

1-on-1 with  
CSAF Gen.  
Goldfein

Boom Times in Space 34 | Q&A: AFGSC's Gen. Ray 8 | Deployments Get Agile 38

20

# AIR FORCE

MAGAZINE



# UNDETERRED

Airmen rally to combat a pandemic. | 18



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**Airmen arm an F-15C Eagle during exercise WestPac Rumrunner at Kadena Air Base, Japan, Jan. 10. See "ACE-ing the Test," p. 38.**

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Airman 1st Class Abbey Reeves

Staff Sgt. Montea Armstrong in protective gear. See "World: Getting the Job Done Despite a Global Pandemic," p. 18.

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# Innovate to Dominate

**“N**ever let a good crisis go to waste,” Winston Churchill said. He knew something about crises, and how to make the most of them. Crises bring out the best and worst in people.

The worst are easy to spot: The worst are easy to spot: The ones who flee from adversity, melt down under pressure, and panic in the face of adversity. The hoarders of toilet paper, who put their fears before the needs of neighbors, and the profiteers who exploit shortages for personal gain materialize in crises like rats on a sinking ship. They were there all along, even if we didn't see them.

The best may be harder to see: Heroes behind masks who treat the sick, build hospitals and clinics, clean up after others, put service before self. They include Airmen achieving the mission despite obstacles, and gloved cleaning crews and grocery clerks behind plexiglass shields, all risking their well-being to ensure life goes on for everyone else.

Let us not forget the innovators, those who responded to calamity with ingenuity, defying impediments in their paths. Some of their are stories sprinkled through this issue of Air Force Magazine, but there are many more whose contributions will remain invisible.

Among them are Airmen at Altus Air Force Base, Okla., who rallied to sew masks for their brothers and sisters in arms; Space Force personnel at Schriever Air Force Base, Colo., who arranged for increased bandwidth to help doctors aboard the Hospital Ship Mercy in Los Angeles; cadets at the Air Force Academy who overcame the tragic deaths of two classmates and the limitations of a lockdown to put forth a unique and memorable graduation; and aircrews in Guam who maintained social distancing, even as they executed a mammoth elephant walk of B-52 bombers—a giant show of force after COVID-19 sidelined an aircraft carrier on that same island a week before.

Don't mess with America, they said. Not now, not ever.

Innovation is suddenly in. Not just talking about it, but doing it—widespread, real-life innovation at the grassroots level. Tech. Sgt. Chad Hardesty and Chief Master Sgt. Ian Eishen at Edwards Air Force Base, Calif., launched Air Force Quarantine University on Facebook, attracting 20,000 members to share home-brewed video presentations on everything from leadership to pancake-making: Instant professional development.

Airmen at Travis Air Force Base, Calif., used 3D printers to manufacture face shields and masks, applying their tools and expertise to help others. Other leaders reorganized schedules and procedures to keep airplanes flying while isolating air and ground crews to minimize risk. Depot managers staggered shifts to ensure airplane overhauls don't pause and technicians don't get sick. Training instructors continued to transform recruits into Airmen, even as schools around the country shut down, finding new ways to impart know-how despite social distancing. Pilots pushed the limits of virtual reality, not because it's possible, but because we now know VR training works.

The so-called frozen middle where new ideas go to die has thawed. Rules change when conditions change. Mission accomplishment trumps tradition and process. This is understandable. The best innovations are disruptive, and crusty NCOs are trained to crush

disruptions, not embrace them. They got where they are by enforcing standard operating procedure—not by breaking the rules. But, they get it when changing the rules is the only way to achieve the mission.

Silicon Valley no longer has the corner on the market for innovation. Necessity being the mother of invention, COVID-19 exposed unanticipated needs, flaws in our emergency planning, and cracks in our supply chains. America, the land of plenty, experienced extended shortages of toilet paper, paper towel, cleaning supplies, and all manner of PPE (personal protective equipment), the newest acronym to enter our collective lexicon (not counting the name of the disease itself).

While some shut their doors, innovators got to work. Even before General Motors and Ford shut down their automobile plants, both organized to start making medical supplies and ventilators, collaborating closely with smaller specialists who could not keep up with demand and leveraging their own trusted supply chains. Together, they somehow managed to turn on a dime. Distilleries and paint makers converted lines to make hand sanitizer.

Who knew that American manufacturing could still be so agile and effective? Could this spark a revolution in modern domestic manufacturing? Would that not be a win for the nation?

Chalk up another win for our incredible, resilient internet. As shocking as it was to experience 22 million lost jobs in a matter of weeks, imagine how much worse it could have been without Zoom, Microsoft Teams, Google Meet, Cisco's WebEx, and other video

conferencing systems that kept millions collaborating while doing their work from home. Web-based cloud platforms saw triple-digit growth, but networks did not crash.

Likewise, our deeply divided Congress managed to come together despite differences, passing emergency legislation in a matter of days. Was there disagreement? Yes. But there was also a deal. Another win.

Here's what America learned. We have not forsaken the gifts bestowed on us by the Greatest Generation. Deep down, we too are made of the right stuff. Boomers, Xers, and Millennials are cooperating and will pull us through to the other side, into what Air Force Chief of Staff Gen. David Goldfein calls “the new abnormal.”

Yes, normal may never be the same. We may don masks each winter. We may reopen our economy this summer only to have to shut it back down again next winter. We may never again shake hands, if we follow the advice of Dr. Anthony Fauci, the director of the National Institute of Allergy and Infectious Diseases. We will be different.

That's OK. We Americans already are different, and our Air Force and Space Force are different. Our indomitable spirit is driven by independent and adaptable thinking and a deep and abiding trust: that subordinate commands can be imbued with their commanders' intent and will do the right thing.

Rather than wait for answers from on high, squadron commanders adapted faster than the virus because they were uniquely skilled to solve their own problems, to innovate in the face of challenge, to share the fruits of their innovations with others. We are witnessing the American spirit in action.

Our future is bright.

## **We are witnessing the American spirit in action.**



**Boomer Sooner**

Those with a twisted sense of humor must have been responsible for the cover graphics of the most recent magazine issue. The description of an acquisition process that is "Faster, Cheaper, Better" [cover story, March 2020] certainly does not jibe with the story on p. 28 detailing the ongoing saga of the KC-46 ["World: KC-46 Delays Impact Readiness"].

This ultra-embarrassment of acquisition and fielding must be given top priority and solved immediately. The aircraft's primary mission is to air refuel, and for Air Mobility Command to state that fixes to the remote vision system (RVS) won't be in place to allow for fully mission-capable deployment for "three-to-four years" raises serious questions about leadership in this program. Why is the Air Force continuing to take delivery of aircraft that cannot perform their primary mission? Units slated to receive the KC-46 have lost their reliable KC-135s and now sit in limbo wondering what comes next.

While I understand that the Air Force must field aircraft capable of performing multiple missions, how can Boeing have laid such an egg developing an aircraft that is, in essence, an off-the-shelf airframe? Multiple countries have already fielded fully capable B-767 tanker aircraft with proven technology. Why did the Air Force allow for production to proceed when testing clearly showed that the RVS was critically flawed? What do you call a tanker that can't refuel?

The Air Force and Air Mobility Command must solve these deficiencies today. Functional aircraft and trained capable crews are being shelved and replaced by ramp queens. If this is an example of how the Air Force's acquisition

program is faster, cheaper, better—some serious review is needed. Our Airmen and the U.S. taxpayers deserve better.

Lt. Col. Carl Roediger,  
USAF (Ret.)  
New Castle, N.H.

Permit me the obvious, but can 3D-vision capability for the boomer be achieved the same way it is provided in 3D movies? There would be two cameras, on opposite sides of the rear fuselage, having different color filters. The boomer would have the different color lenses in the goggles. The camera sets could be multispectral for night and weather.

Orin L. Humphries  
Lynnwood, Wash.

When is someone going to state the fact: The "boomer" should be at the tail end of the refueling aircraft and not sitting somewhere looking at a video screen?

If someone had the nerve to make this happen when the whole process of procurement started, where would the Air Force be at now?

How much money? How much grief? And how much sooner would the KC-46 been in service correctly?

Sometimes egos should be left at the door and not brought inside. Try not to reinvent the wheel in this case. Just a new airframe and "keep it simple, stupid."

Gary Oien  
Gardnerville, Nev.

**Sorry, Tyndall**

I read ["Q&A: Reconstruction and Resiliency"] in the January/February 2020 edition with interest. When the Air Force announced they were investing billions in the Tyndall [Air Force Base, Fla.] recovery, I shuddered. I couldn't understand the rationale for spending billions in Tyndall recovery beyond saving the local economy with DOD/AF jobs; a political decision in lieu of what's right for our nation.

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The Tyndall investment once again highlights our lack of political will to make tough decisions.

It's my opinion we're investing/leaning heavily on 'smart city' technology to inform when facility maintenance is required to avoid costly full-scale repairs when the civil engineering community possesses this capability today. What smart city technology doesn't do is provide the funding to make the known/planned/programmed repairs and/or replacement.

The civil engineers develop pavement, roofing, facility by mission category, mechanical systems, repair/maintenance plans with projected optimal replace [each] year to avoid system failures, costly repair/replacement, and mission risk. They document risk if funding isn't provided in the year-of-need. But they don't control the budget process and instead are forced to showcase their abilities to "Band-Aid" infrastructure to function well beyond its life expectancy. How is the facility investment at Tyndall going to change the budget/funds allocations process? The Air Force civil engineering community will capture more data, but for what purpose?

USAF has 32 percent more base capacity than required. This would have been the opportunity to shed some of that excess capacity. Instead we divert investment dollars from other unfunded infrastructure requirements to rebuild a base we don't need.

We read and hear about investing our DOD/AF dollars smartly, yet leadership doesn't walk the walk. SecAF Barbara Barrett stated in the March issue the need to discipline cost and the need for creative solutions. But unfortunately, neither are forthcoming. Without the political will to make tough decisions, the Air Force will continue to cry wolf with regard to infrastructure funding shortfalls. USAF cries should fall on deaf ears when dollars are not being optimized.

Stuart A. Nelson  
San Antonio

### Humble Suggestions

I enjoyed your report on your conversation with our new Secretary of the Air Force, the Honorable Barbara Barrett ["Q&A: Nukes, Space Force, and Change," March, p. 8]. Based on her comments and responses, my personal opinion is Barrett will serve extremely well as Secretary.

I've been in favor of establishing a Space Force since the idea was first proposed and am happy legislation was drafted and signed to create our United States Space Force. As for the "pass-through" items in the Air Force budget, anyone who has any accounting experience would agree we should STOP doing that—plus it makes it appear as if we're trying to hide, or cover up, something. Are we?

Then your conversation with the SecAF veered into nuclear modernization, how to get it done, and how to discipline the costs. You quote Secretary Barrett: "There is complete understanding that nuclear modernization is a huge bill, coming due now, and is no longer deferrable. Creative solutions are welcome, and, unfortunately, missing." Well I have a creative solution I'd like to propose, but you Air Force Magazine editors and readers, hold on to your hats, 'cause your first reaction will probably be, NO WAY!

Amputate one USAF leg of our nuclear triad. Amputate, as in eliminate in its entirety, either the air leg or the ground leg of the nuclear triad. A serious study would have to be conducted to determine which leg would best be severed. Upgrading all three legs (and their C2 structure), and continuing to pay for all other defense items is simply not feasible. Period, dot. Amputating one leg of the triad would "discipline the costs" of modernization by ~1/3. One-third, Madam Secretary. Cutting off one leg of our triad would be a step toward an overall objective of eliminating all nuclear weapons at some point in the future. That means our nukes, and everyone else's too.

The same issue of your magazine reported progress in hypersonics and directed-energy weapons. When the United States has fully functional hypersonic delivery of conventional warheads packing the same punch as a nuke, and directed-energy defensive weapons, why will we still need three legs of nuclear capability? The United States was the first country to develop and use nuclear weapons. How about let's be first in eliminating them. Start with a third.

Capt. Daniel J. Purdy,  
USAF (Ret.)  
Trenton, Ill.

### The Wages of War

John T. Correll continues his inimitable style to relate the horrors of German buzz

bombs in his article in the March issue ["Hitler's Buzz Bombs," p. 54]. It brought back a memory of one evening in late 1944, while visiting London on leave, I took a Royal Air Force red-headed WAF (Women in the Air Force) by the name of Pat to dinner. She suggested a very small restaurant on a narrow street by Charing Cross Tube Station. She had heard they served steak, unheard of in war-torn England, and which turned out to be horse meat, although delicious—also rationed. As we sat at the table eating, we heard the ominous and distinctive sound of a German V-1 buzz bomb approaching. We knew once the engine stopped, it would dive to the surface and explode. It grew in sound until it seemed overhead. Very scary. I immediately dove under the table with little gallantry. Pat, in her enviable English manner, remained calmly eating her steak. There was a lesson there that I did not appreciate at the time; the indomitable and resolute British spirit in the face of a ferocious enemy and the stubborn determination to finish her rationed steak!

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

I was born in Ilford (northeast London), England, in March 1943, and while I have no personal memories of the buzz bombs, they terrified my mother. Thirty-four fell on Ilford and the surrounding area in the 30-day period between June 16 and Aug. 16, 1944, and by the end of the war, 35 V-2 rockets had exploded in the area. On March 3, 1945, just shy of my second birthday, a V-2 destroyed the entire block just down the street, killing 10 people and doing enough damage to our house that we had to move out until repairs were made. The falling plaster ceiling had destroyed my crib, but my life was spared, only because I was sleeping with Mum that night.

According to the U.K. National Archives, 2,340 V-1s actually hit London, causing 5,475 deaths, with 16,000 injured. However, the injuries were not always physical. I'm sure that my mother suffered from what we now call PTSD (post traumatic stress disorder), and the psychological damage likely contributed to her eventual suicide 14 years after the war was over. War is hell, and not just for the military.

Master Sgt. Stephen L. Childers,  
USAF (Ret.)  
Wyoming, Del.

## Loose Fasteners

This article brings back memories when I was stationed at the USAF Ballistic Missile Office, Norton Air Force Base, Calif., from 1984 to 1989 ["World: Lockheed Mixed Up Structural Fasteners in F-35s," March, p. 22].

I was a quality assurance program manager responsible for the Peacekeeper Missile System Boeing Basing Contract and the Westinghouse Peacekeeper Launch System quality assurance contract oversight. As part of my oversight responsibilities, I made many trips to conduct on-site reviews and inspections at prime contractor and subcontractor facilities. The kind of problem highlighted in the article is not an uncommon occurrence when similar parts get mixed up. What concerns me is there is a bigger problem with parts control throughout the assembly process of the F-35 that the on-site Defense Contract Management Agency (DCMA) did not identify with their plant audits and inspections.

The commingling of threads and fasteners is a big no-no on any production/assembly line, much less at the F-35 assembly facility. How does the Lockheed on-site quality system and all the state-of-the-art material control equipment and software that is used, not identify this production assembly gap? One of my questions is how the parts are pushed or pulled from stock and issued to the assembly kit or to a work planner and what is done with the parts that are not used. It is my experience having walked many Boeing assembly facilities that there should be strict control of all threads and fasteners. If Lockheed uses a work cell manufacturing concept and konbon practice to stock the work cell, mixing up of parts that were not used is a very big breakdown of the manufacturing assembly process.

In the article it states that there were similar problems with the F-16, where workers threw leftover fasteners into the wrong bin. Quoting the article, "Such problems can often take months to discover." This statement by Lockheed is totally unacceptable and should have raised red flags across the Lockheed and the DCMA quality assurance organizations. This problem should have triggered a company-wide Lean Six Sigma Project to identify how widespread this practice was at all Lockheed manufacturing, production, and assembly facilities. Part substitution has been a problem—especially when one is dealing with a lower-cost fastener vs. a

very high-priced fastener. Is DECA sure that someone at this Lockheed plant did not purposely substitute the \$5.00 part for the \$20.00 part, when the more expensive part was not available in order not to stop production? I hope there is a follow-up article on what the quality-assurance/quality-control root cause and correction investigation discovers.

Senior NCO Robert J. Wiebel,  
USAF (Ret.)  
Melbourne, Fla.

I read, with a great deal of interest and concern, John Tirpak's article on Lockheed's fastener mix up on the F-35. I understand the feeling that no restrictions may be needed at this time, but that leaves the door open for these things to occur in the future. The key will be what will cause the JPO to pull the trigger on implementing these actions. Since the issues revolve around structural integrity, unless you have a system in place and procedures to check the areas where the wrong fasteners were installed, on a regular basis, you have to wait until some form of corrosion, cracking, or heaven forbid catastrophic failure occurs before action is taken.

This is supposed to be the front line fighter for the defense of the nation going forward, and we can't even get it off the assembly line without major problems. The article highlights that commingling of these fasteners was not restricted to the assembly plant in Fort Worth, Texas, but also at the Italian FACO facility—but not in Japan. You have to ask, why *not* in Japan? The fact that these two fasteners are similar but significantly different should have been a dead giveaway that they needed to be controlled to prevent cross commingling.

The article says aircraft inspections were conducted and high levels of fastener compliance were found, but doesn't say who did the inspections or how many aircraft were inspected. If you want transparency, have a team of Air Force personnel inspect a large cross-section of aircraft, in the field and at the assembly facilities, and have them verify these results. The report to DCMA should have been completed by now, so what were the results? DCMA also stated that Lockheed implemented corrective actions starting back in November 2019, but there is no mention of what these corrective actions are. Going forward, the question will be—after significant time has passed and the aircraft are engaged in combat or peace-keeping

missions stressing the aircraft—if cracking develops or we lose an aircraft to catastrophic failure, who will be held responsible if the incident is caused by this fastener mix up? Local inspections will put additional stress on Active-duty personnel who are already straining to meet current operational taskings, and for those of us that were in the maintenance community, they don't give you additional manpower to accomplish these inspections.

One last question: Who at these assembly facilities are performing in-process quality assurance inspections to ensure maintenance and assembly are being completed according to manufactures guidelines and procedures? In-house inspectors who value their jobs are only going to reveal what they have to.

Chief Master Sgt. John P. Fedarko,  
USAF (Ret.)  
Xenia, Ohio

## AD ASTRA

All things come to he/she who waits. I earned my Space Badge in 1975 and wore it proudly for the next 25 years through several space operations and teaching assignments. In 1999, as I was completing my last assignment as an instructor on the Air War College faculty, I wrote a reading for the space block of instruction titled, "The Next Force." It was not meant to be predictive but rather to get students talking about what things would need to occur to enable the formation of this new organization. Briefly, these criteria were dreams, visions, leadership, do-able roles and missions, access to space, and the significant emotional event.

The last item might be either an alien threat, hazards from either asteroids or comets, or a space-based threat from a rogue nation. In the movie "Deep Impact," the President was briefed on an extinction level event. This would occur when a NEO (Near Earth Object) intersected the Earth's orbit to result in a catastrophic impact. In the 1990s, two CSAF studies were conducted at Air University titled Spacecast 2020 and Air Force 2025. In each study, we made room for a Planetary Defense Working Group. The idea was that if the dinosaurs had a Space Force they would be around today as the dominant species in Dinotopia. Anyway, this mission morphed into a Planetary Defense Office within NASA HQ now run by one of our former AWC students.

So the dream of having a Space Force

was finally formalized in December 2019, much like Billy Mitchell and the Air Force pioneers achieved [USAF's] beginnings in 1947. Perhaps the hard part will be the name that is chosen to describe the members of this 6th service.

I would suggest a scan of our best Sci-Fi authors to discover the appropriate title.

Finally, congratulations to Gen. [Jay] Raymond, the Chief of Space Operations, and all the service members and civilians who join him in truly slipping the surly bonds of Earth. AD ASTRA.

Col. Victor P. Budura,  
USAF (Ret.)  
New Market, Ala.

As a long time reader of Air Force Magazine, retired aerospace worker, and father of a member of the Air Force, I respectfully suggest that personnel of the Space Force be known as "Space Techs." Nothing catchy, but it encapsulates the location of their operations and the nature of their work.

Ralph Bruce  
E6 Ex-Navy Swabby  
Marietta, Ga.

You recently asked what would we call personnel in the new service, I say they should be called Airmen. Sailors operate on the sea, Soldiers operate on land, and Airmen operate above the ground, regardless of the altitude.

Tech Sgt. Charles E. Mims,  
USAF (Ret.)  
Chesapeake, Va.

**Naming Rights**

I enjoyed reading the "Airman for Life" synopsis highlighting World War II pilot Ollie Crawford. Crawford obviously had a full and renowned career and was a life-long staunch advocate for the Air Force and its members. To show their appreciation, the Air Force recently dedicated the building where undergraduate remotely piloted aircraft training takes place at Randolph Air Force Base [Texas], as "Crawford Hall."

Crawford was a P-40 pilot during World War II who went on to log over 13,000 hours in nearly 100 different types of aircraft. An internet search didn't yield any indication of a direct relationship between Crawford and RPAs.

Known as unmanned aerial vehicles in the early days, not everyone in the Air

Force flying community was exactly "all-in" on UAVs. Many "white-scarf" pilots like Crawford might actually think that an aircraft without a pilot is like a Texas day without sunshine.

Like a protégé of mine, it's hard to imagine how Crawford would have reacted had he been on the fighter track in pilot training only to be matched with RPAs upon graduation. It's not beyond the realm of the possible that as a new RPA student Crawford would have had to be dragged kicking and screaming into the very training building that now bears his name.

My protégé summed it up in an e-mail, "Maybe when the time is right we can dedicate a building to someone as a memorial to their lifetime achievement related to that building or what the building represents. Until then, so what if it remains Building 1602? Focus on the real mission ... training aviators, and leave the naming business to the historians." After all, in the illustrious history of Air Force flying operations, RPAs are only in their infancy.

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

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—**Gen. David Goldfein**, Air Force Chief of Staff, in a message to commanders about leading in a time of crisis.

**Think Fast**

"We don't need to mass-produce an MRAP, or a tank, or aircraft carrier—we need to mass-produce cotton swabs. We ought to be able to figure that out."

—**Rep. Adam Smith** (D-Wash.), House Armed Services Committee chairman, on rapid acquisition in response to the COVID-19 pandemic.

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Mass Communication Specialist 3rd Class Nicholas Huynh/USN



**Leadership Crucible**

"We are not at war. Sailors do not need to die. If we do not act now, we are failing to properly take care of our most trusted asset: our Sailors."  
—**Capt. Brett Crozier**, then-commander of the aircraft carrier Theodore Roosevelt, in a March 30 memo to Navy leadership. Crozier was fired three days later and soon after tested positive for the COVID-19 virus.

"If he didn't think that information was going to get out into the public, ... then he was ... too naive or too stupid to be the commanding officer of a ship like this. The alternative is that he did this on purpose. ... It was a betrayal of trust with me, with his chain of command, with you, with the 800 to a thousand people who are your shipmates on shore right now. ... It was betrayal!"

—Then-Acting Navy Secretary **Thomas Modly** during an April 6 obscenity-laced address to the Roosevelt crew, following Crozier's firing.

"He was only trying to help us!"

—**Anonymous Roosevelt crew member**, recorded during Modly's April 6 address to the crew.

"With a heavy heart, I hereby submit my resignation, effective immediately."  
—**Modly** on April 7

**Believe It or Not**



China Ministry of Defense/ Fan Xianhui

"The ongoing novel coronavirus pneumonia (COVID-19) outbreak did not cause cases of infection among the military medics and service members, but improved the combat readiness of the Chinese military instead!"

—Chinese military news channel **ChinaMil.com**, in a claim attributable to a Chinese People's Liberation Army officer.

"The U.S. is not facing the threat of war, but it is seeking enemies everywhere it goes with a Cold War mentality, looking for unnecessary trouble. Even if all crew members on the aircraft carrier disembark and go into quarantine, no other country will wage war on the U.S."

—**Zhang Junshe**, senior research fellow, People's Liberation Army Naval Military Studies Research Institute, on U.S. readiness with regard to the COVID-19 infections aboard the USS Theodore Roosevelt, Global Times, April 1.

**All Together Now**

"The preponderance of space capabilities across the department, including those from other services, should also be united into the Space Force. So, we are doing that same process that we did with the Air Force, to canvas the Army and the Navy to figure out ... how do we unify efforts?"

—**Gen. John "Jay" Raymond**, Chief of Space Operations, on integrating all the right elements into the new Space Force.

**Not My Bailout**

"I cannot support a move to lean on the federal government for a stimulus or bailout that prioritizes our company over others and relies on taxpayers to guarantee our financial position."

—**Nikki Haley**, former Boeing board member, in a letter to the board resigning the position. Haley is a former U.S. Ambassador to the United Nations and governor of South Carolina.

# Right-sizing Bombers and People

*Gen. Timothy Ray is the commander of Air Force Global Strike Command and the Air Forces Strategic component commander for USSTRATCOM. He directs the Air Force's three bomber fleets, its land-based Intercontinental Ballistic Missiles (ICBMs) force, and the nuclear command, control, and communications enterprise. He spoke exclusively to Air Force Magazine Editorial Director John A. Tirpak on March 31 about the evolving bomber force, AFGSC end strength, the changing nature of deterrence, and future weapons. The conversation has been edited for length and clarity.*

**Q. You've said the Air Force will need more than 100 new B-21 bombers. Is the final number coming more into focus?**

A. I'm very comfortable with where the B-21 program is, writ large, and we've said publicly that we think we need 220 bombers overall—75 B-52s and the rest B-21s, long-term.

The size of the bomber force is driven by the conventional requirement, and then we manage the nuclear piece inside of that, based on treaty and policy. In the context of the National Defense Strategy (NDS) and great power competition, 220 is where we think we need to go.

Those 75 modernized B-52s, ... that's not a simple set of modifications, but we think we have a plan going forward. It will feature a bridging mechanism to keep the B-1 fleet viable and—where needed—modernized, to get us through that gap. It features keeping the B-2 viable until we know we've got enough penetrating capability with the B-21.

There's a lot of things that have to happen between now and, I would say, five years from now, to begin setting a path beyond 175. I won't call it aspirational; I think it's a realistic assessment of what we think we need to do. I don't think that even my replacement will make a decision on that. I think it's two commanders from now who will really determine the exact path on the bomber roadmap to take us past 175.

**Q. The Air Force has asked to take some B-1s out of service to help pay for Joint All-Domain Command and Control (JADC2). Can you fulfill the NDS with what's left?**

A. If we right-size the B-1 fleet, based on what I think we can sustain, and if we make some structural and capability modifications. ... My goal would be to bring on at least a squadron's worth of airplanes modified with external pylons, to carry the [Air-Launched Rapid Response Weapon, or ARRW] hypersonic cruise missile.

Some B-1s need significant structural work, so if we limit that liability, then we can do smart things, and we've got support from Congress to do this.

All aspects of long-range precision strike absolutely depend on a viable Space Force. That has to happen. Anyone who wants to do long-range precision strike in the future, they can't be

serious about it unless they're fully partnered on all-domain command and control and the Advanced Battle Management System (ABMS).

**Q. Did you request money for hypersonic weapon pylons in the 2021 budget?**

A. No, that's not in the current budget, that's a project we're working on. There are several versions that we could contemplate, but we believe the easiest, fastest, and probably most effective in the short-term will be to go with the external pylons. And as we move toward the ARRW, that is a good weapon/airframe and configuration match to get us quickly into that game.

**Q. Would you commit to the ARRW?**

A. I think we're going to commit to the ARRW, because I think our carriage capability is good for that. With some mods, we may be able to increase the B-52 carriage but, really, the ability for the B-1 to take up hypersonic testing takes a load off the B-52 for the engines, the radar ... and there's a good number of communications upgrades I need to make.

We actually have a very aggressive game plan, here, over the next three to five years. We'll have

to commit more aircraft and maintainers and operators to test. Typically, we have two bombers at Edwards [Air Force Base, Calif.]; we're going to ramp up to eight.

**Q. Do you think you'll need a conventional version of the Long-Range Standoff weapon (LRSO), along the lines of the Conventional Air-Launched Cruise Missile (CALCM)?**

A. First things first. The ALCM is aging out on us. I pulled alert in the old days of [Strategic Air Command] SAC with ALCM, and I've shot CALCMs in anger. The utility of those is unquestionable. We've got to replace the ALCM.

Realize that everything we do will be driven inside of a treaty context. I'm pleased with the thinking and approach in the LRSO program; I think that's going to be a very good missile. If we needed a conventional cruise missile in a hurry, with even longer range than the [Joint Air-to-Surface Standoff, Extended Range], I would start there, with the LRSO.

I'm not asking for it, because I've got to solve the nuclear version first. But as opportunities present themselves down the road, LRSO certainly has some attractive features and capabilities for a conventional cruise missile.

**Q. When you talk to Congress about strategic modernization, do you get the sense that everybody's on board? What do the unconvinced need to hear?**

A. I think the awesome part of democracy is that we debate the issue. It's always healthy to question what you're doing to make sure you're doing the right thing.

The context in which we view the nuclear triad is important, and we can't pick the context. It has to be viewed in the context



Airman 1st Class Jacob Wrightsman

**Gen. Timothy Ray, commander of Air Force Global Strike Command, at Barksdale Air Force Base, La., March 10.**

of the now-existing Chinese triad, and a fully modernized and augmented Russian triad. And absolutely, in the minds of our partners and allies, to whom we've promised protection—so they don't have to go down the path of a nuclear program.

That's the very clear reality of where we are. And when you explain things that way, it becomes an easier way to understand the problem.

We have had significant reductions in the number of nuclear weapons in the past, and we've done it through treaty. My advice and counsel was, 'you're going to have to continue down the path until you've got a change in the world, and it has to be done in a multilateral fashion.'

**Q. Russia has heavily modernized its strategic weapons. Has that fundamentally changed deterrence?**

A. The biggest change is the number of players on the field, and our ability to manage multiple problems at one time.

I think the triad concept remains very firmly intact. The number of ICBMs creates very significant challenges for anybody who would attack us, they would need to use a very high number of weapons. ... Our ability to strike back keeps the bar very high. The [Sea-Launched Ballistic Missile submarine] fleet is very survivable, and certainly has the visibly flexible deterrent of a bomber and its ability to go in multiple places and shoot from multiple axes.

We're going to have to continue to think about the command and control viability, and how we keep space very clearly in the middle of all these conversations. But I don't see that, broadly, deterrence has changed.

**Q. You'll need an aggressive schedule of convoys when you replace Minuteman with the Ground-Based Strategic Deterrent (GBSD). Will you have enough manpower, and the new helicopter in hand, in time to do that?**

A. I believe so. We've done this before with Minuteman and Peacekeeper, so it's not a new thing. But when we designed the GBSD, it is a single weapon system, now, and not simply the silo and the launch-control facility. It's an integrated capability. And we think that will give us a far more secure, far more reliable, and easy-to-upgrade system.

Right now, we think there will be a two-thirds reduction in the number of convoys and the amount of times we have to open the silos. We're working with the local communities and states on some of that thinking.

**Q. The bomber roadmap of a couple of years ago said AFGSC would have to live within a certain end strength, and it couldn't add systems without getting rid of some. The "Air Force We Need" analysis, though, called for more bomber squadrons. Will your manpower go up, or down?**

A. When the B-21, GBSD, new helicopter, and new cruise missile are all bedded down, the goal for the command is to actually have fewer people. For example, you go from a four-person B-1 crew to a B-21 with a two-person crew, right? With GBSD, there will also be fewer people involved.

Broadly, we can't just keep throwing manpower at these things, we have to be really smart about that. Our goal is a net reduction in manpower. I think that's the right thing to do for the taxpayer and for the force.

**Q. So, after a few years, you would expect to start reducing manpower?**

A. You'll probably have to grow a little bit before getting smaller. You're going to go from three [to] four bomber fleets to get to two.

You have to work through weapons generation facilities, training pipelines, etc. We know where we want to be, roughly, and we know where we are, and it will be a very interesting path to work through the next three to five years to get certainty on that.

**Q. The Army's new Long-Range Precision Fires program is aimed at a lot of the target sets that have traditionally been the purview of the Air Force. Is a roles and missions debate brewing?**

A. I don't believe a roles and missions conversation is really the smart path forward. I believe we all recognize and acknowledge the need for long-range precision strike. Again, I underscore, ABMS and JADC2 are the entering argument, and why we're leading that effort for the joint force and why the SecDef and the Chairman [of the Joint Chiefs of Staff] look to us to do that.

I believe that [the Army is] not really looking to shoot at ranges fundamentally different than what we could with the [hypersonic] weapon, but we add several thousand miles to the launch point. So, I wouldn't get into, there has to be the right this-and-that. None of it matters unless we get JADC2 and ABMS and space right.

What we bring differently from them is, I can shoot from anywhere on the planet. A ground force will have limitations. I wouldn't say that's not necessary, but they don't have the universal access that we will from the air side. So, I think there's a clear advantage to having that in the arsenal, but to choose between that or the long-range strike, I don't think is the right informed debate.

**Q. Is it settled that the arsenal plane will be the B-52? Or is the aperture open to looking at other kinds of platforms?**

A. The aperture is still open to looking at better ideas—and more ideas.

I believe we should really press into that. You like to have multiple ways to get to the right long-range strike volume. And if you can find a more affordable path, then we should look at that.

The way we do acquisition, we usually buy a platform and keep it for a long period of time. I think there's value to the Century Series approach, where we buy an aircraft, we pay for the design, but we don't pay to sustain it for 30 to 40 years. We pay to keep it for a little while because technology is moving so quickly.


**Q. How do you think that concept will work in AFGSC?**

A. I think we're going to continue to ask industry, can you do something where I only buy a small number, and I only fly it for 10 years? But I've got to have the conversation about price point and where that return on investment is. So, there's a lot of work to be done. We haven't really tasked industry to put all their creative energy into this just yet. I think we need to press harder on that.

**Q. Is there a role in AFGSC for attritable-type systems?**

A. Absolutely. Our goal is to be the world's most feared and respected long-range force. Those kinds of capabilities can be added to our arsenal. Our ability to carry a lot, a long way, and reach out is one of the more important attributes in this next era of conflict.

With everything we're acquiring, we're looking for margin and affordability. The attributes we want are modern and mature technology; to own the technical baseline so that we can affordably and competitively modernize; [and] modular and open systems, so we can rapidly upgrade and update.

We've kept requirements very stable, and our intent is to get things on the ramp or in the silo on time and then run a modernization program. So if you continue down that path, you could do lots of things that I think are important. 

By John A. Tirpak

# Detering in Space, Winning in Jointness



Andy Morataya/USAF

With Secretary of the Air Force Barbara Barrett looking on, U.S. Space Force Chief of Space Operations Gen. Jay Raymond administers the U.S. Space Force oath of enlistment to Chief Master Sgt. Roger Towberman at the Pentagon in Arlington, Va., April 3.

**G**en. Jay Raymond, the Chief of Space Operations (CSO) heading up the new U.S. Space Force, is grappling with a different sort of problem: Detering adversaries in space, where the full complement of U.S. capabilities is shrouded in secrecy.

Effective deterrence requires a certain amount of transparency, enough at least to make clear that certain actions could evoke highly undesirable reactions.

“We are overly classified,” Raymond said flatly during a video conversation with retired Lt. Gen. David Deptula, dean of AFA’s Mitchell Institute for Aerospace Studies. The Space Force will need to open up with allies to coordinate space activities with them and share enough with the rest of the world for potential adversaries to be able to see that broad unity of effort. The aim is “to change the calculus” for any nation contemplating action against U.S. or allied assets.

“We are working on the strategy to do that,” Raymond said. Initial efforts to build space partnerships with France, Germany, Japan, and others have begun. These include linking operations centers, putting hosted payloads on allied satellites, and creating a Combined Space Force Component Command. The work is already “paying big dividends,” Raymond said, and in the future will be “absolutely critical for us.”

Building a new deterrence strategy goes hand in hand with developing a Space Force doctrine for a world in which space is getting “more crowded” and more dangerous. Raymond said his marching orders from Air Force Secretary Barbara Barrett remain as before: Be bold. “Build the service that we need, and that’s what

we’re focused on.” Raymond described five lines of business in his planning: organization; human capital and development; acquisition; architecture; and culture, “which obviously takes some time.”

## WHO’S IN?

Raymond said his team identified those people and organizations that should become part of the Space Force but were not already attached to Air Force Space Command, which made up the initial cadre reporting up to him as CSO. That scrub identified 23 organizations and about 1,840 Airmen who will be reassigned to the Space Force over the next six months. They will join some 16,000 people whose jobs will be transferred to the Space Force over time. Meanwhile, organizers are “collapsing layers of command,” Raymond said, to build a “light, lean, agile force that’s innovative and can go fast.”

A similar scrub is underway across the other military services, Raymond said. “We are doing what we did with the Air Force: to canvass the Army and Navy to figure out ... how we unify efforts across the Department.”

Just having “space” in an organization’s name or mission set is not necessarily enough to warrant a move. In some cases, those capabilities will remain central to the original service. “We have to also be careful we don’t break” the Air Force, Army, or Navy when space components are reassigned.

Work on the Pentagon’s fiscal 2022 budget is already underway, Raymond said; the first that will have a stand-alone Space Force budget. Raymond said he’s not looking for a surge in space spending, only what’s appropriate for activities in that domain.

After that, “it will compete across the Department of Defense for funding,” Raymond added that he doesn’t envision Space Force will ever “be the size of an Army or Navy” but will be focused on “high tech, and we’re going to design it that way.”

The budget will also reflect that “we’re doing all the culture and outreach kinds of things [that] you would expect: seals, logos, uniforms, songs and that type of work, which will be important to our service.”

Raymond said work was proceeding to develop a “foundational” space acquisition capability that draws on expertise from all the other services. Again, he said he’s “canvassing” the services “for what authorities they have that we would like to adopt, that work well ... and pull those together.” The watchwords will be speed, agility, and efficiency in buying, he said.

## THE SPACE TEAM

Raymond was the first official member of the Space Force and as of April 15, was still one of only two, with Chief Master Sgt. Roger Towberman, Command Senior Enlisted Leader of U.S. Space Command, having been sworn in as the second member April 3. The next up will be 88 new graduates of the U.S. Air Force Academy, sworn in April 18 at their early graduation. The new grads will be “a mixture of space operations, acquisition, engineering, and computer software programmers,” Raymond said, and could be joined by one or more West Point or Annapolis grads later this spring.

The Space Force is bringing in a civilian workforce, as well. “I think you’ll see an increase in use of civilians and contractors,” Raymond said. “We have the authority to direct-hire folks out of industry.” The Space Force will be small and therefore can be highly selective, he added. “The numbers of people that are knocking on our door, begging to be a part of this,” shows true national excitement, he said. In an initial hiring notice for about 60 jobs “we got 5,700 applicants,” Raymond said. Finding the right people will not be hard, he added. “We’re going to get the talent we need.”

## JOINT ALL-DOMAIN NECESSITIES

Air Force Chief of Staff Gen. David Goldfein has been talking about multi-domain operations since he became the Air Force’s top officer four years ago. This year the language, budget implications, and narrative changed, as well.

In a video interview with Mitchell’s Deptula, he said he’s tripled the number of engagements between top USAF leadership, Congress, and congressional staffs to sell what’s now called Joint All-Domain Command and Control (JADC2).

“It’s a tough conversation,” he said, because to pay for a new, invisible connectivity, the Air Force must divest tangible assets, including B-1 bombers, aerial tankers, and other aircraft. Those assets translate to jobs on bases in lawmakers’ home districts in ways that a network may not. Goldfein admits JADC2 is not “something you can put your hands on,” but without that network, assuring future victory against peer adversaries becomes nearly impossible.

One of the reasons he feels confident that the Air Force can tolerate giving up aircraft is that he’s got hot production lines building new fighters, bombers, tankers, and trainers.

“I’ve got a unique situation,” he said. Programs built and funded by past Chiefs are delivering now. “Hot lines ... allow me as the Chief and us as an Air Force to take more risk on those legacy systems.”

Picking and choosing cuts where they can be afforded makes sense, Goldfein said.

“What we’re doing is fleet management,” he said. “I’m looking tail by tail and parking [the most troubled planes] in the boneyard.” That frees up funds “to first go back into the remaining inventory to modernize it and get it back up to speed, and then move forward with the remaining fleet.”

Upgrading the remaining B-1s, for example, will make those aircraft “exceptional,” Goldfein said. Building B-21 production capability means if more aircraft are needed than currently planned, that can be supported over time. The same holds for fighters and tankers.

## WHO’S GOING TO FIND AND FIX?

The JADC2 is an imperative, he said.

“I try to be the conscience of the Department when it comes to ‘find, fix, finish’ ... the kill chain,” Goldfein said. “It’s easy to talk about ‘finish’ and long-range fires. The question I ask about those program charts—if you want to do long-range strike, hypersonics, artificial intelligence—[is] how exactly are you going to get the data that you require? ... Who’s solving that for you?”

This is usually followed by a “long pause in the room,” Goldfein said, “and I use that pause to say, ‘OK, let’s talk about Joint All-Domain Command and Control.’”

“We’ve done the analysis for the force we’re moving toward,” Goldfein said, and lawmakers seem to understand the issues once the briefings are done. “I haven’t come across one staffer or member who didn’t say, ‘I get it,’” once the issues had been clearly laid out. Investing in JADC2 now is “a step we can’t skip.”

Downward pressure on future defense budgets was already visible a year ago, but with the nation taking on trillions in new debt as a result of the COVID-19 pandemic, those pressures will only increase in the future. Goldfein said he expects tough choices ahead.

No one in current DOD leadership has faced declining budgets before, but as budgets tighten, “we are going to have to take a hard look at where we have duplication,” Goldfein said. That could mean questioning strategic decisions in the Army to invest in long-range fires or in how the services invest in new developments, such as hypersonics. He called recent collaboration there the “gold standard” and dismissed the idea that long-range fires alone can win future wars.

“A significant number of wargames” demonstrated that stand-off attacking forces alone did not prevail, Goldfein said. Victory occurred only with a “hybrid” force of stand-in and stand-off capabilities, operating both inside and outside the enemy’s air defense zones.

“This can’t be a gut feeling,” Goldfein remarked. “We owe it to the nation to show—with analytical rigor—why we believe that this is the force that actually wins in the future. And what wins is [a force] that has a combination of what works inside and ... outside.”

## DON’T CUT THE ICBMs

Goldfein is no less focused on keeping the strategic modernization plan intact. Some in Congress see the Ground-Based Strategic Deterrent as too expensive and argue it’s time to eliminate the land-based leg of the nuclear triad.

But Goldfein remains convinced that the ground-based ICBM force is foundational to deterrence.

“We’ve got several hundred missiles buried in the Northern Tier,” he said. “There is no adversary on the planet that has what it takes to take them out. ... So we will always have a second-strike capability that will destroy any nation who chooses to take us on. ... They cannot take out that leg.”

Giving that up puts deterrence at risk, Goldfein said.

Russia has already modernized its strategic forces, Goldfein said, suggesting that the way to build-down is to build up.

“I would never advise, in any way ... that we should unilaterally reduce our capacity and capability without getting anything in return,” he said. “That, to me, would be the worst advice I could ever give.”



Mask fashion swept through the force, as the Pentagon ordered service members and civilians alike to cover their mouths and noses when working in close proximity to others, to help stop the spread of the COVID-19 pandemic. With medical masks in short supply, Airmen were told to improvise. Airman 1st Class Bernard Coe, 55th Aircraft Maintenance Squadron, donned a bandanna as he and others at Offutt Air Force Base, Neb., kept missions rolling, in spite of the restrictions.



Spreading out to limit the spread of the new coronavirus were members of the 194th Wing, who gathered for a mission brief at Camp Murray, Wash. The Airmen were part of Joint Task Force Steelhead, the Washington National Guard's COVID-19 response team.

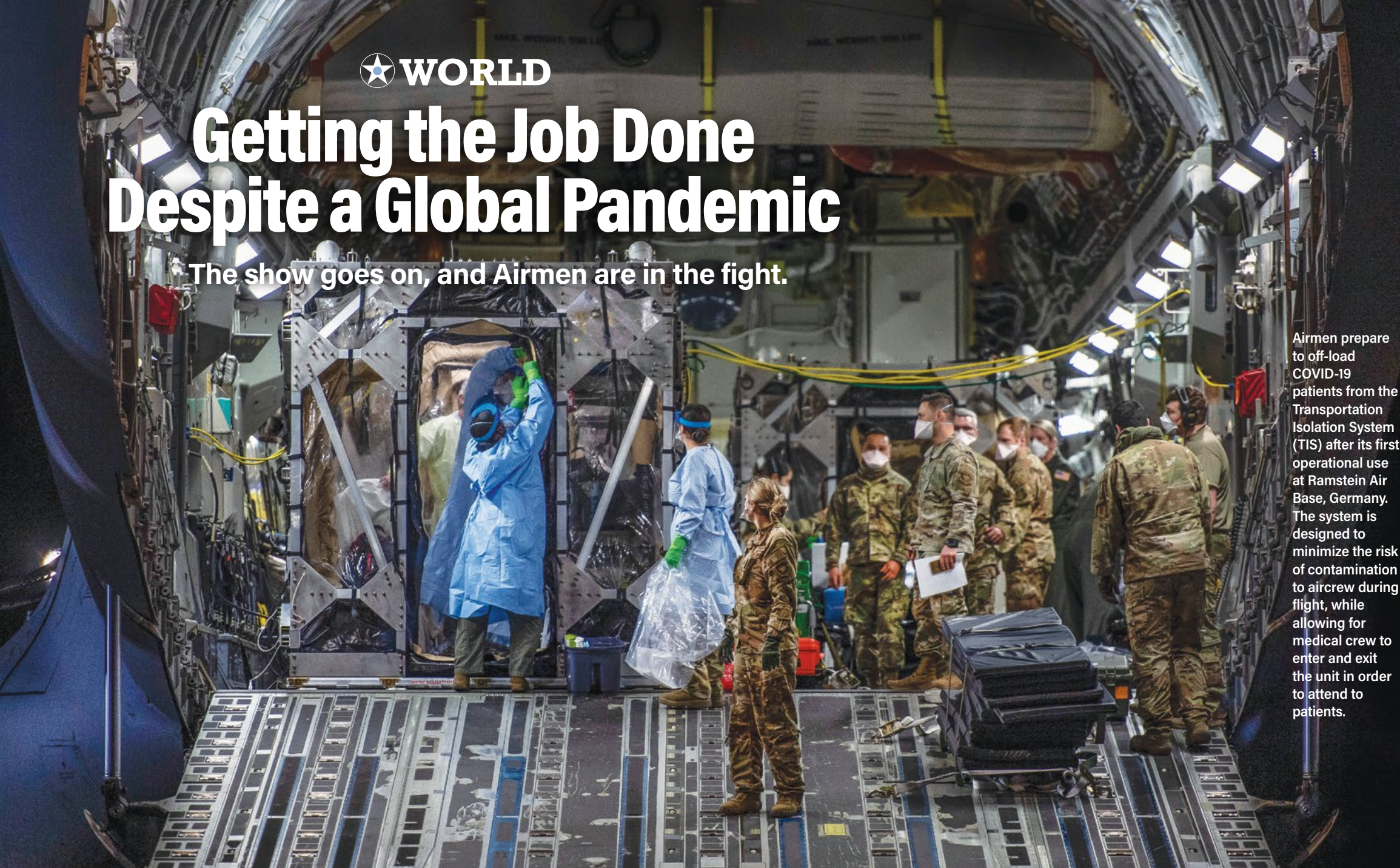
Veterans Cemeteries stopped conducting military funerals, but at Arlington National Cemetery, run by the Army, ceremonies continued, with modifications. Masked Honor Guard Airmen carried the casket of retired Air Force Chief Master Sgt. Andrew William Johnson to his final resting place in April. A decorated veteran of the Korean and Vietnam wars, Johnson died in December at age 86, well before the virus outbreak reached his native New York.

Jon Girard/Arlington Media/Andrew Johnson Jr. family  
courtesy photo



# Getting the Job Done Despite a Global Pandemic

The show goes on, and Airmen are in the fight.



Airmen prepare to off-load COVID-19 patients from the Transportation Isolation System (TIS) after its first operational use at Ramstein Air Base, Germany. The system is designed to minimize the risk of contamination to aircrew during flight, while allowing for medical crew to enter and exit the unit in order to attend to patients.

By Brian W. Everstine and Amy McCullough

This is the Air Force as you've never seen it before. Masks on faces. Latex gloves. Enforced social distancing. Livestream events rather than all-hands calls. A global stop-move-order blocking most training, moves, and travel.

Yet, the show goes on. Despite the stop-move-order through June—and its possible extension beyond that—Air Force units maintained momentum, responded to needs, and met mission demands all around the globe. Airmen stepped in to make masks or use their tools and training to solve problems.

COVID-19 changed routines, but not objectives. Deputy Secretary of Defense David Norquist said once the viral risks subside, the military will have to begin to reset gradually. “We’re going to need to change

**“We’re going to need to change and adapt because even over the coming months, the virus isn’t going to go away!”**

—Deputy Secretary of Defense David Norquist

and adapt because even over the coming months, the virus isn’t going to go away,” Norquist said. “We’re going to have to operate in a COVID environment, which means, ‘how do you train? How do you prepare? How do you deploy?’ ... We have adapted in the past. We will adapt in this environment.”

Major commands cut back on flying, curtailing exercises and canceling some, such as Red Flag-Alaska, entirely. Travel restrictions forced Pacific Air Forces to get creative with partner engagements, said Maj. Gen. Scott Pleus, Pacific Air Force’s director of air and cyberspace operations.

Core missions such as Operation Noble Eagle, which keeps fighters and tankers on alert to defend the continental United States, Guam, Alaska, and Hawaii, continued unabated.

Despite travel restrictions, Airmen continued to train, taking off from their respective air bases and

meeting in international airspace to train.

Mobility units surged to meet an uptick in demand for medical supplies and equipment.

A C-17 from Air Mobility Command’s (AMC’s) 618th Air Operations Center flew three highly contagious COVID-19 positive patients—all U.S. government contractors—from Afghanistan to Germany for treatment, using specially designed isolation pods to protect the crew in flight. A team of aeromedical evacuation specialists, Critical Care Air Transport Team members, infectious disease doctors, and technicians launched within 24 hours of receiving orders from U.S. Transportation Command.

The Transportation Isolation System was developed in 2014 during the Ebola outbreak in West Africa, but the April 10 mission was its first operational use. Anticipating demand for the systems to grow, AMC designated Joint Base Charleston, S.C., to be the hub for training medevac Airmen to use the system.

Air Force Materiel Command (AFMC) is also developing a new Portable Bio-Containment Module to transport long-term

## DOD Extends Stop-Move Through June—for Now

The Defense Department extended its Stop-Move order through June. The decision will be reviewed biweekly and could be extended or lifted early, said Undersecretary of Defense for Personnel and Readiness Matt Donovan.

The new policy eases some restrictions on deployments and redeployment to home location, while extending the overall order by seven weeks.

“We don’t want to do anything that places the health of our force at risk,” said Chairman of the Joint Chiefs of Staff Gen. Mark Milley during a live-streamed town hall April 9. “If that means further delay, then that means further delay.”

Delays mean sacrifices in training and readiness, Milley acknowledged. The intent of any decision is “keeping you and your family safe.”

Rampant unemployment and devastation across the airline industry will have an impact on both recruiting and retention. Interest in joining, extending, or staying is rising as opportunities outside the Air Force contract.

Air Force Chief of Staff Gen. David Goldfein said the Air Force would likely ease restrictions on the amount of leave Airmen may carry over to the next fiscal year, and will allow some who had planned to retire or separate to delay those actions. Goldfein himself could be extended past his planned retirement in July if there is any delay in confirming his relief, Gen. Charles Q. Brown Jr., who is currently commander of Pacific Air Forces.

Members on Active duty, whether in the Active, Guard, or Reserve forces typically cannot accrue more than 60 days of leave and must typically burn leave within eight months of exceeding the 60-day cap. Goldfein said a plan is in the works to allow Airmen to carry some extra leave into 2021. ✪

infectious patients. The Air Force anticipated testing the newer, more advanced system before the end of April, according to AFMC.

### GETTING THE JOB DONE

Through dozens of other missions, AMC moved people, gear, and equipment, including urgently-needed COVID-19 test kits and ventilators, around the globe. C-130s moved personnel and field hospital equipment to New York and the state of Washington, and other AMC crews flew to Honduras, Colombia, and Panama to help evacuate hundreds of civilians stuck there when flights out of those countries were suspended.

AMC changed operating patterns, isolating and screening aircrews to keep them healthy, and maintenance shifts were staggered to minimize the risk of passing on infections.

AMC Deputy Commander Lt. Gen. Jon Thomas said during an April 3 briefing that command and control operations centers, communications support, and cyber security teams are reporting for duty but the command was cutting support for exercises and partnership efforts to focus on mission-critical capabilities.

### BEATING THE VIRUS

At Aviano Air Base in northeast Italy, less than 200 miles from the heart of the Italian COVID-19 outbreak, Airmen and aircraft maintained a normal schedule while increasing social distancing and finding new ways to be flexible.

# Goldfein Tackles the New Abnormal

*Air Force Chief of Staff Gen. David Goldfein took time out in the midst of the COVID-19 crisis for an interview with Air Force Magazine Pentagon Editor Brian W. Everstine. His comments here are edited for space.*

## **Q: How is it to lead an Air Force while social distancing and working remotely?**

A: We're learning a ton in terms of how to keep operations going and how to continue to communicate. It's interesting just to try to be the example and set the standard. I'm teleworking two days from the Air House, and I'll tell you, those are some of my busiest days ... nonstop VTC-ing [video teleconferencing]. We're finding we can keep operations going across the Air Force, and we're just finding new ways of doing it.

## **Q: The Majcoms earlier this month filed reports on mission essential tasks that need to be met in this COVID-19 environment. What did you learn?**

A: The first thing we did was identify the key missions where we know we will get no relief, nor should we expect relief. When it comes to defending the homeland and doing those other critical missions, the Air Force performs. ... We have continued operations in space, continued operations in cyber, we have a robust medical response, we've got nuclear operations, ... we've got our ongoing ISR operations. ... Then the ask was 'OK, how do you build the breadth and the depth to be able to sustain operations even if there's an outbreak?' And so, we've adjusted operations in the nuclear missile fields, we've adjusted operations in our command and control headquarters, we've made adjustments in how we maintain space operations. ... So, now, we're operating in what we call the new abnormal, operating with the virus.

## **Q: How does that impact Airmen standing alert and trying to stay ready?**

A: Let me cover two things that are ongoing: Air mobility and nuclear missile operations. Obviously, all of it at an unclassified level.

As the nation and the world continues to hunker down, more and more we move to the air. And so when it comes to Air mobility, and the leadership of Gen. Maryanne Miller, who's just brilliant at this kind of operation, we're putting the crews essentially in a bubble, right? The cockpits are clean. They fly a mission, they leave that cockpit ... we put them in a bubble where they're not in contact with anybody else, [other than] those they've already been in close proximity with in the cockpit. So, it's close, close proximity. And then they go into a room and they stay in that room with whatever's required, delivered to them, and then they go back into that cockpit to do the mission. So global mobility continues unabated.

So, nuclear missile operations: A typical nuclear crew would go on about eight alerts a month, and for some period of two to three days. We've increased the timeline, they're in the field upward of 14 days at a time. And we're on blue/silver teams. So one team is on, one team is off. And we rotate in and out. ...

"Projecting combat air power is our primary mission, and that is a way we're going to contribute to beating this virus," said Capt. Claire Bieber, an F-16 pilot with Aviano's 510th Fighter Squadron. "I know that sounds like it's not correlated, but it is important



Staff Sgt. Divine Cox

USAF and U.S. Navy airplanes performed an Elephant Walk at Andersen Air Force Base, Guam, as a show of strength during the COVID-19 outbreak.

We're adhering to CDC (Centers for Disease Control and Prevention) protocols at the same time, and operations continue unabated.

## **Q: What about Basic Military Training? How can you sustain that?**

A: [With] Basic Military Training, we're putting through about half of what we normally put through ... at Joint Base San Antonio-Lackland [Texas]. When young men and women arrive, we watch them for 14 days with restricted operations and movement. After 14 days—and ensuring that they have no symptoms and they're clean from the virus—they go into training. ...

Gen. Brad Webb has really been a marvel for thinking creatively on how to do this. They're just standing up a tent city, to be able to further account for isolation and protocols. ... We can actually sustain this for a significant time. ... Hard to tell what the recovery looks like to get the numbers back. ... I think what we'll actually return to, I predict, is not a return to normal, but a return to a new abnormal. ... This is going to have some longer-term implications.

## **Q: And outside of BMT are you seeing similar implications for things like PME or Air University or Weapons School?**

A: We are using this as an opportunity to truly look at the way we do business, and accelerate some things that we were working on before, especially virtual training. Now's the opportunity to really accelerate those. So, what can you do if you no longer have the capacity or capability to go sit in a classroom together? How do you continue to train virtually and through some distance learning? And what we're finding is that there's a lot of things you can train to without having to be side-by-side, face-to-face. I would say we're starting to look at simulation differently. You know, whether we can actually do simulation, to include flying simulation, where the simulators are in one place in and the instructors are in another. And I predict we're not going to go back to the old way of doing business completely, we're going to take some of the things that we're learning, and that'll be the new way of doing business going forward.

## **Q: And what about changes for Air University, officer training, things like that?**

A: I was just talking to the Air University commander and he was saying his staff is talking to the Air Force Academy. Learn what they went through when they transitioned very quickly—they transitioned to distance learning in 10 days for three

to make sure that both Americans and everybody else knows that this isn't going to beat us and that we're going to continue to be ready, no matter what hazard or threat is thrown our way.

"We're working really, really hard to minimize the risk and

classes of cadets. ... Air University and others are sort of looking at what the Academy has learned and adjusting accordingly. We're already talking about the next school year. And just how much—again living in the new abnormal—how much of this can we return to in terms of classroom and face-to-face? How much should we return to that? How much of this can we do through distance learning? ... This is a new challenge that provides some huge new opportunities.

**Q: Are there other areas that you can see these current changes, such as new ways to do acquisition?**

A: Absolutely. You know, [Will] Roper, he is just such an inspirational leader. I mean, I think so many of us, not just in the Department of Defense but also in industry, are just feeding on his energy and his ideas. ... He saw and was looking at new ways to engage with industry months before the COVID virus hit. And so, we were doing our pitch days. Using the authorities Congress gave us to write contracts quickly, incentivizing small business and venture capitalists to put resources against defense acquisition and new ideas. And what's been fun to watch is, so much of what he put in place is today exactly what the entire Department of Defense is leaning on and relies on to keep business moving forward and especially those that are cash-strapped, where we can write a contract very quickly, and keep them moving so that we emerge on the back end with a healthy industrial base—which we know is a critical, strategic part of how this department defends the homeland.

**Q: Will the increase in remote work be something that will remain after this all ends? How can you address issues such as working with classified information remotely?**

A: One of the things that we started early in our approach to this is, I put a note out to all commanders in the Air Force. ... Whiteman is not going to look like Clovis. It's not going to look like Hill in the middle of Salt Lake City. It's not going to look like Ramstein. It's not going to look like Kunsan. Every one of our bases is unique in that there are different missions, different populations, different communities, different health care in the community in terms of capacity and capability, right? So, a one-size-fits-all approach to leading through this crisis is doomed to fail. So, our approach has been to provide broad mission command guidance to local installation commanders, get them the resources they need, ensure they have the decision authority they need, and then expect them to move out and really handle their base in the way that that is best suited for that population in that community.

**Q: What about flying hours? If there's a shortfall, how do you overcome it?**

A: If you go forward to Kunsan, if you're going forward to Bagram, you will find we're flying ops at no degradation, because these are our fight-tonight forces. ... If you look at Air Mobility Command, not only are they flying pretty much at the same rate, but it's going to go up as we move more and more by air. And then you'll go to Air Training Command and you'd find that they're flying right at the 50 percent level.

One of the areas that we watch really hard is our depots, because our civilian workforce in the depots are just magicians. They keep 58-year-old airplanes flying, I mean, it's just magic what they do. But they also tend to be an older population, so therefore at greater risk. So General Bunch [Gen. Arnold Bunch Jr., head of Air Materiel

Command] is working hard to make sure that we adjust our depot operations because that impacts number of aircraft available, it impacts the mods that we're doing, and that translates directly into our flying hour program.

I think where we are closer to fight tonight, we're flying just as we did before COVID. And where we get farther away from that is where you get closer to that 50 percent. How do we get it back? You know, the good news is ... we have been through times where we've had to ground fleets for some period of time because of a maintenance action, and then have to reconstitute that fleet. And so we actually have some good templates. We know how to do this.

**Q: The last time we saw a major reduction of flying hours during sequestration. What did you learn?**

A: What's interesting about sequestration is how long it took us to recover from that one major year of across-the-board cuts. It's just amazing to me. I still find areas where if something goes badly, and I asked the team to dig into it, we go back to, 'Well, this is a decision that was made back during sequestration.' ... So are there some things that we can learn from that. ... I would say that there are probably more current examples.

**Q: What has been the impact of the stop-movement order, of not being able to bring units back from downrange or Airmen not being able to PCS?**


A: Right now it's manageable, but it's not without some level of pain for Airmen and families who had a plan and had to pack, all planned and ready to go. So we're managing it Majcom by Majcom, base by base, and, quite frankly, Airman by Airman.

**Q: To the downrange side of things, is this preventing units that were set to return home from returning home? How long can that continue?**

A: We're working that unit by unit. There still are rotations that are going on, especially when you talk about the CENTCOM AOR. So we're working that with the CENTCOM commander, really, unit by unit, based on his overall mission.

**Q: Some bases and units have made big public shows of force recently. For example, a B-52 Elephant Walk at Andersen Air Force Base in Guam. Why?**

A: I think it's really important for people around the globe to know that this Air Force is up and operating, and this would be a dangerous time to even consider taking us on. We can generate airplanes, we can generate air power, we can generate space power. The United States Air Force is fully capable, and that's what an Elephant Walk demonstrates. But it also allows us to upgrade our procedures, because we don't put aside social distancing, we don't put aside CDC protocols.

There are 1,000 fingerprints on every aircraft that takes off, right? It's not just the crew in the cockpit. This is air traffic controllers, weapons loaders, weapons builders, refuelers, tire and battery. And so every one of those operations has got to be modified and adjusted. And so we learn. How do you do air traffic control in a COVID environment? How do you build weapons in a COVID environment? How do you refuel aircraft and operate a fuel truck? These are all things that we're modifying real time. It's a great exercise to ensure ... we can continue to produce air power despite the COVID challenges. 

minimize the exposure," Bieber said. "We're taking really, really careful precautions to ensure the safety of all of our members and their families. But it can't be understated how important it is that we're still projecting air power."

The base also hosts the 555th Fighter Squadron "Triple Nickel," which saw its Middle East combat deployment extended as part of the stop-movement order.

The deployment meant more space for the 510th to work and

# BMT Overhauls Training in Face of Coronavirus Pandemic

U.S. Air Force Basic Military Training graduation at Joint Base San Antonio-Lackland, Texas, on April 9. The ceremony was closed to the public, and the graduates observed social distancing rather than mustering in tight, close-in ranks.



Johnny Saldivar/USAF

By Jennifer-Leigh Oprihory and Brian W. Everstine

Not even stop-movement orders, social distancing, COVID-19, nor the notoriously germ-friendly environs of open-bay dorms and stressed and sleep-deprived young people could bring Basic Military Training (BMT) to a halt, but continuity did not mean business as usual.

Schedules were redesigned to enable newcomers to spend their initial 14 days in restricted movement, socially distanced from each other to ensure recruits were virus-free before they began training more closely together. Masks joined ABUs as standard issue.

Training was cut from eight-and-a-half to seven weeks; dorms built for 60 were limited to half that number or less. Screening helped limit to five—of some 6,000—the number of recruits who tested positive for COVID-19 on arrival. And for the first time in half a century, the Air Force opened up a second BMT location to enable training to continue as the number of recruits ramps up for the busy summer training season.

In addition to training recruits at Joint Base San Antonio-Lackland, Texas, the Air Force opened a BMT operation at Keesler Air Force Base, Miss., sending 60 recruits in an initial proof-of-concept to provide a surge capacity in extenuating circumstances and make USAF's training pipeline more agile. Not since 1966 had portions of BMT been located elsewhere. Back then, it was to Amarillo Air Force Base, Texas, in the winter of 1966 following a meningitis outbreak at Lackland.

At that time, Lackland also instituted its own form of social distancing when the illness broke out at the installation, AETC said, which included:

- Separating BMT flights as much as possible.

- Keeping dining-hall tables further apart.
- Shutting “chapels, theaters, bowling alleys, and similar places of indoor congregation.”
- Permitting “outdoor congregation” as long as there was a “vacant row between flights.”
- Forbidding recruits from coming into “any kind” of contact with civilians.

Air Education and Training Command Commander Lt. Gen. Brad Webb said as of April 7 that the size of BMT classes would be cut. “I wouldn’t to leave you with an impression that this doesn’t affect our ability in any of our pipelines because it does,” he said. “But we are, as elegantly as we can, navigating the risk-to-force and the risk-to-mission kind of aspects of keeping after readiness, to the extent that we can.”

Keesler was chosen because it already hosts tech school training; by shipping recruits there directly and having them do their BMT and tech school in one location, travel can be minimized, and, along with it, potential exposure to COVID-19.

“We don’t have to expose them and expose the community in a transportation hub, like a commercial airport,” said 2nd Air Force Commander Maj. Gen. Andrea Tullos in a conference call with reporters. Keesler’s medical and expeditionary training capabilities added to its advantages over other alternatives.

Training will be different, Tullos said, but not less. The quality of training must remain.

“At the end of the day,” Tullos said, “the Airman that comes out and marches across the parade field is going to be the same quality Airman.”

more time to fly. The squadron had been practicing Agile Combat Employment prior to the pandemic, but returned to focusing on basics once stop-over visits elsewhere were no longer an option.

“We’ve kind of changed our turn pattern around pretty significantly, but still flying as much as we were before, and maybe a little more,” Bieber said.

Units reordered routines so pilots could fly two to three times per day, then stay home in isolation on days they weren’t flying. Before COVID-19, regular operations meant about 12 F-16 flights each morning and 10 in the afternoon. Now, the schedule is typically eight sorties in the morning, eight in the afternoon, and eight overnight. Pilots used to



Joshua Seybert/USAF

Tech. Sgt. Jacob Liebel prepares a new nitrogen tank to be loaded onto a C-17 Globemaster III while wearing COVID-19 personal protective equipment at the Pittsburgh International Airport Air Reserve Station in Pennsylvania on April 8.

have 10 to 15 fly days per month. Now it's just four or five, but each includes three sorties.

"That makes for some pretty long debriefs," he said, noting that they aren't done in person, but remotely.

**"We're taking really, really careful precautions to ensure the safety of all of our members and their families. But it can't be understated how important it is that we're still projecting air power."**

—Capt. Claire Bieber, an F-16 pilot with Aviano's 510th Fighter Squadron

Medical staff embedded in the squadron perform daily check-ins, and Airmen are encouraged to stay home if feeling unwell. Beyond that, "there's hand sanitizer literally all over the place."

Aviano's 56th and 57th Rescue Squadrons (RQS) are limited in how they can train; prior to the pandemic, the 56th regularly flew with NATO allies Croatia and Slovenia, but pilots now remain in the mountain areas around the base or fly out over the Adriatic Sea, said Capt. Samuel McNell, a pilot with the 56th RQS. That includes jumps for pararescuemen, "so we're still maintaining combat mission readiness," said Capt. Jordan Nichols, a combat rescue officer with the 57th Rescue Squadron.

As elsewhere, Aviano Airmen who can are working from home and conducting video meetings online.

Aviano Airmen who live off base had to receive special permission and documents in order to travel to work. Some recent arrivals have been stuck in temporary lodging, unable to seek a home off base. Schools are closed, children need to be home-schooled, and spouses can't leave the house when Airmen need to report to work.

"We just miss each other," Nichols said. "You don't get to see your best friends every single day. It does help out having WhatsApp chats, having Zoom meetings so guys can razz." 🌟

# Space Force Finalizing Slew of Reports as New Service Stands Up

## Policies, suggestions, and recommendations hit Congress.

By Rachel S. Cohen

**T**he Space Force's plans for a new acquisition enterprise for military space are outlined in 10 recommendations to Congress delivered in a required report to lawmakers at the end of March.

The report stops short of recommending legal language, but instead highlights policies and approaches that need to change to streamline how the Space Force develops, buys, and upgrades its systems.

Six of the 10 recommendations would require legislative changes, according to Shawn Barnes, acting assistant secretary of the Air Force for space acquisition and integration.

The other four do not require Congress's approval. These include changing how the Joint Staff develops requirements for space capabilities—viewing space assets as a unified "basket of capabilities" rather than disparate spending accounts that make it harder to achieve objectives because money is stuck in one account or another.

What Barnes really wants is a freer hand. "If I were to have a single program element for all [research, development, test, and evaluation] for missile warning, missile tracking, that would allow greater flexibility," Barnes said in an April interview. "When we see a program either outperforming what we thought it was going to do, or under-performing what we thought it was going to do, then we could adjust resources."

The portfolio approach has gained attention in the Air Force in recent years as a means to move faster and spend money more wisely, especially on software, where it's harder to predict how long it might take to achieve a given capability, and where incremental improvements sometimes can be achieved rapidly. The Space Force wants to convince Congress that R&D would remain transparent at the same time that it looks to streamline acquisition, which often means cutting down on reporting requirements and reducing the number of people involved in a decision.

Another issue to be resolved is the whether the newly created Air Force space acquisition chief has jurisdiction

**"When we see a program either outperforming what we thought it was going to do, or under-performing what we thought it was going to do, then we could adjust resources"**

—Shawn Barnes, acting assistant secretary of the Air Force for space acquisition and integration

**A United Launch Alliance Delta IV rocket carrying a GPS payload for the U.S. Air Force Space and Missile Center (SMC) lifts off from Space Launch Complex-37 at Cape Canaveral Air Force Station, Fla., in 2019. The SMC and other space agencies met in February to discuss architecture for the new U.S. Space Force.**



United Launch Alliance

beyond the Department of the Air Force. “The way the law is written, it talks about it with respect to the Department of the Air Force,” Barnes told Politico. “When you take a look at the joint explanatory language, it indicates the assistant secretary serves as the senior architect for space systems and programs across the Department of Defense.”

The disparity has yet to be resolved.

The Space Force acquisition report is informed by discussions held during an architecture summit in February, which brought together the Space and Missile Systems Center (SMC) and Space Development Agency (SDA), among others, to discuss how to distribute the acquisition workload. Barnes said the Space Force needs a formal document to define terms such as space enterprise and portfolio architect, guidance that will eventually cover the Department of the Air Force, SDA, the Missile Defense Agency, and the Intelligence Community.

Setting up the future space acquisition enterprise means untangling a web of offices now responsible for planning, experimenting, buying, integrating, and launching space systems. DOD foresees a structure that would split acquisition into short-term and long-term programs, traditional and out-of-the-box ideas, and tactical, operational, and strategic planning.

If successful, multiple offices could operate efficiently yet without stepping on each other’s toes, wasting investment, or siloing programs.

The idea would be that “the sorts of work that happens in the National Capital Region remains strategic, and the work that happens at SMC is focused primarily on the sort of technical aspects of our architecture,” Barnes said. Between those two levels, the Space Security and Defense Program would focus on operational-level concerns such as space-related threats.

One of the biggest challenges has been setting a baseline for what terms mean and what DOD is looking for, Barnes noted. More modeling and simulation is needed to understand what operational concerns might pop up for space assets, such as threats against satellites and ground stations, hindering

intelligence-gathering, or blocking service members’ ability to do their jobs on Earth.


Space Development Agency Director Derek Tournear told reporters April 2 the summit helped each group understand more about what roles the other players in the acquisition ecosystem should hold. While SDA plans to move from the Office of the Secretary of Defense to the Space Force in the next few years, Tournear said it serves as a voice for the other services’ space requirements in the interim. That sets the department up for a better flow of information between the services as the Space Force matures, he said.

He argues that funneling architecture decisions through the same office will drive short-term thinking, as near-term needs will always win out over long-term vision. His organization would focus on what the military should want in the long run, which may not resemble near-term plans.

SDA is in charge of figuring out how to tie together all military sensors and communications assets in space to create an overarching network that connects to personnel in the various services. Tournear wants to keep that planning separate from considerations of what needs to reach orbit now.

The fledgling Space Force Acquisition Council, created to oversee space procurement requirements and policy, has to lead this enterprise as it evolves over the coming decades, while being realistic about the people and resources it has.

Barnes imagines workforce requirements could shrink as oversight demands are peeled away. Training could focus on showing acquisition staff how to handle issues at the lowest level and to encourage bold decision-making. By inculcating a culture of creative, rapid development, the new space buyers would keep U.S. satellites, sensors, and systems ahead of rapidly advancing competition from rivals.

A report on the National Reconnaissance Office and Air Force acquisition authority integration was due to Congress April 18, and a plan for Space Force military and civilian personnel is due in June, along with a plan for medical and physical requirements for Space Force members. 

# Early Graduation Launches 1st Space Force Lts.

By Rachel S. Cohen

**S**ome 86 newly minted second lieutenants are heading to the U.S. Space Force as its first company-grade officers, following their April 18 graduation from the U.S. Air Force Academy.

They are among nearly 1,000 new graduates, with the balance commissioning into the Air Force, capping a tumultuous month for the Cadet Wing, during which seniors rallied to organize the travel home of roughly 3,000 underclassmen to protect against the spread of the coronavirus, two seniors died in apparent suicides, and Academy and service leaders moved up graduation by six weeks to help the Class of 2020 move on from the tragedy and begin their professional careers.

In the wake of the suicides, rumors and unsubstantiated comments on social media fueled anguish among cadets, at least two first-class cadets tested positive for COVID-19 and were moved to isolation, and at least three other people living and working at the Academy had tested positive.

"In nearly four decades in uniform, I can tell you that this week has been one of my most difficult," Silveria wrote to the Academy community after the second death was confirmed. "It is in times like these that feeling the full strength of the USAFA bonds—between our cadets, graduates, faculty, staff, and our entire community—can make all the difference."

Air Force Secretary Barbara Barrett, USAF Chief of Staff Gen. David Goldfein, and Chief of Space Operations Gen. Jay Raymond all flew to the Academy on March 30 to talk to cadets, leaders, and staff, and returned 19 days later for the graduation, in which the graduates marched and assembled six feet apart, as their leaders watched, socially distant from each other on the reviewing stand.

No friends or family were permitted to attend in person, and only cadets first class were present. The rest of the Cadet Wing was sent home in March to stem the spread of the COVID-19 pandemic. Despite the enforced social distancing, when the ceremony was complete, the Thunderbirds flew overhead and hats flew skyward in the traditional celebratory salute.

"In this time of trial and testing for you and for our nation, you have demonstrated courage," Vice President Mike Pence told the graduates. "You're an inspiration to every American."

Their journey had not been easy. Cadet First Class Haeley Deeney, the Cadet Wing Commander, wrote to the broader Academy community in April, addressing both families and alumni and taking critics to task for "negative ... harmful posts and comments" in social media.

"Not only is this spread of false information in direct conflict with the dissemination of real-time, accurate updates, but [it's] detrimental to the mental and emotional health of the Cadet Wing," Deeney wrote. "As the cadet and permanent



Photo by Tech. Sgt. Michelle Alvarez

U.S. Air Force Academy Cadets with the Class of 2020 wear masks against the Covid-19 virus and observe social distancing as they graduate at the U.S. Air Force Academy, Colo., April 18. Nearly 1,000 cadets commissioned into both the U.S. Air and Space Forces.

party leadership team exhausts all efforts to take care of the wing, our jobs have been made more difficult combating rumors."

USAFA Superintendent Lt. Gen. Jay Silveria called the day a "defining moment" in the Academy's history. Seniors spent their final weeks at the Academy under strict rules restricting movement, gatherings, and trips off campus while grieving the tragic suspected suicides of two classmates in March.

Chief of Space Operations Gen. Jay Raymond addressed the entire class, and not just his newest 86 Space Force members, as he told them, "You are our future."

Among the roughly 960 seniors earning their bachelor's degrees and commissioning into the Department of the Air Force as second lieutenants:

- 71 percent are men and 29 percent women.
- 30 percent identify as minorities.
- 13 were international cadets representing Georgia, Macedonia, Moldova, Pakistan, Panama, the Philippines, Rwanda, Singapore, South Korea, Taiwan, Thailand, and Tunisia.
- 485 were selected for pilot training.
- 11 were selected for combat systems officer training.
- 10 were selected for air battle manager training.
- 30 were selected for remotely piloted aircraft training.
- 536 will become rated officers in other careers.

They bring the total number of USAFA graduates to more than 52,000 over the past 61 years.

Once the Thunderbirds had roared overhead and the new graduates' covers flew skyward in a burst of joy, reality set in again. The new second lieutenants would be screened once more for COVID-19 and then depart the Academy for further training and the launch of the Air Force and Space Force careers.

Silveria said the Class of 2020 would always be unique. "When the Class of 2020 entered USAFA we were a nation at war," he wrote. "You have all signed up to serve in a time of war—to make a difference. We still battle terrorism and extremism around the world, but today we are at war with another enemy, a global pandemic, and that fight is unconventional. ... We must make unconventional decisions and take what some would consider extreme measures." ★

# Inspector General Blasts USAF, AFRICOM

## The new operating base in Niger draws heat.

By Brian W. Everstine

**T**he Air Force and U.S. Africa Command skirted congressional oversight, didn't adequately complete a site survey, and didn't meet safety requirements in building a new operating base in Niger, leading to extended delays, cost overruns, and possibly unsafe conditions for personnel at Air Base 201, according to a report from the Defense Department's Inspector General.

Niger Air Base 201 is the largest Air Force-led construction project in the service's history, expected to be a hub of intelligence, surveillance, and reconnaissance operations in the Sahel region of Africa and capable of C-17 operations. The IG report, released April 2, outlines a list of issues with the construction process, though both AFRICOM and U.S. Air Forces in Europe-Air Forces Africa dispute the conclusions drawn.

The base was originally tasked in 2013 with a targeted completion date of October 2017. However, the Air Force completed the airfield and base camp in May 2019, and work on infrastructure to support sustained ISR operations began earlier this year.

Throughout this timespan, the Inspector General report states:

- The Air Force built runway shoulders at the base without congressional authorization. The original plans excluded these runways, with AFAFRICA "significantly" underestimating its project cost, which created a risk the service would not complete it.

- The service bypassed congressional notification by splitting ISR construction requirements into six projects, funded with operations and maintenance dollars. With each portion under \$2 million, the service was able to use O&M as opposed to military construction funding, which would have required notifying lawmakers. AFAFRICA disputed this claim, stating each ISR project is an individual, "complete, and usable facility."

- The Air Force may have violated the Antideficiency Act, which prevents the service from making obligations in excess of appropriated funds. The Air Force bought 12 permanent guard towers at a cost of \$3.7 million, using procurement funds instead of MILCON. Additionally, these guard towers were built on foundations originally laid for temporary towers, potentially creating a safety issue. AFAFRICA disputed this, saying the towers count as equipment.

- Both AFRICOM and AFAFRICA did not perform adequate site surveys, specifically no soil sampling or topographic analysis. This caused pavement compaction and drainage problems.

- The base was not constructed to meet safety, security, and other technical requirements. For example, the base's perimeter fence was not up to standards, requiring a waiver, and the runway's solar airfield lighting did not conform to requirements that it provide continuous lighting.

"These problems occurred because USAFRICOM and the Air Force did not adequately oversee and coordinate with stakeholders on the delivery of Air Base 201," the IG wrote. "As a result, the airfield and base camp needed to support the USAFRICOM ISR mission was delayed by almost three years from the original planned date of completion."

The way the base came together "could lead to increased risk



Photo: Tech. Sgt. Perry Aston

U.S. Air Force RED HORSE take advantage of the cooler temperatures at night to pave an access ramp to the flight line at Air Base 201 in Agadez, Niger, in 2019. An Inspector General report on USAF in the region has proved controversial.

in safety and security," the IG alleges. The delay required the Air Force to issue temporary waivers to begin ISR operations in June 2019, and the shortfall "increases the safety risk for personnel operating at Air Base 201," states the report.

Going forward, the IG recommends the Air Force and AFRICOM establish a coordination and decision-making process with stakeholders, along with submitting congressional notification as needed and reviewing its records management. At the base, the Air Force should review its solar lighting and develop a plan to address issues with aircraft rescue and firefighting services, the report states.

Both AFRICOM and AFAFRICA disagreed with most of the IG report's findings, "stating that USAFRICOM and the Air Force accomplished the construction of an ISR and C-17-capable airfield in an operationally challenging environment with changing requirements during the construction period."

AFAFRICA said that throughout this process, there were "key stakeholder meetings" to discuss planning, design, and construction.

The base is very remote, which causes problems in sourcing material to build the base. Supplies had to be trucked in long distances from ports in west Africa, and eventually C-130s flew basic supplies in about once per week, the command told Air Force Magazine.

Logistics issues like these caused large cost overruns. For example, the initial 2013 assessment for the base estimated a cost of about \$203,000 for base utilities. By 2017, that estimated cost exploded to \$3.1 million—a 1,426 percent increase.

AFAFRICA and Airmen were able to build the base "in a little over three years in the middle of the Sahara Desert, despite the necessity to meet emerging requirements and overcome environmental factors. ... Such [an] undertaking would not be possible without senior level oversight and effective planning and design," the command said in response to the report. ❏



# Russia Flexes Space Muscle with Anti-Satellite Weapon Test

By Rachel S. Cohen

Russia again flexed its muscle in space by testing a ground-based, direct-ascent anti-satellite weapon on April 15, drawing criticism from U.S. Space Command.

“Russia’s DA-ASAT test provides yet another example that the threats to U.S. and allied space systems are real, serious, and growing,” SPACECOM boss Gen. Jay Raymond said in a release. “The United States is ready and committed to deterring aggression and defending the nation, our allies, and U.S. interests from hostile acts in space.”

The command, which manages daily offensive and defensive military space operations, did not reveal where the ASAT weapon was aimed, but it is not tracking any space debris as a result of the test, according to spokeswoman Lt. Col. Christina Hoggatt. She referred questions on whether SPACECOM had spoken with its Russian counterparts about the test to the State Department, and did not say if the Pentagon was responding in a way that could deter Moscow from testing such weapons in the future.

“This test is further proof of Russia’s hypocritical advocacy of outer space arms control proposals designed to restrict the capabilities of the United States while clearly having no intention of halting their counterspace weapons programs,” Raymond said.

SPACECOM said Russia’s missile can destroy satellites in low Earth orbit, which stretches up to 1,200 miles above the Earth. Direct-ascent weapons try “to strike a satellite using a trajectory that intersects the target satellite without placing the interceptor into orbit,” according to the Center for Strategic and International Studies. Ballistic missiles and missile defense interceptors can be used as direct-ascent ASAT weapons.

Russia’s demonstration that it can damage assets in low Earth orbit comes as the U.S. plans major investments in that area of space. LEO is already home to remote sensing and scientific satellites, according to the National Air and Space Intelligence Center, and is where the government and commercial sectors want to loft a vast constellation of low-cost communications and other satellites over the coming decades.

A CSIS report published in March noted that Russia is developing an air-launched, direct-ascent ASAT missile and has already tested a ground-based version. The country is ramping up its ability to interfere with other nations’ space assets using kinetic means as well as electromagnetic and cyber tools.

“Evidence suggests that Russia has invested in a sweeping range of kinetic physical counterspace capabilities over the past decade, including ground- and air-launched direct-ascent ASAT missiles capable of targeting satellites in LEO and co-orbital ASAT weapons that could operate in any orbital regime,” the March 31 report said. “Russia’s kinetic physical

counterspace activities often closely resemble previously operational Soviet-era ASAT programs, suggesting that the country has benefited from decades of ASAT weapons research conducted by the Soviet Ministry of Defense.”

The U.S. military has reported other instances of suspicious Russian activity on orbit this year. Most notably, Time magazine first reported in February that two Russian satellites were following a National Reconnaissance Office satellite, which the Pentagon decried as an act of aggression even as Moscow said the systems were part of a domestic experiment to see if a “nesting doll” satellite could separate into two on orbit.

SPACECOM says Russia’s action in space “would be interpreted as irresponsible and potentially threatening in any other domain.”

The announcement of the DA-ASAT test comes the same day a Russian Su-35 intercepted a U.S. Navy P-8A Poseidon flying in international airspace over the Mediterranean Sea.

“The interaction was determined to be unsafe due to the Su-35 conducting a high-speed, inverted maneuver, 25 [feet] directly in front of the mission aircraft, which put our pilots and crew at risk,” according to a statement from U.S. Naval Forces Europe-Africa. “The crew of the P-8A reported wake turbulence following the interaction.”

The Navy said the U.S. was operating in international airspace and did nothing to provoke the 42-minute intercept.

“While the Russian aircraft was operating in international airspace, this interaction was irresponsible. We expect them to behave within international standards set to ensure safety and to prevent incidents, including the 1972 Agreement for the Prevention of Incidents On and Over the High Seas (INCSEA),” reads the statement. “Unsafe actions increase the risk of miscalculation and potential for midair collisions.”

The U.S. aircraft was operating consistent with international law and did not provoke this Russian activity. ❖



## Directed-Energy Demo Underway

By Rachel S. Cohen

The Air Force Research Laboratory announced April 6 it has kicked off its overseas demonstration of directed-energy (DE) weapons dispatched to take down threatening unmanned aircraft.

While the demo has long been in the works, AFRL revealed that its Tactical High-Power Operational Responder (THOR) system will join four Raytheon-built laser and microwave weapons in the assessment. Microwaves interfere with a small drone’s electronics to stop or redirect them, while lasers burn a hole in the fuselage.

“THOR is a directed-energy game-changer,” Kelly Hammett, AFRL’s directed-energy director, said in a release. “Drones are becoming more and more pervasive and can be used as weapons intended to cause harm to our military bases at long



AFRL Directed Energy Directorate

**The Air Force Research Laboratory's Tactical High-Power Operational Responder (THOR) employs microwave energy to defeat multiple, concurrent targets, such as drone swarms.**

standoff ranges. ... THOR, with its counter-electronic technology, can take down swarms of drones in rapid fire. This capability will be an amazing asset to our warfighters and the nation's defense."

The THOR microwave is built to tackle multiple, short-range targets at once. Though the service is often hesitant to say exactly how many drones could be downed as a swarm, it has tried attacking more than a dozen at a time. BAE Systems created THOR with the Air Force Research Laboratory. Leidos and New Mexico-based Verus Research contributed to its design as well, according to the Albuquerque Journal.


Raytheon's joystick-driven Phaser microwave will take part in the yearlong field test, as well as three laser systems.

"The differences with the three [laser] systems are minimal," said Michael Jirjis, who oversees base defense experimentation in the Air Force's Strategic Development Planning and Experimentation Office. "We have made slight changes based on input from lessons learned through our acceptance and overseas analysis, but at this point those have been minor and they are the same system."

He did not immediately answer how the capability of each microwave weapon differs.

Military officials worry that commercially produced, cheap drones can spy on base operations and carry explosives. They also could prove catastrophic if sucked into a jet engine. Protecting bases from those unmanned aircraft is a top Air Force priority that has become the focus of the service's directed-energy experiments over the past few years.

USAF has vetted a range of systems at the White Sands Missile Range in New Mexico as well as at the Army's Maneuver Fires Integrated Experiment in Oklahoma, judging how easy each weapon is to use, how effectively they confuse and destroy unmanned aircraft, and how well they integrate with other DE systems and command-and-control software.

The service is not disclosing where the tests will take place, though the systems could become a permanent fixture there if they succeed. 

## USAF to Launch Search for Flying Cars This Month

By Rachel S. Cohen

The Air Force will kick off its effort to encourage the development of flying cars with a virtual launch event featuring product presentations and government briefings from April 27 to May 1.

Known as "Agility Prime," the initiative aims to support private companies that are pursuing the next great creation in air transportation. The Air Force is offering funds and testing resources to vendors with designs for "advanced air mobility vehicles" that can be used for missions from medical evacuation to installation security to disaster relief.


The service hopes to mature that market to the point that flying cars become cheap and accessible enough for the broader public, not just for military use. Its first solicitation calls for vehicles that can carry three to eight people at speeds faster than 100 mph, with a range of more than 100 miles and endurance of more than an hour. Those prototypes must make their first full-scale flight by Dec. 17 to prove they are on the path to certified airworthiness and move on in the program.

If successful, the service plans to buy a small number of usable flying cars—or "ORBs"—by 2023. ORB can stand for "organic resupply bus, for disaster relief teams, an operational readiness bus for improved aircraft availability, and an open requirements bus for a growing diversity of missions," according to an Air Force solicitation document.

"Agility Prime also aims to bring together industry, investor, and government communities to establish safety and security standards while accelerating commercialization of this revolutionary technology," the service said. "Over 200 companies around the world are developing transformative vertical flight aircraft. ... These aircraft may incorporate nontraditional electric or hybrid propulsion for manned or unmanned missions, with an onboard pilot, remote pilot, or autonomous control."

Defense One previously reported the concept could eventually augment or replace the V-22 Osprey as a quiet, affordable, more flexible air vehicle that doesn't need a runway.

To bring the idea to fruition, the Air Force Research Laboratory will work with the mobility program office and the Air Force Warfighting Integration Capability group on transitioning prototype technology to a real-world program for Airmen. AFVentures, a service-run group that works with venture capitalists and small businesses, will help bridge the gap between the Defense Department, funding sources, and industry as well.

"Now is the perfect time to make 'Jetsons' cars real," Air Force acquisition boss Will Roper said in an April 13 release. 

## T-7 Sims Pass Design Review

By John A. Tirpak

The Ground-Based Training System that goes with the T-7A Red Hawk advanced jet trainer has passed its Critical Design Review (CDR), concluding 18 months of development work and paving the way for fabrication of simulators and other devices, Boeing announced April 3.

The Air Force reviewed the T-7A's "ability to conduct live, virtual, and constructive training exercises, through dynamic motion-enabled trainer cockpits; high-resolution projection systems; digital debrief stations and simulated

avionics; as well as egress training that will better prepare pilots for escaping an aircraft during an emergency,” Boeing said. The CDR, which was conducted virtually between the System Program Office at Wright-Patterson Air Force Base, Ohio, and the Boeing T-7A Red Hawk program office in St. Louis, took five days to complete. Air Education and Training Command’s office at Edwards Air Force Base, Calif., Air Force and Defense Department acquisition officials at the Pentagon, and the Defense Contracting Management Agency also participated.

The CDR for the aircraft itself was conducted Sept. 10-19, 2019. Initial capability is planned for Joint Base San Antonio-Randolph, Texas, in 2024.

Boeing, along with its partner Saab of Sweden, received a \$9.2 billion contract in September 2018 to develop the T-7A—since nicknamed the “Red Hawk”—and to build 351 of the aircraft and 46 simulators.



**The T-7A Red Hawk’s Ground-Based Training System passed a critical milestone, paving the way for the fabrications of simulators and virtual training.**

A company spokesman said Boeing considers the T-7A a “franchise program,” with potential global sales of trainer aircraft, companion trainers, light attack versions, and “Aggressor” versions, as well as simulators and ground-based training gear to be \$40 billion. Company officials have previously predicted the world trainer market alone to be 2,600 airplanes, including 475 for the Air Force.

Boeing invested nearly \$100 million of its own money in developing the jet and bid nearly \$10 billion below the Air Force’s own estimates for further development, building a production capability and the initial jets. ✨

## Global Strike Commander Seeks ‘Clean Sheet’ Arsenal Plane

By John A. Tirpak

Gen. Timothy Ray wants a new, “clean-sheet” aircraft design and not a reconfigured B-52 bomber to be the basis of a future arsenal airplane.

Ray, the commander of Air Force Global Strike Command, also reported that B-1 repairs are advancing toward improved readiness for the supersonic bomber, touted the hypersonic Air-Launched Rapid Response Weapon (ARRW), and hinted that demand for close air support from his command may be waning.

“The arsenal plane concept is probably better described as more of a clean-sheet approach to a platform that can affordably and rapidly fill the gap for long-range strike capabilities and to go down more innovative paths,” Ray told participants in a Defense Writers Group telephone conference. Ray and Air Combat Command chief Gen. Mike Holmes have previously suggested the B-52 could fill the role of an arsenal plane loaded with standoff



Master Sgt. Russell Scalf

**The B-1 fleet was so heavily used for close air support in Afghanistan and Iraq in recent years that mission capable rates plunged. A recovery overhaul program is now well underway.**

weapons to augment a stealthy conventional strike force.

The National Defense Strategy demands that AFGSC develop more capability in long-range strike. The “gap” Ray referred to would be the Air Force’s requested reduction in the B-1 fleet, assuming Congress allows it.

The B-1 is to be fitted with the hypersonic ARRW (pronounced “arrow”), Ray noted. AFGSC plans to add external pylons that would allow the B-1 to carry six such missiles, in addition to other standoff missiles mounted internally on rotary launchers, he said.

Air Combat Command and AFGSC agree that ARRW is the preferred hypersonic weapon, at least in the near-term, beating out the Hypersonic Air-breathing Weapon Concept (HAWC) being developed by USAF and the Defense Advanced Research Projects Agency, Ray said.

Asked about debate between Air Combat Command and Global Strike Command over ARRW versus HAWC, Ray replied that the two commands are “in a similar place in terms of ARRW being the thing we need to go move out with. We think we’ve got a good game plan going forward. We’ll continue to work with them.” He added that “obviously the action officers will debate,” but “we’re stepping out” on ARRW.

As for the air-breathing system—which presumably would be smaller and allow a greater loadout per platform—Ray said, “We think an air-breathing missile in the long run would also be something to consider, but we’re very comfortable with where the Air Force is going in their selection on hypersonics.”

Fitting the B-1 with ARRW allows Global Strike “to take on that hypersonic mission faster,” Ray explained.

The B-1 has been turning in dismal mission readiness rates for several years because it was used as a high-altitude loitering munitions platform in Afghanistan and Iraq for a decade, rather than in its design role, to fly very fast and low. However, the fleet is recovering well, Ray said.

“I have a very positive recovery for the B-1 community,” he said. “I have more flyable airplanes and ready crews than we’ve seen in many years.” While he would not discuss mission capable rates for the B-1, crews are generating “at least 25 flyable airplanes a day,” he said. That’s “more sorties in a month than we’ve seen in the last three or four years.” Ellsworth Air Force Base, S.D., flew 100 B-1 sorties last month—something the base had not done in a single month for several years, he noted.

“I’m sitting on a significantly larger number of mission-ready crews,” Ray added, saying there has been “good progress, good momentum. I couldn’t ask for better.”

Ray suggested that to align with the National Defense Strategy, AFGSC is getting out of the close-air support business.

The NDS “by necessity ... focuses us to increase our long-range strike regardless of the platform. So we see an opportunity as we turn our hand from the close-air support mission (CAS)” to put more emphasis on long-range strike. “We have many platforms in the Air Force that can conduct the CAS mission so, there’s no shortage of CAS capability,” Ray observed. But having aircraft with “long legs” is “particularly beneficial” to AFGSC’s primary mission, he said. ✪

## A-10 Makes Wheels-Up Landing



Andrea Jenkins/USAF

An A-10 at Moody Air Force Base, Ga., landed wheels-up after an in-flight emergency. No one was injured.

By Brian W. Everstine

An A-10 pilot was uninjured when a Warthog made an emergency belly landing April 7 at Moody Air Force Base, Ga.

The A-10 from the 75th Fighter Squadron was flying a routine training mission when the pilot declared an in-flight emergency. The pilot returned to base and the aircraft’s landing gear retracted, but did not extend, forcing it to land and skid to a stop on Moody’s primary runway, according to a base release.

The pilot was evaluated by flight surgeons after the incident and released. A photograph of the incident shows the A-10, tail No. 81-0995, parked on the runway next to emergency vehicles.

An Air Force board will investigate the incident. ✪

## AIB: Inert Bomb Dropped Near Misawa Due to Pilot Error

By Brian W. Everstine

An F-16 pilot mistakenly dropped an inert bomb on private property near Misawa Air Base, Japan, in November due to a communication failure, according to a recently released Pacific Air Forces investigation into the incident.

On Nov. 6, 2019, an F-16 with the 14th Fighter Squadron was flying a suppression of enemy air defense upgrade training sortie at the Draughton Range north of the base. As part of the mission, the F-16 was loaded with an inert GBU-12 bomb that was to be dropped if the mission and weather allowed.

During the sortie, the F-16 twice attempted to drop the weapon on a target at the range, but scattered clouds obscured the target. After primary training was completed, the



Airman 1st Class China Shock

A U.S. Air Force F-16 Fighting Falcon taxis down the runway at Misawa Air Base, Japan, on March 30.

pilot made one more attempt to drop the bomb, using the “buddy lase” method, where two other aircraft participating in the sortie provided final guidance for the bomb after it was dropped, according to the investigation.

While on the attack run, the F-16 pilot asked for and received the targeting coordinates. He then selected “symbology” on the targeting system, which he believed corresponded with the correct coordinates, but it was actually about 3.4 miles from the intended target, the report states.

The pilot dropped the bomb, without confirming the coordinates were correct, and it landed on private property outside the range near Lake Ogawara. There were no injuries or significant damage to private property.

The Accident Investigation Board report states the incident was caused by pilot error and a failure to properly communicate with the other aircraft targeting the bomb. Additionally, changing weather, targeting technical error, and “channelized attention” contributed to the incident.

The 35th Fighter Wing temporarily stopped employing munitions at the range, impounded the aircraft, and grounded the pilot. The pilot was disqualified, but has since been retrained. Other pilots also have been briefed on the mishap, so they will not also make the same mistakes. The wing’s training program was investigated as part of the AIB process, and found to be sufficient. ✪

## VOX Space Nabs First Mission of Quick-Launch Program

By Rachel S. Cohen

Virgin Orbit subsidiary VOX Space will launch dozens of small satellites into space for the Space Force’s Orbital Services Program-4 (OSP-4), under a \$35 million contract.

For OSP-4’s first round of launches, dubbed Space Test Program-S28 (STP-S28), VOX Space will deliver 44 satellites to low Earth orbit across three launches starting in October 2021. Onboard will be a range of experimental technologies that will further the military’s progress in areas such as space domain awareness and communications.

“One such payload is QUEYSSAT, the No. 10 ranked [DOD Space Experiments Review Board] experiment and a cooper-



Galactic Unite illustration

**VOX Space, a Virgin Orbit subsidiary, plans to launch 44 satellites into low-Earth orbit beginning in October. VOX will use launch the rockets from a Boeing 747-400 dubbed “Cosmic Girl,” shown here in a photo illustration.**

ative effort between the U.S. Air Force Research Laboratory and the Canadian Department of National Defence,” the Space and Missile Systems Center said in an April 10 release. “This experiment will demonstrate and quantify the potential to improve Earth-satellite quantum channel uplinks via adaptive optics, expand quantum network concepts, and exploit this capability for defense applications.”

VOX Space says it has demonstrated all of its major LauncherOne components and is preparing for an orbital launch demonstration soon. VOX Space and Virgin Orbit launch a Boeing 747-400 plane named “Cosmic Girl,” which carries the LauncherOne rocket up to around 35,000 feet before shooting the payload into low Earth orbit.

“With the space domain more contested than ever, it’s crucial that we find ways to enable those responsible for space security to act quickly and effectively. Ultimately, we believe that affordable and responsive launch helps keep everyone safer—in part by creating a major disincentive for adversaries to work against existing satellites and space systems,” said Virgin Orbit CEO Dan Hart.

OSP-4 aims to launch 20 missions over nine years, with payloads heavier than 400 pounds, starting with STP-S28. It is one way the Space Force is trying to shorten the time it takes to put payloads on orbit, by launching systems no later than two years after a task order is issued instead of waiting several years. OSP-4 will also carry missions for the Space Development Agency.

The Space and Missiles Systems Center plans to award a contract for the next batch of launches, including STP-29, by the end of 2020. The pool of OSP-4 launch providers that could handle that mission includes Aevum, Firefly Black, Northrop Grumman, Rocket Lab, SpaceX, United Launch Alliance, VOX Space, and X-Bow Launch Systems. ✪

## Col. Alfred M. Worden, 1932-2020

By John A. Tirpak

Alfred M. “Al” Worden, retired USAF Colonel and Apollo astronaut, died March 18 at the age of 88. Worden was the Command Module Pilot for the Apollo 15 mission in 1971, the only Apollo mission on which all of the crew were Air Force pilots.

Worden performed the first “deep space” extravehicular activity (EVA), performing a spacewalk far from the Earth or

moon to retrieve samples and film cartridges from the ship’s service module. He made 74 solo orbits of the moon.

He grew up in Michigan, graduated from West Point in 1955, and was commissioned in the Air Force, receiving his wings in 1956. After service as a fighter pilot, he earned masters’ degrees in aeronautical and instrumentation engineering from the University of Michigan in 1963. In 1965, he graduated from both the Aerospace Research Pilots School and the British Empire Test Pilot’s School. In 1966, Worden was one of 19 new astronauts selected by NASA. He was assigned as the backup command module pilot for the Apollo 12 mission and to the prime crew of Apollo 15.

The first of the “J” Missions—how NASA referred to more elaborate scientific missions—Apollo 15 was the first to employ the lunar rover, the first to launch a microsat during the mission, and it achieved the longest stay on the moon at that point. Worden stayed in lunar orbit in the Endeavor command module, conducting microgravity experiments and photographing the moon’s surface, while crewmates David Scott and James



NASA

**Col. Alfred Worden**

Irwin descended to the moon’s surface in the lunar module Falcon. There they collected some 171 pounds of lunar samples during nearly 67 hours on the lunar surface. Worden’s record-setting EVA in deep space lasted 38 minutes. He received the NASA Distinguished Service Medal in 1971.

The Apollo 15 crew drew public ire when it was learned they had agreed to carry stamped envelopes to the moon for later sale, franking them on launch day and upon their return. Though they declined the agreed payment, all three were reprimanded by NASA for seeking to profit from their mission. None of

the crew flew in space again.

After his Apollo mission, Worden was Senior Aerospace Scientist at the NASA Ames Research Center, later becoming Chief of Systems Study. He retired from NASA and the Air Force in 1975. In later years he was president of Maris Worden Aerospace, Inc., and staff vice president of Goodrich Aerospace. He chaired the Astronaut Scholarship Foundation until 2011, at which point he published a memoir, “Falling to Earth: An Apollo 15 Astronaut’s Journey to the Moon,” which was an LA Times bestseller.

Worden ran unsuccessfully for Congress in Florida’s 12th congressional district in 1982. He was inducted into the International Space Hall of Fame in 1983 and the U.S. Astronaut Hall of Fame in 1997. ✪

### ■ The War on Terrorism

#### Casualties:

As of April 13, 2020, 92 Americans had died in Operation Freedom’s Sentinel in Afghanistan, and 96 Americans had died in Operation Inherent Resolve in Iraq, Syria, and other locations.

The total includes 184 troops and four Defense Department civilians. Of these deaths, 87 were killed in action with the enemy, while 101 died in noncombat incidents.

There have been 570 troops wounded in action during OFS and 224 troops in OIR.

# **FACES OF THE FORCE**



courtesy of Sal Speziale



Spencer Deer/USAF



LeeAnn Murphy



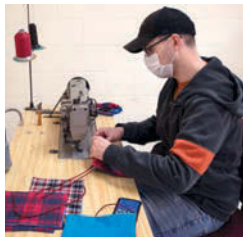
Staff Sgt. Jason Huddleston

As many restaurants closed their doors following nationwide stay-at-home orders, former Air Force and Air National Guard fighter pilot **Sal Speziale** chose a different path: He brought relief to those on the front lines, delivering free meals to first-responders and hospital workers from his Ciao Osteria restaurant in Centreville, Va. What began as a gift of 25 lunches to staff at Inova Fair Oaks Hospital expanded quickly with the help of a GoFundMe campaign that raised over \$100,000 and spread to include meals for Inova Fairfax Hospital and Reston Hospital Center, as well as two area fire stations among other locations. The 1978 Air Force Academy grad and AFA member said he was witnessing “an awakening” of compassion and kindness in the midst of a national crisis. “It’s gonna be a different world when we wake up out of this, and a different country,” he said. “But I think it’ll be a better country.”

AFRL Materials and Manufacturing Directorate research scientists **Ajit Roy** and **Nicholas Glavin** are developing a wearable volatile organic compound (VOC) detector to protect maintainers working on aircraft fuel tanks. This device would detect the presence of VOCs such as jet fuel vapor. “When a molecule of the gas comes close to the surface of the film,” the device would send “an RF [radio frequency] signal” to let the maintainer know they’re in danger, he explained.

**LeeAnn and Rich Murphy**, former Security Forces Airmen, separated from the Air Force more than a decade ago but continue to help veterans recovering from the traumas of war. The Murphys volunteer with Veterans to Farmers, which helps train veterans for agricultural careers, and they also help vets find housing and support. LeeAnn, who grew up on a farm, is now the organization’s chairman and chief instructor, and has taught more than 200 veterans.

A C-17 and **PACAF Airmen** flew a 41-hour, 6,866-mile emergency mission across 12 time zones to bring the twins of U.S. Soldiers to Walter Reed National Military Medical Center in Bethesda, Md., for emergency neonatal care. The parents were in quarantine in South Korea when their twins were born in Daegu. Military hospitals in the region couldn’t provide the care they needed. “Sometimes it only takes five pounds of precious cargo to generate an all-hands-on-deck effort,” the command said.



Tech. Sgt. Kenneth Norman



Kristina Lorelli



Sr. Airman Jay Grabiec



Sr. Airman Shannon Chace/ANG

By the time the Pentagon ordered cloth face coverings for everyone in military installations on April 5, **Master Sgt. Robert Whisenhunt**, the Aircrew Flight Equipment flight chief with the 97th Operation Support Squadron, had already devised a plan. “I came up with the idea on Friday, by Saturday we started experimenting” for effectiveness, he said. By Sunday, he had 45 volunteers helping to make masks for Airmen at Altus Air Force Base, Okla.

After spending 16 years as a professional ballerina, Virginia ANG Student Flight trainee **Kristina Lorelli** is trading in her pointe shoes for ABUs. Lorelli, who is in school and interning “at an auto shop,” has decided to pursue a career as an aircraft maintainer. “When I looked online for jobs in the Air National Guard and found Aircraft Maintenance, I thought—because I already have some background and I’ve always wanted to be a pilot—this would be good preliminary experience,” said Lorelli.

**Second Lt. Jon Kent** led a group of 60 **Illinois ANG** members supporting relief efforts at an emergency alternative health care facility set up in Chicago’s McCormick Place in response to the COVID-19 pandemic. “In just five short days, they were able to set up a system that they were unfamiliar with and greatly enhanced the capabilities of medical responders who will soon be using the facilities here,” said Kent. For most of the Guardsmen, it was their first state activation.

Airmen from the **Alaska ANG’s 168th Wing** are using 3D printing to manufacture “a functional respirator mask” so that N95 particulate respirators can be allocated for use by medical Airmen responding to the new coronavirus pandemic. “Some of our jobs demand PPE-like masks, but we’re trying not to use them,” said 168th Maintenance Group Commander **Lt. Col. Jennifer Casillo**. A team of Airmen led by 168th Aircraft Maintenance Squadron production superintendent **Senior Master Sgt. Ray Allen** scoured internet forums for potential designs and tested them before settling on one known as the “Montana Mask,” which was brainstormed by a neurosurgeon from the state. The washable, sterilizable design is made of plastic and uses replaceable paper filters. “Although not yet approved by any state or federal regulating institute, early testing shows the mask to be effective if fitted properly,” the Wing noted in a release. But the Wing isn’t alone. Airmen from across the country are using additive manufacturing to make personal protective equipment, such as “N95 style face masks” being made by the 388th Maintenance Group at Hill Air Force Base, Utah, and face shields being created by 57th Aircraft Maintenance Squadron maintainers from Nellis Air Force Base, Nev.

**Tell us who you think we should highlight here. Write to [afmag@afa.org](mailto:afmag@afa.org).**

IN TIMES OF CRISIS, THE AIR FORCE FAMILY PULLS TOGETHER.

**YOU CAN HELP.**



**STRONGER TOGETHER**

That's why we created the *AFA COVID-19 Airman's Assistance Fund*.

Find out more and donate at [www.AFA.org/COVID-Help](http://www.AFA.org/COVID-Help)



Join the fight!



A United Launch Alliance (ULA) Atlas V rocket carrying the AEHF-6 mission for the U.S. Space Force's Space and Missile Systems Center in Florida lifts off on March 26.

# Building the Space Range of the Future

Cape Canaveral is running out of room.

United Launch Alliance

By Rachel S. Cohen

CAPE CANAVERAL AIR FORCE STATION, FLA.—

**F**lorida's historic, 16,000-acre spaceport on the Eastern Seaboard is filling up with companies and partnerships as a new space age unfolds.

Launchpads that sat vacant for years are now stretched so thin that newcomers are referred to NASA's neighboring Kennedy Space Center. While United Launch Alliance (ULA) assembles one of its Delta IV Heavy rockets at the Cape, Blue Origin's growing facilities are under construction nearby. Cape Canaveral hosts five companies at its launch facilities, three more than it had a decade ago. Fifteen new companies have asked for launch property on the coast in the past year, compared to three in 2015 and zero in 2010. The Eastern Range in 2020 expects to hold more than three times the number of launches than it saw in 2010.

"Everyone wants to come to Cape Canaveral," said Tom Eye, the plans and programs chief for the 45th

**"What we're calling 'Range of the Future' is all based on: How do we position ourselves to get after the warfighting requirements that we're going to need from a joint capability?"**

—Chief of Space Operations Gen. Jay Raymond

Space Wing at Patrick Air Force Base, Fla. "If you look at our little 'We're Busy' chart, there's two vacant spots."

The installation's disappearing real estate is a visible metric of the commercial race to space that is transforming how the Space Force manages launches across the country and is driving a plan to modernize those facilities known as "Range of the Future."

The Space Force plans to update Cape Canaveral and its sister range at Vandenberg Air Force Base, Calif., in terms of both infrastructure and processes over the next decade, clearing the way to accommodate what could be daily launches for everything from manned spaceflight to military and commercial communications and surveillance payloads. Thanks to modern manufacturing techniques and multi-payload launches, the cost of launching hardware into space is plunging, and military-run launch facilities want to shoot systems into orbit as fast as the commercial sector can churn them out.

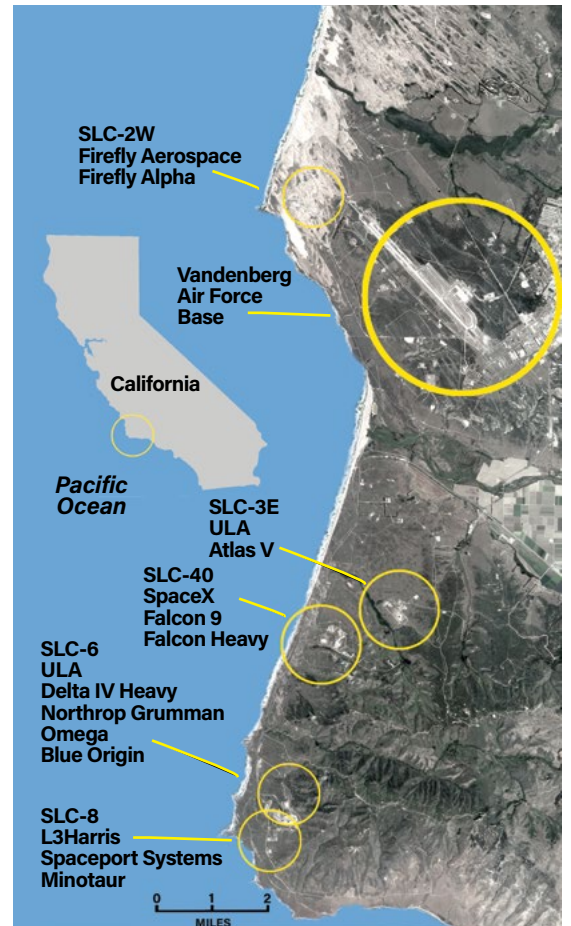
This is what the Space Force calls "on-demand, assured access to space."

"What we're calling 'Range of the Future' is all based on, 'how do we position ourselves to get after



# Flocking to the Space Coasts

The number of companies looking to launch their rockets and payloads into space from Cape Canaveral Air Force Station, Fla., and Vandenberg Air Force Base, Calif., is growing. The Space Force is considering a slew of changes to its ranges to accommodate increased demand in the modern space era.



the warfighting requirements that we’re going to need from a joint capability?” said Chief of Space Operations Gen. Jay Raymond last November. “I’m hoping to do this with less money. ... With autonomy, you get to reduce some of that infrastructure, which I think will be very important and would also be a cost savings.”

A January 2019 Air Force Space Command slideshow laid out a three-phase approach to rolling out changes. First, top-priority projects—such as transitioning to a new safety system and overhauling how launches are scheduled and infrastructure upgrades paid for—would take place until 2023. From 2023 to 2024, the military would “continue focused development of architecture/infrastructure improvements” while settling into its new business practices. The slides dub 2024 and beyond the “era of U.S. spaceports,” using launch sites on-demand in the same way as airlines at a major airport.

“Range of the Future” offers the 45th Space Wing at Patrick and the 30th Space Wing at Vandenberg the chance to reshape their relationship. Officials say the two bases are the closest they’ve ever been and are rethinking their roles as more companies come knocking on both coasts.

Col. Anthony Mastalir, 30th Space Wing boss, and Brig. Gen. Doug Scheiss, 45th Space Wing commander, are trying to better align their organizations to work more efficiently and to offer a unified storefront to anyone wanting to get to orbit.

“This is a really unique opportunity for us,” Mastalir said. “When a customer comes to ... a U.S. Space Force range, it really shouldn’t matter whether it’s an Eastern Range or Western

Range. That storefront should be similar. They should expect similar processes, similar capabilities.”

Col. Kris Barcomb, 30th Operations Group commander at Vandenberg, said standardizing safety protocols and environmental compliance and other standards will create an “even stronger customer-oriented model.”

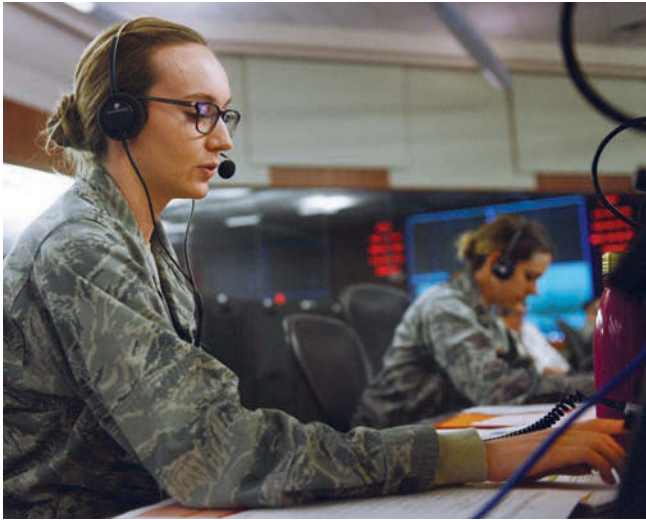
“We believe that we can minimize a lot of the transaction barriers, a lot of the entry barriers for them,” he said. “We’re looking to find all those friction points together with the 45th to present ... a menu of options and services to them and helping them grow their business model.”

The Space Force already provides customers with the basic necessities for launch, such as nitrogen, helium, power, and weather tracking. But it becomes more complicated when a company wants to bring their own systems, such as a telemetry dish, that might not work with the military’s existing electronics.

“Sometimes we can make modifications to support those customers, sometimes it’s easier for them to just bring their own,” Mastalir said. “We want to be able to create a range where anybody who wants to bring their own equipment can plug-and-play.”

The ranges’ most pressing need is a network-based communication system that would allow commercial companies’ tools to share data with the Space Force without running into encryption or other problems. Replacing the decades-old wired network would accommodate newer means of collecting telemetry data, such as mobile vans equipped to operate anywhere on the range, rather than from a sole fixed spot.

Google Earth; Mike Tsukamoto/staff



Tech. Sgt. Jim Araos

1st Lt. Jeanne Nolan collects data as a ULA Atlas V-401 carries NASA's InSight mission payload to Mars after lifting off from Vandenberg Air Force Base, Calif., in 2018. Both Vandenberg and Patrick Air Force Base, Fla., are preparing to support more flexible and frequent space launch programs.

Some Airmen will change their jobs as communications specialists to handle cyber defense, Scheiss said.

## CHALLENGES AND OPPORTUNITIES

Adopting autonomous flight safety systems (AFSS) to rockets poses another big opportunity for space launch stakeholders. AFSS, which automatically destroys the launch vehicle if it flies off course instead of requiring a human to do the job, will be required on all rockets by 2023. The system can cut down on launch prep time, as well as resource and staffing needs.

"That's going to be critical, as we're driving future customers to adopt that type of AFSS structure, [it] allows us to bring down a lot of aging equipment, reduce our footprint on the range, and then divert those resources into more attractive options for commercial providers and government launchers," Mastalir said.

The 2019 AFSPC presentation noted that when considering divesting certain hardware and software to reinvest that money in range modernization, the service needed to be "careful with this thought since [the Air Force] does not reinvest like this."

Scheiss pointed to changes to everyday processes that can help hit the higher launch goal, such as creating templates showing where certain rockets are expected to travel so that Airmen can standardize safety checks. It's also becoming easier to schedule launches as companies become more open with each other. Instead of keeping their work tightly under wraps, the wing has a software system that lets companies deconflict their prep work with each other and claim time slots for upcoming launches.

Changing to a range that heavily relies on automation and remote operations—without as much manual equipment monitoring and reconfiguration—will help cut the time it takes to prepare a range for the next launch from 72 hours to four. Scheiss said the number of launches at the Cape is more important than the size of the rocket, since smaller payloads and rockets can take off more often than larger ones.

Patrick and Cape Canaveral are relying on that gradual shift to accomplish a launch manifest with as many as 51 events this year, and even more in the years to come.

"It's not just, 'can I launch a rocket once a week?'" Scheiss said. "It's, 'can I launch a rocket when anybody needs me to launch it?' That could be two days apart or one day apart from each other."

The ranges have also adjusted to a world where rockets don't just blast off, but also return. Cape Canaveral works with organizations such as the Coast Guard to watch the area where rocket parts are returning and assist if something goes wrong. Right now, SpaceX is still the only company recovering its boosters, but the industry is broadly moving toward reusable launch vehicles.

"That was a big culture shift," Scheiss said. "How do we make sure that we're doing public safety and resource protection as that comes back? It kind of extends the launch a little bit. ... We'll continue to do that as others bring [theirs] on."

All companies with reusable rockets will share the same landing zone on land or recover their systems on ships operating in the Atlantic Ocean.

The Space Force is rapidly running out of room for other commercial companies wishing to work on the Cape. Eye said the service is looking to NASA to help work around environmental concerns and develop some more property on the Space Coast. Officials are eyeing other ways of sharing real estate, such as Northrop Grumman building its new OmegaA rocket on the same pad as NASA's Space Launch System for manned spaceflight.

Space Florida, a state-run aerospace economic development organization, is turning one complex at the Cape into a multiuse facility where companies could show up within a day of launch, set up their rocket, shoot it, and leave. This kind of sharing could be a game-changer—provided assurances can be met.

"If there is an anomaly like they had on [launch complex] 40 with SpaceX and the thing blows up, it's going to damage that pad," Eye said. "When the pad is damaged, then your program is not going to go. So, where are you going to launch your rocket from?"

## EASING SUPPORT STRESS

Vandenberg's launch schedule is quieter than Cape Canaveral's. It currently hosts United Launch Alliance and SpaceX for national security space launches and could bring in Blue Origin or Northrop Grumman for government launches, if they win contracts under a major Space Force procurement effort. At least six commercial companies have approached Vandenberg about launching from the California coast, Mastalir said. Firefly Aerospace, a company that takes small to medium payloads to orbit, is on this year's manifest.

Vandenberg plans to host 14 launches this year. Growing the number of launches on base property promises to strain the Space Force's supply of security personnel, firefighters, and others. Airmen have to close roads, evacuate people, handle fire hazards, and manage other public safety tasks for each launch.

The possibility of overburdening those support personnel concerns Mastalir more than the number of different providers that could seek their help. Base officials are working on a master plan that could set up a commercial zone outside their gates, so that additional launch customers wouldn't rely as heavily on Space Force resources.

"There's a lot of give and take in terms of maximizing the capacity of the Western Range," Mastalir said. "It's something that we're very conscious of—not for today's mission, I don't have that problem this year. But, I think there may be a day

in the future where we are going to have to understand, 'how can we increase capacity?'"

He doesn't see a limit to the number of companies that the 30th Space Wing could bring in, particularly with the new network and safety equipment that would allow Airmen to turn the range over faster between launches—no need to spend time customizing things like the data-transmission fibers setup or managing command-destroy systems.

Vandenberg wants to bring in more companies whose rockets are in earlier stages of development, too. The base is turning Space Launch Complex 8 into an incubator where companies can mature and fly their designs. It will host Defense Department tests first, but eventually could be a dual-use complex.

"If you have a company that is using [venture capitalist] money and trying to make ends meet to deliver a product to earn more funding, very cost-conscious ... that'll be a big benefit for them," Mastalir said.

Added Barcomb: "If we can facilitate them while meeting government objectives, but also facilitate their access so that they can focus on the development on their own ... intellectual property, their technologies, without having to invest in infrastructure and power and roads and those kinds of things, then it's kind of a win-win."

The space wings could revamp their training to work with new aspects of the range. The 30th Space Wing already has a small virtual reality lab—which Barcomb describes as "cool," but "not in a fully applicable stage"—that can help train Airmen for mission-assurance processes that take place only occasionally. The wing can also design its own mock parts for training, instead of asking a company to build them at a higher cost.

Airmen from Vandenberg sometimes go to Patrick for training, and the two bases work together when the secretive X-37 space plane returns to Earth. Scheiss believes the space wings will need to update their training as they move under the Space Force's new Systems Command, which is expected to lead acquisition for the service. Space operators will still need to earn launch experience while working with the acquirers, he said.

"As we get to [AFSS] and others, we won't have the need for as many space operators, but we still want them to be knowledgeable in this mission," he said. "We may have to change a little bit [of] what they do to a more mission-assurance kind of aspect, of checking out the range, make sure the range is ready to go."

## TAKING TURNS

For companies, the biggest concern is that the Space Force be able to meet the launch schedule they want.

ULA Chief Executive Officer Tory Bruno said his company is very happy with the support it receives from the range. Instead of pushing for a particular new technology, he simply wants the government to stay on top of maintaining its infrastructure.

"As we look into the future, there may be a higher launch tempo, especially to deal with space as a warfighting domain," Bruno said. "When we look into the future of the pure commercial launch market, the forecasts still don't show that. They show a flat and anemic market for about the next seven to eight years. But if the Air Force needs more launches, then we would love for the range to be able to keep up."

For now, Bruno noted, ranges can't launch two rockets on the same day and can't conduct certain operations on side-by-side pads at the same time.

"If my competitor's on the pad next door conducting a hot firing of their engines or launching their rocket, I cannot have my personnel on my pad doing preparations for my next launch," he said. "What I look for in the future is their ability to be flexible and agile and keep up with the demands so that we're not in each other's way."

Other launch providers did not respond to requests for comment.

For future projects, the 45th Space Wing wants Congress to approve a proposal to let private companies pay for infrastructure changes on government-owned ranges. When Blue Origin wanted to widen the roadway at the Cape a few years ago, the government balked. Lawmakers said funding from contractors would have to be funneled through Capitol Hill's regular budget process, instead of going directly to the Department of the Air Force.

Wing officials think creating a revolving fund can pay for projects like the communications network upgrades at the center of the "Range of the Future" plan.

"It's just a matter of getting it through the wickets from the DOD into the system," Eye said. "Now's the time, because it's so opened up now with the focus on space, whether it's the Space Force or what's happening in space."

Because companies manage the facilities they lease from the government, the revolving fund could also become a key tool in adapting the private property to rising sea levels along the Florida coast.

## REPOSITIONING

As range customers diversify, so will the places they want to go.

Vandenberg launches most of its rockets south into polar orbit, while Patrick is better positioned to launch east to reach geosynchronous orbit. Geographically, both positions help ensure rockets launch over water, rather than land, minimizing risk to people in case of an accident.

Patrick is now considering returning to polar orbit launches, which it handled in the 1960s, based on interest from commercial customers. It's cheaper for a company that is already set up at the Cape to stay there instead of investing at Vandenberg for polar launches as well, and it would offer more options and some redundancy for satellite proliferation plans.

Vandenberg officials are thinking about taking on the kinds of launches more common at Patrick, as well. Instead of flying over the Rocky Mountains, rockets could fly south and make a sharp turn to get to an equatorial orbit. That approach uses much more fuel when traveling from California, compared to the more direct route from Florida, but could alleviate launch demands on the Cape.

"At some point, you'll have a hard time getting on the [Eastern Range] manifest," Mastalir said. "There's only so many things you can launch in a day, and so I think we're a good option for some NASA missions. ... Fast forward into the future, and we've colonized Mars and we're starting to build out infrastructure there, that's where I think there's different options where we would come into play."

Talk about Mars no longer seems far-fetched. In the space community, the excitement is palpable, reminiscent of that earlier, awe-inspiring era when Americans first set foot on the Moon, and crowds cheered up and down Cocoa Beach, Fla.

"You can see the buzz. You see people lining up again along the roads," Eye said. "It's kind of like back in the '60s. ... We're coming back into a busy time. It's going to be a good time."

# ACE-ing the Test

WestPac exercise stresses Agile Combat Employment.

Four F-15C Eagles refuel with a KC-135 Stratotanker Jan. 10 during Exercise WestPac Rumrunner out of Kadena Air Base, Japan. Aerial refueling magnifies the reach of military assets.

By Jennifer Hlad and Amy McCullough

**T**he idea was straightforward: Use what you have, where you have it, for a realistic training scenario that meets commanders' objectives and falls in line with the National Defense Strategy.

"The old way of doing exercises is take everything—build a requirement—and move it to a spot, all one spot," said Capt. Brian Davis. But WestPac Rumrunner—Davis's brainchild—was different. Forces from around the region converged here at Kadena Air Force Base, Japan, for one day, acting as adversary air, while the 18th Wing defended its home turf.

The exercise incorporated forces from the U.S. Navy, Army, Marine Corps, and Air Force and involved 53 aircraft. While the focus was a base defense scenario, WestPac Rumrunner also tested Agile Combat Employment, or ACE, a Pacific Air Forces concept for sustaining combat operations in an anti-access, area-denial threat environment.

"ACE combines adaptive basing, the operational maneuver of air forces, assured command and control, mission-type orders, and other elements to ensure [the force] can generate and sustain combat sorties," explained Mark Gunzinger, director of future aerospace concepts and capabilities assessments for AFA's

**"ACE combines adaptive basing, the operational maneuver of air forces, assured command and control," and more to ensure USAF "can generate and sustain combat sorties."**

—Mark Gunzinger, Mitchell Institute for Aerospace Studies

Mitchell Institute for Aerospace Studies.

By reducing the Air Force's dependence on its main operating bases in the Pacific, ACE makes the Air Force less vulnerable to Chinese air or missile attacks.

"The Air Force understands that it cannot generate air combat power as it has in the past," Gunzinger said. "ACE and other concepts like it take advantage of the flexibility and maneuverability of air power to counter these threats."

PACAF first validated the ACE concept in 2017, when China was ramping up military activity in the South China and East China seas, North Korea was aggressively testing new ballistic missile capabilities, and Russia was beginning to fly more long-range aircraft in the area. Today, the command incorporates elements of ACE into every exercise or event, said PACAF spokeswoman Lt. Col. Megan Schafer.

Brig. Gen. Joel Carey, commander of the 18th Wing, said the Air Force has no choice. "We've got to become harder targets, we've got to be more agile, we've got to, in some ways, be able to go back to our roots in working not just in our main operating bases and out of our main operating bases, but in other more expeditionary, dispersed locations."

WestPac Rumrunner took that concept and ran with it, Carey said.

Pacific Air Forces Commander Gen. C.Q. Brown



Jr. explained the intent to make PACAF "light, lean, and agile" during an all-call at Kadena in November.

"In order to operate, all you need is a runway, a ramp, fuel bladder, a trailer full of munitions, a pallet of MREs, and some multifunctional Airmen. We should be able to operate from anywhere, any location in the world," Brown said.

In order for ACE to work, the service must rethink the way it operates. Traditionally, Airmen have a single Air Force Specialty Code and perform only those tasks and functions defined by that AFSC. With ACE, however, Airmen must be ready and able to perform other tasks as well.

As with the Air Force's Contingency Response Groups, which employ small teams of multi-capable Airmen, Agile Combat Employment demands flexibility, Brown told Air Force Magazine in a February interview, just a few days before he was nominated to succeed Chief of Staff Gen. David Goldfein.

Not every Airman will need to take on additional roles, Brown said, but for those who do, the change will be akin to adding a secondary specialty. Brown does not anticipate consolidating AFSCs.

"It gets rid of some of the 'union cards' [that say], 'You can't do this because you're not fully trained,'" Brown said. For example, "If we go into conflict, and we start losing people, and I need somebody to go refuel an aircraft or help load or unload a C-130, we're going to ... [find] someone who actually is trained [and put them in charge] with some other Airmen to go, 'Here's what I need you to do: You stand here and you do this.'"

During WestPac Rumrunner, Airmen with the 18th Maintenance Group tested the concept by relocating to Marine Corps Air Station Futenma, which is also on Okinawa.

The Airmen were told on a Wednesday night that they were going to another location, but then told the aircraft was "delayed" until Friday. They didn't know where they were going or how many aircraft they would be working on until they were picked up Friday morning, said Lt. Col. Johnny West, deputy commander of the 18th Maintenance Group.

Once in the new location, Airmen had to launch and recover aircraft in an unfamiliar location, which "presents a challenge in and of itself," West said. "Whether you're ready or not, the aircraft are coming." More to the point, fewer people, with less equipment, are on hand, so getting aircraft refueled and back up in the air is more difficult.

"We have exercises here at Kadena where we simulate another location, but it's too convenient," he said. "It's too easy. So, putting them in a different location inhibits and limits the amount of equipment they have available."

Capt. Jessica Abbott, the maintenance lead for the exercise, said the challenges begin the moment Airmen get the order.

"They had to start thinking about, how can they operate creatively from the locations in PACAF?" she said. "How can we prepare ourselves to best work out of those places with what we have?" Then, once they learned where they were going, that helped define who needed to go and what equipment they needed to bring.



U.S. Air Force Airmen from the 961st Airborne Air Control Squadron discuss locations and strategies to maintain air superiority aboard an E-3 Sentry during WestPac Rumrunner.



Staff Sgt. Benjamin Sutton

Staff Sgt. Thomas Parris runs preflight checks on an MC-130J Commando II in preparation for a sortie during WestPac Rumrunner. The exercise gave the 18th Wing an opportunity to hone critical expeditionary skills with joint partners across the Indo-Pacific area of responsibility.

The exercise was also a change for the AFSOC participants, who typically train only with other special operators. “We’ve been in the counterterrorism, counter-violent extremist organization fight for the past 20 years,” Paull said. “So starting to work more with partners within the Air Force itself, that’s really valuable for us, because it is so different from our day-to-day. I’ve been here about three years, and this is the first time I’ve seen all of us working together to affect training, simulating a fight.”

Davis, who directed the exercise, said the scenario showed just how important it is to rehearse joint operations. “The combined joint force was successful at defending Kadena Air Base, and it took the entire team to do it.”

He added that the exercise proved ACE is the right approach: “The ability to plan and execute a mission on this scale across these distances by using in-place assets is a testament to the ACE concept of operations.”

The idea for WestPac Rumrunner started on a Navy ship “somewhere in the South China Sea,” Davis said. “We were planning Valiant Shield, and I sat down with a couple friends there, and I said, ‘What if we do a Defend Your Base Friday?’ ... That was a year and a half ago,” he said. “It was just, what do we have, who can I find, and let’s make something that’s tactically relevant, operationally sound, and effective for everybody.”

Carey embraced the idea as soon as he heard about it, he said.

“The exercise was designed as a defensive counter-air scenario ... and we also integrated these expeditionary, Agile Combat Employment” concepts, by having maintainers and aircrew operate at other locations, Carey explained.

“For decades, we have operated in this part of the world in a way where we would build power in a particular location, and then we would employ from that main location,” he said. “And that’s still going to be part of the concept of operations into the future. That’s why bases like Kadena are so important and will continue to be for stability in this region and our continued relationship with our Japanese partners.”

The U.S. and its allies must develop a capacity to challenge

### MEANWHILE, AT USAFE ...

U.S. Air Forces in Europe is also building an ACE-like concept of operations. The deputy commanders of USAFE and PACAF have been meeting regularly to identify those aspects of the concept common to both theaters and those that are not.

“We’ve charged the wings to go look at and operate out of some of the airfields that they would expect to operate at if we had to do this in a live operation,” said Gen. Jeffrey Harrigan, USAFE commander, in an interview. “So, we’re doing that incrementally over time and allowing the wings the leverage to work together.” Harrigan said USAFE has shared a basic concept of operations, but his goal is for the effort to be driven from the bottom-up. “Those guys are getting out there learning, and there will be things that we may have felt were a reasonable idea, but they’ll uncover—‘OK, that doesn’t work exactly like that. Here’s what we would suggest you do’ instead.”

For now, USAFE’s plan is classified, but Harrigan said, “We’re trying to get it releasable, because I want the partners to see it so that they’ve got skin in the game with us.”

While partner support is key, ACE also looks to incorporate the joint force. The Rumrunner exercise gave USAF maintainers

a chance to work with Marine Corps maintainers, and to support a mission, which they don’t get to do every day, Abbott said.

“I think there’s just excitement in the wing for ACE,” West said. “We’re excited for the opportunity. Frankly, we’re excited that we’re in on the floor of this thing, at the very start. When I came in, the new thing was, ‘the Air Force is expeditionary in nature.’ [Now] we’re getting better at it.”

Abbot said the one-day Rumrunner exercise “instilled a lot of confidence, especially in maintainers,” and “proves we are combat-capable and we can do this—we can do ACE.”

Capt. Harrison Paull, the ACE and Forward Area Refueling Point lead for WestPac Rumrunner, said the exercise began with an MC-130 giving fuel to a Navy E-2 on the tarmac at the “remote” base.

“Both aircraft are engines running,” he said. “It’s not a hot pit or cold fuel or a fuel truck hooking up. ... [It’s] one of the more dangerous things” Air Force special operators do.

“Even though the aircraft aren’t [flying], they’re moving on the ground in close proximity to each other and the fuel’s transferring while the engines are running, so if things do go wrong, [they go] wrong fast,” he said.

competitors with complex operations that make it harder to counter allied strengths. “We have got to continue to cause them—or develop capabilities that cause them—problems,” Carey said.

One way to do that, Carey said, is to “increase expeditionary capability, to increase dispersed operations in different locations ... and the logistics, the communications, the command and control—everything—that is involved with developing those capabilities.”

The exercise included two airborne C2 battle management platforms: An AWACS and a Navy E-2 Hawkeye. Maj. Alex Demma, an E-3 AWACS mission crew commander and director of operations for the 961st Airborne Control Squadron, said the exercise “allowed us to coordinate the battle from assets that were coming from different locations, coalesce in one place, and then execute the mission.”

Integrating this way is unusual. “These are rare opportunities that you don’t get unless you are traveling to another place,” he said. “So, to be able to do this organically, home station, is really the benefit.”

Without cargo being shipped, advance teams, and prepping the environment at Kadena, Davis said, the event was more like a real ACE scenario. “You’re going to drop into somewhere that’s not your home field, that’s set up by somebody else,” he said. “That was a huge, huge win for us to be able to do that.”

Another part of the exercise involved simulating the loss of communication links back to higher headquarters.

“In a perfect world, we still keep [communications] back with the Air Operations Center and the higher headquarters, so they can direct the pieces and make the war effort happen,” Davis said. But cutting off that link forced Airmen to make decisions and come up with solutions under pressure.

The exercise was a real opportunity to “lean on our junior NCOs, lean on our younger officers, to make important decisions, and now to make sure that aircraft generation and regeneration machine continues,” West said.

For some Airmen, WestPac Rumrunner was their first time in that type of situation, he said. It went well enough, however, that the next exercise will be a little more difficult.

Indeed, the next iteration is already in the planning stages, said Capt. Shawn Storey, an air battle manager on the E-3 with the 961st Airborne Air Control Squadron and a member of the WestPac Rumrunner planning cell.

“Our intent is to execute Rumrunner once a quarter and to move the host base around the AOR as much as we can,” he said. “This will be impacted by mission and exercise schedules, as well as real-world events, such as COVID-19, but that is the guidance we are planning with right now.”

Doing that in addition to an already busy exercise and deployment schedule may be a challenge, but Davis said that ACE will eventually work its way into those larger events. In the meantime, the service is pulling from lessons learned with ACE as it works through the ongoing coronavirus pandemic.

“COVID is merely just another challenge to the world order,” said Maj. Gen. Scott Pleus, PACAF’s director of air and cyberspace. By pushing the decision-making authority down to lower-level commanders through ACE, commanders have had “to be creative in how they maintain the readiness, deploy their force, protect their force. I see this as a real-world execution of the Agile Combat Employment in action, against a real threat. ... I’m super proud of the commanders and our supervisors at all levels that they’ve been able to rise to the challenge and fight their way through this just like any other contingency operations.”

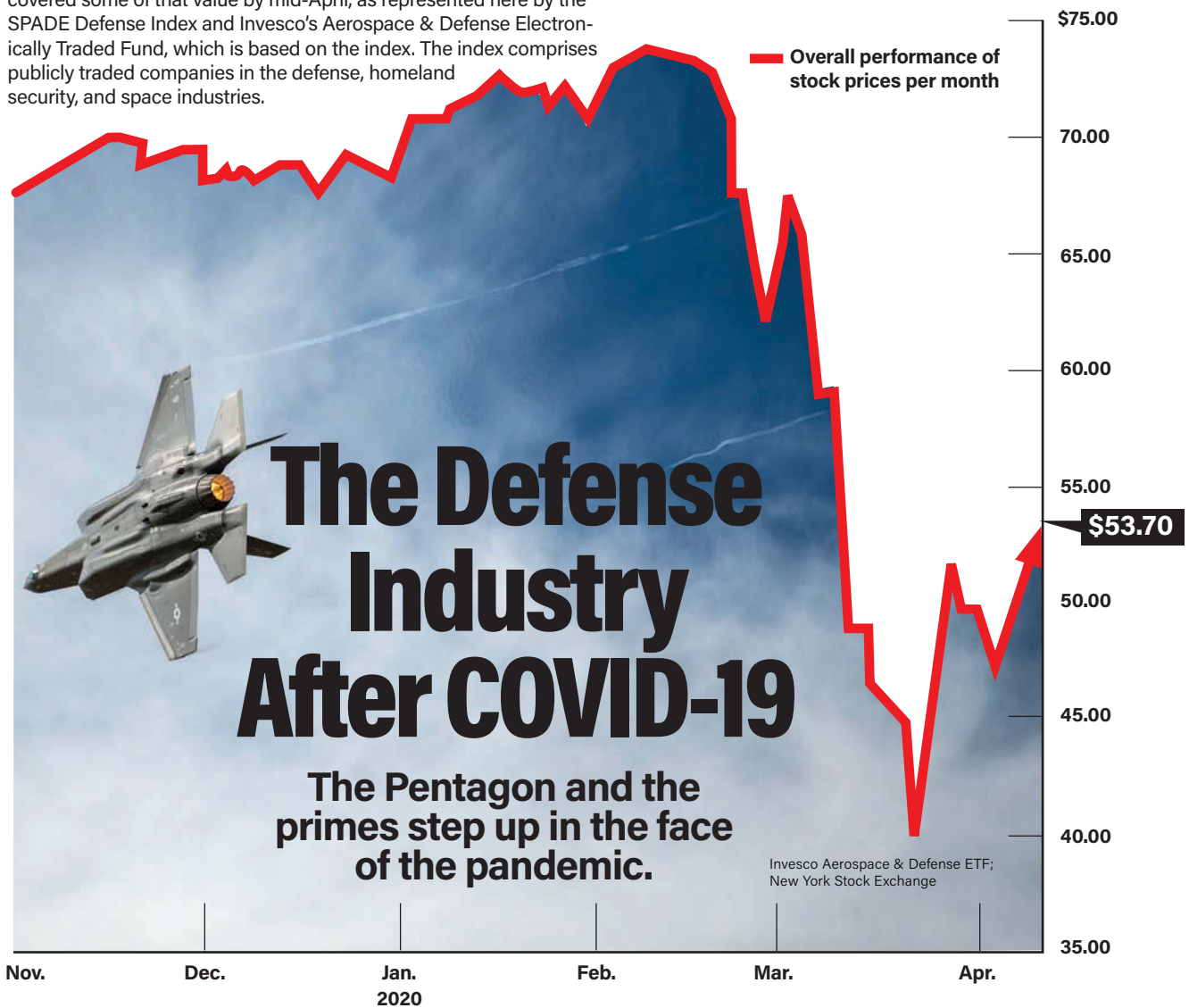


A KC-135 from Kadena Air Base, Japan, refuels a U.S. Navy F/A-18 Super Hornet from the USS Ronald Reagan over the Philippine Sea during Exercise WestPac Rumrunner.

Jennifer Hlad

# Coronavirus Crash

The market value of defense stocks plunged as the U.S. economy shut down in response to the COVID-19 pandemic. The defense sector lost more than 40 percent of its value in March, and only recovered some of that value by mid-April, as represented here by the SPADE Defense Index and Invesco's Aerospace & Defense Electronically Traded Fund, which is based on the index. The index comprises publicly traded companies in the defense, homeland security, and space industries.



Senior Airman Codie Trimble

By John A. Tirpak

**A**s the COVID-19 pandemic shut down or slowed down businesses across the nation, the defense industrial base was among the first to get help from Congress and will likely be among the first to bounce back once the crisis is finally past.

It may not come back as it was, though, as Congress and the nation rethink priorities in the wake of trillion-dollar emergency spending bills, a coming recession, and the long road back to a robust national and international economy.

Defense contractors were specifically directed to keep working, while protecting the health of their workers as much as possible. The Pentagon accelerated progress payments, and the massive \$2 trillion Coronavirus Aid, Relief, and Economic Security (CARES) Act injected more than \$17 billion in cash

**“It’s a more severe, dire situation than even after 9/11.”**

—Eric Fanning, Aerospace Industries Association president and former undersecretary of the Air Force

for defense, plus another \$80 billion in loans for the broader aerospace industry.

“The largest stimulus package in the history of the country has impressed us, and it happened in pretty quick order,” said retired Gen. Herbert “Hawk” Carlisle, president of the National Defense Industrial Association. Progress payments rose from 80 to 90 percent to larger contractors and from 90 to 95 percent for small businesses, to ensure healthy cash flow, Carlisle said, and DOD accelerated pay for small businesses. Some companies, did, as well: Lockheed Martin accelerated payments to its supply chain, he said.

Undersecretary of Defense for Acquisition and Sustainment Ellen Lord’s office issued a series of memos deeming defense work “critical” to ensure employees could travel to work without running afoul of local pandemic-related travel bans. This sent a message to defense firms to hold the line, even as other industries ground to a halt.

She also moved to ensure smaller businesses don’t

McConnell Air Force Base in Kansas received its 17th KC-46 Pegasus on Nov. 22, 2019. McConnell will have a fleet of 36 KC-46s to lead the future of aerial refueling. Boeing temporarily shut down the Puget Sound, Wash., plant that makes the Pegasus and the Navy's P-8 patrol airplane, but the program will continue. The plant reopened in April.



China Ministry of Defense

A Chinese military officer, right, and Iranian officials sign papers after a delivery of medical supplies. China seeks to fill a global leadership void with donations of medical materials to the Iranian armed forces from the Chinese military. The supplies will aid in Iran's battle against the coronavirus and included test kits, protective suits, and medical masks.

they want to replace us as the superpower with influence, and they want to replace the international rules set [to a system] that benefits just them."

The U.S. emphasis should remain "building those alliances and friendships ... the asymmetric advantage we have against our adversaries."

Added to that will be questions about preparedness, Carlisle noted: "How do we respond to another situation like this? How do we get early indications that something like this is going to happen?"

NDIA published an analysis of the health of the defense industrial base in February, "Vital Signs 2020," before the brunt of the COVID-19 pandemic hit. That report cited cyber theft, a shortage of skilled labor, and rising prices for critical materials as critical concerns. The pandemic largely validated the report, Carlisle said, including that there are too many opportunities for "single-point failures in the supply chain."

American overreliance on China for certain products, including pharmaceuticals and critical defense materials, is unacceptable, he asserted.

In the aftermath of the pandemic, "with our friends, partners, and allies, we've got to build a robust supply chain, address the fragility of it, address the single-point failures," Carlisle said. "And that's going to take money and dedicated effort, both on the part of government and industry."

Another key takeaway is that there is a shortage of people with skills in key trades: "electricians, physicists, engineers, mathematicians, across the entire spectrum."

Small businesses may bear the worst of the COVID-19 damage, Callan predicted, referring to companies the Air Force has wooed in recent years through AFWERX and its various pitch-day events. Their access to cash may become more restricted and their business models may be weighted toward commercial markets that may be in trouble. Some "may have a real struggle for survival, here, depending on what happens the next couple of months," Callan said.

Air Force acquisition chief Will Roper created a coronavirus task force on March 25 aimed at ensuring cash flow to contractors and aiding small businesses so they can survive the upheaval. Pitch days will continue, with new contracts awarded. Indeed, at a

become vulnerable to "adversary capital," where peer competitors such as China offer cash-strapped firms a lifeline in exchange for access to innovative technologies. The Pentagon wants its suppliers to stay in business "without losing their technology," Lord said in a press conference. She offered no details on foreign attempts of this sort, but allowed that the crisis "presents a greater attack surface, if you will," for such approaches, and said it's important that DOD "mitigate that uncertainty."

There's been no letup in the Pentagon's demand signal for defense goods and services, Lord noted, as she pledged to play "offense ... using our trusted-capital mechanisms" in cooperation with the Committee on Foreign Investment in the U.S., or CFIUS, to support the industry.

Eric Fanning, president of the Aerospace Industries Association, said defense firms are somewhat insulated from the crisis because, unlike commercial clients, the Pentagon's spending isn't subject to the whims of markets. By contrast, commercial aviation "is dependent on the customers." Airlines were among the hardest hit by the crisis as travel thinned to a skeleton schedule.

"It's a more severe, dire situation than even after 9/11," Fanning said. "We don't know how fast the airlines will get back flying. ... We haven't faced anything like this before, so it's hard to model it."

Unlike 9/11, when defense priorities instantly changed to

fighting terrorism, there is no obvious uptick in sight for defense, noted Byron Callan, a veteran defense and aerospace stock analyst with Capital Alpha Partners.

Defense stocks plunged with the rest of the stock market and, while not as far down as some firms, did not rebound with the likes of tech firms Amazon, Microsoft, and Apple. The defense recovery will be slow.

"It's going to take a couple of years," Callan said.

The \$2 trillion CARES Act—and potentially other massive rescue packages—will have its own impact on Pentagon spending downstream, he explained.

The Office of Management and Budget now predicts "trillion-dollar budget deficits for the next couple of years," he said. If interest rates remain low, that may be manageable. But if rates rise, pressure on defense and the wider federal budget will mount. The defense sector could find itself in "a world of hurt" come 2024 to 2026, he said.

The pandemic will also likely shift defense priorities, Callan predicted. Congress may be less willing to support the Air Force's plan to divest dozens of aircraft to fund its ambitious joint all-domain command and control systems, for which there is no obvious voter constituency.

Cutting airplanes would "have direct job impacts in congressional districts," Callan said, and lawmakers eager to restart the economy will see little value in doing away with ready-made jobs. "You want to keep people busy at work," he said.

Strategically, however, COVID-19 could ramp up concern about global stability. Iran suffered disproportionately in the pandemic, relations between the U.S. and China grew tense, North Korea has resumed missile testing, and Russia is growing more impatient with economic sanctions. Tensions and accusations arose as the U.S. questioned China's reporting of its COVID-19 data, and China sought to fill a void in global leadership and generosity by sending masks and other supplies to various parts of the world, including Europe and the U.S.

Rising tensions means the U.S. may be "looking at a whole new array of security threats," Callan said, and "a messier, more insecure world in 2021 and 2022." That could reduce the impulse of Congress and the administration to view defense as the "piggy bank" to fund other emerging needs.

The National Guard could be a winner in this scenario, especially if there is a sense that it was underequipped for the domestic crisis. That spending would translate directly to home districts—and could come at the expense of Pacific-focused investment.

Carlisle, however, does not envision a major shift in defense priorities.

"We still see our great power competition and China being the pacing threat, with Russia to a lesser degree and then North Korea and Iran," he observed. "China hasn't changed their plan. They want to be the No. 1 economy in the world,



Minh Vu, a program manager with the Pitch Bowl venue Capital Factory, runs a room during the virtual Spark Collider and Pitch Bowl event in Austin, Texas, on March 12. The South by Southwest conference was canceled, but AFWERX's pitch events went on virtually.



Staff Sgt. Jordyn Fetter

time when face-to-face business is stressed, Chief of Staff Gen. David Goldfein cited USAF's efforts to accelerate acquisition with credit card purchases as a success that proved useful under quarantine conditions.

An AFWERX event intended to coincide with the South by Southwest conference in Austin, Texas, went forward virtually in March, even as the wider event was canceled. The Air Force signed 550 research contracts worth about \$1 billion as a result of the event—before stay-at-home orders were issued. Roper said he instructed program managers to accelerate contract awards where possible.

Lockheed, the nation's biggest defense firm, announced in early April it had hired almost 1,000 people in the latter half of March and plans to hire another 5,000 workers this year to meet mounting orders for F-35 fighters, hypersonic and subsonic cruise missiles, and the Air Force's new Combat Rescue Helicopter (recently named the Jolly Green II), among others.

"We recognize that providing jobs during this period of economic downturn is ... critically important," said Lockheed CEO Marillyn Hewson. She said the company would pay bonuses to employees whose jobs demand they be present—rather than telework—and that it was accelerating payments to suppliers.

Speaking for the industry, Fanning emphasized that most of the funding in the CARES Act are loans, which must be paid back.

"A company will decide whether it wants to access those loans," Fanning said. "It comes with the provision that it be paid back. And the provisions are going to be worked out, but they're likely to be business terms with a little premium."

Even if some loans to smaller firms will ultimately be forgiven, the flow of funds through the industry, from prime contractors to subcontractors, suppliers, and employees, ultimately flows into the general aerospace and defense "ecosystem," Fanning noted.

"Most of the money going into those big companies goes into the supply chain," he explained. Boeing, for example, sends 70 cents of every dollar into the supply chain. "It's the most efficient way to get money into the smaller companies without trying to target them individually."

Fanning, who was Secretary of the Army and Undersecretary of the Air Force under President Barack Obama, said the federal response to COVID-19 had been appropriate and effective: "Government actually playing its role." ✪

## Boeing's Mounting Woes

With more than 160,000 employees and 17,000 suppliers, Boeing is at the apex of the aerospace ecosystem, but its heavy dependence on commercial work and missteps with some important defense contracts has left it vulnerable at a critical time.

With airline traffic ground to a near-halt and airliner deliveries all but suspended, Boeing shut down its facilities in Puget Sound, Wash., including those that make the Navy's P-8 patrol plane and Air Force KC-46 tanker. It also shut down facilities in South Carolina, where it builds the 787 airliner. The plants reopened with reduced staff April 13.

The pandemic piles on to Boeing's already-acute problems getting the 787 Max flying again. That aircraft has been grounded more than a year due to problems discovered from high-fatality crashes in late 2018 and March 2019.

Boeing must adjust to a "new reality," CEO David Calhoun wrote to employees.

That reality will likely bring a smaller and different sort of commercial market in the wake of the COVID-19 pandemic. The company offered early retirement incentives as the first step in reducing its workforce and has sought aid from the government. But Calhoun balked at some of the conditions Congress imposed, such as limiting company executive pay, stock buybacks, and paying dividends. Calhoun and Larry Kellner, Boeing's chairman, said they would forgo their salaries through the end of the year, and the company suspended paying dividends to shareholders.

To ease the strain, the Air Force released \$882 million that had been withheld from Boeing because of deficiencies on the KC-46 tanker. In exchange, the company agreed on a plan to fix the plane's faulty Remote Vision System at its own cost. Air Force acquisition chief Will Roper said the agreement will incorporate new technology in the KC-46 without making the aircraft more expensive for the Air Force. The program will continue, Roper said: "We wanted to send a clear signal in the deal that this is our tanker for the future." ✪

# Modernizing UAV Export Policy for Effective Coalition Forces

It's time to stop giving China a helping hand.

A U.S. Air Force MQ-9 Reaper remotely piloted aircraft awaits an engine test prior to intelligence, surveillance, and reconnaissance operations at Ali Al Salem Air Base, Kuwait. For export purposes, Reapers are treated like missiles, not like manned aircraft.

Photo: Sgt. Michael Mason

By Heather R. Penney

Unmanned aerial vehicles (UAV) are crucial technologies for modern military operations. Whether for persistent intelligence, surveillance, and reconnaissance, or integrated overwatch and strike operations, the U.S. has prototyped and operationalized a range of unmanned aircraft over the past 25 years. As the nation now positions itself to compete against high-end peer threats, American success depends upon leveraging the value of unmanned aerial systems across the spectrum of combat. Yet for the purposes of international export, the Missile Technology Control Regime (MTCR), which was established to control nuclear proliferation, defines unmanned systems as nuclear missiles.

The U.S. cannot fully realize the potential of UAV in coalition operations without a fundamental shift in this policy.

Other nations have carefully examined how the U.S. leveraged unmanned aerial systems across its military operations, and now seek this advantage for themselves. Indeed, at least 101 nations operate UAV in a military capacity today. Teal Group's 2019/2020 Market Study projects UAV production will rise from

**"The Chinese product now doesn't lack technology, it only lacks market share."**

—Chinese military analyst Song Zhongping

\$7.3 billion annually in 2019 to \$10.2 billion in 2029, totaling \$98.9 billion in the next 10 years. Research spending could add another \$61 billion over the decade. This market demand is here to stay.

Despite this demand, the U.S. defense industrial base is restricted from exporting these systems, even to key U.S. allies and security partners. The MTCR, of which the United States is a founding member, is a voluntary, informal agreement among participating states "to limit the proliferation of missiles and missile technology," according to its website. Yet under this regime, founded in 1987, UAV are just as tightly restricted as intercontinental ballistic missiles.

The increasing divergence between export policy, military requirements, and reality in the global marketplace is a dangerous impediment to current and future U.S.-led coalitions. Security partners are, and will long continue to be, critical to ensuring the political legitimacy and combat effectiveness of any military operation. Yet these same partners are largely barred from importing and operating unmanned aerial systems, undermining allies' ability to fully tap the value of these systems.

More insidiously, export restrictions are driving America's security partners into the arms of China, which is using this market vacuum to expand its

influence, gain an intelligence advantage, and, perhaps, surreptitiously compromise the ability of potential partners to integrate with U.S. forces.

Unmanned aerial systems should not be treated as if they were nuclear missiles. They should be removed from the MTCR and regulated as any other combat aircraft.

#### CASE STUDY: JORDAN TURNS TO CHINA

When the Royal Jordanian Air Force first displayed their Chinese-built remotely piloted aircraft at the Special Operations Forces Exposition and Conference in May 2018, it was hardly a surprise to U.S. military officials: For years, the United States had denied Jordan's repeated requests for U.S.-built remotely piloted aircraft.

Without a U.S. source, Jordan's decision to acquire long-endurance surveillance and reconnaissance from China was necessary and rational. At the same time, it signaled a fissure in the U.S. relationship and now presents significant security implications for cooperative military operations between Jordan and the U.S.

Iraq, Saudi Arabia, and the United Arab Emirates—all U.S. security partners—have also procured Chinese drones, as have Algeria, Egypt, Kazakhstan, Nigeria, Uzbekistan, and others. The growing list demonstrates China's desire and ability to sell UAV hardware to nations with long-term ties to the U.S.

"The Chinese product now doesn't lack technology, it only lacks market share," Chinese military analyst Song Zhongping told the Associated Press in 2018. "And the United States restricting its arms exports is precisely what gives China a great opportunity."

#### THE PROBLEM WITH 'MADE IN CHINA'

The migration of traditional U.S. partners and allies to Chinese military hardware signals an erosion of key security relationships and the growing influence of China in regions important to the United States. The reliance of U.S. partners on China for training, sustainment, intelligence processing, and command and control (C2) systems strengthens these nations' ties to China.

Chinese drones pose serious security risks to coalition and U.S. networks, sensors, and tools because they provide China the opportunity to exploit U.S. technologies and operations, even when flown by other nations. China maintains control of the C2 systems that are necessary to operate these UAV. This gives them the opportunity to collect on every aspect of operations, from sensors, to geolocation, to data messaging. When operating Chinese UAV platforms with coalition assets, China gains valuable insight into operations, means and methods, targets, and CONOPS (concept of operations). As a result, procuring Chinese systems effectively bars partners from participating in certain coalition operations, which in turn imposes a greater burden on the U.S. These security risks also limit the sharing of intelligence, further weakening relationships.

For operational security reasons, the United States cannot integrate partners with Chinese systems into coalition operations—and not simply because of technical incompatibilities, such as data links. Interoperability with allies and security partners requires full integration into the air tasking order, mission objectives, the sharing of intelligence, and collaborative targeting and tactics. Integration of Chinese UAV into coalition operations would help China collect data on U.S. operations, signals, and systems.

China maintains a strong hold on the command and con-



trol elements of their drones, the data links, ground station software and computers, and other controls that enable operations. As a result, China could potentially monitor activity and even collect intelligence from these drones in its efforts to learn about coalition operations, discern potential high-value targets, and assess status of forces.

When U.S. allies and security partners acquire Chinese unmanned systems, American bilateral and military relations are weakened, and coalition operations are dismantled. Without changes to U.S. export policy, China will continue to expand its market—and its sphere of influence—into regions critical to the economic and national security interests of the United States.

Given the long life span of these systems, the rift in critical partnerships is long term. Thus, rather than creating stability and decreasing risk for the U.S. and its allies, the MTCR drives allies toward adversaries, inhibits the U.S. ability to conduct integrated operations, and provides crucial intelligence to China, all while stimulating the innovation of the Chinese drone industry.

#### THE OPERATIONAL VALUE OF SHARING SYSTEMS

The most effective strategy to achieve success in coalition operations is to ensure our security partners and allies operate the same unmanned aerial systems as the U.S. With the superior range, endurance, multisensor packages, and weapons magazine, the most capable American systems offer allies genuine force multipliers.

Operating the same systems means partners can burden-share with the United States, freeing U.S. assets for other global commitments or increasing force density where required. When allies operate the same UAV, such as the MQ-1 Predator, MQ-9 Reaper, or future unmanned aerial systems, machine-to-machine data transfer is seamless, intelligence processing and sharing is enhanced, and flexibility in operations is dramatically increased. When allies operate a Chinese-made UAV, however, all these strategic advantages are lost.

One remotely piloted aircraft operator recalled a mission that demonstrated the opportunity costs when allies and partners operate incompatible UAV. Tasked to take over an orbit from a U.K. asset, the handoff of the target was exceedingly

A Chinese-made CH-4B UAV owned by the Royal Jordanian Air Force is displayed at SOFEX 2018 in Amman, Jordan, in May 2018. The drone is similar to the MQ-9 Reaper. After owning the aircraft for two years, Jordan recently sold all its CH-4Bs to Libya.

difficult and nearly failed. Because the two systems were not interoperable, crews had to transfer tracking of the target—an individual in a truck—by describing coordinates over the phone, a time-consuming and imprecise methodology that proved “almost pointless.”

“We couldn't data-share. As a result, [the U.K. operator is] passing the coordinates, over the phone, for a vehicle with a last-known heading, going this direction, an approximate miles per hour, and a description. But the target was in a city with such traffic density that we just couldn't find it.”

By contrast, another operational handoff with a partner that had an interoperable system was seamless.

“With real-time data-sharing, I literally could pull up on my computer screen his exact sensor and double click on it

with my mouse to slew my sensor to exactly where they're looking. It's instantaneous and they're looking exactly where my crosshairs are and confirm—in a dynamic, dense, and often confusing environment—that we are on the exact car.”

The interoperability of the two systems enabled a quick, precise handoff and positive confirmation of an elusive target in a challenging, complicated, and dynamic environment.

#### THE MISSILE TECHNOLOGY CONTROL REGIME

The MTCR was established by the G-7 industrialized nations (Canada, France, Germany, Italy, Japan, the U.K., and the United States) to strengthen nuclear nonproliferation efforts by addressing the “most destabilizing delivery system for such weapons”—ballistic and cruise missiles. Although



An Iraqi officer with the 100th Recce/Attack Squadron, which operates the Chinese-made CH-4B drones in the background, discusses recent attacks against ISIS militants using the UAVs in a Ministry of Defense video from Al Kut/Ubaydah Bin Al Jarrah Airport, released on Feb. 12, 2018.

the 1970 Treaty on the Non-Proliferation of Nuclear Weapons has long been the foundation of global nonproliferation efforts, the premise behind creating the new regime was that limiting the transfer of missiles and missile technologies would pose an additional barrier to rogue actors obtaining nuclear capability.

In 1992, the regime altered its charter to combat the proliferation of any weapon of mass destruction (WMD). As described by then-chair of the MTCR, Ambassador Piet de Klerk, “It was decided to enlarge the scope to not only missiles but all unmanned delivery vehicles, for all weapons of mass destruction, including chemical and biological weapons.”

The Missile Technology Control Regime is an “informal political understanding”—not a treaty—and is not binding in any statutory or legal manner. The strictly voluntary MTCR has no jurisdictional oversight nor any power of enforcement. According to DOD’s Defense Technology Security Administration, “the Guidelines and Annex are implemented by each Partner in accordance with its national laws and legislation.” Thus, national statutes take priority over the MTCR Guidelines and Annex.

Still, MTCR participants are expected to unilaterally adhere to a common set of export controls on WMD delivery systems defined by the MTCR Guidelines and Annex, a “list of controlled items including virtually all key equipment, materials, software, and technology needed for missile development, production, and operation.” Current U.S. export policy for UAV closely follows the MTCR.

The MTCR Annex divides missiles and UAVs into Category 1, which includes systems capable of carrying a 500 kg (or greater) payload more than 300 km one way, and Category 2, for systems that offer less than 300 km of range.

Category 1 items and their subsystems are considered highly sensitive; nations are instructed to take an “unconditional strong presumption of denial regardless of the purpose of the export.” The Guidelines also acknowledge that “the decision to transfer remains the sole and sovereign judgment of the government.”

## ENABLING THE PROLIFERATION OF IRRESPONSIBLE ACTORS

Military requirements calling for UAV capability, coupled with the MTCR’s “strong presumption of denial,” have driven many nations to circumvent the controls by acquiring highly capable unmanned systems that RAND Corp. calls “near-Category 1 UAV.” Falling just short of the Category 1, 500 kg payload threshold enables the suppliers to avoid more serious restrictions. Advancing technology means manufacturers can skirt MTCR Category 1 while still providing similar mission effects.

Contrary to the intent of the regime, treating UAV platforms as if they were missiles creates a market vacuum for unethical actors to export UAV technology without appropriate controls. The growing export of “near-Category 1” systems demonstrates how ineffective the MTCR is in this regard. The challenge posed to nonproliferation efforts is the inability of responsible actors to monitor, influence, and control the transfer and use of these technologies.

It is well-known that China does not expect, demand, or enforce any limitations on the employment or end-use of its weapons. This, taken in conjunction with the unviable restrictions on Category 1 UAV sales and the gaming involved in marketing near-Category 1 products, further points to the ineffectiveness of the MTCR in controlling the proliferation of unmanned systems.



Staff Sgt. Arielle Vasquez

**U.S. Airmen conduct flight control checks while communicating with a pilot and sensor operators during preflight of an MQ-9 Reaper. Communications and interoperability are greatly hampered when allies field Chinese-made UAVs.**

## THE FUTURE FORCE REQUIRES UAVs

The developmental path for unmanned aerial systems will diverge even further from MTCR relevance in the future. While the presence of a pilot and/or crew may seem like a reasonable way to define UAV export categories, this will not remain a viable threshold over the long term. Unmanned aerial vehicles will become less and less manpower-intensive over time.

Future autonomous, intelligence-gathering systems will not require preplanned routing like that of autopilot flight management, but will instead enable these aircraft to operate with unpredictable but rational maneuvering. As described in the Mitchell Institute’s major publication, “Restoring America’s Military Competitiveness: Mosaic Warfare,” they will avoid threats and seek out optimized looks at target sets or other entities of interest, autonomously collaborating and deconflicting with each other.

For weaponized systems, humans will continue to be involved in the kill chain, but their roles and responsibilities will evolve. Today, much of pilots’ and operators’ workload is associated with identifying the target, complying with rules of engagement and commander limitations, refining the weapon aim point, and maneuvering the vehicle into a position of launch to optimize target effects. Unmanned aircraft in the future will be capable of autonomous, collaborative, and dynamic maneuvering, operating as “loyal wingmen” in formation with a manned aircraft where human pilots act as mission commanders responsible for UAV in autonomous flight.

The definitions and controls imposed by the MTCR are clearly mismatched to this reality. Such weapons are not cruise missiles on kamikaze missions, but rather specialized aircraft conducting innovative, conventional combat missions.

## TREAT UAVs LIKE CONVENTIONAL AIRCRAFT

The MTCR weakens the ability of U.S. partners to achieve their broader security objectives. Ensuring that allies and security partners share the same systems creates seamless coalition operations that can meet the physical and operational challenges of the 21st century.

While many nations are using “near-Category 1” vehicles to skirt MTCR trade restrictions, Category 1 systems are more



Sgt. Corinne Buxton/RAF

**A British Royal Air Force MQ-9 Reaper in Saudi Arabia. The RAF helps Iraqi forces clear ISIS from the north of Mosul, Iraq, using U.S.-produced unmanned aerial vehicles for ISR.**

often the clear and best choice for a security partner. Greater size and fuel load confer longer persistence, increased area coverage, and greater mission flexibility. The larger sensor packages of a Category I UAV provide higher-quality data, and with a larger weapon load-out, these systems can retain weapon employment options through the duration of their sortie.

Instead of treating unmanned aerial systems as missiles, a more effective and enduring approach would be to treat them as conventional aircraft and subject them to the same conventional arms export policies in place for combat aircraft. This supports the national security interests and objectives of the United States and its allies, while still protecting critical technologies from misuse or exploitation.

The Royal Jordanian Air Force recently sold its six armed, Chinese-built CH-4s to the Libyan National Army. Led by Khalifa Haftar, the Libyan National Army controls most of eastern Libya and is fighting against the U.N.-recognized unity government in Tripoli. While Jordan supports Haftar, without end-use controls, the international community lacked any mechanism to obstruct the sale by the kingdom.

## RECOMMENDATIONS

Jordan's decision to sell the drones to the Libyan opposition in 2019 was a surprise. The fleet has at least another decade or more of operational life, though reports indicate Jordan was unhappy with the drones' "heavy maintenance requirements and limited capacity."


Unlike U.S. foreign military sales, which include robust training, sustainment, and support packages, much cheaper Chinese systems likely do not. Without support from a dedicated security partner like the United States, buyers may be unprepared, ill-equipped, untrained, and without needed spares to maintain a healthy, robust fleet. Indeed, after selling its CH-4Bs, Jordan again expressed interest in procuring U.S. unmanned aerial systems.

The window for the United States to re-engage valued security partners through the deliberate export of unmanned aerial systems may not be open for long. China is learning critical operational lessons from their unmanned systems and developing new and improved unmanned aircraft. The United States should not be willing to cede market share, and the

insight and leverage that comes with it, to China. Continuing to include unmanned aerial systems within the guidelines of the MTCR harms critical U.S. relationships, U.S. industry, and coalition operations.

The Trump administration and Congress should modernize UAV export policy, including:

1. Congress should affirm the U.S. commitment to non-proliferation in the 2021 National Defense Authorization Act and also clearly define unmanned aerial vehicles as aircraft, not cruise missiles, and therefore not subject to the MTCR guidelines, annexes, or any other U.S. policy driven by the MTCR. This language should further direct that military UAVs be subject to the same export considerations as other military aircraft
2. Additional language in the 2021 NDAA should seek for UAV the same co-development, co-production, and any other privilege or consideration afforded to military aircraft for the purposes of direct commercial sale or foreign military sale.
3. The administration should capitalize on a limited window of opportunity to re-engage with key partners that may be wavering in their Chinese UAV partnerships. Of key symbolic and strategic priority is a deliberate goal of exporting American UAV capabilities to Jordan.

These actions will begin the process of normalizing unmanned aerial systems' export policy. The future of warfare will depend evermore on UAV technology. The consequences of conflating unmanned aerial systems with nuclear missiles is dangerously detrimental to U.S. security interests. Unmanned systems are aircraft, not missiles, and for too long the MTCR has distorted the normal balance of national security and economic interests against the fear of nuclear and WMD proliferation. An immediate and significant change in U.S. policy must occur before more damage is done. <sup>TM</sup> 

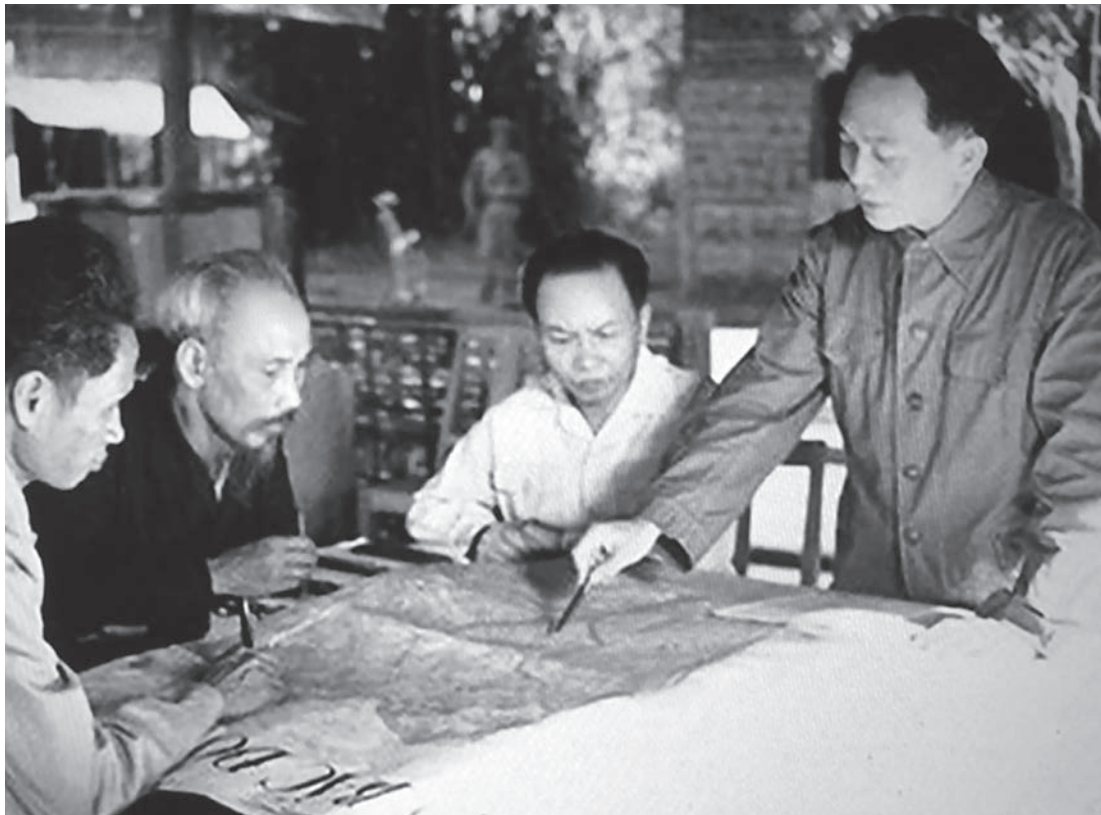
**Heather Penney** is a senior resident fellow for the Mitchell Institute for Aerospace Studies, where she conducts research on defense policy with a focus on leveraging the decisive advantage of aerospace power. Penney worked for over a decade in the defense industry focused on defense budgets, supporting program execution, and campaign management.

# Calling the Shots in Hanoi

The legendary North Vietnamese leaders stood tall—especially in the perception of their U.S. opponents.



Dash Parham/staff



Vietnam People's Army Museum

Facing page: Le Duan and Ho Chi Minh. Left: General Staff at the battle of Dien Bien Phu. Left to right: Prime Minister Pham Van Dong, President Ho Chi Minh, General Secretary Truong Chinh, and General Vo Nguyen Giap discuss plans for the seige, which would be the final curtain for the French in Indochina.

By John T. Correll

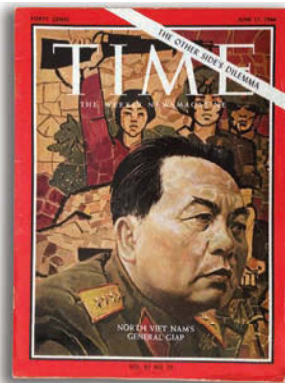
**D**uring the Vietnam War, two names from the other side were burned into the awareness of the U.S. public and news media: Ho Chi Minh, the president of North Vietnam, and his close colleague, Vo Nguyen Giap, commander of the army and minister of defense.

By long tradition, Ho and Giap have gotten most of the credit for forcing the French and the Americans to withdraw from Southeast Asia. In recent years, though, the legends have undergone considerable reexamination and a different picture has begun to emerge of North Vietnam's wartime leadership.

Ho Chi Minh was Vietnam's great national hero and president of North Vietnam from 1945 until his death in 1969. He was listed by Time magazine as one of the "100 Most Important People of the Twentieth Century." War correspondent Bernard Fall described him as "a frail 77-year-old gentleman with a wispy beard and rubber sandals, ruling a country the size of Florida."

News reports called General Giap "the Red Napoleon" and "the greatest military strategic logistician since Hannibal." He built the army from a cadre of 34 peasant soldiers in 1944 and, in 1954, Giap managed to haul his artillery overland and inflict a humiliating defeat on a technologically superior French force at the isolated mountain outpost at Dien Bien Phu.

However, by the 1960s—and unknown by the outside world—the political power in North Vietnam had shifted. Ho and Giap no longer had the strength they possessed earlier. This has been revealed mainly



**"One of the greatest misconceptions of the Vietnam War was that Ho Chi Minh was the uncontested leader of North Vietnam."**

—Columbia University historian Lien-Hang Nguyen

through the work of Columbia University historian Lien-Hang Nguyen, who interviewed sources in Vietnam and had access to previously unavailable North Vietnamese records.

"One of the greatest misconceptions of the Vietnam War was that Ho Chi Minh was the uncontested leader of North Vietnam," she said. "In reality, he was a figurehead, while Le Duan, a man who resides in the margins of history, was the architect, main strategist, and commander in chief of North Vietnam's war effort."

Le Duan, the party first secretary, lacked Ho's popular appeal and exerted his power from behind the scenes. His right-hand man was Le Duc Tho, who would later be the negotiator who met with Henry Kissinger at peace talks in Paris.

As late as 1967, "America's military intelligence and civilian leaders had no real idea of who was actually calling the shots in Hanoi," professor Nguyen said. Two major events usually attributed to Giap, the Tet Offensive of 1968 and the Easter Invasion in 1972, were actually the doing of Le Duan.

## REVOLUTIONARIES

Ho Chi Minh, born in 1890, was a committed Communist, an admirer of Lenin. He left Vietnam in 1911 on the crew of a passenger ship and spent his early years abroad, notably in Paris and Moscow. He rose in the ranks of the Communist International. "Soon Ho was roaming the earth as a covert agent for Moscow," said historian Stanley Karnow.

In 1930, Comintern sent Ho to Asia where he settled differences among dissidents and formed the Indochinese Communist Party. He was sentenced to death in absentia by the French but they were

RF-4C Phantom II destroyed during the enemy attack against Tan Son Nhut during the Tet Offensive. More than 100 targets were struck during the holiday movement, including cities, towns, and military bases all over South Vietnam. The audacious attacks were planned by Le Duan, but the U.S. continued to give Ho and Giap the credit—and some still do.



U.S. Air Force

unable to extradite him from Hong Kong, where he was in a British jail, having been arrested for subversive activities.

In 1940, he was operating from Kunming in southern China, where he met Giap for the first time. In 1941, Ho revived the inactive Viet Minh independence movement and organized the anti-French, anti-Japanese resistance around it. Giap was military leader of the Viet Minh.

In 1941, Ho returned to Vietnam after an absence of 30 years and set up his headquarters in a large cave in a mountainside near the Chinese border. He went by various names before settling on Ho Chi Minh, which means “He Who Enlightens.”

Giap began to read the anti-colonial articles published by the expatriate who would become known as Ho Chi Minh when he was 13 years old. He obtained a law degree from the French university in Hanoi, but did not practice law because he failed the examinations. Instead, he taught history at a private school.

In 1940, the Communist Party—which Giap joined in 1931—sent him to China to join Ho, with whom he formed a close relationship. He was self-taught in military matters. He wrote extensively on strategy and tactics, but his work derives almost completely from Mao Zedong’s theories of “people’s war.”

In 1945, Ho, as president of the Provisional Government of

the Democratic Republic of Vietnam, declared independence in Hanoi. The crowning achievement for Ho and Giap was Dien Bien Phu in 1954.

For 56 days, Giap’s insurgent army pinned down 11 French battalions. His artillery, firing from the hills, pounded the encampment in the valley below. Ground routes were cut off. Airplanes could not land on the besieged airstrip. The only way in was by parachute. There was no way out. The fall of Dien Bien Phu was the final blow for the French in Indochina. Almost 30,000 victorious Viet Minh troops entered Hanoi, where Ho set up the Communist government.

#### THE COMRADES LE

Le Duan came into contact with revolutionary thought through his work as a railway clerk. He became a Communist Party leader, and was imprisoned several times in the 1930s and 1940s. When independence was declared in 1945, he hoped to be named minister of defense. Ho chose Giap instead, which “might be one source of Le Duan’s lifelong disdain for Giap and Ho Chi Minh,” professor Nguyen said.

Instead of going to Hanoi, Le Duan remained in the south to direct subversive operations. In the 1950s, he was head of

the Central Office of South Vietnam. The party leadership sent him Le Duc Tho, who became Le Duan’s trusted deputy.

Le Duc Tho, a revolutionary at age 15, had worked as a post office radiotelegrapher while organizing demonstrations against the French. He made his mark as a regional press and propaganda chief. In later years, U.S. officials made the mistake of believing Le Duc Tho was a moderate. Both Le Duan and Le Duc Tho were reassigned to Hanoi in 1957.

The reputation of the new regime had been severely damaged by a “land reform” debacle. The idea of redistribution of agricultural acreage to peasants was forgotten as party cadres and “people’s courts” seized farms and executed those accused of being landlords. Most of the land wound up in state-owned collective farms.

The first secretary of the party got most of the blame and was driven from office. Ho assumed the first secretary’s title himself and in 1959, appointed Le Duan—the only official not tainted with the land reform disaster—to handle everyday responsibilities of party leadership.

In 1960, the party congress named Le Duan first secretary and the second-ranking member of the Politburo. Ho remained head of the Politburo, as well as party chairman and president. It was Le Duan, though, who held the daily

levers of power, including internal security, by means of which he established an effective police state.

#### HANOI INTRIGUE

As early as 1956, the Politburo had explored the idea of overthrowing the South Vietnamese government to reunify the country under northern control. A “people’s war” in the South was approved in 1959.

Ho and Giap were aligned with the “North Firsters,” who wanted to concentrate on building North Vietnam. Conquest of the South would be gained through protracted insurgency with assistance from North Vietnam.

The “South First” faction, of which Le Duan and Le Duc Tho were part, wanted to move faster to secure an all-out victory. In 1963, the party central committee approved Le Duan’s proposal for a General Offensive/General Uprising (GO-GU) strategy, employing full-scale military force to stimulate mass political uprising in the South.

“Le Duan proceeded to implement this strategy not once but three times over the course of the war (1964, 1968, and 1972), at great costs to the revolution,” professor Nguyen said. Giap opposed such actions as foolhardy.

The first GO-GU effort included an assault on U.S. ships in the Tonkin Gulf in 1964 and an attack on the U.S. air base at Pleiku in 1965. The result was not what Le Duan expected. The U.S. responded with deployment of aircraft in substantial numbers, followed by introduction of ground troops, a sustained air campaign against North Vietnam, and a relentless buildup of U.S. ground forces.

Le Duan was not able to try GO-GU again until the Tet Offensive of 1968. In preparation for it, he carried out a purge in 1967 of those insufficiently enthusiastic about his plan. He did not strike directly at Ho or Giap, but he arrested and imprisoned dozens of their allies.

Ho went to China, returning to make a futile last stand against the offensive at the Politburo meeting in December 1967. Giap fled to Hungary, where he remained until early 1968. He took no part in the Tet operation, which was commanded by others reporting directly to Le Duan. Neither Ho nor Giap challenged Le Duan publicly.

#### TET

On the night of Jan. 30-31, 1968, at the beginning of the Tet Lunar New Year holiday, the North Vietnamese and the Viet Cong insurgents attacked cities, towns, and military bases all over South Vietnam, striking in more than 100 locations. The offensive was defeated at every point. The Viet Cong lost 80 percent of its infrastructure and was destroyed as an effective fighting force.

However, U.S. leaders managed to turn battlefield victory into a strategic defeat. Having depicted the war as almost won, they lost faith, abandoned the goal of winning the war, and sought a negotiated settlement. That was not what Le Duan wanted. His second shot at winning the war had failed and it would be years before he had the resources for another attempt.

Meanwhile, U.S. officials repeated their misperceptions. The State Department said that “Ho Chi Minh and leaders in Hanoi planned the Tet Offensive,” and U.S. commander Gen. William C. Westmoreland declared that “the myth of General Giap’s military genius was discredited.”

The New York Times noted the absence of Giap in Hanoi but had an explanation: He had moved temporarily to a command center closer to the action in the South. Westmoreland



believed reports from his intelligence staff that Giap had been seen “coming and going” around the U.S. Marine base at Khe Sanh. As late as 2013, a retrospective in the Washington Post said the Tet Offensive “was orchestrated by General Giap.”

Ho Chi Minh died Sept. 2, 1969. Most of his titles were relegated to ceremonial use. “Collective leadership” was supposedly in force, but Le Duan continued in firm control via his position as first secretary. At the funeral, he read Ho’s political will, which urged the preservation of party unity and predicted the defeat of the United States.

Giap published several journal articles urging concentration on mobile strike units instead of massed forces. According to the New York Times, U.S. intelligence took this to mean that “in the light of the failure of the big enemy offensives in 1968, the 57-year-old defense minister had evolved a new strategic concept, making a virtue out of a necessity.”

## THE EASTER INVASION

In 1972, with virtually all U.S. ground forces withdrawn from Vietnam, Le Duan saw a renewed opportunity. He threw 90,000 North Vietnamese troops into a three-pronged invasion across the DMZ and out of Laos and Cambodia. Unfortunately for him, some US air power remained and it was rapidly augmented.

As airstrikes intensified, Hanoi sustained huge losses in a failed effort. The bombing of Hanoi and Haiphong in December 1972 forced Le Duan and Le Duc Tho to bargain for a settlement. The Paris Peace Accords were signed Jan. 28.

U.S. negotiator Henry Kissinger and Le Duc Tho were jointly awarded the Nobel Prize. Tho declined to accept, saying that “peace has not yet been established.” In fact, North Vietnamese losses and the cease-fire had the practical effect of delaying conquest of South Vietnam for another two years.

Giap was kept on the sidelines during the 1972 operation, but the press held him responsible anyway. The New York Times reported that it was Giap who “bore the brunt of criticism” for the defeat. The Washington Post said, “He was relieved of his command after his Easter Offensive failed.”

In March 1975, with the United States long gone from Vietnam, Le Duan finally launched a successful invasion of the south, a massive operation that led to the fall of Saigon within



Vietnamese General Secretary Le Duan, left, with students of Hanoi University in 1972.



U.S. Army

Ho Chi Minh (left) and Vo Ngyuen Giap (right) near Tan Trao, Vietnam, July 16, 1945, with Maj. Allison Thomas, leader of the OSS Deer Team, and other unidentified team members. The U.S. Deer Team helped the Vietnamese against the Japanese in what was then French Indochina.

six weeks. Saigon was renamed Ho Chi Minh City.

Giap was removed from his nominal position as Minister of Defense in 1980 and lost his seat in the Politburo in 1982. Enough was left of his earlier fame for him to be permitted a small role as vice prime minister for science and education.

Le Duan died in 1986. Even then, he was still seen in the shadow of Ho Chi Minh, his own history misconstrued once again. His obituary in the New York Times said that “he had proved to be a faithful and able executor of the political will of Ho Chi Minh by managing to maintain the collective leadership that Ho left as a legacy on his death in 1969.”

Le Duc Tho’s death in 1990 drew limited attention, his influence having been in decline for some time.

## THE LEGENDS PERSIST

Fifty years after the Vietnam War, the legends of Ho Chi Minh and Vo Nguyen Giap appear to be firmly rooted, both in the United States and in Vietnam.

Giap outlived all of the others. When he died in 2013 at the age of 102, the major newspapers gave him full credit for the military victory. The obituary headline in the Washington Post said, “Giap Defeated French, U.S. Forces in Vietnam Conflicts,” and the New York Times headline referred to him as “Giap, Who Ousted U.S. From Vietnam.”

According to the Telegraph in Britain, Giap stands “second only to the late revolutionary leader Ho Chi Minh as modern Vietnam’s most revered figure.”

Today, Ho’s picture appears on all Vietnamese currency, as well as in most public buildings and schools. His birthday is an official state holiday.

Since 1975, Ho’s preserved body has been on display in a glass-enclosed casket at a mausoleum in Ba Dinh Square in Hanoi, where Ho read the Declaration of Independence Sept. 2, 1945. The queue of those waiting to enter stretches for several hundred meters.

Ho’s expressed wish was that he be cremated, but the regime had a different need for the symbol of the nation. ✪

**John T. Correll** was editor in chief of Air Force Magazine for 18 years and is a frequent contributor. His most recent article, “The Difference in Korea,” appeared in the April issue.




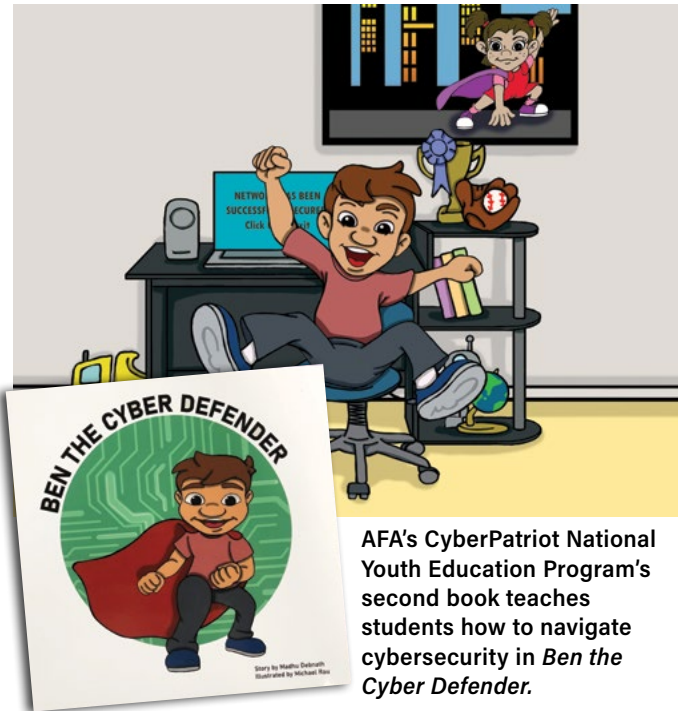
# CyberPatriot Promotes Cybersecurity for Youth

The Air Force Association is excited to announce the release of the second book in CyberPatriot's Cyber Education Literature Series—*Ben the Cyber Defender*. The Cyber Education Literature Series was developed with the goal of introducing cybersecurity awareness to young children in a fun and interactive way. As most schools have recently closed amid the new coronavirus outbreak, finding ways to keep kids engaged and to continue learning while at home can become challenging.

The book follows Ben, a typical kid with a not-so-typical passion for cybersecurity and helping others. His skills are put to the test when his cousin, Ethan, accidentally releases a virus that is set to ruin devices all over town. Can Ben stop the cyberattack in time and prove that he is ready to be a true cyber defender?

In today's world, it's important to teach kids about the value of safe engagement in online communities and, more importantly, the risks associated with use of such technology. While limiting screen time and introducing alternative learning resources, kids will surely love following Ben's adventure as he teaches them vital lessons and precautionary measures for being active online. *Ben the Cyber Defender* is a great place to start for parents who are unsure about how to address the issue of cyber safety with their kids.

The book is available for purchase online along with the first book in the Cyber Education Literature Series—*Sarah the Cyber Hero*. 



**AFA's CyberPatriot National Youth Education Program's second book teaches students how to navigate cybersecurity in *Ben the Cyber Defender*.**

# AFA's StellarXplorers VI 2020 National Champions

The Air Force Association announced the National Champions of the sixth season of its StellarXplorers National High School Space Challenge. The program is aimed at inspiring students to pursue education and careers in science, technology, engineering, and math (STEM) fields using space system engineering.

The National Finals Competition had been changed to a virtual event in March due to the COVID-19 virus. However, due to nationwide shelter-in-place restrictions, the StellarXplorers Program Office made the decision to award the top teams from the semifinal round as the overall winners of the competition.

After four rounds of rigorous competition, Team "Rocket Men" of the Bergen County Technical Schools in Teterboro, N.J., were crowned the 2020 National Champions from the original 213 teams from across the nation and at two overseas locations. Team "Rocket Men," captained by Yoshiki Kakehi, posted the best total aggregate score by just a small margin.

Second place went to Team "Africanized Killer Bees," the Aurora Composite Squadron's Civil Air Patrol team from Portland, Ore.; in third place was the team from the "Fighting Hornets" of the School of Engineering and Bioscience at Pueblo County High School in Colorado.

"AFA is delighted that each year the students competing in StellarXplorers bring excitement and passion to the competition," said AFA President retired USAF Lt. Gen. Bruce "Orville" Wright. "With the creation of U.S. Space Force in December 2019, space has been rightly elevated as a key part of our nation's defense strategy,

StellarXplorers is preparing the next generation of space warriors."

During the competition, the teams were required to define orbits, select spacecraft components, and choose a launch vehicle to meet a set of mission requirements. All competitors exhibited and sharpened their skills in analytics and problem solving, while the eventual winners demonstrated exceptional teamwork and leadership.

"Once again, over the course of another successful season, our competitors have shown they have the 'right stuff' to lead the future of U.S. space," said Stephen Gourley, StellarXplorers program director. "We are exceptionally proud to have inspired and motivated over 3,000 students in the last six seasons to pursue education and careers in many STEM fields, not only in aerospace engineering. Our sincere thanks go to our 2020 enabling sponsors, USAF STEM, the L3Harris Foundation, the Aerojet Rocketdyne Foundation, Rocket Lab, and SpaceX, along with our Educational Alliance of Analytical Graphics, Inc. (AGI), Space Center Houston, and Coyote Enterprises Inc. (CEI)."

The USAF STEM Program provided \$19,000 in educational grants to each member of the first-place, runner-up, and third-place teams.

**Registration will open May 1 for teams of 12- to 18-year-old students for the seventh season (2020-21 academic year), with finals to be held in Colorado Springs, Colo. To learn more about this program, visit [www.stellarxplorers.org](http://www.stellarxplorers.org).** 



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**1** William Harrell Nellis. **2** An A-10 Thunderbolt II over Nellis AFB, Nev. **3** F-80 fighters at Nellis, 1950s.



USAF (1/3): Staff Sgt. Tabatha McCarthy

# NELLIS

## Whatever It Took

Billy Nellis may not have been a natural fit for the role of wartime hero. He had to work hard for years to overcome obstacles, but he finally made it, and his heroism has not been forgotten.

His name graces Nellis Air Force Base, Nev., “Home of the fighter pilot.”

William Harrell Nellis grew up in tiny Searchlight, Nev. His father worked as a miner. Searchlight had no high school so, at age 13, Billy moved to Las Vegas in order to attend one there.

Billy could not afford college. After graduation, he took odd jobs until he eventually found steady work with the railroad.

Then came World War II. At the time, Nellis was married and the father of two—safe from the draft. However, he decided to join the Army Air Forces and become a pilot. It wasn’t easy.

Nellis, 26, was older than most enlistees. To impress the Army, he took flying lessons, soloed, and logged eight hours aloft.

When the Army still hesitated, Nellis tapped a former boss, Berkeley Bunker—by then a U.S. senator—for help. On Dec. 2, 1942, the Army finally accepted Nellis into its ranks.

Nellis capped a year of flight training on Jan. 7, 1944, when he was commissioned a flight officer. In May 1944, Nellis left for Europe, where he linked up with the 513th Fighter Squadron. He trained as a P-47 Thunderbolt pilot.

After the Normandy Invasion, Nellis flew 70 combat missions in support of Gen. George S. Patton’s Third Army, strafing and bombing German positions in northern

France. Twice, he was shot down and managed return to his unit and keep flying. He was twice promoted.

On Dec. 18, 1944, Germany launched a major counter-offensive now known as the Battle of the Bulge. Fighting took place within 10 miles of Bastogne, Belgium. Weather was awful. Air missions flown in the area were extremely hazardous. Nellis’ squadron flew sorties from dawn to dusk in support of the U.S. 101st Airborne Division.

In this environment, Nellis flew his final combat mission.

It came on Dec. 27, 1944. Nellis took off in his P-47 and began strafing a German convoy of armor and transports in Luxembourg.

Suddenly, the P-47 was hit by concentrated ground fire. The fighter burst into flames and plunged downward. It was too low for Nellis to bail out, and so he rode the airplane all of the way to the ground, crashing near Winseler,

Luxembourg.

In April 1945, US forces recovered the body. It was interred in Henri Chapelle American Cemetery and Memorial in Belgium.

This combat heroism and sacrifice transformed Billy Nellis overnight into a local Nevada hero. At the urging of Nevadans, the U.S. on April 30, 1950, renamed Las Vegas Air Force Base in honor of the fighter pilot who started out as a poor boy in Searchlight.

Today, Nellis is the home of more squadrons than any other base in the Air Force. It hosts major air combat exercises such as Red Flag and close air support exercises such as Green Flag. It is also the home of USAF Warfare Center, USAF Weapons School, and the 57th Wing.



### WILLIAM HARRELL NELLIS

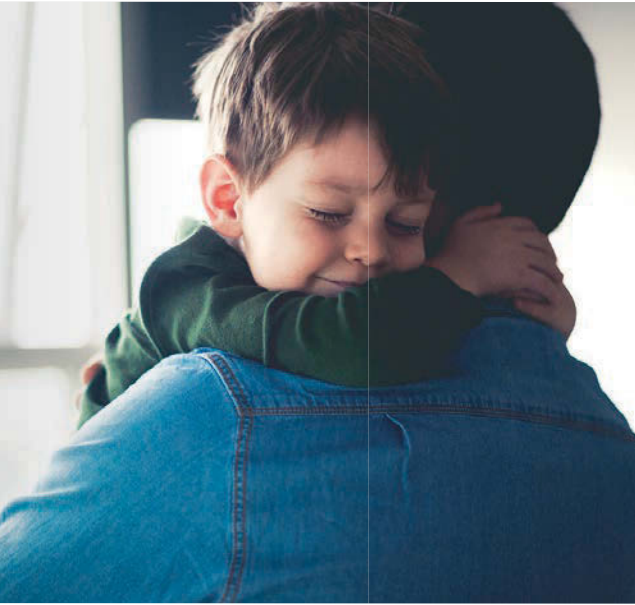
**Born:** March 8, 1916, Santa Rita, N.M.  
**Died:** Dec. 27, 1944, Winseler, Luxembourg  
**Education:** Las Vegas High School  
**Occupation:** US military officer, pilot  
**Service:** United States Army Air Forces  
**Main Era:** World War II  
**Years Active:** 1942–44  
**Final Grade:** First Lieutenant  
**Honors:** Legion of Merit (2); Distinguished Flying Cross (2); Purple Heart (posthumously); Air Medal (7); American Campaign Medal; European African Middle Eastern Campaign Medal (5); World War II Victory Medal (posthumously)  
**Resting Place:** Henri Chapelle American Cemetery and Memorial, Belgium

### NELLIS AIR FORCE BASE

**State:** Nevada  
**Nearest City:** Las Vegas  
**Area:** 177 sq mi / 11,300 acres  
**Status:** Open, operational  
**Opened as Las Vegas Army Air Field:** July 1941  
**Deactivated:** January 1947  
**Reactivated as Las Vegas Air Force Base:** Jan. 4, 1949  
**Renamed Nellis Air Force Base:** May 1, 1950  
**Current owner:** Air Combat Command  
**Former owners:** West Coast Air Corps Training Center, Air Corps Flying Training Command, Air Training Command, Tactical Air Command.  
**Home of:** 57th Wing



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#### AFA GROUP TERM LIFE INSURANCE PLAN FEATURES:

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- PROTECTION 24 HOURS A DAY, 365 DAYS A YEAR
- PREMIUMS WAIVED IF TOTALLY DISABLED
- FAMILY COVERAGE AVAILABLE FOR SPOUSE AND DEPENDENT CHILDREN



Underwritten by: New York Life Insurance Company, 51 Madison Avenue, New York, NY 10010 on Policy Form GMR-FACE/G-30290-0 Under Group Policy N. G-30290-0

\* Including features, costs, eligibility, renewability, limitations and exclusions.

Program Administered by Mercer Health & Benefits Administration LLC  
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