able to handle it and incur the few thousand dollars [of] additional expenses in the process."

He hopes the Air Force might be able to reimburse him through funding from the pot used for people who need to live in hotels while PCSing. He said it's unfair that he hasn't been paid back for charges he didn't expect, but said it ultimately boils down to the military's culture of "doing more with less."

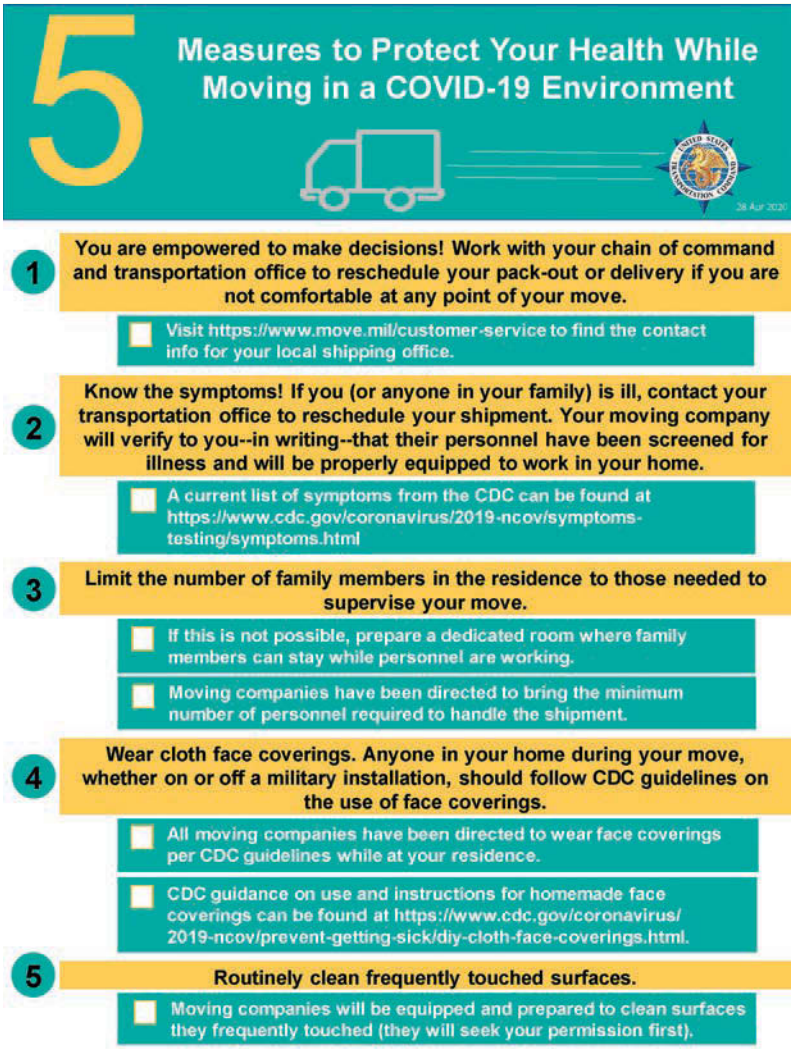
"There's not much you can learn, other than, be ready to live out of a suitcase for however long you need to. For me, it was almost eight months. I can't say it was bad," he said. "The only thing that was disappointing to me was the way the financial stuff was handled."

He's now working as a training manager, which isn't his typical career field. It's the job McConnell had available because they weren't expecting him, he said. He could be there for up to six years.

For some, shifting travel dates complicated moving company appointments and airline tickets.

Burrows said her family planned to leave in July until her husband was ordered to arrive at training earlier, before the travel freeze ended. The family had trouble figuring out when movers would take their belongings: No one would schedule it for early May as they wanted, so it was pushed to late that month instead.

Kelly Campbell, an Air Force spouse who moved this summer from Okinawa, Japan, to Mountain Home, Idaho, said they



Secretary of the Air Force Public Affairs

Airman 1st Class Kylee Thomas

Moving to a new station is stressful in the best of times. These aren't the best of times. Global travel restrictions meant to limit the spread of COVID-19 made the summer relocation season complicated and even more difficult.

needed to find a date when the military flight out of Okinawa could accommodate their two dogs. When that date changed again because of the stop-move order, and the military plane didn't have space for the dogs, they turned to a pet shipping company that quoted an "astronomical" cost. They and their pets were eventually allowed to fly military air together.

Senior Airman Jason Wade, a cyber target analyst at Joint Base San Antonio, Texas, also had to cancel and rebook commercial flights from Italy until he found ones with room to bring his two cats.

Once in the U.S., Wade felt that receiving 10 days of housing assistance funds during the military's required 14-day quarantine, or restriction of movement, forced Airmen to work on finding a home instead of being safe.

"We basically didn't quarantine because we couldn't," he said of needing to find housing before the military assistance ran out. "It would make more sense to me if they gave us 14 days [of Temporary Lodging Allowance] for quarantine, and then 10 days [for house hunting] afterward. That's where I feel like the leadership aspect failed at promoting personnel protection."

He said the pandemic has also taken a toll on his work schedule. Even though cyber is designated as a mission-essential field, Wade was in limbo between jobs, waiting to leave Italy but lacking the security clearance to start his new position once in Texas.

"I basically haven't really been working normal shifts for six, seven months now," he said. "It's very strange. … I would also like to see my squadron, and COVID is hampering that because I have to get a polygraph to do my job."

He expected it would take until at least mid-September for his clearance to go through so he could join the other cyber Airmen. In the meantime, he waited for his belongings to arrive in Texas, went for walks, and bought groceries.

"It's pretty monotonous right now," he said in August. "There's training available, but … I don't have my household goods, and I don't have my computer."

Wade noted that because of the pandemic, he hasn't gotten much help with in-processing at JBSA. The onus is on Airmen to figure out their own issues, like finding a car. He hopes younger Airmen—those coming out of technical school who don't know the ropes of military moves—aren't left in the dark. He also worries about people dealing with anxiety and depression during a stressful PCS, particularly while parts of American society are still shut down because of the pandemic.

He recommends service members double-check important dates for aspects such as flights and moving crews, to make sure everything goes as smoothly as possible in unusual circumstances.

Despite the Air Force's effort to ease the moving process, Airmen and their families had mixed reviews of how easy the changing guidelines were to follow. Amsden felt the service lacked a cohesive policy at the top or local levels of the Air Force.

"Every day was new information and new rumors," Burrows said.

Allee, in the Air Force's personnel shop, said the service heard those concerns and was working on new guidance to help.

"We just want the Airmen to be able to have the most up-to-date information at their fingertips as they get ready to move," she said. "What happens if you get on your plane and you go overseas and suddenly the country you're landing in doesn't allow you to come in because you don't have a piece of paper with a negative test? We don't want Airmen to get caught up in that."

The service wants to make sure its installations are working hand in hand with the logistics and medical communities to give people everything they need at a military port or commercial airport.

The Air Force is thinking about what future moves might look like or how much time Airmen will need to complete the process, as well.

"Maybe we don't have to move the force as often as we originally thought, if we could set up this telework environment," Allee said. She acknowledged those considerations will be different for people in combat-related jobs compared to those doing administrative staff work.

Walton, the TRANSCOM spokesman, said they are trying to improve the Pentagon's biggest challenge during the pandemic: communication.

"When we saw delays or other issues with specific shipments, we made phone calls to customers to explain the issue and field their questions. We also tried to improve our help desks and customer service," he said. The command is assessing whether its policy changes this year worked for families and corporate partners.

"Implementing the stop-movement order brought to focus nuanced interrelationships and challenges, which have always existed, but were not as apparent as they were this year," Walton said. "The most notable is the linkage with the personnel community. We need to take a broader approach across the department and develop a more integrated and complete approach to delivering information to DOD personnel and their families."

It's too early to declare success, he added, as TRANSCOM continues processing higher-than-normal volumes of people and belongings into the fall.

In the meantime, Airmen and their families are adjusting to life in new places.

Burrows's family in Texas wishes they could go out and meet new people, as in past moves. Usually, they would join as many activities and groups as possible, but making connections with others during a pandemic and "trying to remember people's names when you can only see their eyes" is not easy, according to Burrows0.

Her daughter started high school without ever seeing the inside of her new school and is now dealing with being the "new kid" in an online classroom.

An Air Force career "has taught us to be very resilient," Burrows said, but "the virus has kind of sucked the life out of our military life." ✪

Master Sgt. Larry E. Reid Jr.

An F-16C, foreground, and an F-16CJ on approach during exercise Cope North 20 at Andersen Air Force Base, Guam, Feb. 19. Cope North is an annual trilateral exercise conducted at Andersen. The base is vital to the U.S. strategic force presence in the Pacific region.

The Air Base: The Air Force's Achilles' Heel?

History shows the Air Force needs a new approach to forward basing.

By Lt. Col. Price T. Bingham, USAF (Ret.)

Air Force doctrine today fails to pay sufficient attention to the key role air bases play in the employment of air power at the operational level of war. Throughout the history of air power, from World War I to Desert Shield/Desert Storm, air bases are among the primary means by which air commanders maneuver air power to achieve the advantages of concentration, survivability, and surprise that make air power effective.

Without having to fight a near-peer opponent since World War II, the Air Force devoted most of its attention to improving airborne performance, which has made it more expensive in terms of time, money, and engineering resources to field the bases needed to maneuver air power. The Air Force must again make the air base a key concern when establishing aircraft requirements and reorganize forces to exploit mobility, dispersal, concealment, and deception to ensure survivability.

The Air Force must again make the air base a key concern when establishing aircraft requirements, and reorganize forces to exploit mobility, dispersal, concealment, and deception to ensure survivability.

THE WORLD WARS

The primitive aircraft available in the First World War needed little more than a small field to take off and land, and air commanders could easily provide the necessary maintenance, fuel, and munitions to maneuver air power. With only short-range aircraft, bases had to be close to the front lines, which were somewhat static in the Great War. Relatively little maneuvering took place. But, as the fighting became more fluid and the Allied armies went on the offensive, the maneuvering of air power became essential. In August 1918, then-Col. William "Billy" Mitchell, commander of the recently established United States' Army Air Service, moved his pursuit and observation

U.S. Navy/National Archives

U.S. Army aircraft were destroyed by Japanese raiders at Wheeler Air Field, Hawaii, on Dec. 7, 1941, as well as at Pearl Harbor. The attack revealed the vulnerability of U.S. aircraft in the Pacific region.

squadrons into fields around the flanks of the St. Mihiel Salient in preparation for the coming offensive. Mitchell's decision to concentrate air power and use airstrips closer to the battlefield led to the first U.S.-led Allied victory in the war.

Advances in aircraft performance in the interwar period had a growing impact on basing requirements. Aircraft were faster and heavier, needing larger fields with longer runways built of stronger materials to support all-weather operations. The ability to rapidly build air bases in austere locations did not get much attention until World War II's Operation Torch, when Allied armies moving across North Africa required air support. The German Air Force possessed local air superiority and operated from developed, all-weather bases close to the battlefield. Allied aircraft operated from poorly supported, undeveloped, and muddy bases that were farther away. Soon, however, improvements in Allied basing and the use of C-47s to deliver fuel and munitions forward helped the Allies prevail. By the end of the campaign, engineers had built or improved 129 air bases, causing Gen. Carl A. Spaatz to write to Gen. Henry H. "Hap" Arnold that aviation engineers were "as nearly indispensable to the [Army Air Forces] as is possible to ascribe to any single branch." Basing continued to play a key role in determining objectives as the Allies advanced across the Mediterranean Sea to Sicily and then Italy.

The operations of 9th Air Force in the European theater also revealed the importance of air bases to the maneuver of air power. Establishing the IX Engineer Command was critical, as it was responsible for developing, constructing, and rehabilitating air bases. As Allied armies advanced across France and captured partially demolished German airfields, the IX Engineers refurbished them, enabling aircraft to base closer to the enemy. As the need for airfields became more urgent, the engineers were hindered considerably by difficulties moving construction supplies to these forward airfields. Later, 9th Air Force's analysis concluded "the engineers—and all other Air Force commands—would have profited by the establishment of a joint, air-ground traffic priority board which [could have] determined priorities of movement, of personnel, and supply."

Rapid construction of airfields was also critical in the Pacific. The Japanese air attacks in Hawaii and the Philippines revealed the vulnerability of concentrating air power at a limited number of bases. By seizing islands and establishing bases, air power could affect the movement of Japanese naval forces, enabling the Allies to bypass many Japanese islands.

However, the failure of some of the Army's leaders to understand air power, and appreciate fully the difficulties involved in building air bases, was evident in the Allied invasion of the Philippines and their decision to seize Leyte rather than Mindanao. The lack of proper seasonal weather information, soil conditions, and rainfall on existing Japanese fields all combined to greatly delay the building of suitable bases on Leyte, increasing the exposure of Allied ships to Japanese kamikaze attacks and causing overcrowding at Tacloban Air Base, Philippines. So important was the ability to construct new airfields that by 1945, 36 aviation engineer battalions were concentrated in the Philippines—more than in any other theater. By the end of the war in 1945, engineers had completed 200 runways between Australia and Okinawa.

KOREA

When North Korea launched its surprise invasion of South Korea in June 1950, the U.S. Far East Air Force's (FEAF) instantly found itself handicapped by the limited number of air bases in South Korea. They had only a few improved bases suitable for the FEAF's F-80 jet fighters, plus six primitive short sod strips. The improved bases were quickly captured, forcing the F-80 Shooting Stars to fly missions from bases in Japan. The F-80 required a higher takeoff and landing speed and weighed more than the F-51, requiring longer and smoother runways, and it soon became apparent that it would take more time and materials to build bases suitable for modern jets.

Air Force commanders at the time were not knowledgeable about air base engineering problems and when the Air Force became a separate service, the Army retained responsibility to support aviation engineer units. The Army's ability to provide the required engineering suffered, however, from constricting post-World War II budgets. Army engineer units were undermanned, poorly trained, and often equipped with obsolete, worn out, or unserviceable gear.

The need for air commanders to maneuver air power for survivability was again apparent during the defense of the Pusan Perimeter. North Korean ground forces posed a serious threat to air bases at Taegu and P'ohang-dong, forcing the 5th Air Force to cancel the planned maneuver of four squadrons of F-51s forward from Japan and to withdraw to Japan two F-51 squadrons already in Korea. When United Nations Command (UNC) ground forces advanced into North Korea in early October, the 5th Air Force's ability to drive its air power forward from bases in Japan was severely restricted by General MacArthur's decision to make an airborne assault and a second amphibious landing at Wonsan. This created a massive logistical problem, reducing available airlift and

F-51D Mustangs on the flight line of a Korean airfield in 1952. North Korean ground forces were a major threat to the maneuvering of F-51s during the Korean War.

USAF

the use of the Port of Inchon, so that heavy equipment had to move forward from Pusan using severely damaged transportation infrastructure. The logistical problems slowed the forward maneuver of air power, which, in turn, handicapped UNC forces' ability to detect and attack Chinese forces that had moved into locations deep in North Korea and along the Yalu River. On Nov. 25, powerful Chinese forces ambushed the UNC ground advance, forcing the sudden withdrawal of UNC ground forces. To survive, 5th Air Force units had to maneuver to the rear and quickly abandon several bases from which they had only just begun to operate, leaving behind much of their equipment.

VIETNAM

As the United States increased its involvement in Vietnam, air commanders paid close attention to lessons learned in Korea. Commanders maneuvered land-based air power to existing air bases in the region, while naval air commanders maneuvered aircraft carriers in the Gulf of Tonkin. For land-based air operations over South Vietnam, just six bases dating from the French regime were available initially, and only the first three were suitable for jet fighters like the F-100 Super Sabre. All three bases were seriously overcrowded with aircraft and fuel, and munitions storage—located near base perimeters—was also vulnerable. Space constraints meant large numbers of key personnel, including aircrews, lived off base.

To achieve the desired concentration of forces, air commanders maneuvered air power to bases in Thailand. Initially, only three bases in Thailand could support the takeoffs and landings of heavily loaded jet fighters such as the F-105 Thunderchief. Runways at Ubon and Udorn Royal Thai Air Bases, Thailand, were lengthened to support the F-4 Phantom. Propeller-driven World War II-Korean era aircraft like the A-1 Skyraider, along with rescue helicopters, used the shorter runway at Nakhon Phanom, whose location on the Mekong River meant these aircraft could reach areas in Laos and North Vietnam without air refueling.

This was significant: In a first for air power, fighters throughout Southeast Asia had come to depend on air refueling to reach distant targets beyond their normal range, tying fighters to the availability of tankers. After supporting an attack in the morning, tankers had to land and refuel before they could support a second attack, creating a gap of several hours between attacks and making their timing predictable. By contrast, advanced aircraft with longer range, such as the F-111 Aardvark and A-7D Corsair II, reduced the number of tankers required, but their need for escort by F-4s that did require air refueling continued to limit commanders' ability to launch attacks.

Achieving an even greater concentration of air power closer to areas in South Vietnam depended on how quickly the Air Force could both expand existing bases and build new bases. Without established Air Force criteria in place for constructing air bases in wartime, vulnerability problems soon became evident. For example, Phan Rang Air Base, Vietnam, relied on water and fuel pipelines through areas exposed to enemy forces. The Army also delayed sending enough engineers to build these bases because the areas were not yet secure. Weather, the need to move large amounts of earth, and a shortage of aluminum matting contributed to delays. Concerned at the slow pace of air base construction, Air Force Chief of Staff Gen. John P. McConnell requested permission to contract with a civilian company to build a base under a new, single-package philosophy called the Turnkey concept. The contractor was responsible for the entire project: design, engineering, materials, equipment, shipping, and construction. Six months after the advanced construction party arrived, an expeditionary base was ready with a 10,000-foot temporary aluminum plank runway to be followed by a 10,000-foot concrete runway.

Air Force basic doctrine had ignored air base ground defense, so Air Force units were not prepared to provide the necessary local ground defenses. The 1968 Tet Offensive ground assaults at Tan Son Nhut and Bien Hoa temporarily stopped air operations at both bases, and began six months of standoff attacks by mortars and rockets that destroyed 14 aircraft and damaged 114 more. In response, the Air Force constructed aircraft shelters, switching from revetments surrounding aircraft to shelters with overhead protection. By January 1969, 373 shelters had replaced about 1,000 revetments.

DESERT SHIELD/DESERT STORM

After Iraqi forces invaded Kuwait in August 1989, the Unit-

USAF/courtesy

An F-16C prepares to take off on a mission during Operation Desert Storm at an air base in Saudi Arabia. Dispersed and plentiful air bases were a boon to U.S. and allied forces during the conflict.

ed States convinced King Fahd of Saudi Arabia to allow the U.S. forces to operate from his country during the conflict. Immediately, the United States began deploying air, land, and naval forces to the region. Naval air commanders recognized that operating carriers in the confined waters of the Persian Gulf close to Iraq posed too great a risk, so carriers conducted air operations from the Red Sea and east end of the Persian Gulf, distances that meant the Navy's aircraft would depend heavily on air refueling provided by land-based Air Force tankers.

The basing infrastructure was already available because the Army Corps of Engineers had helped build air bases in the region over the previous decades. Yet, the U.S. air commander, Lt. Gen. Chuck Horner, still needed to enlarge existing bases with taxiways, ramps, fuel and munitions storage, and housing. Horner also created a quick-turnaround base at King Khalid Military City, less than 50 miles from the Iraqi border, to support the forward maneuver of air power. Eventually, U.S. and allied aircraft were based at more than 20 air bases on the Arabian Peninsula, though it took a while for logistical support to catch up so these bases could function properly.

Ultimately, the coalition force comprised 2,614 aircraft. Concentrating so many aircraft on bases without shelters created a major vulnerability, but the Iraqi Air Force was unable to mount a serious threat to take advantage. Although equipped with modern aircraft, Iraq lacked well-trained pilots and, while the Iraqis possessed the Scud-B surface-to-surface missile and some 225 mobile launchers, the missiles themselves were inaccurate. Out of the 51 missiles fired at targets in the Arabian Peninsula, only one caused casualties, striking a barracks at Dhahran, Saudi Arabia.

CONCLUSION

History shows that air bases have played a vitally important role in a U.S. air commander's ability to achieve increased effectiveness through the maneuver of air power at the operational level of war. But future air commanders' ability to maneuver air power at sea on aircraft carriers or at land air bases will be seriously challenged in a near-peer or peer conflict. Aircraft carriers conducting sustained air operations close to land sacrifice the protection mobility provides and could risk unacceptable losses. Further, opponents such as China and Russia are too distant from the sea to be within the range of unrefueled, carrier-based aircraft, and advancements in surveillance and precision missile technology pose a dual and increasingly dangerous threat to carriers, despite their mobility. Finally, as accidents during the Vietnam War demonstrated, the concentration of large numbers of aircraft, fuel, munitions, and personnel on a small carrier deck poses a major risk should any attack reach its intended target; even if the ship itself survives, it would likely have to leave the area to make lengthy repairs.

In contrast to carriers, air commanders can still conduct survivable air power maneuver using land bases, provided the Air Force recognizes the critical importance of making the air base a key concern when establishing aircraft requirements. While aircraft are now seen as weapons systems that require integration of the airframe, engine, avionics, and munitions, the Air Force has neglected appropriate planning for air base requirements to ensure aircraft can operate effectively at the operational level of war against a near-peer opponent. The Department of Defense often makes the unexamined assumption during tactically oriented exercises that air power will always be available and operable. Yet the growing threat from precision attacks by near-peer precision attacks suggests that may not be the case.

To neglect air bases today is to behave like armies in the past, which continued to build castles in the age of gunpowder. To meet evolving threats, armies had to radically change how they organized, trained, and equipped. The same need for change is now an imperative, as the Air Force makes plans to deploy forward to wage theater warfare against a near-peer opponent. Just as armies have been forced to use mobility, dispersal, concealment, and deception in their maneuver to increase survivability, the Air Force must do the same at its future bases. Survivable maneuver will require exploiting numerous runways located throughout the world and the ability to quickly refurbish these fields and make them capable of supporting dispersed air operations. This requires significantly reducing dependence on long, smooth runways and elaborate support measures that require vast stores of readily available spare parts and large numbers of personnel. Instead, personnel must be prepared to live in austere conditions and to defend themselves and their base against an increasing variety of threats, including unmanned aerial vehicles and special operations forces.

As new Air Force Chief of Staff Gen. Charles Q. Brown Jr. recently pointed out, making these personnel responsible for base defense will also require rethinking service roles and missions, so the Air Force takes full responsibility for air base defense. While dispersed operations alone are not sufficient to provide the essential degree of survivability, these capabilities would also allow Air Force units to exploit concealment and deception measures, rendering adversaries' targeting information unreliable. ✪

Lt. Col. Price T. Bingham, *USAF (Ret.) is a widely published author; flew fighters in Vietnam, Europe, and the United States; and finished his career at the Air Force Doctrine Center.*

The Air Force Enters the Vietnam War

Under cover of secrecy, the "training" mission turned to "advice in combat" and then into "combat training sorties."

Air Commando Association

In operation "Farm Gate," USAF pilots wore plain flight suits and flew aircraft, such as these T-28s, painted with Republic of Vietnam Air Force markings.

By John T. Correll

U.S. Air Force presence in Southeast Asia eventually reached 95,000 military members and 1,800 aircraft. Nobody ever imagined it would escalate to that level when the first USAF unit deployed to Vietnam.

It began in November 1961 with a detachment of 151 Airmen and 16 propeller-driven airplanes to the old French airfield at Bien Hoa, north of Saigon. The airstrip was 5,300 feet of pierced steel planking, badly in need of repair. The Airmen initially slept in tents set up for them by an advance party.

The New York Times was told by an "informed source" in Washington that the reason for the deployment was supply and "on-the-spot" training of South Vietnamese pilots. That was at least misleading, if not an intentional deception.

The operation was designated "Farm Gate." The pilots wore plain flight suits and their aircraft were painted with Vietnamese markings. They were secluded at Bien Hoa from the press and outside observers.

"We never trained a Vietnamese pilot."
—Col. Benjamin King, Farm Gate commander

The detachment was from the newly formed 4400th Combat Crew Training Squadron at Eglin AFB, Fla., but the unit nickname, "Jungle Jim," was more indicative. The Airmen were primarily a fighting force, not trainers or advisers.

"Those completing the program were certified to be emotionally mature, highly motivated, and stable," said R. Frank Futrell in the official USAF history of the advisory years in Vietnam. "Unfortunately, not all were mentally attuned to teaching members of other cultures, or in fact to perform a training mission—they were combat-oriented."

Within a month, the mission—as described behind the screen of secrecy—had evolved from "training" to "advice in combat" to "combat training sorties," soon indistinguishable from direct combat.

By U.S. rules for combat engagement, there was always a Vietnamese national aboard the airplane, sometimes a pilot, sometimes not, but either way, his function was to legitimize the mission. He was nominally in command but took no part in the operation.

The pretense continued. President John F. Kennedy, asked in February 1962 whether Americans

Air Commando Association

Maintainers work on the guns of a B-26 twin-engine attack bomber at an undisclosed airfield in Southeast Asia.

were engaged in combat in Vietnam, said not "in the generally understood sense of the word."

The involvement grew from there, gradually and increment by increment, more often as a matter of mission creep than from any comprehensive analysis of overall strategy. The inclusive dates for Farm Gate are subject to opinion, but the consensus is that the operation ran from Oct. 1, 1961, when the deployment decision was made in Washington, to July 28, 1963.

COIN

The Geneva Accords of July 1954 temporarily divided Vietnam into two parts along the 17th parallel, pending all-Vietnam elections in 1956. Neither South Vietnam nor the U.S. signed the accords, and South Vietnam declined to participate in the reunification elections.

"You have broader considerations that might follow what you would call the 'falling domino' principle," said President Dwight D. Eisenhower. "You have a row of dominoes set up, you knock over the first one, and what will happen to the last one is that it will go over very quickly."

In December 1960, North Vietnam created the National Liberation Front—the Viet Cong—to wage guerrilla warfare in the south, directed, equipped, supplied, and reinforced from the north. The struggle in South Vietnam was underway in earnest.

Kennedy came to office in January 1961, spring-loaded for action in Vietnam. He subscribed to the Domino Theory and was determined to demonstrate U.S. credibility and commitment to preventing the spread of Communism in Asia.

At the same time, the new gospel of "counterinsurgency" or COIN swept like wildfire through the U.S. armed forces, inspired by Kennedy's interest in guerrilla warfare. As far back as a speech in 1958, Kennedy had identified "limited brush-fire wars" as a new threat.

He was further influenced by "The Uncertain Trumpet" (1959) by Ret. Gen. Maxwell D. Taylor, former Army Chief of Staff, a champion of "flexible response," calling for greater priority on ground forces and less reliance on strategic air power.

In February, 10 days after the inauguration, Kennedy directed the Department of Defense to put more emphasis on development of counter-guerrilla forces. In May, he approved 500 military advisers, most of them from the Special Forces, for South Vietnam and ordered the start of clandestine warfare.

During Kennedy's tour in office, the number of US military "advisers" in Vietnam rose from about 700 to more than 16,000.

JUNGLE JIM

The Air Force contribution to the counterinsurgency buildup was the Jungle Jim squadron, activated by Tactical Air Command in April 1961 at Hurlburt Auxiliary Field No. 9 at Eglin with Col. Benjamin King as commander.

USAF screened thousands of personnel records to find "candidates whose records indicated they should be 'invited' to join this select group," said Lt. Robert Gleason, who later followed King in command. "Membership in Jungle Jim was not an open proposition for any and all volunteers. Volunteers, yes, but by invitation only."

Pilots had at least 5,000 hours of flying time and enlisted personnel were rated among the top 2 percent in their specialties. There was also a secret commitment.

Those invited to volunteer were asked, "Would you volunteer to serve in a foreign country under extreme hardship conditions for extended periods?" Gleason said. "Would you perform in an overt or covert status? Would you serve out of

Air Commando Association

A B-26 pulls up after dropping bombs during Farm Gate.

the U.S. uniform?" It was understood that the government might deny knowledge of such measures.

Jungle Jim was outfitted with three types of vintage airplanes both as part of the cover story and also because the Geneva agreement of 1954 prohibited jet aircraft in Vietnam. The United States elected to abide by the agreement even though it was not a signatory.

■ The Jungle Jim fighter-bombers were T-28D Nomads, a modification of the single-engine T-28A Trojan the Air Force had used previously for primary undergraduate pilot training. The fighter variant carried rockets, bombs, and machine guns.

■ The B-26 Invader was a twin-engine light bomber and ground attack aircraft. During World War II, it was designated as the A-26. In April 1961, the CIA had used the same kind of aircraft, the B-26 Invader, purchased from USAF surplus, in the Bay of Pigs invasion of Cuba, where it was flown by American volunteers.

■ The SC-47 was a modified C-47 transport, configured for dropping flares and supplies as well as for such psychological operations as delivering leaflets and making loudspeaker broadcasts.

In October 1961, Kennedy sent Maxwell Taylor and Walt Whitman Rostow of the White House staff to Vietnam to explore courses of action. One part of the program—deployment of the Jungle Jim detachment—was already decided but unannounced.

When Taylor and Rostow returned, The New York Times, again quoting unnamed "officials," reported that Taylor "did not look favorably" on U.S. combat troops for Vietnam and that Kennedy was also "strongly opposed." In fact, Taylor had recommended an "initial commitment" of 6,000 to 8,000 ground troops.

At a conference in Hawaii in December, Secretary of Defense Robert S. McNamara "opened the meeting by stressing that the President did not desire to introduce American combat troops openly into Vietnam at that time," said historian Futrell.

FARM GATE

The Farm Gate contingent at Bien Hoa consisted of eight T-28s, four B-26s, and four SC-47s. The T-28s and the SC-47s went by way of Clark Air Base in the Philippines where they were re-painted with South Vietnamese markings and underwent some modification. The B-26s—better equipped than the ones back in Florida—were drawn from CIA facilities in Taiwan.

Employment from Bien Hoa began with reconnaissance of the junk and sampan traffic in Vietnam coastal waters. The first "combat training sortie" was Dec.19.

Command and control was awkward. Nobody in the Pacific had been told much about Farm Gate. "There was the matter of who we reported to," King said, according to Air & Space Magazine. "A lot of people had questions about that, including me. ... I took my orders from two lieutenant colonels in the bottom of the Pentagon building."

The military assistance and advisory group could not direct combat operations, so an "advanced echelon," the 2nd ADVON, was established by 13th Air Force in Saigon and put in charge of Farm Gate. In February 1962, the ADVON became subordinate to the newly created Military Assistance Command, Vietnam.

Farm Gate in Combat

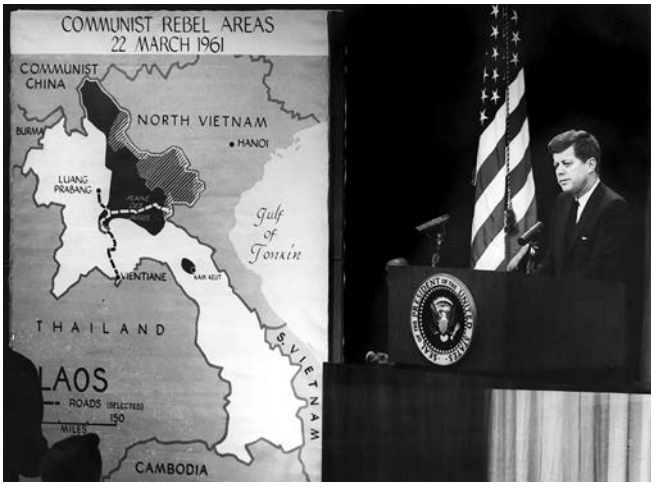
Aircraft during Farm Gate included modified trainers and World War II-vintage light bombers/ground attack airplanes.

	1962	1963
B-26 sorties	1,140	3,674
T-28 sorties	1,853	4,848
Enemy killed	3,200	3,256
Structures destroyed	4,000	5,750
Boats destroyed	275	2,643

USAF Historical Division/Van Staaveren

Maintainers work on an SC-47 atop a steel runway at an undisclosed location. The aircraft was a C-47 transport modified to drop flairs, supplies, and leaflets.

Air Commando Association



John F. Kennedy Presidential Museum

President John F. Kennedy stands at a lectern next to a map of Laos, Cambodia, and Vietnam that reads "Communist Rebel Areas, 22 March 1961."

MACV introduced a different kind of problem, its structure being dominated almost completely by Army officers. No better solution was found until the Second Air Division, precursor to 7th Air Force, was activated in October 1962.

"This regularization of USAF unit organization indicated a movement away from counterinsurgency concepts and toward the conventional," said historian Futrell.

Farm Gate attracted some attention despite the secrecy. At a news conference in March 1962, McNamara disclosed that, "There has been sporadic fire aimed at United States personnel and in some minor instances they've had to return fire. Americans are under instructions not to fire unless fired upon."

In May, however, Undersecretary of State George W. Ball was sticking to the cover story, declaring that there were no American combat forces in Vietnam and that the United States was neither fighting or running the war.

THE ODD COUPLE

The Joint Chiefs of Staff had no concerns about Farm Gate undertaking combat missions, provided that a Vietnamese national—any Vietnam national—was aboard the aircraft and designated as in command.

"On every mission, we carried a VNAF who sat on a pull-down seat behind the navigator and the hydraulic fluid reservoir," said B-26 pilot Jack Williams. "We were ostensibly there to advise the VNAF, but our advice was simple: 'Don't touch anything.' We did not carry the aircraft forms with us and in the event of a crash, the VNAF was flying and we were along to give him advice."

"We'd carry anybody that was available,' pilot Roy Dalton recalled. "We'd go over to the Vietnamese base commander and he would give us the guy who was sitting around either typing or sweeping the floors—and he would fly with us."

Not all of the Vietnamese who flew with Farm Gate were unqualified. Col. King's copilot on an SC-47 leaflet-drop mission was Col. Nguyen Cao Ky, later chief of staff of the Vietnamese Air Force and prime minister from 1965 to 1967.

Several Farm Gaters likewise went on to greater fame. John L. Piotrowski, the first Farm Gate armament officer, became

A T-28 Trojan (foreground) and an A-1 Skyraider, both painted with Republic of Vietnam Air Force markings, during Operation Farm Gate.

Air Commando Association

commander in chief of U.S. Space Command. Richard Secord was a deputy assistant secretary of defense in the Reagan administration.

The Air Force tried to get the requirement for a Vietnamese "commander" rescinded, but the State Department and the Office of the Secretary of Defense would not relent.

Farm Gate carried the air war to the Viet Cong throughout Vietnam. The T-28s also provided escort and support for U.S. Army helicopters and for Air Force C-123s in Operations Mule Train (airlift) and Ranch Hand (defoliation).

The number of combat missions increased steadily. The low-level attacks became more hazardous as the accuracy of the enemy's small arms fire improved. Sixteen Farm Gate crewmen were killed in action between early 1962 and the middle of 1963. In-service rates declined for the T-28s and B-26s—old to begin with and given limited rehabilitation before going to Vietnam. Attrition losses from structural failures increased. The detachment was augmented with additional aircraft and aircrews.

Along the way, Farm Gate mixed in some training with the combat, but it was not the "on-the-spot" training of South Vietnamese pilots declared by the "informed source" in November 1961. Looking back years later, Col. King said, "We never trained a Vietnamese pilot."

END OF THE BEGINNING

By 1963, U.S. military strength in Vietnam was 16,263, of which 4,630 was Air Force. The fiction of Farm Gate as a non-U.S. enterprise was wearing thin. Air Force chief Gen. Curtis E. LeMay argued that the main effect of the secrecy was to impose an administrative burden and persuaded the Joint Chiefs of Staff to declassify the mission.

In April 1963, the Farm Gate unit was transferred to Pacific Air Forces. It was disestablished in June as a detachment of the Special Air Warfare Center at Eglin, and its assets—now 41 aircraft and 474 men—went to the 1st Air Commando Squadron, activated in place of Farm Gate and assigned to the 34th Tactical Air Group of the Second Air Division.

"This organizational change made little difference in the role of the unit and missions continued to be carried out in much the same way as before," said Eugene D. Rossel in a retrospective for the Air Commando Association. "Now that Farm Gate was no longer classified, some attempts were made to drop the code name, but it had become so well-known throughout the USAF that it was finally decided to keep it."

The demand for Farm Gate-style sorties continued. The Air Force proposed replacing the T-28s and B-26s with jet aircraft, but McNamara approved A-1E Skyraiders instead, propeller-driven attack bombers that nevertheless represented a substantial increase in capability and effectiveness. The A-1s took over in the spring of 1964.

The war shifted gears in August 1964, when Air Force fighters deployed in strength to Southeast Asia in response to an attack by North Vietnamese patrol boats on U.S. ships in the Gulf of Tonkin. In 1965, the Air Force and Navy launched Operation Rolling Thunder, the sustained air campaign against North Vietnam. In the south, two A-1E squadrons continued to fly 80 percent of the sorties in support of the South Vietnamese Army.

LASTING INFLUENCE

Today's Air Force special operations establishment traces its lineage to World War II. Indeed, there had been U.S. air commando actions in that war, notably in Burma, but they were limited and local.

It was Farm Gate that created the real basis for what was to come as air commandos moved into the Air Force mainstream. This one detachment led the USAF expansion in Vietnam. It also carried the brunt of the air war against the Viet Cong for two years and demonstrated the value of employing air power in less conventional modes.

It is a reasonable question whether it would have happened without the secrecy and deception early on.

Air Force Special Operations Command is presently headquartered at Hurlbut, where the 4400th Combat Crew Training Squadron and the Jungle Jim aircrews began their activities almost 60 years ago. ✪

John T. Correll *was editor in chief of* Air Force Magazine *for 18 years and is a frequent contributor. His most recent article,* "Rise of the Air Corps," *appeared in the September issue.*

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THE HARTFORD

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OUTSTANDING AIRMEN OF THE YEAR

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

The Air Force Association drove the creation of the Outstanding Airmen of the Year program, which debuted at AFA's 10th annual convention in 1956. Airmen selected receive the Outstanding Airman of the Year ribbon with bronze service star device; they also wear the Outstanding Airman badge for a full year. This year's honorees were chosen by a selection board from among nominees advanced by commands in the Air Force and Space Force.

Senior Master Sgt. Verna L. Cannon-Golemboski

Superintendent and Functional Manager
Manpower and Organization Division, Hurlburt Field, Fla. (AFSOC)
Home of Record: Toledo, Ohio

Senior Master Sergeant Verna Cannon-Golemboski led a team of 48 personnel advising senior leaders on the command's 19,000 authorizations worth $1.9 billion. Her leadership and expertise were vital in delivering the command's first-ever 207 member Munitions Squadron, maximizing combat capabilities. She led the command's Chief Grade Review, resulting in the adjudication of 136 positions and nine upgrades. Additionally, as a subject-matter expert, she assisted in the design of a 17-lesson courseware for her career field, which provided in-depth training for all manpower analysts. Finally, she was hand-selected as one of 15 Senior Noncommissioned Officers by the Chief Master Sergeant of the Air Force for a think tank to develop enlisted progression, courses of action to shape the Air Force development plan for 264,000 Airmen.

USAF

Senior Master Sgt. Christopher A. Haney

Assistant Squadron Superintendent
1st Maintenance Squadron, Joint Base Langley-Eustis, Va. (USAFE-AFAFRICA)
Home of Record: Colorado Springs, Colo.

Senior Master Sergeant Christopher A. Haney led multiple maintenance teams to correct the control and stability concerns across 28 F-16 Fighting Falcon fighter aircraft ejection systems. He gathered personnel and equipment to perform around-the-clock inspections, ensuring airworthiness across the fleet at Spangdahlem Air Base, Germany, in under 72 hours. He helped return the United States Air Forces Europe and Air Forces Africa's sole suppression of enemy air defense's mission set to combat-ready status. Additionally, his direct engagement synchronized maintenance efforts of 459 Airmen and civilians from 14 Air Force Specialty Codes, propelling the 52nd Fighter Wing to the best F-16 installation in the Air Force. Finally, he harmonized eight flights' optimized compliance processes, which drove the squadron's "Outstanding" 95 percent quality-assurance pass rate, advancing the squadron's lethality and readiness.

USAF

Senior Master Sgt. Wilfred A. Morgan

Facility Systems Superintendent
5th Civil Engineer Squadron, Minot Air Force Base, N.D. (AFGSC)
Home of Record: Washington, D.C.

Senior Master Sergeant Wilfred Morgan led 58 engineers in the maintenance of a 525-mile utility grid, overcoming a 34 percent manning deficit to complete 4,000 repairs and 7,000 hours of preventive maintenance, ultimately driving an astounding 97 percent completion rate. He strategized the maintenance of a $53 million airfield lighting system, creating an innovative anti-icing solution for 558 taxiway lights that saved the Air Force $11 million in replacement costs and protected 1,200 annual B-52 Stratofortress Bomber sorties. Additionally, he oversaw the command's largest lightning-protection system program, certifying 165 protection level-one assets and developed a nuclear-gate grounding program that was benchmarked across the command. Finally, he superbly led his team in a near flawless Nuclear Surety Inspection, clinching "Superior Team" honors.

USAF

Senior Master Sgt. Christopher M. Ricks

Security Forces Operations Superintendent
Logistics, Engineering & Force Protection, Joint Base Pearl Harbor-Hickam, Hawaii (PACAF)
Home of Record: Portsmouth, Va.

Senior Master Sergeant Christopher M. Ricks directed theater airlift security by deploying 302 security forces members to defend 24 airfields, which directly supported the execution of 88 combatant commander strategic objectives. He validated the Chairman of the Joint Chiefs of Staff task to transfer the Andersen AFB, Guam, security function from the U.S. Navy to the Air Force. His efforts eliminated a 10-year resource gap by sourcing an additional 138 security forces members, allocating $3 million in equipment and an additional $250,000 budget increase, which fueled the theater bomber mission. Additionally, he quarterbacked Eielson Air Force Base, Alaska's, F-35 bed down for two fighter squadrons. Finally, he brokered requirements for 41 security forces alarm systems worth $400,000 and created a secure nest for 58 5th-generation fighter aircraft worth $3 billion.

USAF

Master Sgt. Douglas K. Brock

Joint Terminal Attack Controller
124th Air Support Operations Squadron, Boise, Idaho (ANG)
Home of Record: Fremont, Calif.

Master Sergeant Douglas Brock was the first Airman from the Idaho Air National Guard to attend and graduate the U.S. Army Ranger School as No. 1 out of 348 graduates in April 2019. He was the lead planner and coordinator for two joint major readiness exercises, where his team was critical in the execution of precision-strike capability across the battlefield. His devotion to training more than 100 Airmen and supporting thousands of Soldiers with air power led to him earning two Army Achievement Medals. Additionally, he led multinational trainings for the Dutch and Brazilian commandos and ensured 36 U.S. Air Force joint terminal attack controllers were combat-ready. Finally, during a 10-day period, his teams' efforts deconflicted 74 close air support missions from 370 artillery fires, resulting in zero fratricide incidents.


USAF

Tech. Sgt. Jeremiah C. Camper

Pacific Operations Recruiting Manager
369th Recruiting Squadron, Encino, Calif. (AETC)
Home of Record: Roanoke, Va.

Technical Sergeant Jeremiah C. Camper shipped 109 applicants to Basic Military Training (BMT), which was the most new enlistment contracts and entered Active duty in squadron history earning himself the Air Force Recruiting Service Gold Olympiad Award. He is No. 1 of 1,200 Enlisted Ascension Recruiters and won the coveted Gold Badge for the 369th Recruiting Squadron, recognizing him as the best in the squadron for his dedication to targeting the needs of the force. Additionally, he managed a $260,000 travel budget, analyzed 195 requests, and resolved 11 errors ensuring a 100 percent on-time BMT ship rate. Finally, he eclipsed the mission requirement by 84 contracts achieving 297 percent production, which was conducive to the squadron earning the Air Force Recruiting Service Standards of Excellence Award.


USAF

Tech. Sgt. Yvonne N. Febles-Rosario

Physical Therapy Flight Chief
628th Operational Medical Readiness Squadron, Joint Base Charleston, S.C. (AMC)
Home of Record: Fort Polk, La.

Technical Sergeant Yvonne N. Febles-Rosario directed 6,900 patient visits worth $959,000 in rehabilitation services. She prevented the loss of $27,000 in physical therapy services by organizing the support of five U.S. Navy physical therapy technicians during a manning shortage. Additionally, she provided critical warfighter support to mission critical personnel with a 100 percent return to duty rate, enabling the success of six deployments and 270 missions. She championed injury-prevention by organizing 49 strength-training and ergonomic classes for more than 800 Joint Base Charleston personnel. Finally, she performed above her peers as an additional duty first sergeant and squadron superintendent by advising four commanders, managing hurricane evacuations plans for 95 families, and expediting $400,000 in health care.


USAF

Tech. Sgt. Matthew M. O'Neill

Airfield Weather Services Noncommissioned Officer in Charge (NCOIC)
612th Air Base Squadron, Soto Cano Air Base, Republic of Honduras (ACC)
Home of Record: Valley Stream, N.Y.

Technical Sergeant Matthew M. O'Neill led as the NCOIC of Airfield Weather Services, filling the field grade officer role of Joint Meteorological and Oceanographic Officer for Joint Task Force Bravo. He orchestrated downed-aircraft support, providing critical environmental intelligence and 43 warnings to the Joint Force Land and Maritime Component Command, ensuring the recovery of nine personnel. His expertise in air assault and amphibious reconnaissance support was critical in the success of 14 international exercises and 11 operations. Additionally, he collaborated with 14 units to craft the local Warrior Skills Course that fortified 47 Army South tasks, resulting in the certification of 33 personnel. Finally, O'Neill chaired an international conference in which he gained access to 15 sensors and two radars, eliminating a 413,000-square-mile weather-data void.


USAF

Tech. Sgt. Nicole A. Gansert

In-Flight Refueling Journeyman
78th Air Refueling Squadron, Joint Base McGuire-Dix-Lakehurst, N.J. (AFRC)
Home of Record: Cherry Hill, N.J.

Technical Sergeant Nicole A. Gansert was a critical member of the team who enabled coalition forces to strike Islamic State group targets during Operation Inherent Resolve, where three KC-10 Extender Tankers provided pre- and post-strike refueling for 11 F-15 and F-35 fighter aircraft. She flew 25 combat missions totaling more than 200 hours and offloaded 2.5 million pounds of critical fuel in support of the operation. She deftly managed an in-flight emergency involving a GR-4 Eurofighter, resulting in the preservation of $127 million in assets, averting a strategic loss. Additionally, she managed the Total Force integration mobility exercise deployment and scrubbed 72 records, smoothing the rotational prerequisites. Finally, she enabled two Active-duty Air Force evaluations, backfilled four Total Force integration missions while in predeployment preparation, alleviating 30 percent of the boom operator shortfall.


USAF

Senior Airman Cassidy B. Basney

Space Intelligence Instructor
50th Operations Support Squadron, Schriever Air Force Base, Colo. (USSF)
Home of Record: North Ridgeville, Ohio

Senior Airman Cassidy B. Basney delivered intelligence support to space operators, securing 13 weapon systems and 70 Department of Defense satellites worth $71 billion. She authored the first Air Force Space Command Signals Intelligence Essential Elements of Information criteria, establishing eight enterprise-wide requirements for 42 threats, which integrated operations and intelligence support to the mission. Additionally, she revamped the 14th Air Force Request for Information process, analyzing 20 requests and distributing intelligence to six crews, resulting in a decreased response time from four months to one week. Finally, she headed 150 proximity reports for the 1st Space Brigade, which synchronized joint Air Force and Army satellite communications operations and increased tactical support to 241,000 warfighters.


USAF

Senior Airman Roxanne Y. Darien

Public Health Technician
75th Operational Medical Readiness Squadron, Hill Air Force Base, Utah (AFMC)
Home of Record: Bronx, N.Y.

Senior Airman Roxanne Darien executed readiness exercise operations by verifying 2,300 requirements and clearing 96 deployers, directly contributing to her team being named "Best Performing" by the command's Inspector General. She enhanced the Hill Air Force Base flu-line initiative by teaming with local health departments, resulting in the vaccination of 2,000 personnel in less than 16 hours. She led the Department of Defense food recall program by initiating the process that verified 31 Food and Drug Administration notices in less than two hours. Additionally, she led the National Public Health Week activities by coordinating hygiene and food safety demonstrations for 270 patrons. Finally, she inspected 55 work centers and audited 1,000 Occupational Safety Health Administration requirements, securing the safety of 7,000 personnel.


USAF

Senior Airman Portia L. Short

Ceremonial Guardsman
U.S. Air Force Honor Guard, Joint Base Anacostia-Bolling, Washington, D.C. (AFDW)
Home of Record: Lawton, Okla.

Senior Airman Portia L. Short led more than 80 ceremonies in Arlington National Cemetery and the National Capital Region as a fully qualified member of the Firing Party Element. Additionally, she performed duties as a Base Honor Guard Training Instructor, where she was instrumental in training over 80 personnel, providing Military Funeral Honor Guard training consistency for 17 bases supporting more than 40,000 missions worldwide. She was an instrumental member of the unit's recruiting team where she briefed more than 3,000 candidates and was crucial in selecting top recruits. Finally, she was a speaker for the International Festival and Events Association Expo, where she briefed over 142,000 attendees and was key in the scheduling of seven events performed by the Honor Guard for an estimated audience of more than 3 million.


USAF

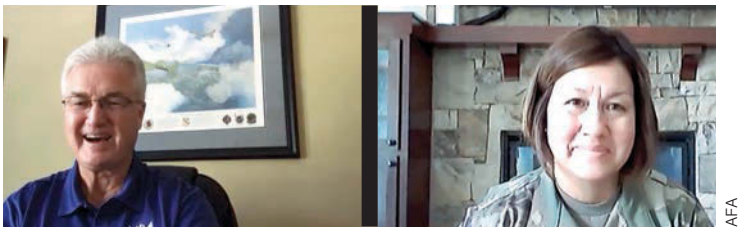
AIRMAN FOR LIFE

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

AFA 2020: A Celebration of Past, Present, Future

The COVID-19 pandemic kept the Air Force Association from holding its annual convention for field delegates, but it didn't stop a team of staff and volunteers from putting on a virtual fundraiser and leadership development event that raised more than $40,000 for educational and outreach efforts and exposed thousands of people from across the Air Force family to AFA.

Dubbed "AFA 20/20: A Celebration of Where We've Been, Where We Are, and Where We're Going," the virtual field leadership development event took place Sept. 12-13 with addresses from AFA, Air Force, and Space Force leaders, including a virtual fireside chat between two Chief Master Sergeants of the Air Force: AFA Chairman Gerald R. Murray, CMSAF 14, and CMSAF JoAnne S. Bass, the 19th Airman and first woman to hold the position. Their talk was streamed live on Facebook and was viewed 20,812 times in 24 hours.



AFA

Zoom chat with Air Force Association Chairman of the Board Gerald Murray, left, and CMSAF JoAnne Bass.

AFA 2020 National Election Winners	
Gerald Murray	Chairman of the Board
Jim Simons	Vice Chairman of the Board, Field Operations
Jim Hannam	Vice Chairman of the Board, Aerospace Education
Rick Hartle	National Secretary
Chuck Martin	Treasurer
Mac MacAloon	National Director, East Geographical Area
Len Vernamonti	National Director, At-Large
Steve Gourley	National Director, At-Large

AFA President Lt. Gen. (Ret.) Bruce "Orville" Wright moderated a conversation in leadership with Maj. Gen. Barry R. Cornish, Commander, 9th Air and Space Expeditionary Task Force-Afghanistan and Deputy Commander-Air for U.S. Forces-Afghanistan, and Maj. Gen. John E. Shaw, commander of Combined Force Space Component Command at U.S. Space Command and also of the Space Force's Space Operations Command at Vandenberg Air Force Base, Calif.

"Our Airmen at Basic Training and Tech Training get drilled into them they are now part of this Air Force family," Bass said. "We need every level of leadership to continue that mantra."

Retired Lt. Gen. David Deptula, dean of AFA's Mitchell Institute for Aerospace Studies, joined Sam Grizzle, AFA's Georgia State President and chairman of the Field Council advocacy team, and Mark Tarpley, an AFA national director, for a session on how AFA members can be more effective advocates for Air and Space power.

Cornish echoed that point: "That ability to advocate, even at the smallest level, can make a huge impact—that, I think, is in the true spirit of Jimmy Doolittle."

To see the videos and resources, go to AFA.org, and search for "AFA 20/20." ✪

Preserve Renamed for World War II Combat Flier

By Chequita Wood

World War II veteran and **Shooting Star (N.J.) Chapter** member Lt. Col. Thomas R. "Bob" Vaucher was honored in August with the naming of a 36-acre property that will be now known as "The Vaucher Revolutionary Preserve At Steele's Gap." The preserve was purchased as an "open space" to be preserved as historic land by New Jersey's Bridgewater Township, Somerset County, and Crossroads of the American Revolution.

Bill Fosina, Shooting Star Chapter President and North East Region President; Howard Leach, chapter Treasurer and N.J. State President; Lt. Col. Thomas Vaucher; and Mayor Matt Moench, Bridgewater Township, with the painting "Steele Gap."

Vaucher has lived in his family home on Foothill Road where the property is located for the past 70 years. He was instrumental in creating the township police department, shaping its government, securing land for the local high school, pushing for road improvements, and was a founding members of the Foothills Civic Association.

Vaucher, who is 102 years old, flew 117 combat missions in WWII, earning two Distinguished Flying Crosses, five Air Medals, eight Battle Stars, and over a dozen commendations and citations.

"I want to say how deeply honored I am to be recognized for my contributions to my beloved country as a member of the U.S. Army Air Corps during World War II, as well as my contributions to Bridgewater, which I've cherished as my home for 70 years, Vaucher said.

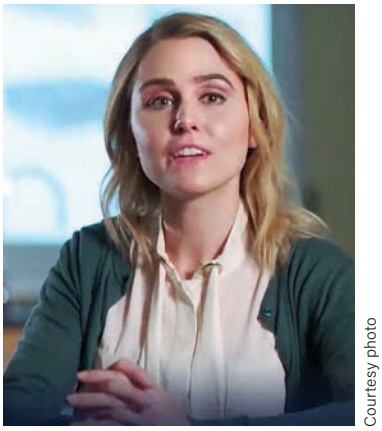
AFA's Shooting Star Chapter purchased a painting of the "Steele Gap" and presented it to the Bridgewater Township in Bob Vaucher's honor, to be hung in the Township Municipal Building in Bridgewater, along with a dedication. ✪

Catching Up with Rachel Arens: AFA's 2020 National Teacher of the Year

By Chequita Wood

Aligning with the Air Force Association's mission to promote STEM (science, technology, engineering, and math) education among today's youth, Rachael Arens, a teacher at the Omaha Northwest High Magnet School in Omaha, Neb., is the 2020 AFA National Teacher of the Year, presented by Rolls-Royce.

"With her leadership and support for her students, Rachael has demonstrated the qualities of a dedicated and successful proponent of STEM. Rolls-Royce is proud to support Rachael and the Air Force Association, as we all work together to develop and support today's STEM students—the science and technology leaders of tomorrow," said Rolls-Royce Senior Vice President, Business Development–Fixed Wing, Lt. Gen. Darryl Roberson, USAF (Ret.).



Courtesy photo

Rachael Arens, AFA Teacher of the Year, presented by Rolls-Royce.

Nominated by the **Ak-Sar-Ben Chapter,** Arens teaches ninth through 12th grade AP Environmental Science, Chemistry, Anatomy/Physiology, Biology, and Advanced Horticulture, and is Omaha Public Schools science curriculum director. Named a 2020 Albert Einstein Distinguished Educator Fellow, she is working with NASA in Washington, D.C., this fall.

Arens earned a master's degree in biology, a graduate teaching certificate, and is a doctoral candidate in STEM education. Among her many leadership roles, she has served on two state science education boards, served as a state adviser to the National Geographic Education Society, and developed standards and district-wide curriculum for science courses.

Arens' interest in STEM—specifically biology—started when she was growing up on a farm in Peirce, Neb., playing in her backyard creek with frogs and tiger salamanders. After some time had passed, she noticed that all of the frogs and salamanders had disappeared from the creek. The water was labeled as toxic, and she wanted to know what happened, and why.

When entering college Arens pursued biology with an emphasis in Toxicology, or poison. Frogs, she learned, are bioindicators—meaning, when they get sick or disappear, something is wrong with the water or habitat. Wanting to teach others to foster "transformational change" regarding science—and not just learn the curriculum as taught—is how she teaches her students. She wants them to figure out how to enact change and transcend boundaries.

When asked how she felt science has changed since she has been teaching, she replied that today it is much harder to "accept science." With an inundation of information on social media websites, along with the current political climate, there are many ways to make information "appear" credible, even when it's not—and vice versa.

Her school in Nebraska boasts a diverse population, with the majority being Black. Arens said she sees more girls in her biology classes and, in the engineering classes, there are more boys—"a nice mix."

A one-year, science-engagement partnership with NASA has her working to curate national education programs, implement web-based programs—specifically geared toward online learning during the pandemic—and developing STEM teacher programs. Although teachers are learning new ways to teach and keep students engaged, nothing beats hands-on, face-to-face time with the students, she said. This is where relationships, mentorships, and great sessions debating and discussing issues occur.

Arens said she feels teachers need more advocacy, whether in the form of resources, better pay, or help teaching in underrepresented and rural communities. She believes that AFA can help by "building bridges" and attending statewide educator conferences in order to strengthen teacher networks so teachers will know where to look when they need help. AFA, she says, can also use social media accounts to disseminate information and connect with local school districts, which may then reinforce commitments to teachers. Recently, a disturbingly large number of teachers have chosen other careers, she said. Knowing that they have a support system in place can, and will, make a difference.

Arens encourages her students to seek out solutions for problems that occur in their own communities. They are involved in service-oriented projects and practice results-driven research, learning ways to advocate for civic and social justice and science initiatives. She takes being a role model and mentor for her students seriously, and is doing her part to bring along the next generation of STEM leaders.

AFA salutes Rachael and the many, many STEM teachers across the nation who are motivating young people and making a difference in America's schools. ✪

Left: Using a secchi disc, Arens and her students measure water turbidity, or transparency, in a community stream to asses its health. Right: At Northwest High School in Nebraska during an outdoor classroom session, students build solar panels to power their community garden equipment and their laptops while working outside.

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USAF; Peterson Museum; Steve Kotecki

1 1st Lt. Edward Peterson Jr., 1942.
2 Peterson's F-4 "Photo Lightning."
3 Airmen at Peterson AFB upgrade computer systems in 2017.

PETERSON

Death in Colorado

Though he was not born in Colorado, "Pete" Peterson was a Coloradan through and through. He grew up there. He died there. His mortal remains are there. His memory definitely lives on there.

The big USAF facility in Colorado Springs—Peterson Air Force Base—bears his name, memorializing his tragic death at age 24.

Edward Joseph Peterson Jr., born in 1917 into an emigrant Swedish farming community in rural Harlan County, Neb., didn't seem destined for fame. His father was an itinerant farmer who moved the family around, eventually landing in small towns in Colorado.

In 1931, the family settled in Englewood, a Denver suburb, where Pete began to stand out. He had a superb high school athletic career and ranked No. 5 academically in the Class of 1935.

Unlike most Depression-era graduates, Pete went on to college, graduating from the University of Denver in 1939 with a bachelor's degree and in 1940 with a master's degree.

It was in college that he was drawn to aviation, a pursuit that became all-consuming. He enrolled in the federal government's Civilian Pilot Training Program—a kind of farm team for future U.S. military pilots—and received his civilian pilot's license.

Peterson never looked back. In March 1941, he enlisted in the Army's Aviation Cadet Program and entered pilot training. He was awarded wings and a commission in the Army Air Forces in October 1941—just two months shy of Pearl Harbor.

Peterson was considered an outstanding pilot. In Spokane, he trained on P-38 Lightnings and was promoted to first lieutenant, after which he reported to duty at Colorado Springs Army Air Base.

He began work as operations officer for 14th Photographic Reconnaissance Squadron, a unit composed of F-4 "Photo Lightning" aircraft—the recce version of the P-38 "Lightning" fighter.

Peterson had more flight hours in the P-38/F-4 than anyone else in the squadron, and by default, became its test pilot. That is how on Aug. 8, 1942, he wound up in the cockpit of an F-4, preparing for a test flight of the fighter after an engine change.

The aircraft lifted off the runway. Just as the landing gear retracted, smoke billowed from the new engine, which shut down. The F-4's left wingtip dipped, struck the runway, and threw off sparks that ignited a fuel tank. The F-4 crashed in flames.

Three enlisted men—Tech. Sgt. Albertis Hilbert, Sgt. Walter Boulier, Sgt. Thomas Deutsch—risked death to pull Peterson from the fire. They succeeded, but Lieutenant Peterson was too badly burned to survive. He succumbed to his injuries that afternoon.

Lieutenant Peterson was cremated, and his ashes were scattered over Pikes Peak from a P-38. Four months later, the Army Air Forces renamed the base Peterson Field in his honor.

Today, the base is a major nerve center of the new U.S. Space Force. It is also the headquarters of North American Aerospace Defense Command and the joint force U.S. Northern Command. The new Peterson-Schriever Garrison (combining the former 21st Space Wing and 50th Space Wing) is headquartered at Peterson. ✪

EDWARD JOSEPH PETERSON JR.

Born: Nov. 16, 1917, Harlan County, Neb.
Died: Aug. 8, 1942, Colorado Springs, Colo.
Education: University of Denver
Occupation: U.S. military officer
Services: US Army—Air Corps, Air Forces
Main Era: World War II
Years Active: 1941-42
Final Grade: First Lieutenant
Resting Place: Pikes Peak, Colo.

PETERSON AIR FORCE BASE

State: Colorado
Nearest City: Colorado Springs
Area: 2.3 sq mi / 1,442 acres
Status: Open, operational
Opened as Colorado Springs AAB: April 28, 1942
Renamed Peterson Field: Dec. 13, 1942
Inactivated: Dec. 31, 1945
Reactivated: Sept. 29, 1947
Inactivated: Jan. 15, 1948
Reactivated: Sept. 22, 1948
Inactivated: Nov. 7, 1949
Reactivated: January 1951
Renamed Peterson Air Force Base: March 1, 1976
Current owner: USSF Space Operations Command
Former owners: Photo Reconnaissance Operational Training Unit; 383rd Bomb Group; 214th AAF Base Unit (Combat Crew Training); 268th AAF Base Unit (Fighter Training Station); Strategic Air Command; Air Defense Command; Air Force Space Command
Home of: Peterson-Schriever Garrison; North American Aerospace Defense Command; U.S. Northern Command

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