Romanian Deployment 52 | Q&A With CSAF Gen. Goldfein 10 | Stealth Origins 63

# AIR FORCE MAGAZINE

# AIR SUPERIORITY

How USAF is expanding the competitive edge. 43

Published by the Air Force Association

September 2019 $8

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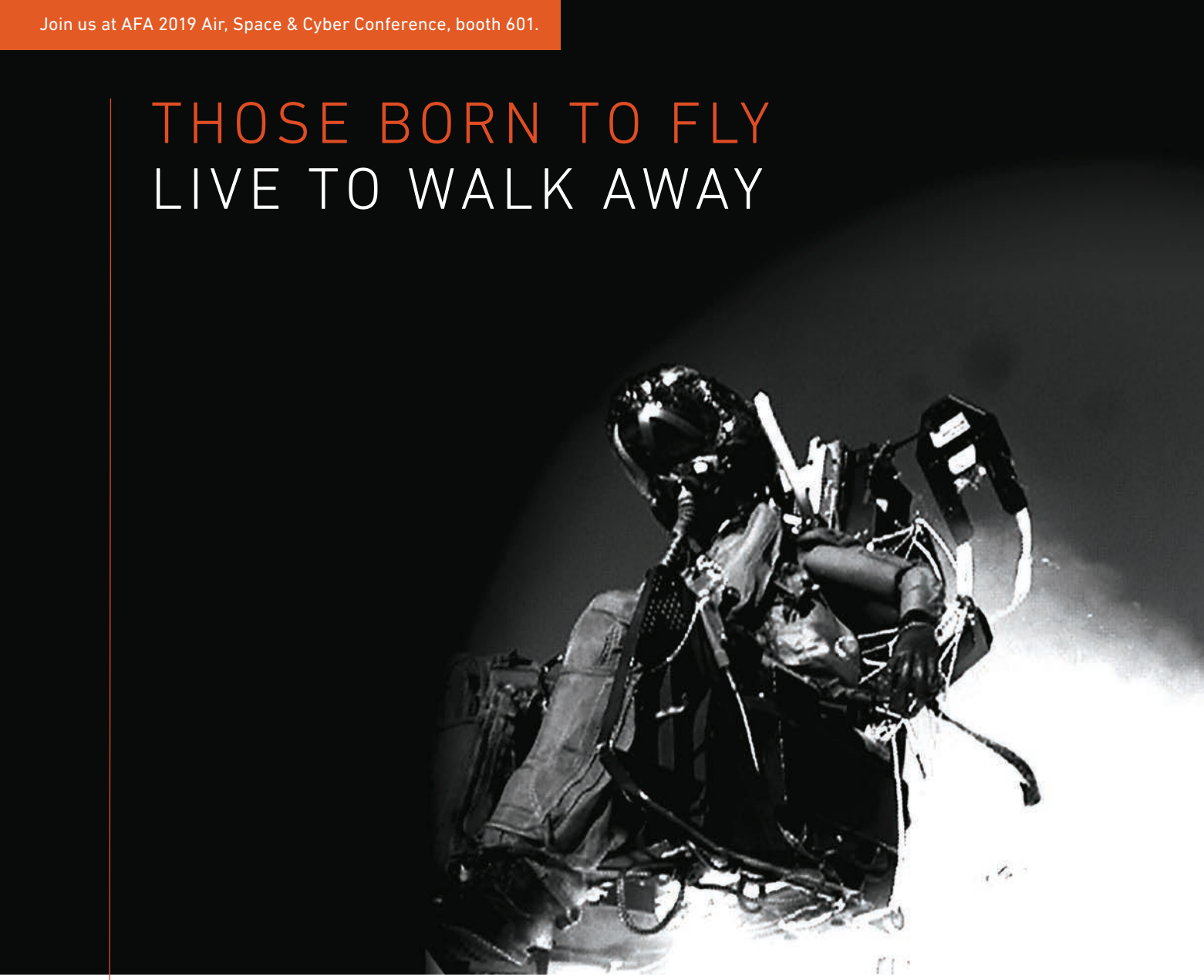

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# AIR FORCE

September 2019. Vol. 102, No. 8

Photo: Brian Everstine/staff

## DEPARTMENTS



## FEATURES



**Romanian Air Force MiGs. See "Vipers and Reapers in Transylvania," p. 52.**

## ON THE COVER

Photo: SSgt. Samantha Mathison

An F-22 near Hawaii. See "USAF's Dogfight Power Curve," p. 43.



**Air Force Magazine** (ISSN 0730-6784) September 2019 (Vol. 102, No. 8) is published monthly, except for two double issues in January/February and July/August, by the Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Phone (703) 247-5800. Periodical postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** $50 per year; $35 e-Membership; $125 for three-year membership. **Subscription Rate:** $50 per year; $29 per year additional for postage to foreign addresses (except Canada and Mexico, which are $10 per year additional). Regular issues $8 each. USAF Almanac issue $18 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send changes of address to Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air Force Association. 

By Tobias Naegele

# Developing Better Airmen

The most critical role of the Chief of Staff of the Air Force, working on behalf of the Secretary, is to build the force of the future. The Chief's leadership sets the tone for today, of course, but it's the decisions he makes to shape the future of the force that have the most lasting consequences. This is as true of developing future weapons as it is with selecting and developing future leaders.

For as long as it has existed, the Air Force has chosen future leaders the same way: With the exception of chaplains, doctors, and lawyers, it has lumped all its officers into a single category known as the "Line of the Air Force," and selected a percentage of them for promotion. "This system has served us very well," says Lt. Gen. Brian T. Kelly, the Air Force's deputy chief of staff for personnel. "It is one of the most thorough, fair, and equitable processes we have."

But an effective officer development system must be more than fair and equitable. It must also generate the correct mix of leaders, appropriately skilled and experienced, to lead and operate in an increasingly complex, joint, and specialized world. This is not about promoting individual airmen. It's about managing talent for a better Air Force.

This is where the current system falls short. Asking promotion board members to pit combat heroes against technical experts in a Darwinian competition that starts at major and continues at each successive level puts technical experts at a disadvantage and shortchanges the Air Force of specialized skills at its upper ranks. Instead of valuing diverse career paths and skill sets, it drives everyone to follow essentially the same career path, one conceived to ensure a highly competitive process for selecting general officers and, ultimately, a Chief of Staff.

What it does not ensure, however, is a comparably healthy selection of technical experts to become the leaders of their various technical specialties. Fields such as cyber, intelligence, logistics, maintenance, missiles, public affairs, space, and weather are ill served by this approach.

Today's system does not promote officers to fill specific jobs and requirements, but instead promotes officers as if they are entirely interchangeable. They're not. Inevitably, some newly promoted officers end up as square pegs in round holes—skilled enough to get the job done, perhaps, but not the best fit for the job at hand. If there aren't enough space-trained colonels, for example, then officers lacking that expertise must fill those billets.

Kelly has engineered a plan to break the Line of the Air Force into multiple competitive categories, a deliberate and scientific approach to help the Air Force better manage its talent and ensure it promotes and retains not only the best and brightest, but also that it promotes and retains officers in the right numbers and with the right skills and expertise to meet the service's needs. Assuming no surprises emerge, Chief of Staff Gen. David L. Goldfein will recommend to the Secretary in late September that these changes be adopted.

Instead of promoting by volume and then trying to match skills to jobs afterward, the new system will tailor promotions to the changing needs of the force. More competitive categories provide leaders the precision controls needed to manage highly specialized career fields, just as it does today with medical specialties, where competitive categories are already very narrowly defined. This way, instead of having one promotion rate of 80 or 85 percent for all aspiring lieutenant colonels, rates can be adjusted up or down for each individual category to match the needs of the force.

To be sure, this means the Air Force will also be able to set floors to ensure a minimum number of a given category of officer will be promoted. In a meritocracy like the Air Force, this will raise concerns about lowering standards. It shouldn't. In reality, the difference between the 80th percentile and the 81st in a group numbering in the thousands is infinitesimal and arguably arbitrary. It stands to reason, then, that the needs of the service are at least as valuable a discriminator as the relative merits of any given individual.

Kelly spent the summer visiting bases and briefing officers about the proposed changes. After presentations at Hurlburt Field and Eglin Air Force Base in Florida, officers who spoke with *Air Force Magazine* were largely positive about the proposed changes. Some expressed concern about unintended consequences, while others worried that the effects would be slow to become apparent. Most seemed to accept the logic that finer controls would allow for more and different kinds of career paths and for different specialties to develop their own ideal career paths over time.

Kelly acknowledged some missteps. His initial roll out ran into turbulence because its focus on "promotions" set off defensive responses before the proposed changes could be explained. "It's really more about development than promotion," Kelly said in an interview. "It's about how we organize and who we compete with for promotion, and about how we unlock the ability to develop talent differently."

The existing system's "one-size-fits-all model," Kelly says, has driven everyone to check the same boxes at the same points in time, and in some fields, caused leaders to redesign organizational structures to better position officers for promotion.

"Look, if you ask me to choose between great leaders and great technical experts, I'm going to choose great leaders," Kelly says. "But ideally, what we really want in our Air Force is to be able to develop people who are both a leader and a technical expert. We think going to this system gives us the ability to maximize both, so we're not forced to choose between those two scenarios."

Changing the competitive categories is ultimately just a part of a larger set of changes Kelly and the Chief envision. Others include a new system for officer performance reports that will eliminate grade inflation by using data analytics to normalize scores based on the rating history of each reviewing officer. Like advanced baseball statistics that make it possible to more accurately compare pitcher and hitter performance based on how players perform in different ballparks, this approach will provide a more accurate means for comparing OPR ratings from different raters and eliminate the perception that anything less than a "5" will damn an officer's career potential.

Just as significant is a proposal to eliminate officer promotion zones, along with below-the-zone and above-the-zone promotions. Officers are human, Kelly argues, so it's unrealistic to think everyone will develop at the same rate. He'd like to give some officers more time to develop at a given rank, while letting others advance more quickly, breaking the direct tie to year groups. This, too, is complicated, but Kelly argues it could be better for many individuals and help the Air Force better manage its talent pool.

There's a pattern here. The Air Force is only as good as its airmen. Those airmen are not machines, but people. Care for them, and they will grow and perform—often beyond expectations—but only if their talents are successfully managed. ✪

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# LETTERS

## Soviet Eye-Opening

As a 40-year-plus AFA member, I found your "Team B Tackles the CIA" article very interesting and informative [June, p. 136]. Anyone who read the annual Soviet Aerospace Almanac you published for years recalls that it was obvious the Soviets were trying to greatly surpass US military capabilities. As a missile combat crew member (MCCM), the Soviet almanac was "eye-opening" and reaffirmed my decision to cross-train as a MCCM.

Maj. Richard W. Stone,
USAF (Ret.)
Santa Maria, Calif.

## Small But Mighty

The May 2019 issue proves that *Air Force Magazine* still packs a punch at 64 pages. I try to catch up on my "professional reading" at lunch while eating at my desk and have thoroughly enjoyed this month's articles, even if I am a bit behind. As a retired space ops officer, as well as being on the Northrop Grumman/EADS Request for Proposal Team for the KC-46 Tanker in 2005-2007, I found so much to dig into in this issue. I loved the profile of Andrew Marshall by John A. Tirpak [p. 26] and have added a podcast he mentions to my listening queue. He also wrote the profile of the last of the Doolittle Raiders, Dick Cole—fantastic and inspiring reading.

The articles on current issues with the mobility fleet (including tankers and references to the KC-46) ["The Biggest Needs in the Mobility Fleet," p. 39] always make me shake my head a bit at the decision the GAO made to overturn the award to NG/EADS in 2008.

My time spent working with the 505th Command and Control Wing while at a HQ/FOA (as well as a student at the 505th of the Joint Air Operations Command and Control Course), along with duty at Air University as an instructor for the Joint Air Operations Planning Course, made the story "Moving MDC2 from Research to Reality" [p. 42] relatable on so many levels.

As a current defense acquisition corps member, I was also intrigued by the story "Instant Contracts" [p. 34] and hope to learn more from the Air Force in my current position with a sister service.

The beautifully written article on Operation Allied Force [p. 56] is a great reminder for today's younger generation of men and women serving who are as far removed from that period in time as I was from Vietnam upon commissioning in 1991. I had the privilege to hear Lieutenant General Short speak at the AFA Air Warfare Symposium in Orlando shortly after the OAF—I still have those notes.

But the one topic that keeps me scratching my head the most, due to the current considerations of a separate Space Force or Corps, was the story by Rachel S. Cohen, "Questions Remain as Lawmakers Mull Space Force Proposal," [*World,* p. 20], which was interesting from several perspectives. I spent two years at Cheyenne Mountain AFS, Colo., with USSPACECOM and was later amazed (and perplexed) when USSPACECOM was disbanded, or reorganized, into USSTRATCOM, mostly as a result of Title 10 restrictions on the number of COCOMs and the desire or need to stand up NORTHCOM following 9/11. So, 20 years later, here we are again. The 1990s' report from the "Space Commission," chaired by the Honorable Donald H. Rumsfeld, regarding the future of space warfighting capabilities, and the recommendations and lessons learned from that, seemed to have been forgotten in the past 10 years. The proposal of a Space Corps does, however, comes directly from that commission, as does the possibility of a separate military department for space. In the interim, returning the space domain to a COCOM is the right thing to do.

Whether or not a separate Space Force is required is another matter. Goldwater-Nichols provides a good structure for presenting forces to the COCOM that all of the military services understand perfectly. To organize, train, and equip those forces should remain a service-level responsibility, with a lead service most suited to USAF and Air Force Space Command. The recommendation that has been left in the dust is acquisition authority for space capabilities. The growth or creep of space acquisition across all of the services should be the center of gravity that is addressed first (and most efficiently). A single acquisition authority for space capabilities, with a set number of Joint Program Offices (JPOs) at the Space and Missile Systems Center in Los Angeles and Colorado Springs, Colo., seems to be a logical FIRST step.

Maj. Robert DeForest,
USAF (Ret.)
Rockledge, Fla.

## Remembering Robin

I throughly enjoyed the picture on pp. 6-7 showing Scat VII ["Airframes," July/August]. Robin [Olds] and I were in the 479th Fighter Group based at RAF Wattisham, UK, and we were both in the 434th Squadron. I was a lowly second lieutenant while Robin was a first lieutenant. Robin was a graduate of West Point, I was a graduate of Pasadena High School. I met Robin in May 1944 when I was assigned to the 434th. We started in P-38s before switching to P-51s in September 1944. I saw his plane on the tarmac many times and sat with him through many a preflight briefing. I remember in July 1944, Olds and I flew in a P-38 *Droop Snoot,* Robin at the controls and me in the "bombardier" position. We flew up to Scotland with Olds doing a series of lazy rolls just to make sure I did not fall asleep

## WRITE TO US

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

—The Editors

in the nose. I flew with the 434th until November 1944, before cycling back to the US as a training pilot while Robin re-upped and stayed with the squadron. Robin was a bigger than life individual who we could always count on when wheels up. He was an amazing leader that all of us enlistees would fly with regardless of the flak.

Lt. Col. Walter Drake,
USAF (Ret.)
Newport Beach, Calif.

## Parochial Priorities

John T. Correll is to be congratulated on his important article ["The Counter-Revolution in Military Affairs," p. 52] in the July/August issue. He calls attention to the threat to our national security that is created by those Army and Marine officers who have been continually working to ensure American airpower is kept in a supporting role to land forces. Their parochial efforts are focused on protecting ground force budgets and ensuring that only soldiers and Marines are theater commanders, rather than on making America's military more effective and efficient. To counter these parochial efforts it is critical that all officers (soldiers, Marines, sailors, and airmen), civilians in key Defense Department positions, as well as members of Congress have a much better grasp of military history and theory.

Examination of history and especially the opinions of those soldiers who have been on the receiving end of American air attacks can do much to help explain how and why American airpower has contributed to our successes in past wars. The opinion of German, North Korean, Chinese, and Iraqi soldiers is different from that of many American soldiers, Marines, and even some airmen who believe that attrition caused primarily by close air support has been airpower's main contribution to the defeat of the enemy army. Being on the receiving end of both close air support and air interdiction caused enemy soldiers to see that air interdiction was the major threat because of its ability to prevent them from using maneuver to achieve their objectives. This was the case in Korea when United Nations ground forces retreated after being ambushed by the Chinese. As had been anticipated by Far East Air Forces Commander Gen. George Stratemeyer, but significantly not by Gen. Douglas MacArthur, the Chinese attempt to complete the destruction of UN ground forces with a rapid pursuit put the Chinese troops out in the open even during daylight—exposing them to devastating air interdiction attacks. The massive losses inflicted by these attacks soon forced the Chinese to break off their pursuit and hide by day, allowing UN ground forces to break clear and prepare defenses further south.

Theory is equally important because it helps identify those developments in technology that are changing key assumptions critical to airpower's efficiency and effectiveness. Until the Gulf War, an important assumption was that American airmen relied on their vision to find an enemy's mobile ground forces, especially those not in close proximity to our forces. This assumption helps explain the need for the targeting of fixed key transportation infrastructure like bridges. Reliance on aircrew vision not only made the search for enemy mobile ground forces not in contact with our ground forces inefficient and dangerous, it generally limited the search to the hours of daylight and good weather. And when the visual search did find enemy forces, it was often difficult to determine whether these forces were decoys or had already been damaged or destroyed. Moreover, once found accurate air attacks against these forces required dangerous low-altitude weapons deliveries that increased exposure to point air defenses.

But in the Gulf War it began to become apparent that developments in ground surveillance technology, especially the Joint STARS ground-moving target indicator radar, were transforming American airpower by significantly reducing reliance on aircrew vision for finding the enemy's mobile ground forces not in contact with our ground forces. When this ability to find ground forces moving throughout a large area, even during the hours of darkness or in bad weather, was combined with developments in precision munitions and night vision capabilities, American air interdiction's effectiveness and efficiency in targeting and destroying Iraqi ground forces was dramatically increased, as the Iraqis discovered during the Battle of Al Khafji. The Iraqi reaction to our air interdiction's increased capabilities was to disperse and avoid movement, even at night and in bad weather, which seriously degraded on their ability to resupply and train. The result was a demoralizing paralysis that does much to explain why the defeat of the Iraqi Army was far less costly in terms of American lives than most sol-

diers and Marines expected.

Today, advances in technology are continuing to increase the ability of our airpower to find and precisely target an opposing army's mobile forces, and this is creating valuable new opportunities for how we can defeat an opposing army. Providing we change our joint and service doctrines to include service roles and missions in order to use our ground forces in support of our airpower—rather than in the reverse as most Army and Marine officers would prefer—we will have the opportunity to defeat an opposing army at even less cost than was the case in the Gulf War. To achieve this success faster and at less cost than is currently the case, the maneuver of our Army's forces needs to be used in support of our airpower by putting the opposing army's commander on the horns of a dilemma with no satisfactory answer. His dilemma is this: If he attempts to move in order to counter our Army's maneuver or threat of maneuver (which could be in the form of retrograde operations as in Korea, as well as by offensive operations), he would make his forces even more visible and vulnerable to devastating air attacks, but if he attempts to reduce the vulnerability of his forces to these attacks by dispersing and not moving as the Iraqis did, he provides our airpower with even more time to complete the destruction of his forces.

The result of these air attacks, as was the case in the Gulf War, would be to provide the opportunity for our Army to use its maneuver to complete the opposing army's defeat by overwhelming his isolated and demoralized units at the lowest possible cost in American lives.

Lt. Col. Price T. Bingham,
USAF (Ret.)
Melbourne, Fla.

## Bacon Sunglasses

So, let me see if I understand: We're going to add insult to the F-22 unit production debacle by considering the purchase of fourth-gen F-15EXs at the expense of F-35 production units ["F-15EX vs. F-35A," May, p. 30]. We're talking about a 50-year-old design, albeit significantly modified, competing against a gen-five system that is greatly advanced. And get this, ... the projected procurement costs and the cost per flying hour of the F-15 are projected to be slightly higher than the F-35! So why is this even a discussion? Propping up the industrial base is given as one reason, but I'm certain that Boeing's future doesn't hinge on a warm F-15 production line. And thanks to the quagmire that is our acquisition system, that rationale left the barn when it started taking decades to get a bird on the ramp. We know from experience that industry can produce highly capable and sophisticated systems in a timely manner with streamlined government oversight, a la the Skunk Works' U-2, SR-71, and F-117, to name a few. It would be transformational if the acquisition community did more than talk about such measures and implement them, once and for all. The other reason behind this absurdity is detailed in your side-by-side comparison, specifically regarding congressional support. The guys and gals on Capitol Hill need to remove the bacon sunglasses and act responsibly for the nation's defense posture. We've got finite resources and limited time to field systems that will dominate now and well into the future. To watch our elected officials use that treasure to garner votes is beyond infuriating. So is the prospect of yet another panel on acquisition reform. We've been doing rounds of that navel-gazing for half a century, and to no avail. We're running out of airspeed and altitude on this matter. I pray that we don't make the same mistake with the F-35 that we did with the F-22. Here's hoping that rational heads prevail on this and future requirements.

Lt. Col. Charles F. Minter Jr.,
USAF (Ret.)
Shalimar, Fla.

## Creech Breech

I read the article "Namesake: Creech" in your magazine [June, p. 144] and respectfully disagree on a number of points. During the first few years he led Tactical Air Command, the Air Force did suffer from lack of resources. The budgets under the Carter administration were austere and placed the Air Force in a position that strained their readiness. It was not his vision and management decisions that brought the Air Force out of this precarious situation. The Reagan administration was the driving force behind the increase in flying time, resource allocation, and a return to a readiness posture that made the Air Force more than the 'Hollow Force' we had under the previous regime. He was instrumental in killing the F-4 Phantom by excluding it from future upgrades, and he was equally influential in selecting the F-16 over the superior F-17 as the newest fighter aircraft for the Air Force.

He presided over Tactical Air Command during the most tragic incident to fall upon the Thunderbirds Demonstration Team. When the entire four-ship diamond formation crashed, Creech took charge of the team and instituted a series of conditions to micromanage their performances before allowing them to resume operations. During his tenure, and in the years to follow, the team had to demonstrate a show and obtain approval prior to the start of each show season. Beginning with Creech, the leader of Tactical Air Command often modified maneuvers and formations flown by the Thunderbirds for their shows. This did not serve the team well as the ambassadors in blue. The Blue Angels gained popularity during this time, performing shows in the A-4Fs with little interference from their leadership.

Creech was a mentor for the crop of four-stars that ruled the Air Force for several decades after his retirement. These generals, naturally, had great praise for their benefactor, but these same officers were referred to as the 'Fighter Pilot Mafia.' Their ideas and visions were solidly entrenched in single-seat, single-engine mentality, and they were instrumental in prejudicially removing nonpilots from the cockpit of every airframe they had control over. The Air Force suffered under their oppressive tenure for years. Eventually, their policies were instrumental in eliminating electronic warfare platforms like the F-4G Wild Weasel and EF-111A Jammer. They also removed the navigator from the KC-135, the gunner from the B-52, and retired the only tactical reconnaissance platform, the RF-4C, from the inventory. These men did not transform the Air Force into a better, more inclusive fighting force. They concentrated their efforts on the pilot core and treated everyone else as an afterthought.

General McPeak, as an example, nearly ruined the Air Force with his radical views on everything from new uniforms, physical standards (modeled on himself), and his composite wing concept that proved to be a disastrous failure. Introducing a new uniform that looked like a cross between an airline pilot and a Navy uniform—it did not get positive reviews. In a show of support for Total Quality Management, which was in

vogue at this time, he instituted a period when the uniform would be evaluated and receive feedback from the field. After the evaluation period, the results were overwhelmingly negative. In the truest sign of the times, McPeak declared that the Air Force was not a democracy that was beholden to popular opinion and switched to the new uniform anyway.

These were the kind of leaders General Creech placed in positions of authority. Generations of pilots will continue to sing their praises, but the rest of us were not impressed.

Lt. Col. I. Maximciuc,
USAF (Ret.)
Franklinville, N.J.

I enjoyed reading about Gen. W. L. Creech ["Namesakes: Creech," June, p. 144]. I was assigned to the then-1st Tactical Fighter Wing at Langley AFB [Va.,] when he commanded Tactical Air Command. I remember him for also giving us universal "Creech brown" paint schemes, our "Flag" programs, and a 10-word quote I use to this day: "Make it happen, make it better, and make it last."

Joe Davis
Washington, D.C.

## Many Faces of War

I found the group photo of glider pilots spread across pp. 10-11 of the 2019 Almanac (June) very interesting. I was fascinated by the variety in the photo. I did not attempt to count them, but there must be a dozen or more varieties of uniforms! And the headgear, or lack of it, is amazing! Some men are bareheaded, some have on service caps, some flight caps, some ball caps, some steel helmets, and at least one has goggles on his head! One man has suspenders and another appears to be wearing a parachute. And the expressions on their faces varies so much also—from laughing and smiles, to concern and grim! What a great record of the men in the Army Air Forces at the time! Thanks so much for publishing this photo. I keep going back to it to see what else I can see in it!

SMSgt. Carl M. Lehman,
USAF (Ret.)
San Antonio

## Show and Tell

I keep seeing these reports of debris in the pre-delivery of the KC-46 tankers ["World: Debris Causes 2nd KC-46 Acceptance Pause," May, p. 25]. How about someone taking a few photos of the debris, in place, at the time of discovery so we can all see what is being called debris? I'd like to know if the Air Force is using this as a device to delay acceptance and delivery of aircraft because it does not have the capacity to accept the aircraft as they are delivered. Let's have an accounting of the stuff that is being found as to quantity, size, effect of debris on flight qualities, and so on.

Lawrence Mayfield
Pahrump, Nev.

## Top 10

Now that Congress (in all their wisdom) has the top 10 list of Air Force bases that are most vulnerable to climate change, we have given them a list of bases to start looking at either for relocation or closure before they are all destroyed ["World: For USAF Bases, Hard Choices Follow Storms," May, p. 23]. Maybe we should provide the bases in the northern tier that are impacted by winter storms as well. I can't wait for the Air Force Green Plan.

Col. Quentin M. Thomas,
USAF (Ret.)
Las Vegas

### Boots Not Airplanes

I take exception to Tobias Naegele's assertion in "A Space Force for the Future" ["Editorial," June, p. 2] that, "Airpower had already won a war" upon creation of the US Air Force. This is just not true. While the strategic bombing campaign in Europe hurt Germany, fact is production was up in the later stages of the war. It took a massive invasion with boots on the ground to defeat the Axis. And while the atomic bombs accelerated the end of the war with Japan, they did not win it. It was won through the actions of the US Navy on the high seas and the island-hopping campaign in the Pacific. As for the essence of the article, I agree that it would be premature to create a whole new service. We are just not there yet.

Maj. Douglas McGuire,
USAF (Ret.)
Fredericksburg, Va.

## Is Zealotry Such a Bad Thing?

In reference to "Doolittle Was a Zealot" by Lt. Col. Mike Daetwyler [*Letters,* May 2019, p. 4], I say ditto, but the temper of the time in World War II demanded zealotry to win the war.

Gen. Curtis E. LeMay's method of air warfare—destruction of the German factories—was uppermost to that zealot.

[Zealotry] was a necessary evil. The Arnolds, Mitchells, LeMays, Doolittles, MacArthurs, and Pattons are never to be forgotten, the best the era had.

Lt. Col. Daetwyler mentioned that the Chinese and Russian militaries have delved into space, so we in the US must seek zealots to bring us into the future or we will be cut short as we were in World War II, where we had to bring "Rosie the Riveter" and the other women ferrying airplanes and the rich guys with their own private planes looking out for German submarines close to our shores, which brought about the Civil Air Patrol, credited with sinking one U-boat and which was a menace to the [German Navy].

Our zealots of yesteryear were necessary. Because of them we overcame and defeated—it was the excessive devotion to a cause that was just.

Lt. Col. Charles J. Lercara, CAP
Flushing, N.Y.

## Not Made in America

A newer aircraft having parts shortages did surprise me ["Fighter Force Struggling to be 80 Percent Mission Capable," April, p. 20]. Two things came to mind: Original parts in the airplane are not meeting standards or all parts are not manufactured by American companies, and foreign manufacturers are needed—I can see where America does not have the material to make all parts. So we need to fix this area.

I see an additional concern—retaining experienced maintenance people. Are we still some 17,000 short in people? It seems the first re-enlistment is the [problem] area ... just get people trained and they leave.

I believe we have a major problem.

Kenneth A. Smith
Mesa, Ariz.

## Chest Salad

A soldier returning from World War II might wear three ribbons, General Pershing had only two rows ["Almanac: Awards and Decorations," June, p. 48]. A World War II airman with combat experience might have five or six ribbons, as might a sailor serving in Korea, the last war in which we had any significant naval operations—the Inchon landing. The last war in which we faced aggressive airborne and AA opposition was Vietnam. Our present engagement is in the Middle East, the longest in our history, and has been ground combat in small numbers as compared to previous wars with close air support. This makes me wonder why I see senior military members with ribbons going from left pocket seam almost up to the shoulder. What do all those decorations mean? Any Active Duty or retired military member knows the answer—they mean essentially nothing—a medal for doing your job, another for doing it well, and yet another for doing it really well. I met a young female airman second class with two years of service, none overseas, wearing three rows of ribbons. Swimmers, hoist operators, and flight nurses have received DFCs, the aircraft simply being the bus taking them to the site of their operations. Soon a Distinguished Potato Peeling Medal will be awards to KFs! It's ridiculous and has to stop.

In World War II, we laughed at Hermann Goering and his decorations. We made fun of North Korean generals with awards going down the front of the their tunics to the trousers. Now, foreign military laugh at us.

The military must sit down in committee with intent of making draconian cuts in awards enacted in the past 50 or 60 years and limit eligibility of prestigious decorations to combat-only. "Staff Hero" awards must be drastically reduced and made junior in precedence to those related to armed conflict. Let us try to return the honor and dignity to the military decorations.

Cmdr. John W. Bradford Jr., USN (Ret.)
Wetmore, Colo.

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# 'Halt Force' Readiness

*Air Force Chief of Staff Gen. David L. Goldfein spoke with* Air Force Magazine *Editorial Director John A. Tirpak and Editor in Chief Tobias Naegele on Aug. 2 about how the Air Force will return to its expeditionary roots—the better to serve as the "halt force" in future conflicts—as well as readiness and other issues affecting the service.*

**Q. We've talked a bit about how the Air Force will become more expeditionary. What's still to come?**

A. My intent is to tie a bow on the work we've been doing the last three years. We've focused on fixing the fighting formation, joint leader development, and multi-domain operations, which has actually got some traction now.

What ties it together is, how do you present forces to a combatant commander?

We're coming out of an era where we've been rotating airmen into a rather mature campaign. We have forward mature basing, infrastructure, and command and control squadrons that we can rotate airmen in and out of.

But that is not the model that will actually work for a Russia or China campaign, for which we are expected to be the 'halt force.'

This is not parochial, and I'm skirting operational sensitivity here, but if you look at the operational war plans, every one of the combatant commanders expect—by virtue of the fact that we fly into theater—that we will be there in hours and days, not weeks and months. So we're the component they expect to arrive the quickest and establish ourselves to halt enemy activity, while follow-on forces can then be brought in and built up. But somebody's got to get in there first to halt the adversary. And that's us.

Every unit is going to have to figure out how they do five core tasks in support of that. [First], they have to establish a base where it currently doesn't exist. Then, employ integrated defenses to protect the base. Third, establish command and control connectivity up, down, and sideways, hooking into higher headquarters as well as subordinate units. After that, receive follow-on forces that may not look like your own, because they're allies and joint forces. And finally, fight your base in a contested environment, where you're likely to be cut off from a portion of your network and you are taking losses.

If you look at those core tasks and then at our current training and development of commanders, … we've got some work to do.

**Q. How will things look different to the airman?**

A. If we get this right, when they go to Red Flag, they're going to … roll in and establish those five things. They will deploy with a command and control kit that allows them to connect-in very quickly. They have to build up that base and operate off it very quickly. At each echelon, what an airman should see at home base is a battle rhythm that mirrors what it will look like when they go to an exercise. For some, it will be very different; for others, their battle rhythms today already mirror what they do downrange.

The most important thing I can do as Chief is to produce competence under fire. … My job is to ensure that when airmen face combat for the first time … they quickly get to that moment where the calm comes over them and they realize, 'I can do this. I've been here before.'

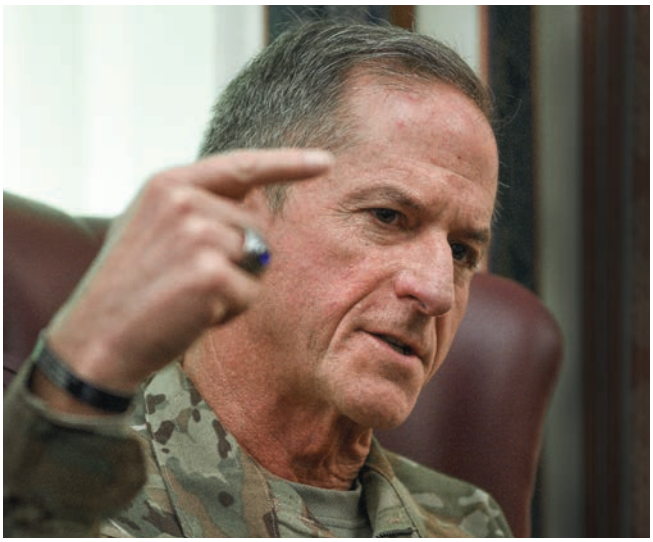

Photo: Mike Tsukamoto/staff

**Gen. David Goldfein, Chief of Staff of the Air Force, believes force readiness goes far beyond mission capable rates and must be viewed and funded holistically.**

**Q. How often will they practice deploying to a bare base?**

A. I don't want to generate too many more deployments because I'm pretty sensitive about white space on the calendar. They need more time at home to be able to train better and have reflective time so they can really absorb what they're learning. Surge has become the 'new normal' in many ways with this smaller force. And I want to keep every airman we've invested in, because we need them. The technology doesn't do much without the trained and ready people.

**Q. To be the 'halt force' you have to be ready to go, all the time. But you've had some serious readiness problems in recent years?**

A. The good news is we've been laser-focused on the pacing units that are required in the opening days of a campaign. And right now … 90 percent of the lead elements for those pacing units are C1 or C2, ready to go.

**Q. What were they before?**

A. They were less than that, ... but we've changed the way we invest our readiness dollars.

In the past, we spread it across all the weapon systems with the approach that all ships eventually rise with the tide. … The problem with that approach is it just took too long to move the needle of readiness.

So we looked at the National Defense Strategy and determined which units will be required upfront in the opening days of a campaign in China or Russia. And we identified those by units and MDS (Mission Design Series) and the core capability they bring. And then we put the bulk of the additional readiness money at them.

The rest of the force, we didn't decrease their funding, they just didn't get as much additional funding. And we have moved

the readiness needle on those pacing units a significant amount.

And a shout out to Congress, who worked so hard, for recently removing the guillotine of sequester, which is huge for the services.

Important to note, though, Secretary [Heather] Wilson, and now [Acting] Secretary [Matthew] Donovan and I, we've been really careful about not getting a 'sugar high.' Which means, if you shovel money in there and get these pacing units in great shape, you feel good about yourself, but then realize you've done damage to the foundational base that's got to feed them.

So, I can't put all the money against an operational squadron. I have to put money against the schoolhouse that produces the crews. We need to keep that balance.

**Q. Sounds like tiered readiness; isn't that something the Air Force used to consider a dirty word?**

A. We still think of it as a dirty word, quite frankly. I can't get into specifics, but if you look at the percentage of the US Air Force needed to be forward in the opening weeks of a China or Russia campaign, it's upward of 80 percent of the force. We don't have the luxury of having an Air Force that's not fully ready to meet our campaign commitments.

**Q. After Operation Deliberate Force in the mid-1990s, the Air Force had a reset; a stand-down to restock and rest. Will there be a reset after Inherent Resolve, or is that a thing of the past?**

A. I don't see it, because if you look at the history of our fight in the Middle East since 9/11, our numbers haven't changed appreciably over the entire time. The other services, they had big swings, right? Big surges. Everybody out of Iraq, then everybody back in. But the air component, we've actually been pretty steady. When the Army's … on the move, they pack up organic fires rather early in the process. And so we become their organic fires and provide them top cover.

So I actually don't see a reset. … I have not seen a reduction at all in the demand signal for air and space power. And I don't anticipate one.

**Q. Back on readiness. You're under a mandate from the Secretary of Defense to get up to an 80 percent mission capable rate on the F-16, F-35, and F-22 by the end of September. Will you make it?**

A. I think we'll get there in one, not the others.

But … the MC rate is actually … not a very good measure of aviation readiness.

You've got to have trained and ready airmen to get the job done. And that's pilots, maintainers, crew chiefs, fuelers, air traffic controllers, air battle managers, intelligence specialists, etc.

And then you have to have someplace to go. A tactical aircraft has to go to a range with high-end emitters to replicate the threat. And has to go to depot and get modifications, and you have to have time to train.

So, how have we done?

We were 4,000 maintainers short, we're now down to zero. We were on a downward spiral of pilot retention, but we've leveled off and seeing indications that retention numbers are actually going up.

**Q. You're still 2,000 pilots short?**

A. But we haven't gotten any worse. And we see trends. … It's not just the bonus take rate, we do surveys that show an inclination to stay longer.

The flying hour program: When we hit rock bottom in terms of our readiness rate, we were at about 16, 16.5 hours per month average, per pilot. We're now at 20 and growing to 21. That's better than when I flew. So we're back in the air.

Ranges: We've put $3.6 billion into ranges. That's not an insignificant chunk of change, into Nevada and the Utah Test and Training Ranges. Depots: We've cut time off depot throughput, and we're getting a better product out the back end. When a combatant commander asked for a squadron of B-52s, in 47 hours—less than two days—they were on the ground half a world away, and in 24 hours they were able to turn and perform combat operations. That's the level of readiness we've been able to achieve.

**Q. So why doesn't all this translate into a better MC rate?**

A. It does. But the way MC rates are measured can give a skewed picture of reality. In F-16s, for example, I had to take a significant number of F-16s offline to do a major modification. And during that time, my MC rates are going to go down. But that's an intentional reduction, to modify that system for future combat.

I don't see a time where all of the MC rates are going to magically get higher, but by overall investment, we're going to drive aviation readiness to a higher place.

**Q. Was the Secretary asking the wrong question?**

A. I understand exactly what he was asking for in terms of these three rates. But that would require targeting investments to achieve an MC rate in only three weapon systems, and I've got to manage across an entire fleet.

The conversation I'm having with the Secretary of Defense's staff is to make sure there's a clear understanding of how you measure, generate, and sustain readiness, and it requires investment in all those areas.

If I were to just focus on MC rates, I would have to take money out of investment in people or ranges or an investment plan. But do I believe that, over time, MC rates are going to increase? Absolutely.

**Q. So, can you get a waiver in the meantime, or is that directive relaxed under the new Secretary?**

A. It hasn't been relaxed. Right now, I want to give Secretary [Mark T.] Esper plenty of decision space, because he's only been on the job a short period of time. But the discussion is not so much MC rate focused, but an accurate depiction of combat readiness. What matters is, when a combatant commander calls and says, 'I need a squadron of B-52s.' What really matters is that I've got trained and ready crews, … and we've been able to meet those timelines and actually exceed them. That's what counts.

**Q. A year ago, the Air Force released 'The Air Force We Need,' which recommended a force of 386 combat squadrons. What's happened since then?**

A. In the 2021 POM (Program Objective Memoranda), you'll see a close linkage between the analysis that went into the Force We Need and budgets we've built.

Our purpose was to start a dialog on this that doesn't start with 'the force we can afford.'

Secretary Wilson wanted to change that narrative, which said, 'regardless of what we can afford, this is the force we need. This is the requirement.' And we were hopeful we would hear Congress repeating this back to us, and indeed, the chairmen of all four committees, in their opening statements, mentioned that the Air Force is too small for what the nation is asking it to do and needs to grow to 386 squadrons. And the president, in his speech at the Air Force Academy, committed to building 386 operational squadrons.

The third objective would be for it to be written into the NDAA (National Defense Authorization Act) as a validated requirement based on analytical rigor.

The 386 stands the test of scrutiny. Now, the hard part of this discussion is, how are you going to afford that? ✪

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By John A. Tirpak

# Boeing Won't Bid on a New Nuke. Now What?


**A Minuteman III transporter/ erector loading test at Minot AFB, N.D., in April. USAF must decide how to proceed with its ICBM replacement program with only one bidder.**

Photo: SrA. Ashley Boster

Aug. 14, 2019—

## DO ME A SOLID

Boeing won't bid on the Air Force's new ICBM replacement, the Ground-Based Strategic Deterrent program, the company announced in July. That leaves the Air Force without a competitor to Northrop Grumman, which now looks to be the sole-source supplier on the potentially $85 billion project.

Boeing's reason for declining to bid was simple: Northrop owns Orbital ATK, the sole producer of large solid rocket motors in the US. Boeing was planning to use Orbital ATK motors, but said it doesn't think there's any way it can underbid Northrop, which can charge a lower price on GBSD because its SRM supplier is essentially in-house. Boeing also said it's uninterested in being on a forced team with Northrop to develop the program, as some have suggested.

The situation echoed loudly a warning offered by the Pentagon itself only a month earlier; namely that the defense industrial base is in trouble. According to an annual Pentagon report released in June, domestic suppliers of many military-critical items—it specifically called out solid rocket motors, as it has for 20 years—are down to one or none, compelling the Defense Department to either forego competition on some crucial items or depend on overseas suppliers.

Besides Orbital ATK (since renamed Northrop Grumman Innovation Systems), which Northrop won approval to acquire in June 2018, only Aerojet Rocketdyne makes SRMs in the US, and it focuses on the smaller SRMs used in items such as air-to-air missiles.

If nothing changes, USAF will have to select Northrop Grumman as its sole-source GBSD supplier, without the benefit of a competitor to put downward pressure on the price.

Boeing Defense CEO Leanne Caret wrote to Air Force acquisition chief Will Roper on July 23, saying the GBSD program doesn't offer a "level playing field." Northrop Grumman, she said, has an "inherent advantage" by virtue of being vertically integrated with Orbital, and that fact means it isn't even worth Boeing's effort to "devote the significant resources required to develop" a proposal to answer the Request for Proposals, which the Air Force released July 16. Responses to the RFP are due in December, and USAF expects to award a contract next summer.

Caret said Boeing has been "transparent with the Air Force about its concerns" throughout the procurement process, but the "modest changes" made in the RFP didn't fix things to the company's satisfaction. Those changes included extending the RFP response deadline by two months and the option to do a joint proposal with Northrop.

The Air Force won't comment on the GBSD developments, because, a spokeswoman said, the program is "now in source selection."

Boeing's move was not a huge surprise to the industry.

As soon as Northrop acquired Orbital, "The spectre of how this was going to play out in the GBSD competition was kind of the big question in town," William A. LaPlante, MITRE Corp. senior vice president and general manager, national security programs, told *Air Force Magazine* in an interview. LaPlante served from 2012-2015 as the Air Force's acquisition chief, and toward the end of his tenure, oversaw the beginnings of the GBSD's Technology Maturation and Risk Reduction phase. Under TMRR, Northrop and Boeing got $329 million and $349 million, respectively, to develop GBSD concepts. Roper and former Air Force Secretary Heather A. Wilson have described this phase of the GBSD program as one of the best-run in the service, offering innumerable digital variations on concepts so USAF can pick the best ones.

As part of the deal to get the Pentagon's acquiescence in the merger, Northrop agreed that Orbital could continue to supply Boeing with SRMs for the GBSD competition.


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Boeing later insisted—and Northrop, at USAF's urging, agreed—that there be firewalls in place to ensure that Boeing design information didn't find its way to Northrop's GBSD capture team. But that still wasn't enough to convince Boeing that it had a shot at winning. Caret said the final RFP failed to "address the unfair advantage" enjoyed by its competitor. The solid rocket motors, Caret said, are "the essential part" of the GBSD, and Northrop's reduced overhead gives it an unbeatable pricing edge.

So what is the Air Force to do?

## FOUR OPTIONS

"At this point, there are ... four ways to go," said LaPlante, who said he has been asked "unofficially" by the Air Force for his perspective.

Option one is "just stay the course," LaPlante observed. Replacing the Minuteman III is urgent and "time is of the essence" in the view of Air Force Global Strike Command, he said. The Air Force could opt to simply award the contract to Northop "in the interest of time," because the Minuteman starts to age out in the late 2020s.

"The pressures of getting this program underway are tremendous," he added, "particularly from the operators." Even with only one contractor, that doesn't mean the program will launch any more quickly than it would under the existing RFP. LaPlante said "awarding and definitizing" the contract will take time, although he acknowledged that the current administration has moved to save time by reducing programmatic reviews, among other steps.

There are three other main possibilities, he asserted.

"One is, the government could form some kind of national team—sort of like the (Missile Defense Agency) did in the early 2000s. They could specify, 'this is the team we want, in the interest of the industrial base.'" The Air Force took a slightly different approach in its RFP, allowing but not requiring Boeing and Northrop to offer a joint proposal alongside a solo bid.

But Boeing addressed that idea in its letter to Roper, saying it's "not realistic" to expect the two companies to develop "a joint proposal in the five months before proposals are due" after building separate proposals for two years. The idea is "not a workable solution," Caret said.

Another option would be for USAF to buy the motors itself, and supply them as government-furnished equipment to the GBSD winner, thus allowing the two companies to compete on the basis of the concept, design, and management of the ICBM replacement process, LaPlante noted.

Finally, "a slight variant on that, is to exclude the cost of the rocket motors from the source selection," LaPlante noted, saying "In other words, make the source selection about everything else" besides the SRMs.

Asked which course he thinks the Air Force will take, LaPlante said it depends on how much the service weighs the time element.

"If time is your priority ... I could see them continuing to go with the course that they've set." If, on the other hand, "the health of the industrial base is viewed as imperative," it could be one of the other three, he said.

It's also possible that the Air Force could widen the field to include Aerojet more broadly, and "the government could say, we will do a competition for the first stages." But that would "probably take too much time," given the urgency of the procurement, according to LaPlante.

His own hunch is that while USAF will certainly review its options, it will also look hard at "what the benefit is of delay. I don't know how quickly you could update the RFP and the acquisition strategy." Both would have to be adjusted, and while changing the RFP is simply a matter of "editing," changing the acquisition strategy would be a radical thing, LaPlante noted—affecting cost estimation models for both the government and contractors, and opening up a whole new round of discussions that would likely a incur long delay.

LaPlante mentioned that when the B-21 bomber competition was underway, "we had the luxury" of two years of discussions with the contractors to iron out every question and address every concern, resulting in a source selection that "withstood the most rigorous protest," he said. With the time pressure on the GBSD, such thoroughness may not be possible, he said.

A senior Air Force official, who spoke on condition of anonymity, said in early August "there's still time" for the service to assess the ramifications of Boeing's announcement. "We may do nothing," he said, and "Boeing could change its mind and decide to bid ... even if nothing changes."

## A WAKE-UP CALL

Will Boeing's opt-out spur Congress and the Pentagon to abandon its decades-long policy of letting the market decide? Will there be more directed buys of critical items to preserve the industrial base and expand the competitive environment?

LaPlante said the SRM situation "didn't have the same 'call to action, clarion call'" that erupted when the US realized it had to address its dependence on the Russian-made RD-180 rocket motor some years ago. "We need a similar program, in my opinion, for the solids," LaPlante said. "We need to have multiple options" for solid rockets as the US will when the RD-180 situation is fully addressed.

Although he initially said an SRM initiative would be "a little late," LaPlante backtracked, saying "maybe not," noting that while the Navy is putting the old Trident II missile on its new Columbia class of sea-launched ballistic missile submarines, "not too long after, the Columbia class will get a follow-on to the Trident II. That will hopefully motivate a solid rocket motor examination for the US."

And "it's not just" the GBSD and the successor to the Navy D-5 missile, LaPlante noted. The ground-based interceptor element of missile defense also relies on solid rocket motors. "All three of those need industrial base policies associated with them," he asserted. "This could be the wake-up call."

What should not happen, LaPlante said, is for the industrial base to be a consideration during source selection. It has to be worked in at the beginning. "You do it before then, in the way you set up" the competition, he said.

Although the Air Force should still try to work competition into the GBSD, there shouldn't be any delay if it can't, according to retired Air Force Lt. Gen. David A. Deptula, head of AFA's Mitchell Institute for Aerospace Studies.

Writing in *Forbes,* Deptula said that "absent a mutually satisfactory agreement ... the Air Force should continue the GBSD program as scheduled." The nuclear stakes are too high, Deptula said, to risk delaying the final retirement of the Minuteman III any longer, and proceeding with a single contractor "would be preferable" to extending the GBSD timelines.

There's precedent for single-bid contracts, he wrote, including the F-35 fighter, Global Positioning Satellite, Army multipurpose vehicle, Navy presidential helicopter, and Air Force Combat Rescue Helicopter, all of which have produced reasonable outcomes.

"Moreover, any major delay would risk increasing the GBSD program's costs and likely require additional, unplanned investments to sustain Minuteman III," Deptula said. The dispute over the structure of the GBSD program could also "be used to revive the narrative of die-hard opponents against modernizing" the land-based leg of the nuclear Triad, and Deptula warned against members of Congress using Boeing's action "to call for another study on the feasibility of extending the Minuteman III." He noted that "a dozen such studies have all concluded that the GBSD is the only option that will meet the nation's requirement for a reliable, sustainable and credible ICBM force." ✪

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"If anyone dares to try to separate Taiwan from China, the Chinese military will not hesitate to go to war to resolutely safeguard the country's sovereignty and territorial integrity."

Chinese Defense Ministry spokesperson **Wu Quian,** after the US Navy's USS *Antietam* passed through the Taiwan Straits as China released its national defense white paper [July 25].

## I'll Have Another Round

Photo: Edsel Little

"Weapons are the 'beer money' of the Air Force. When times are good, there's money for it. When times are not, there's not."

Program Executive Officer for Weapons, **Brig. Gen. Anthony Genatempo,** at Air Force Life Cycle Industry Days.

# I've Got Your Back


Photo: 2nd Lt. Randolph Abaya

"One of the things the Air Force is testing, with Valkyrie, is Loyal Wingman. So, now we'd have a manned platform with manned-unmanned teaming. That decreases risk to some of our personnel, having an attritable [capability.] The thing is, there is a cost associated with that: How many do we attrit before we go, 'We can't afford this anymore?' "

**Gen. Charles Q. Brown Jr.,** PACAF commander, speaking July 30 at the Mitchell Institute for Aerospace Studies.

## FORGET EVERYTHING YOU JUST SAW

Photo: Turkey Ministry of Defense

"F-35 cannot coexist with a Russian intelligence collection platform that will be used to learn about its advanced capabilities."

Statement from the **White House** on the delivery of the Russian S-400 surface-to-air missile system to Turkey, who supplies parts for the F-35 [*Washington Post*, July 17].


Photo: Abby Hendrickson/Mike Tsukamoto/staff illustration

**A 54**
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**E 44**

# BINGO!!!!

"To win at Pentagon Bingo, you have to use the word, 'agile.' "

ASD for Sustainment **Robert McMahon.**

## MAKE MAMA PROUD

Photo: Sarayuth Pinthong/USAF

"Let's unleash the space professionals so they can grow and become the equivalent of the Air Force after separating from the Army."

Acting Secretary Air Force Secretary **Matthew P. Donovan,** remarks in an interview with *SpaceNews* [July 3].

Photo: NNSA

## IT WON'T HURT —MUCH

"When it comes to nuclear weapons, there is no such thing as a proportional response. Our adversaries must know that if they were to deploy a nuclear weapon of any kind on our troops, we would respond swiftly and fiercely. We already have the greatest nuclear arsenal on Earth, yet my colleagues seem focused on expanding our stockpile of low-yield weapons."

**Adam Schiff,** HASC chairman, June 12 statement.

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# Air Force Orders Ops Pause to Address Suicide

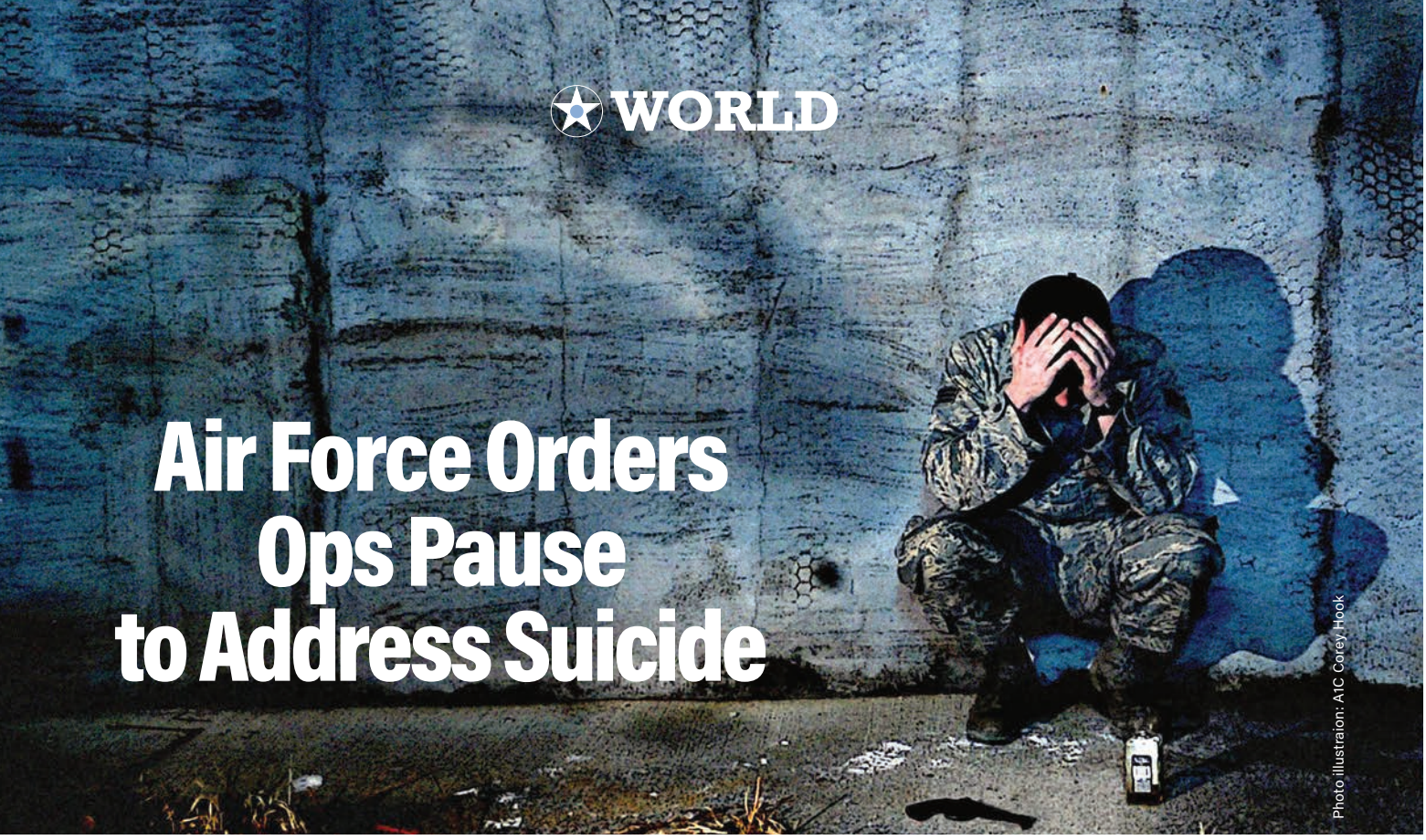

Photo illustraion: A1C Corey Hook

**By Jennifer-Leigh Oprihory and Brian W. Everstine**

The Air Force is taking new steps to address its growing suicide epidemic, which Chief of Staff Gen. David L. Goldfein called "an adversary that is killing more of our airmen than any enemy on the planet."

By the end of July, 79 suicides had occurred in the Air Force in 2019—nearly as many as were recorded in all of 2018. The service saw about 100 suicides per year in each of the last five years.

Chief Master Sergeant of the Air Force Kaleth O. Wright told airmen in July he believes suicide is the biggest problem the service faces.

"Let's take a moment and breathe and spend a little time on our airmen and their resiliency, and make sure we're not missing anything when it comes to suicide and suicide awareness," Wright told *Air Force Magazine* during a visit to Tinker AFB, Okla.

Service leaders called for all units to take an "operational pause" before the end of September. They ordered commanders to stop most operations on a day that best suits their mission, gather their members to discuss resiliency and mental health, and ensure airmen are well. Most of the details are up to local commanders, though Air Force headquarters is providing some resources.

Wright urged leaders to use all the tools available to design a suicide-prevention program that works best for their wing: "We trust commanders," he said.

Goldfein wants feedback from commanders during AFA's Air, Space, & Cyber Conference in September on what they learned from the stand-down.

"Taking care of our airmen and their families so they can take care of the mission is our most sacred duty as leaders," Goldfein wrote in a letter to commanders.

After 12 suicides occurred in the Air National Guard over nine months in 2018, the Guard wants to rely more heavily on chaplains to help combat suicides. A recent ANG analysis discovered easy access to guns and a lack of preventive information contributed to most ANG suicides in 2018.

Ten of 12 ANG suicides that occurred from January to September 2018 were linked to guns, according to the first Suicide Analysis Board findings presented July 11 during a training session for psychological health personnel at JB Andrews, Md.

Hoping to identify trends that could help ANG leaders better combat suicide in their ranks, the board considered factors that preceded each airman's death, how they died, and what actions leaders took afterward.

Current suicide prevention training is seen as "watered down," according to the presentation, which noted "significant barriers to reporting mental health issues still exist."

Investigators found that airmen had "available and immediate access" to weapons they used to take their own lives. In all but one case, relatives, wing colleagues, and ANG leadership told the board they weren't properly trained to talk to airmen about firearms safety, and they didn't know what safe gun-storage options were at their disposal.

"People don't want to give [firearms] up … and leadership is afraid to even discuss it," ANG Chief of Medical Operations Col. Stephanie J. Navas said.

ANG and the board recommend giving chaplains gun locks to offer to struggling airmen and emphasizing across the Guard that airmen can confide in the Chaplain Corps.

ANG Psychological Health Program Manager SMSgt. Jerilyn Farrar's organization often hands out gun locks, she told *Air Force Magazine.* Program staff encourage airmen to store their weapon and the gun lock key in separate parts of their homes. Going to fetch that key can make the difference between life and death.

"Studies have shown that the time that it takes to unlock the gun lock is a deterrent," Farrar said.

Officials hope that chaplains can help overcome the negative stigma around reporting mental health issues. Chaplains aren't required to report issues up the chain of command, so airmen can share their feelings without fearing judgment or that their trust will be betrayed.

"It's a reality," ANG Psychological Health Branch Director Susan Black said of that stigma. "Suicide is becoming an option, yet help-seeking isn't, and so we're trying to change that culture."

Of the 12 airmen who killed themselves in the studied time frame, 10 were men, 11 were enlisted, and their average age was 38. Two of the 12 airmen died by asphyxiation. Five of the Guardsmen were known to have thought about or attempted suicide before.

Seventeen ANG airmen killed themselves in 2018, but the board did not follow up on five of the suicides because they happened after September.

Officials acknowledge the Guard needs to do a better job of reaching out to airmen and their families to ensure they have a close bond with their wings, even if airmen only see their military colleagues in person a few times a month.

"The people closest to you know when something's just not quite right with you, so what our goal is to try to connect with family members and spouses and parents when we have an idea that they may be going through something," Farrar said. "That was something that was repetitive throughout many of the studies."

The board also recommended revamping how the Guard analyzes medical records when new members join, as well as training to teach leaders how to handle suicides in their wing.

ANG aims to create an information campaign to quash Guardsmen's worries that they might lose their security clearances or their place in the military if they report mental health concerns. The campaign would foster better communication between wing leaders and ANG Medical Group staff as well.

"We need to make sure that we're able to message how we tell them, 'You're not going to get kicked out. You're a trained asset,' " Navas said of at-risk airmen.

In the next two years, the board recommends developing "targeted suicide awareness and prevention training" and standardizing guidance and procedures for investigating ANG suicides at the wing and state levels.

Second Lt. Kate Morsch, deputy chief of the ANG's Suicide Prevention Branch, said the board hopes to encompass more of the calendar year in the second round of board investigations. SAB investigations are expected to take place at least once a year as part of broader ANG suicide-prevention efforts.

The ANG Psychological Health Branch is also driving personnel changes aimed at helping 15 wings found to have the highest risk for suicides, family issues, and other harm.

Nine new psychological health director positions were added in fiscal 2018 to better support airmen who serve in high-risk wings, and the ANG program plans on adding another six in fiscal 2021. Psychological health directors are stationed within all 90 ANG wings, and 90 of the 104 total positions are now filled, according to the presentation.

Stephanie Powell, an ANG psychological health branch principal, program adviser, and analyst, told *Air Force Magazine* the program could add more than six directors to serve Guard airmen in 2021, depending on whether demand for their services grows.

A wing is deemed "high-risk" based on its mission and pace of operations during deployments, its divorce and unemployment rates, illegal drug use, sexual assault claims, and more, the presentation explained. The designation also accounts for other statistics, such as the number of people a wing's psychological health director sees, the ratio of directors to servicemembers, and how far a treatment facility is from the wing.

Photo: A1C Shannon Bowman

**CMSAF Kaleth Wright discusses USAF initiatives and suicide prevention at an all-call at MacDill AFB, Fla., on July 27.**

**The 15 wings seen as being the most high risk are:**

- 159th Fighter Wing, NAS-JRB New Orleans, La.
- 174th Attack Wing, Hancock Field ANGB, N.Y.
- 172nd Airlift Wing, Thompson Field ANGB, Miss.
- 153rd Airlift Wing, Cheyenne ANGB, Wyo.
- 193rd Special Operations Wing, Harrisburg International Airport, Pa.
- 136th Airlift Wing, NAS Fort Worth JRB, Texas.
- 145th Airlift Wing, Charlotte ANGB, N.C.
- 124th Fighter Wing, Gowen Field ANGB, Idaho.
- 173rd Fighter Wing, Kingsley Field ANGB, Ore.
- 194th Wing, Camp Murray, Wash.
- 171st Air Refueling Wing, Pittsburgh International Airport, Pa.
- 127th Wing, Selfridge ANGB, Mich.
- 101st Air Refueling Wing, Bangor ANGB, Maine.
- 121st Air Refueling Wing, Rickenbacker ANGB, Ohio.
- 195th Wing, Beale AFB, Calif.

Two wings—Louisiana's 159th Fighter Wing and Washington's 194th Wing—now have dedicated behavioral health teams to assess, triage, and stabilize airmen dealing with combat-related or traumatic stress, the presentation said. These seven-person teams include a clinical psychologist, clinical social worker, and five enlisted mental health technicians.

Twenty behavioral health teams are deployed throughout the ANG as part of an initiative that promotes "full-spectrum medical readiness."

While each suicide is unique, the Air Force has studied each of this year's nearly 80 deaths to find shared elements.

"As we peel back the onion on many of these cases, on occasion, we see some common threads: Relationship problems, sometimes discipline issues, things of that nature," Wright said. "It's really hard to kind of nail down the why—*why* there's been such an increase." ✪

# PACAF Chief Concerned By China-Russia Cooperation, Antarctic Competition


Photo: Gao Hongwei, Wang Bin/China Ministry of Defense

**A Chinese H-6K bomber takes off from Dyagilevo military airport, Ryazan Oblast, Russia, on Aug. 1. Chinese naval aviation troops were participating in Aviadarts 2019, an international competition in Russia.**

**By John A. Tirpak**

Joint exercises between Russia and China and a recent joint bomber patrol that violated South Korean airspace add a new, worrisome wrinkle to US security posture in the Indo-Pacific region, as does growing competition at the North and South Poles, the head of Pacific Air Forces said.

PACAF Commander Gen. Charles Q. Brown, at an AFA Mitchell Institute for Aerospace Studies event, said the July 23 bomber patrol—in which Chinese H-6s and Russian Tu-95s flew together around Japan and South Korea, penetrating the Korean air defense identification zone and prompting intercepts from Japanese and South Korean fighters—is "a potential harbinger of things that could happen in the future."

Coupled with Chinese and Russian cooperation at the "Vostok" exercises last year, Brown said the nations' growing coziness is concerning. Russia also "circumnavigated" Taiwan with a bomber, Brown said. Russia claimed it had diplomatic clearance from China to do so.

"I do have a concern that they may start collaborating or working together," Brown said. "It will make it more challenging for us and our partners, and doing things that will actually drive a rift or a wedge in certain areas."

He acknowledged that the 2018 National Defense Strategy pivots to great power competition with China and Russia, but said the NDS didn't anticipate the two competitors joining forces: "It's something to pay attention to."

Of the two nations, Brown called China the chief US concern and noted that China is expanding the reach and frequency of its long-range air patrols well beyond its regional waters.

The US Intelligence Community's 2019 Worldwide Threat Assessment noted that Russia and China are now more aligned than at any point since the 1950s, especially as their "threat perceptions converge." Intel experts anticipate the two countries will team up to counter US efforts to promote democracy and human rights abroad, "taking advantage of rising doubts in some places about the liberal democratic model."

Russia and China are also trying to partner with other countries as a "counterweight" to the US and its alliances and have expanded their military cooperation since 2014, the report said.

Brown also pointed to state competition spilling into the Arctic and Antarctic regions, arguing now is the time to prepare to operate in those areas. The New York Air National Guard flies the service's only fleet of 10 ski-equipped LC-130s to Greenland and Antarctica. Brown said the US needs more icebreaking ships, as well.

"If we're going to be challenged in the Arctic and the Antarctic, perhaps we need to preserve that capability—we may need more," Brown said.

A treaty that protects Antarctica from exploitation and colonization expires in 2048, and Russia and China are already planning ahead for when it does, Brown said. A Chinese icebreaker that was damaged as it carried US National Science Foundation assets to the South Pole went back to China instead of New Zealand for repairs: "Coincidence?" Brown asked.

The US needs to collectively contemplate those issues as the treaty winds down, he said.

The buildup of F-35 Joint Strike Fighters in the Pacific is capturing Brown's attention as well. Thirty US Marine Corps, Japanese, Australian, and South Korean F-35s are in the region already, and 220 are expected to be based in the area by 2025.

Eventually, Brown expects 75 percent of F-35s in the Pacific will be owned by US partners. The Air Force plans to field the F-35A in the region next year, with a squadron at Eielson AFB, Alaska. The service should start thinking about how it could spread out and deploy an aircraft unit to a more austere location that may not be able to talk to other parts of the military in case tensions rise with China, Brown added.

Brown pointed to greater cooperation between air and naval forces in the Pacific and touted the importance of the services' new Long-Range Anti-Ship Missile. Both services can use the stealthy derivative of the Joint Air-to-Surface Standoff Missile to attack enemy ships, the general said, and the Air Force must also grow its stocks of precision and standoff weapons in US Indo-Pacific Command. ✪


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# MQ-9 "Get-Well Plan" Status

**By Rachel S. Cohen**

The 432nd Wing's new commander says the MQ-9 remotely piloted aircraft community is reaching a turning point in maturity even as the Air Force continues hammering those airmen with a demanding workload.

After the RQ-1 was first assigned to the Air Force in 1996, the service pulled pilots from other careers to make up an RPA workforce. Now, the majority of MQ-9 pilots are in the specialized RPA career field known as "18X" and have graduated from an undergraduate RPA training program, compared to earlier years when most airmen came from other programs, Col. Stephen Jones said.

Jones is one of those airmen: He began as a B-1B bomber pilot before coming to the early RQ-1 Predator enterprise in 2000, and he later helped to weaponize it under the MQ-1 designation. The Predator is now retired in the Air Force, replaced by the larger MQ-9 Reaper.

"I would almost call it the beginnings of community maturity," said Jones, who took over as wing commander at Creech AFB, Nev., in June. "We now have our first '18X' graduate squadron commander, so I'm very optimistic about achieving the next milestone, which will be O-6, full colonel level, 18X leadership positions being filled, such as group commander and wing commander positions."

He expects a few more years will pass before pilots who grew up in the RPA community start achieving the rank of general officer.

"We describe our community as, just like the United States being a nation of immigrants, the RPA community from its earliest origins, was a community of immigrants," Jones said. "We have examples of every other flying platform in the United States Air Force who helped stand up this weapons system, who helped weaponize it, who helped field the MQ-9, who evolved our tactics, techniques and procedures, evolved the bombs and the missiles that we employ in combat."

Still, Jones believes the RPA community is healthier and stronger when led and staffed by airmen who joined the Air Force to fly drones and have spent their entire career in the RPA field. It will be up to that new community of organic pilots to decide what RPA culture looks like going forward.

The wing's culture is also shaped in part by the Air Force's RPA "get-well plan," which went into effect in 2015 to help drone operators achieve a healthier work-life balance. While it has spurred positive changes for the MQ-9 enterprise, there is more work to do, Jones said.

Known as the Culture and Process Improvement Program, the get-well plan was crafted to offer more basing options, money, and time away from combat operations in the hope of retaining RPA pilots. An Air Force official told senators in April 2018 the service had slightly passed its goal of assigning 10 operators to each 24-hour period of MQ-9 combat flights.

Jones said the RPA enterprise needs to make short-term sacrifices to prepare for long-term combat needs. The 432nd Wing wants to be able to train for future conflicts but only has time to prepare for what it will face in current operations. Building more "dwell" time into airmen's schedules will help accommodate that.

"As a community, we're doing much better with manning than in our earlier years," he said. "We're in a healthy spot right now. We know we have to pay attention to that every day, though, or we'll slip back."

When CPIP began, the Air Force aimed to deploy personnel for launch and recovery operations or staff jobs for no more than six out of every 18 months. The service also wanted to keep the combat-to-dwell ratio above 2-to-1, meaning that for every two days someone spends on combat missions, they should spend one day in training or other downtime.

Photo: A1C William Rio Rosado

**The MQ-9 RPA community seeks to include more basing options, money, and time away from combat into an airman's schedule.**

The enterprise needs to either become more efficient or increase manning levels so pilots can get more relief, but Jones said there's no discussion of reaching that point in the near future.

"I can't really specify a date at which I think we can achieve dwell," Jones said. "For now, it remains a concept that we're pursuing."

Jones' predecessor, Col. Julian Cheater, told *Air Force Magazine* last fall that the Air Force was striving to reach this goal by the end of 2019 at the earliest.

The Air Force is slowly growing its domestic MQ-9 outposts as well. In the US, Shaw AFB, S.C., now hosts two MQ-9 squadrons, and Air Force Special Operations Command is expanding its use of the platform at Hurlburt Field, Fla. MQ-9 operators call Creech, Cannon AFB, N.M; Whiteman AFB, Mo.; and Ellsworth AFB, S.D., home, and there are associate units at New York's Hancock Field ANGB and California's March ARB. Undergraduate pilots train at Holloman AFB, N.M.

The Air Force is still pursuing an MQ-9 wing at Tyndall AFB, Fla., Jones said, though the details of whether and how that effort will move forward are murky after a hurricane decimated the base last fall.

Jones also sees a vital role for contractor-run, unarmed MQ-9 operations, like those in Romania and parts of the Middle East. In some cases, contractors fly intelligence-gathering missions on government-owned aircraft; in others, the company owns the equipment as well.

"There's definitely a relationship, and in many places, we fly side by side," Jones said. "Those contract options provide us a lot of flexibility, both in terms of building as well as dismantling operations that we may not otherwise have if we have to do it entirely by the Air Force. … From my perspective at the tactical level that I operate in, it's working well."

Partnering with contractors can help address recruiting and retention challenges in the RPA community, Jones said. Commercial companies offer additional talent pools for the Air Force to draw from as it tries to lessen the workload for blue-suit airmen, though those contracts can be more costly to the service than Active Duty employment.

"My personal goal is for our community to strive for more stability," Jones said. "What I would like is for those dynamics to stabilize so that our airmen and contractors … have a little bit more job stability and predictability, so that they understand how those markets will be not only in the near term but also long term, so they can make better life decisions about who they want to be in their career—whether that's remaining airmen or pursuing commercial opportunities." ✪


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# New Matrix to Vet Cyber Risks

**By Rachel S. Cohen**

Lockheed Martin wants the Defense Department to adopt its recently designed framework that shows how well a military system can hold up against cyber attacks, amid growing recognition that the Pentagon's weapon and business software is vulnerable to 21st century threats.

The contractor is using its "Cyber Resiliency Level" model on about 10 undisclosed test cases that include proposed, developing, and legacy military systems. Those pilots will wrap up by the end of 2019.

When those tests end, Lockheed expects it will inform its military customers of the results so the findings can help shape the programs, Jim Keffer, cyber director in Lockheed's government affairs office, said in an email.

"It would also give them the opportunity to establish a long-term arrangement to continuously measure the cyber resiliency of the system throughout its lifecycle," Keffer said. "We will incorporate the lessons learned and best practices from each of the pilots to continue to advance the model."

The risk matrix, which debuted last year and is now on its third version, breaks cyber resiliency into four categories defined by how a system approaches issues like cyber hygiene, test and evaluation, information sharing, and requirements. Systems that sit at levels three and four ("optimized" and "adaptive") could be more complex weapon systems for which DOD wants less risk, while systems at levels one and two ("ad-hoc" and "managed") could be less mission-essential systems that can take on more risk, like business software.

Dawn Beyer, a senior fellow and CRL project lead at Lockheed, said existing methods of assessing cyber risks can miss the mark if they are based on earlier requirements rather than the most current version of a system.

Lockheed sees its model as one potential piece of DOD's attempt to change cybersecurity policies, guidance, and processes as military systems grow increasingly software-dependent. A 2018 Government Accountability Office report found that while the Pentagon is making progress, the department still "faces barriers that could limit the effectiveness of these steps, such as cybersecurity workforce challenges and difficulties sharing information and lessons about vulnerabilities." ✪

Photo: MSgt. Renae Pittman

**At a USAFE regional training center, airmen provide real-world cyber threat scenarios for mission defense teams.**

Photo: Li Wei, Qian Chunyan/China Ministry of Defense

**A Chinese guided-missile destroyer releases jamming shells during a maritime exercise in the South China Sea.**

# China to Surpass INDOPACOM

**By Brian W. Everstine**

China's military capacity will surpass that of US Indo-Pacific Command within the next few years unless American policy changes significantly, the top US official in the region said.

INDOPACOM boss Adm. Philip S. Davidson, speaking this summer at the Aspen Security Forum in Colorado, said China's "explosive growth" in the air, land, and maritime domains, along with its increased capability in space and cyber, has changed the dynamic of the region.

"We run the risk, if we don't take proactive action, that China will indeed surpass our capabilities in the middle of the next decade," Davidson said.

Still, Davidson added he is "not concerned" about having enough global combat assets for a possible conflict in his arena, despite rising tensions in the Middle East.

China has been "trying to shape everybody's perceptions in the region" and has extensively reached out to other countries, he said. For example, within the past 28 months, Chinese naval ships have made more port visits to more countries than in the previous 28 years, Davidson said in July.

While dicey interactions at sea and in the air snag headlines, Davidson said 99 percent of interactions between the US and China have been professional, and both militaries continue to communicate.

For example, the Army has a yearly humanitarian-assistance and disaster-response training exercise with China, and leaders regularly talk. However, the US has a long-standing but still unacknowledged request to establish an emergency communications channel with the Chinese commander who oversees the South China Sea area.

Reorienting to focus on the Pacific is a top priority for Pentagon leadership after decades of war in the Middle East. Most recently, Defense Secretary Mark T. Esper and Army Gen. Mark A. Milley, incoming Chairman of the Joint Chiefs of Staff, discussed China at length during their Senate confirmation hearings. "Great power competition" with other advanced militaries like China's drives the 2018 National Defense Strategy, as well. ✪

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Photo: MSgt. Ted Daigle

**The B-52 *Wise Guy* was brought back into service after more than a decade in the Boneyard.**

# First B-21 Flight Slated for 2021

**By John A. Tirpak**

The new B-21 Raider stealth bomber is making good progress and should fly in December 2021, USAF Vice Chief of Staff Gen. Stephen "Seve" Wilson said.

Wilson, speaking at an AFA Mitchell Institute for Aerospace Studies event in Washington, D.C., said the service continues to analyze its capacity for long-range strike. The Air Force still believes it is short of bombers and is reviewing alternative force mixes.

Speaking on deterrence and the need to modernize the nuclear command, control, and communications network, Wilson said he was at Northrop Grumman's facilities in Melbourne, Fla., this summer, "looking at the B-21," and said the company is "moving out on that pretty fast." Wilson said he has an application on his phone "counting down the days ... and don't hold me to it, but it's something like 863 days to first flight."

That would put the first flight of the B-21 in December 2021. The Air Force has said from the beginning that the first B-21 would be a "usable asset" but has also said it doesn't expect an initial operating capability with the B-21 before the "mid 2020s."

Northrop Grumman CEO "Kathy Warden and her team are focused on software integration and making sure ... we'll have the software ready for the plane when it's delivered," Wilson said.

The Air Force is "focused on the development of the new bomber, as well as modernizing the B-52" with new engines and radar, "and we're exploring the force structure between the B-1, the B-2, and the B-52," Wilson noted. "The general consensus is, we don't have enough long-range strike capacity, and that came out in 'The Air Force We Need' " study the service published last September.

"We continue to look at what that force will be for the future across the bomber force, what mix it will be." He maintained the service needs "at least 100" B-21s.

*Air Force Magazine* asked Wilson why the service has not advanced the planned number of B-21s, given the acknowledged shortfall in bomber capacity. The Air Force said in "The Air Force We Need" that it requires another seven bomber squadrons. Increasing the planned buy would also have the effect of reducing the unit cost, by amortizing development over a larger number of units.

"That's exactly what we're looking at," Wilson replied, as well as "what the right balance" will be as B-21s come online. The service has yet to decide if it will extend the B-1 and B-2 bombers—slated to retire in the early 2030s—to increase the bomber fleet or simply go for an all B-21 and B-52 fleet. "But we can't have four bombers" Wilson said.

Asked if the Air Force will have the new bomber plan by this month, or in time for the fiscal 2021 budget, Wilson said, "it may take some time" before the Air Force reaches a final decision. He acknowledged that Air Force Global Strike Command boss Gen. Timothy M. Ray has openly questioned whether the B-1 and B-2 should be retired as the Air Force has planned.

Wilson also said that while the Air Force "isn't going to get any new B-52s," AFGSC might still take "one or two more out of the boneyard." He noted that Ray has "already brought one B-52 out." ✪


Photo: SSgt. Andrew Park

**Maintainers work on a C-130H at JB Elmendorf-Richardson, Alaska, during Red Flag 19-2.**

# AMC's Predictive Maintenance Effort

**By Brian W. Everstine**

The Air Force's use of predictive analytics and artificial intelligence to forecast when aircraft parts will fail is broadening to include the military's entire C-130 fleet, followed by C-17s and KC-46s—even before all of Boeing's new tankers are delivered.

The effort, Condition-Based Maintenance Plus (CBM-plus), aims to reshape how the service maintains its aircraft to mirror the commercial airline industry. Air Mobility Command is

already using predictive maintenance for the C-5M fleet and many of its KC-135Rs. Similar efforts are in the works for the B-1, E-3, RC-135, OC-135, F-16, and F-35.

It's so far been an "exciting journey, and we're starting to see some results," Brig. Gen. Steven J. Bleymaier, AMC's logistics director, told reporters.

Instead of reacting to problems, proactively forecasting issues means the service can get ahead of fixes and avoid holding back jets during important deployments because of parts problems.

"The last thing we want to do is go out and send a maintenance repair team across the world to fix an aircraft that's on a mission," Bleymaier said.

CBM-plus takes a two-pronged approach. Predictive algorithm development uses complex algorithms developed by Air Force Materiel Command to determine patterns in maintenance issues. That effort, which began on C-5s, uses data from sensors onboard the aircraft to show how quickly a part is deteriorating and to alert maintainers when that part should be swapped out before it fails.

Predictive algorithm development comprises about 20 percent of CBM-plus. Though it provides information about a platform through "beeps and squeaks" from the maintenance sensors, the Air Force's short supply of spare parts significantly hampers that effort, according to Maj. Todd Downs, the sustainment innovation branch chief in the mobility aircraft division of AMC's logistics directorate.

The other piece, Enhanced Reliability-Centered Maintenance (ERCM), began on KC-135s in April. Under this initiative, the Air Force uses all available historical data on individual aircraft components to determine their ideal life spans, then schedules the best time for a swap. This can be combined with a flight schedule for expected deployments to make the swap as easy as possible.

For KC-135s, the ERCM initiative started at MacDill AFB, Fla., and March ARB, Calif., in April. It moved to RAF Mildenhall, UK, and Scott AFB, Ill., in May. Kadena AB, Japan, and JB Pearl Harbor-Hickam, Hawaii, were the third round, and work began at Tinker AFB, Okla., earlier this month, Downs said. Another 12 units will begin running this process by October, and it will spread to the RC-135 and OC-135.

AMC is focusing on the parts that, when they fail, cause the longest downtime for a plane. Some examples for the KC-135 are the engine-driven hydraulic pump, the cabin outflow safety valve, and hydraulic systems on the boom itself.

The command is also moving condition-based maintenance to all variants of the C-130, including Guard and Reserve. On Feb. 1, 2020, aircrews at Dyess AFB, Texas; Rosecrans ANGB, Mo.; NAS JRB Fort Worth, Texas; Peterson AFB, Colo.; Stratton ANGB, N.Y.; and Peoria ANGB, Ill., will start the process. About six bases will stand up the process per month. While all variants will eventually be included, the components will be common across all airframes.

After the C-130 units begin CBM-plus, AMC will shift its focus to C-17 units, starting at JB McGuire-Dix-Lakehurst, N.J.; Dover AFB, Del.; and Stewart ANGB, N.Y. The Air Force will then begin testing to bring CBM-plus to the brand-new KC-46 fleet. AFMC leaders are still debating which KC-46 components need to be addressed, Downs said.

Moving toward predictive maintenance has been a "major culture change," Bleymaier said, but it isn't yet a way of life for the Active Duty Air Force. Many Guardsmen and Reservists already have airline maintenance jobs, where it has long been a reality.

Their feedback is, "What took you so long?" Bleymaier said. ✪

Photo: Sarayuth Pinthong/USAF

Lt. Gen. Marshall Webb presents a Silver Star to TSgt. Michael Perolio at JBSA-Lackland, Texas.

# TSgt. Receives Silver Star

**By Brian W. Everstine**

TSgt. Michael Perolio and members of his Green Beret team piled into an unarmed ATV to meet with a local, friendly militia on a mission that started out "as normal as it could be in Afghanistan."

The militia turned on the team, killing its own Afghan leader and injuring two members of the US special forces group. Perolio called in a series of airstrikes, aided his team, and evacuated them out of the kill zone during the Jan. 11, 2018, mission that lasted less than a half-hour. On July 18, Perolio received the Silver Star for his actions—that the American team's leader credits with saving his own life.

"In my mind, it's recognition for pretty incredible efforts in some pretty horrible situations," said Army Capt. William Clark, the commander of the mission, who was shot twice but was still able to fight off the attack.

Perolio was the combat controller attached to Special Forces Operational Detachment Alpha 0221 that partnered with the Afghan 8th Special Operations Kandak Commandos in Nangarhar Province. During the deployment, which began in October 2017, the unit regularly sparred with the Islamic State's local offshoot, known as ISIS-Khorasan, while insurgents tried to hold on to a valley near the team's base.

On Jan. 11, Perolio volunteered to be part of a five-man team to visit the nearby leader of the People's Uprising Militia, which manned a checkpoint about 4 kilometers away. The militia was friendly to US and Afghan forces, and secured areas that were already cleared of ISIS.

The team—Perolio, Clark, another Green Beret, an Afghan interpreter, and a leader of the militia—piled into an unarmored dune buggy and made the quick drive to the checkpoint.

The meeting was normal as the group tried to build rapport with the militia it depended on to hold territory.

"As soon as Captain Clark turned the vehicle on and shifted into gear, they opened up on us," Perolio said. The militia used a squad machine gun—the type Afghan national defense forces use—and peppered the vehicle.

The team spilled out to the right of the vehicle, away from the gun fire. Clark was hit twice, once in the abdomen and once in the leg. The interpreter, who goes by Ali, was hit three times in his leg. The militia leader was shot several times and died almost immediately.

At first, they thought another force had taken a higher position to target the team.

"I thought an ISIS element maneuvered on the checkpoint," Perolio said. "We didn't realize it was our militia buddies who had actually turned on us."

Perolio led the team by setting up security, giving the severely injured Clark his rifle to watch in one direction while the uninjured Green Beret watched their backs. The airman then focused on the radio and described the injuries to a nearby surgical team so they could prepare. Perolio also notified a quick-reaction force and administered medical care to his hurt teammates.

"Faced with intense enemy fire, Sergeant Perolio immediately took charge of the element by rendering aid, arming his wounded comrades, and establishing fields of fire," the citation states. "Realizing that the ground force commander was gravely injured and required immediate care, Sergeant Perolio repeatedly exposed himself to the enemy's kill zone, attempt-

ing to identify a route of advantage or cover to maneuver back to friendly lines."

Their vehicle could still move despite being riddled with bullets. Perolio navigated them out of the kill zone, exposed while standing on the side of it so he could direct the driver along the route.

There, Perolio met with a Green Beret warrant officer who took over as commander. With the quick-reaction force, Perolio coordinated F-16 airstrikes on the militia building that housed the 12 fighters. Five 500-pound bombs—one that burst in midair and four that dropped into the building—killed the militia fighters and destroyed a machine gunner's position.

"Sergeant Perolio's quick and fearless actions not only got the element out of an incredibly dire situation and saved all of their lives," the citation states, but "his calm thinking under fire and innate ability to manage a crucial situation allowed two members to receive lifesaving medical care within 15 minutes of injury."

The injured were immediately flown from the forward base to Bagram Airfield, Afghanistan.

Clark said the whole experience was a "bit of a blur," but he remembered Perolio taking control and leading the team out of the kill zone. After that 10-minute ride to the forward base, Clark said he walked into its surgical center, asked for a chest tube, and woke up four days later at Landstuhl Regional Medical Center in Germany.

Following the attack, intelligence arose indicating the militia wanted retribution for the US forces killing 12 of its members. "Luckily, we had a pretty good Afghan commando force," Perolio said, and the Afghans and Americans continued to work together each day. US forces remained safe and eventually met with the militia to "be able to come to terms" with what happened and returned to the valley, he said.

Many of the militia members were prior Taliban fighters, Perolio noted. They were forced out of their homes when ISIS moved in and joined the militia to oust the insurgents, but retained Taliban views.

Perolio is now an assessment and selection instructor with the 350th Special Warfare Training Squadron at JBSA-Lackland, Texas. After four deployments, he said he was taking this time to rest, be with family, and help train the next generation of combat controllers.

At the training wing, there is a wall with the names and stories of Silver Star, Air Force Cross, and Medal of Honor recipients. Perolio's name will join the others on the wall. "For me, it's awesome, it's super humbling to say I'm a part of that now," Perolio said, adding that there are still "guys out there—combat controllers, Green Berets—who may not get the recognition. It's not lost on me how special it is." ✪

# Air Guardsman Receives DFC

**By Chequita Wood**

Kentucky Air National Guard pilot, Lt. Col. John T. Hourigan of the 123rd Airlift Wing, received the Distinguished Flying Cross Award from Air Force Chief of Staff Gen. David L. Goldfein in August. He was credited by Goldfein as having "exceptional airmanship under duress" by preventing a catastrophic mishap.

In July 2016, then-Major Hourigan was commander on a C-130 Hercules that was violently vibrating at low altitude near Owensboro, Ky., preventing crew members from communicating or interpreting flight instruments or engine gauges.

He orchestrated an emergency landing as the plane was decelerating and losing altitude. Hourigan saved his life, his crew members, as well as a $30 million aircraft. ✪

Photo: SrA. Andrew Sarver

Thunderbirds line up at an air show in Rionegro, Colombia, in July.

# Thunderbirds Add Two Pilots

**By Chequita Wood**

Two Air Force Academy graduates have officially joined the USAF Thunderbirds 2020 Demonstration Team.

Capt. Zane Taylor, who graduated from USAFA in 2010, was selected as Thunderbird No. 4, the slot pilot.

He will fly in between two wingmen, just aft of the No. 1 jet.

Capt. Katherine Moorkamp, who graduated from the academy in 2013, will be Thunderbird No. 10, the team's executive officer. That makes her responsible for the team's budget, training, and force support actions for the commander.

The Thunderbirds are a 12-officer team who fly two-year tours of duty. Position openings are staggered to keep up with leadership and continuity of experience. Thunderbirds Nos. 1, 3, 6, 8, and 11 will be replaced in 2021. ✪

# DOD Adds Serial Offender Program

**By Chequita Wood**

The Department of Defense is implementing a new program called CATCH, or Catch a Serial Offender, in an effort to make it difficult for sexual assault offenders to evade capture. The program allows victims to anonymously report sexual assault, which allows their identity to remain confidential. The CATCH database will be accessible worldwide.

The details reported about an offender can be compared to other reports. After details are entered into the system, criminal investigators from the Naval Criminal Investigation Service, the US Army Criminal Investigation Command, and the Air Force Office of Special Investigations will analyze a suspect's information, looking for a match.

Victims can choose to convert their confidential reports to unrestricted reports, which will allow a criminal investigation to move forward. CATCH submissions remain in the database for 10 years. ✪

### ■ The War on Terrorism

**Casualties:**

As of Aug. 13, 77 Americans had died in Operation Freedom's Sentinel in Afghanistan, and 88 Americans had died in Operation Inherent Resolve in Iraq, Syria, and other locations.

The total includes 160 troops and five Defense Department civilians. Of these deaths, 75 were killed in action with the enemy, while 90 died in noncombat incidents.

There have been 449 troops wounded in action during OFS and 80 troops in OIR.

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# FACES OF THE FORCE

Photo: Adrian Cadiz/USAF

71st Flying Training Wing instructor pilot **Capt. Matthew T. Heath** received the 2018 Koren Kolligian Jr. Trophy for landing a T-38C Talon that went unresponsive mid-flight after receiving contaminated fuel. Heath's quick thinking spared the $8.2 million airplane and the lives of both him and his student pilot. "An act of heroism resulting from the Air Force's commitment to education and training, and your skill, composure, and resilience under pressure," Koren Kolligian II, nephew of the award's namesake, said.

Photo: DOD

**TSgt. Steve Fourman** was diagnosed with a rare autoimmune disorder that causes one's internal organs to simultaneously fail and a rare type of lymphoma. Then, during a course of chemotherapy, he contracted a drug-resistant staph infection, the treatment for which left him without an immune system. "They told me to stay out of the gym, but I'm not going to live in a bubble," Fourman said. His persistence paid off in the form of a bronze medal in discus at this year's Warrior Games.

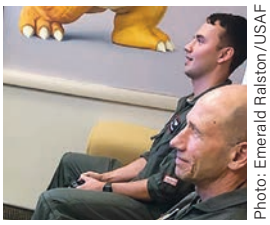

Photo: Emerald Ralston/USAF

F-16 pilot **1st Lt. Wade Holmes** recently beat his dad, ACC boss **Gen. Mike Holmes,** an F-15 Eagle pilot, in the game *Ace Combat 7.* The two pilots flew their respective aircraft during the hour-long game June 29. The event was live-streamed so viewers could call in and ask the pilots about flight training. *Ace Combat 7* takes place in a fictional world in which pilots attempt to secure the skies during an air campaign between two sparring rivals.

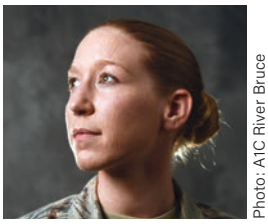

Photo: A1C River Bruce

7th Operations Support Squadron meteorologist **A1C Mary Kapuscinski's** weather radar system acted up, slowing down the process of obtaining weather scans, but she detected a tornado forming miles from Dyess AFB, Texas. Kapuscinski breached protocol, pushed out a warning sans a second opinion, and beat the National Weather Service by nearly 10 minutes. The tornado caused more than $1 million in damage at and near Dyess, but the early warning probably saved lives.

Photo: Chris Zimmer/AFMC

The **Air Force Research Laboratory's Automatic Ground Collision Avoidance System Team** won the National Aeronautic Association's 2018 Robert J. Collier Trophy for designing, integrating, and flight-testing safe-landing technology for the global F-35 fighter fleet. The honor recognizes the foremost accomplishment in American "aeronautics or astronautics" in terms of making "air or space vehicles" more efficient, safe, or better-performing.

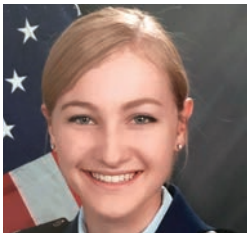

Photo: Courtesy

Air Force Academy cadet and West Coast native **Savannah Menken** may be temporarily landlocked, but she's using beauty pageants to raise awareness about ocean conservation during her time in Colorado. The glamour of pageants sharply contrasts with military culture, but she has found that they shared a common thread. "I liked that in representing your platform, you are representing something larger than yourself," she said. "And I think when you wear a uniform, it's similar."

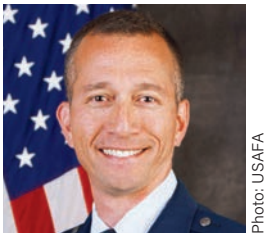

Photo: USAFA

USAFA Vice Superintendent **Col. Houston Cantwell** never got jump training, so he enrolled in the USAF Academy's Freefall Course and was taught how to jump—by cadets. "I earned my commission through ROTC, so I never had the opportunity to jump as a cadet. I enrolled to better understand how the Academy prepares cadets for service in the Air Force. The cadet instructor cadre stood out as the cornerstone to program success."

Photo: Carlie Mensen/USAF

Air traffic controller **SrA. Oscar Cantu** just received a so-called "Grit Award" for his determination to turn his concept into reality for a head-mounted display equipped with augmented reality that he says "would allow controllers to see aircraft in blind spots or through inclement weather allowing for better situational awareness." Despite watching his idea lose in preliminary stages of USAF's Spark Tank competition, he is now in the final running for Defense Department Rapid Innovation Fund support for the concept.

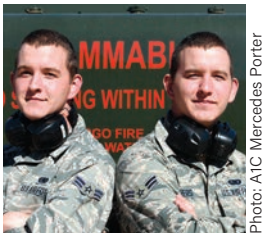

Photo: A1C Mercedes Porter

Identical twins **A1Cs Nathan** (l) and **Nicholas Lathers** have also had identical USAF journeys. After going through basic training together at JB San Antonio, Texas, they ended up in the same training flight, the same career field, attended tech training at Sheppard AFB, Texas, together, and both were assigned to Dyess AFB, Texas, where they both serve in the 7th Logistics Readiness Squadron's fuels flight. They went in knowing "we might not see each other for a year or two," Nicholas said. "But it worked out for us."

Photo: SrA. John Linzmeier/ANG

After the US Air Force Academy rejected **Amn. Anuhea Pikake Alama,** she enlisted in the Hawaii Air National Guard, where her potential inspired leaders to submit an application package for her to attend USAFA's Preparatory School. Alama became the first traditional member of the Hawaii ANG to get into a USAFA program, and may win admission to the Academy after all if she successfully completes the 10-month course. "It's going to be years of challenges, but I know I'm on a mission now," she said.

**Know of someone we should recognize? Send nominees to afmag@afa.org**

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Photo: SSgt. James Richardson

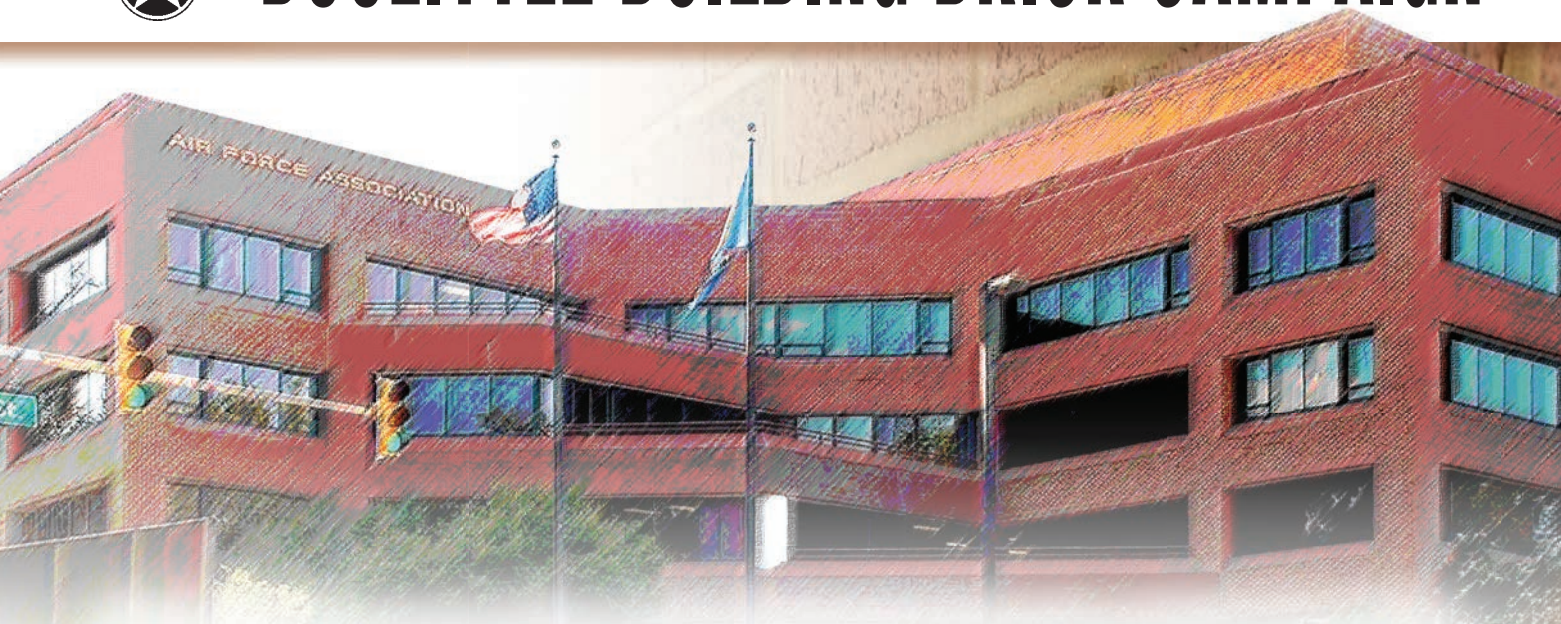
A1C Maggie Hebert lowers herself on a rope using the "Australian Rappel"method at Camp Gilbert C. Grafton Training Center near Devils Lake, N.D. The Aussie method offers the option of having a ready-to-fire weapon in one arm, trained on the ground, while descending.

Photo: David Lipp/ANG

Maintainers prep a U-2 Dragon Lady for a mission in a hangar at Al Dhafra AB, United Arab Emirates. The Cold War-era spyplane watches ISIS and other enemy groups from the edge of space, collecting intelligence through modernized sensors and cameras and providing it to ground troops, bombers, fighters, and other military assets.

Photo: SSgt. Chris Thornbury

# DOOLITTLE BUILDING BRICK CAMPAIGN

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# USAF's Dogfight Power Curve

## How USAF aims to maintain air superiority in the 2020s.


Photo: MSgt. Michael Jackson

An F-35 test aircraft releases an AIM-120 missile during a live-fire test over the Gulf of Mexico. New AIM-260 missiles will replace AIM-120s, with testing to begin in 2021.

By John A. Tirpak

After decades of all-but-guaranteed control of the air in every military conflict, the US Air Force will enter the 2020s freshly challenged and behind the power curve. Potential adversaries are closing the technology gap, and USAF will have to field new equipment and new concepts of operation in order to sustain air superiority in the decades to come.

"The perceived lack of a peer adversary and the need to allocate resources" to the wars in Afghanistan and Iraq led the Pentagon "to forgo investments in advanced air capabilities needed for future high-end operations," the Center for Strategic and Budgetary Assessments concluded in "An Air Force for an Era of Great Power Competition," a March 2019 analysis of the Air Force's future needs. This failure has "created a window of opportunity" for Russia and China to develop advanced ballistic and cruise missiles, integrated air defense systems, anti-satellite weapons, cyber capabilities, and more—that today "are eroding America's airpower advantage."

**"They are working very hard to replicate that capability. They may not have figured it out to the degree we have, operationally, but they will get there eventually."**
—Lt. Gen. David Deptula, USAF (Ret.)

America, CSBA declared, has become too dependent on large overseas bases that are now within adversary missile range, and its failure to rapidly field fifth-generation aircraft means it poses less of a threat to those potential foes.

China has developed (and deployed) one fifth-generation fighter, the J-20, and is far along in developing a second, the J-31; Russia is producing the Su-57. At the same time, China has replaced obsolete second- and third-generation aircraft with new fourth-generation fighters, and Russia has developed—and is exporting—advanced air defense systems such as the S-300 and S-400 series and is testing the more advanced S-500, with a new S-600 also under development.

"China and Russia understand the value of stealth," said retired USAF Lt. Gen. David A. Deptula, head of the Mitchell Institute for Aerospace Studies. "They are working very hard to replicate that capability. They may not have figured it out to the degree we have, operationally, but they will get there eventually."

## Six Steps to Greater Air Dominance

The Air Force is investing in a range of new systems and upgrades to improve its ability to dominate the skies in future conflicts.

Photo: Cynthia Griggs/USAF

**1. Expand capacity.** "The Air Force We Need" envisions increasing combat fighter squadrons from 55 to 62. That requires buying at least 72 new fighters per year, which is also the smallest number necessary to begin reducing the average age of the fighter fleet from today's 28 years. Air Combat Command boss Gen. James Holmes said 62 combat squadrons could be attained by 2024. Most of those fighters will be F-35A Lightning IIs.

Photo: SSgt. Jensen Stidham

**2. New engines, more range.** The Adaptive Engine Transition Program (AETP) will provide significantly longer range or loiter time than existing F-22 and F-35 engines, while also improving acceleration, speed, and altitude. Rafael Garcia, USAF's deputy program executive officer for propulsion, said AETP will be the first new fighter propulsion program in 32 years. "We're going to put it in everything," he declared.

Photo: SSgt. Clayton Cupit

**3. Advanced electronic warfare for F-15.** The Eagle Passive Active Warning Survivability System, or EPAWSS, may not "make an F-15 into an F-35 or F-22," said ACC chief Holmes, but it will help F-15s "buy back" penetrating capability, making it harder to detect them so they can get closer to enemy air defenses. A similar system could eventually be developed for the F-16 as well.

USAF is responding with more than a dozen major initiatives on the books to rapidly develop or insert new capabilities into its existing fighter force, and with others to advance the state of the art in next-generation air dominance.

Looking further ahead, the Air Force is also developing future concepts, ranging from a stealthy successor to the MQ-9 Reaper—because the MQ-9 cannot operate in defended airspace—to a family of systems that will make up the future Next-Generation Air Dominance concept.

The Air Force requested more than $1 billion dollars for NGAD in its fiscal 2020 budget to fund development of a new, undetermined platform as well as a number of other approaches to control the air.

Will Roper, assistant secretary of the Air Force for acquisition, technology, and logistics, has proposed developing a "new Century Series" of aircraft, recalling the rapid development of fighters designed in the 1950s and '60s. Each took a slightly different approach to dogfighting and ground attack, making incremental improvements along the way. None of those aircraft were ever intended to be 30-year platforms, but neither were they disposable.

Because these new aircraft won't be built for a 20,000-hour service life and won't need the logistics train to support that, the jets could be developed more affordably, Roper said.

NGAD will also make use of remotely piloted, and potentially autonomous, aircraft to complement the fifth-generation F-22 and F-35. In USAF's "loyal wingman" concept, RPAs would fly in the vicinity of manned fighters, either providing extra missiles or carrying out their own missions independently. Dubbed "Skyborg" by Roper, the concept is being tested on the XQ-58 Valkyrie, which flew for the first time in March, and on other testbeds.

Photo: SSgt. Cory Bush

**4. Enhanced electronics.** Both the F-22 and F-35 are receiving new electronic warfare systems and weapons, as well as the ability to communicate stealthily with each other and with fourth-gen systems. The F-22 upgrade, called Increment 3.2B, will invest $1.75 billion to add new air-to-air weapons, processors, and data links. The F-35 will gain range and payload with the addition of 480-gallon drop tanks and newly reconfigured weapons bays that will be able to accommodate six missiles instead of four. The F-35 is also set to receive the Block 4 combat enhancements package, which will include two major software updates per year for new electronic warfare sensors and weapons.

Photo: SSgt. Ceaira Tinsley

**5. Improved radars for fourth-generation fighters.** The Air Force has been adding AESA (active electronically scanned array) radars to the F-15 fleet for more than a decade, and the F-16 fleet's first AESA systems are slated to be operational this year. The F-16 is also getting new digital radar warning receivers, software-based radios, and a new operational flight program.

Photo: Ron Bookout/Boeing

**6. The new-build F-15EX.** Congress has authorized the Air Force to purchase the first eight of up to 144 F-15EXs in 2020. These jets would be used to accomplish air superiority in places where defenses are either absent or beaten down, as a domestic interceptor, or as a missile carrier outside heavily contested airspace. By shooting targets designated for them by F-22s and F-35s behind enemy lines, they might also carry hypersonic missiles.

These unmanned systems would be "attritable" aircraft, meaning combat losses would be acceptable, or at least less costly to lose than manned platforms.

Swarms of such autonomous, attritable aircraft "could do things on behalf of a manned fighter, to either go into areas that pose too high a threat or to provide more dilemmas for the adversary," according to Pacific Air Forces Director of Air and Cyber Operations Maj. Gen Scott L. Pleus.

In fact, Air Force leaders have consistently said NGAD need not produce a new fighter, but could yield something else entirely.

"If we were to characterize it as a fighter, we would be … thinking too narrowly about what kind of airplane we need in a highly contested environment," Pleus said. "A B-21 that also has air-to-air capabilities" and the ability "to work with the family of systems to defend itself, utilizing stealth—maybe that's where the sixth-generation airplane comes from."

Ultimately, Deptula argued, the Air Force must develop a "combat cloud" where the source of information about the enemy is "agnostic," relative to the platform it came from, and data is shared and routed through a "distributed, self-forming, all-domain, self-healing network that is difficult to attack effectively."

## THE WAY AHEAD

Reclaiming clear air superiority is not simply a matter of building another next-generation fighter. Instead, the Air Force is pursuing a "family of systems" that "really does diverge away from a platform-centric way of doing air superiority," said Pleus, the former director of plans, programs, and requirements at ACC.

Traditionally, the Air Force approached air superiority as a numbers game. "More airplanes equal more capability," he said. But that may not be the case in the future.

Airmen prepare to launch an F-35 at Al Dhafra AB, UAE. The upgrades to the fleet would allow F-35s to penetrate contested airspace, vacuum up information, and pass it undetected to heavily armed fourth-gen aircraft, such as the F-15EX.

Photo: SSgt. Christopher Drzazgowski

"We're going to have to up our game in all areas," Pleus said. Stealth, sensors, and connectivity will be key attributes, increasing situational awareness both for pilots and commanders. Converging air, space, and ground-based sensors creates "the ultimate in synergy" and an "unbelievable edge in dominating in the air superiority realm," Pleus noted.

Active electronically scanned array radars, infrared search-and-track systems, ground-based sensors, bistatic radars, and satellites—plus the ability to fuse all that situational insight together into a single operating picture—will give the US a speed advantage and force adversaries into a reactive posture.

That means F-35s and F-22s would penetrate contested airspace and "vacuum up" information, passing it undetected to heavily armed fourth-generation aircraft outside of the contested area. Those aircraft will need longer-range missiles, Pleus said, and the Air Force is "teaming with industry" now to develop jam-resistant multimode sensors to guide those weapons and more powerful motors to increase speed and extend range.

"With the scramjet technology … missiles go much longer, much higher, much faster," he said.

The Air Force and Lockheed Martin are developing the AIM-260 Joint Advanced Tactical Missile—a faster, longer-range replacement for the AIM-120 AMRAAM—which has been the undisputed dogfight champ since the early 1990s.

Brig. Gen. Anthony W. Genatempo, USAF program executive officer for weapons, stated in June that said flight tests are to begin in 2021, with initial operational capability targeted for 2022. The missile will fit in the F-22 and F-35 weapon bays, just as the AMRAAM does today.

AMRAAM has a range in excess of 50 miles. The range of the JATM is not yet known. But to counter China's PL-15 long-range air-to-air missile, Pleus said the US needs something far more capable.

"I would love to see us get a missile that would get us in excess of 150 miles," he said.

## BETTER DEFENSES, DIFFERENT STRATEGIES

Improving adversary systems mean it may not be possible or even necessary to achieve blanket air superiority over an entire region. The CSBA study concluded USAF may have to settle for "localized" air superiority instead, particularly, to provide "close air support to friendly forces operating under an adversary's area-denial umbrella at the onset of hostilities."

"I don't expect that we have to have air superiority over the entire area of responsibility, 24 hours a day, seven days a week," Pleus said. "I just think we need to do it where we need it."

To Deptula, that means "not only changing the way we define new requirements," but more importantly, changing "the way we think about command and control and operate the systems associated with this task."

Achieving this construct will "compel adversaries to dedicate more resources toward defense than offense," he said. "It will be strategically dislocating to any military challenger." ✪

# SOFTWARE

## *At bases near and far, Air Force coders are revolutionizing the pace of upgrades and development.*

By Rachel S. Cohen

It started as a gamble in 2017: Fresh from ditching an over-budget, behind-schedule software contract, USAF set out to learn to code just like the commercial tech industry.

The Air Force called the project "Kessel Run," a nod to Han Solo's speedy mission enshrined in "Star Wars" lore. Air Force officials visited Silicon Valley to learn how to apply agile development and operations, or "DevOps," two years ago, and now the service's agile coding gospel has spread to the F-35, space systems, mobile apps, maintenance depots, weather forecasting tools, and more.

"Star Wars" and "Star Trek" references abound among the blue-suit coding centers: Kessel Run in Massachusetts, Kobayashi Maru and Section 31 in California, BESPIN in Alabama, Space Camp in Colorado, LevelUP in Texas, and Rogue Blue in Nebraska. In each place, T-shirt-clad coders—some of whom trained at Kessel Run and then brought their new expertise back to their home bases—push out incremental software releases, sometimes multiple times a day. That's light speed in a world where it used to take years to deliver new features through traditional block procurements.

Now the Air Force's young software development enterprise faces a critical juncture: USAF's coding centers need manpower, steady funding, and continued momentum to turn early achievements into ongoing success. Advocates envision revolutionizing the way systems are developed and upgrades delivered. But others worry that the new mindset may be harder to police and will be stymied by cultural resistance.

**"We're trying to pass this information to anyone else that is trying to stand up an organization so that they're not starting from scratch."**

—Lt. Col. Enrique Oti, Kessel Run director

Capitalizing on its momentum, Kessel Run's wins are helping lay the groundwork for others to follow in its footsteps.

"We're trying to pass this information to anyone else that is trying to stand up an organization so that they're not starting from scratch," Kessel Run Director Lt. Col. Enrique Oti said. "They can learn from our mistakes and hopefully be able to launch a little faster."

### KOBAYASHI MARU

Like Kessel Run, the Air Force's first West Coast coding factory was born of a need to turn around a program headed in the wrong direction. Building off the Joint Space Operations Center Mission System (JMS) program, the California-based group is building space command and control and situational awareness tools faster than before, working closely with operators to deliver capabilities based on the most urgent requirements, and adding new requirements as they arise.

Illustration: Mike Tsukamoto/staff

Photo: Todd Maki/USAF

**Steven Wert (l), digital program executive officer, and Will Roper, assistant secretary for acquisition, technology, and logistics, attend a Kessel Run presentation on custom software applications. Using commercial development practices, USAF is speeding up the pace of upgrades.**

JMS began converting to iterative development in August 2018, and the Kobayashi Maru team had completed two increments as of June, according to Col. Jennifer Krolikowski, senior materiel leader for space C2 at the Air Force Space and Missile Systems Center. Each increment, or sprint, includes a specific set of features and lasts about 90 days. Some install technologies created by commercial industry, while other features are coded in-house.

"We're really trying to capture the commercial companies that maybe typically didn't work for the DOD but do some really great software work and have some really good brainpower on some of the wicked problems that we have," Krolikowski said.

These projects can be broken down into four pieces, which might be best understood by thinking about a smartphone. There's the platform (the phone itself); the application layer (your mapping app, for example); the data repository layer (the information that powers the map); and the infrastructure layer (the phone service provider). Each piece can include multiple products, letting the Air Force work with a variety of partners, instead of choosing one to build everything.

In some cases, software teams are automating and modernizing old code. In others, they are developing new apps from scratch. Projects will expand further into integrated tactical warning and attack assessment, as well as space object tracking.

Among the first products delivered is an app that automated a process that used to take a staffer four hours each day to complete. "By us providing this application," Krolikowski said, "they were able to bring that down to five minutes."

"Space Camp" in Colorado Springs, Colo., is an offshoot of Kobayashi Maru. It is building a platform based on open-source code that can host apps, including both unclassified and top-secret, for the SMC. Another offshoot, "Section 31," brings Air Force and industry personnel together with software companies who can contribute their own widgets.

"Each product line is focused on a specific capability, and then as they're ready to deploy, it goes," Krolikowski said.

That gets at the heart of agile development: warfighters and coders decide where the biggest problems lie, then chip away at those issues bit by bit, instead of waiting for the perfect new system to be totally complete. New code is fluidly developed, tested, and then deployed; requirements are set based on immediate and evolving needs as well as whether the group has the resources to address them.

Silicon Valley-based software firm Pivotal provides a development platform for coders and helped prove Kessel Run could work. Now, the company continues to train airmen on rapid software-building techniques they can take to the newer coding factories.

"The great thing about Kessel Run is they helped give a language to a lot of this stuff," Krolikowski said. "The whole agile concept has been around for a good 10 years in industry. It just took a little while for people to start socializing it in the government side, in the military side."

Named after an impossible training exercise faced by cadets in "Star Trek," Kobayashi Maru aims to evolve into the coding factory for all of SMC. Its original C2 products are the first steps toward that goal. Others in SMC are already interested in lessons learned, and Krolikowski envisions working alongside Kessel Run to develop products supporting multi-domain command and control. "That's something we can offer for the Air Force collectively," she said.

"We actually integrate and talk with each other pretty frequently," Krolikowski said of Kessel Run. "I use some of their platform already. … We're both on a path to make sure that we are scalable."

## BESPIN

Business and Enterprise Systems Product Innovation, or BESPIN, is one of USAF's newest agile development labs. Named for a fictional planet in "Star Wars" and launched in 2019, the Maxwell AFB, Ala., group wants to create mobile and desktop apps for maintenance crew chiefs, aircrew readiness, and ammunition crews.

BESPIN's goals are big and its budget small, with just $4 million now and plans to grow to $15 million in the coming years. The Air Force's logistics, engineering, and force protec-

Photo: MSgt. James Crocker Jr.

**Startup culture and design thinking contribute to faster software development at BESPIN, a USAF development team at Maxwell AFB, Ala. Here, the mobile-app development team meets with Silicon Valley software developers to learn how they implement technological advances.**

tion branch is providing BESPIN's first seed money, with an eye toward tools to modernize maintenance and personnel management.

"I don't have the luxury of a big program with a big budget line to stand up something cool and sexy like Kessel Run," Business and Enterprise Systems Program Executive Officer Richard T. Aldridge said. "I've just got a whole bunch of little programs. So when I pass the hat around, it comes back empty."

What BESPIN does have is 60 enlisted coders in three product teams who trained with Pivotal in Atlanta before returning to Montgomery, Ala., and taking up residence in space gifted by the local Chamber of Commerce.

To build its crew chief app, BESPIN is scaling up the functions of a tool created at Davis-Monthan AFB, Ariz., for the A-10, with the aim of making it useful to maintainers working on other aircraft. Other team members are working on a desktop tool for aircrew management, hoping to replace 40-year-old software that tracks personnel certifications and more.

Aldridge says BESPIN's apps will fit into the Air Force's "flight line of the future," where maintainers could use Internet-connected tablets to issue work orders, for example, that wirelessly connect to the main maintenance system.

Other apps might include augmented reality: "You just hold the tablet with the camera to the jet and say, 'I'm going to work on that part,' " Aldridge said. "The [computer recognizes the] picture, knows that's the right wing of the plane, and it puts 'right wing' in the database." Three-dimensional renderings could then show maintainers what needs to be fixed and which tools to use, queuing up instructional images and freeing the crew chief from having to be nearby with explanations.

"Once you get ... that mobile device onto the flight line, it opens up a whole bunch of other possibilities," Aldridge said. "We can save airmen's time."

He aimed to complete the first crew chief app over the summer, then follow with an ammo troop app in the fall. The aircrew management app is on hold until BESPIN gets money to fund the project. Other projects that may come next: tools to check in airmen as they come off planes, tools to manage trucking overseas, or perhaps new tools to assist refuelers.

"We're at the 'think big, start small' piece," Aldridge said. "We can kind of figure out what our processes and tools need to be internally to us, and change our culture internally. But I suspect that once we start showing success, we will have a line of customers at the door—hopefully with money in hand."

## LEVELUP

Another team will develop and test offensive and defensive cyber tools, starting with the Pentagon's Unified Platform program.

The Air Force said Unified Platform, a joint cyber operations system, debuted in April. That first software release connects the Army, Marine Corps, and US Cyber Command's cyber systems to pull data from across the department and help spot possible attacks on DOD networks.

"Before this first Unified Platform capability, the services maintained stand-alone applications, resulting in duplication of effort and, more importantly, reduced cyber threat visibility," the Air Force said. The group aims to update the system with new releases every three months.

LevelUP is also working to connect some Air Force cyber programs with the joint community, said Brig. Gen. Michael J. Schmidt, program executive officer for command, control, communications, intelligence, and networks.

"There's a council of colonels that [meets] on a regular battle rhythm that decides what are the priorities. ... Then the program office executes," he said. "That execution might be developing a new capability through LevelUP Cyber Works. It might be providing money to an Army or Marine Corps contractor."

In addition to Unified Platform, the "Cyber Works" is setting up a secure environment for any program that wants to use it to build new apps.

LevelUP also offers a glimpse of how Nicolas M. Chaillan, the Air Force's new chief software officer, is shaping the coding factories. Schmidt said Chaillan is bringing prototype

Photo: MSgt. Meredith Mingledorff

A1C Braylen Bartolotti completes inspection forms during an exercise aimed at wielding rapid combat airpower in austere conditions with a minimal footprint. Software maintenance groups could aid mechanics with predictive maintenance algorithms and automated maintenance logs.

programs to LevelUP Cyber Works and guiding the direction of Unified Platform.

"On Unified Platform," Schmidt said, "the minimum viable product was going to be ... almost unobtainable." Then Chaillan stepped in and asked, 'What do you really need in a minimum viable product?' And so he, hands-on, did that with a thousand stickies on the wall."

Northrop Grumman, systems integrator for Unified Platform, is helping stand up LevelUP's continuous development and delivery pipeline, according to a company spokeswoman.

## MAD HATTER

The Mad Hatter software team is tackling F-35 maintenance and its troubled Autonomic Logistics Information System (ALIS). Steven D. Wert, the Air Force's digital program executive officer, said Mad Hatter delivered its initial two apps to Nellis AFB, Nev., in May.

Those apps "help the maintainers do things that they were doing outside of ALIS anyway," Wert said. "They were using Excel spreadsheets and handwritten notes and then having to re-enter those things."

Future tools will work directly with ALIS, with the goal of moving all ALIS data into an accessible cloud and pushing out updates faster than Lockheed has been able to do. Air Force Acquisition Executive Will Roper, a top official encouraging speedy coding, has said aspects of the program could apply to F-22s and older platforms as well.

## MAINTENANCE DEPOTS

Garnering less attention than the big-name coding factories are changes underway at depot-level software maintenance groups.

Those groups at air logistics complexes across the country are coding centers, but have lacked the agile development model, Wert said. That's starting to change. At least one, the 309th SMG at Hill AFB, Utah, has already been renamed a "software engineering group" to reflect its evolution.

"What you see now out at Hill, particularly on personnel recovery command and control, is actually the process implementation, the tools, and automation," Wert said. "You almost could characterize them as a software factory before. I think each of those has over 1,000 software coders."

The changes could aid mechanics as they experiment with predictive maintenance algorithms and learn to care for increasingly complex, information-heavy assets. A group at Tinker AFB, Okla., is developing mission-planning code for the B-52 and is upgrading software for the B-1, B-2, E-3, and E-8.

"There's a lot of talent in those software maintenance groups," Wert said. "As we bring them in earlier on programs, I think there are going to be cases where they're actually heavily involved in development ... not after the fact, telling them to sustain software that somebody else has built."

## RAPID DEVELOPMENT, RAPID LEARNING

Kessel Run and its counterparts are still learning. "At its core, we provided that psychological top cover that it's OK to do this, and it's OK to challenge tradition," said Kessel Run's Oti.

They've led the way in experimenting with commercial products and mindsets, shifting how the Air Force tackles cybersecurity and testing, and revamping hiring practices. Kessel Run shares its lessons learned at monthly "enablement days," and it hosted a "Pitch Day" in July to attract new ideas from the startup community.

The Air Force launched a new "16K" software development officer career field in April, and "8K" for enlisted airmen, signaling that the Air Force recognizes their importance. The new designation's greatest impact may be identifying and tracking people with the skills and the passion for coding that might not be nurtured in other career fields. Cyber operators were among the airmen traditionally put in some of those roles, but they don't always possess software skills, Krolikowski said.

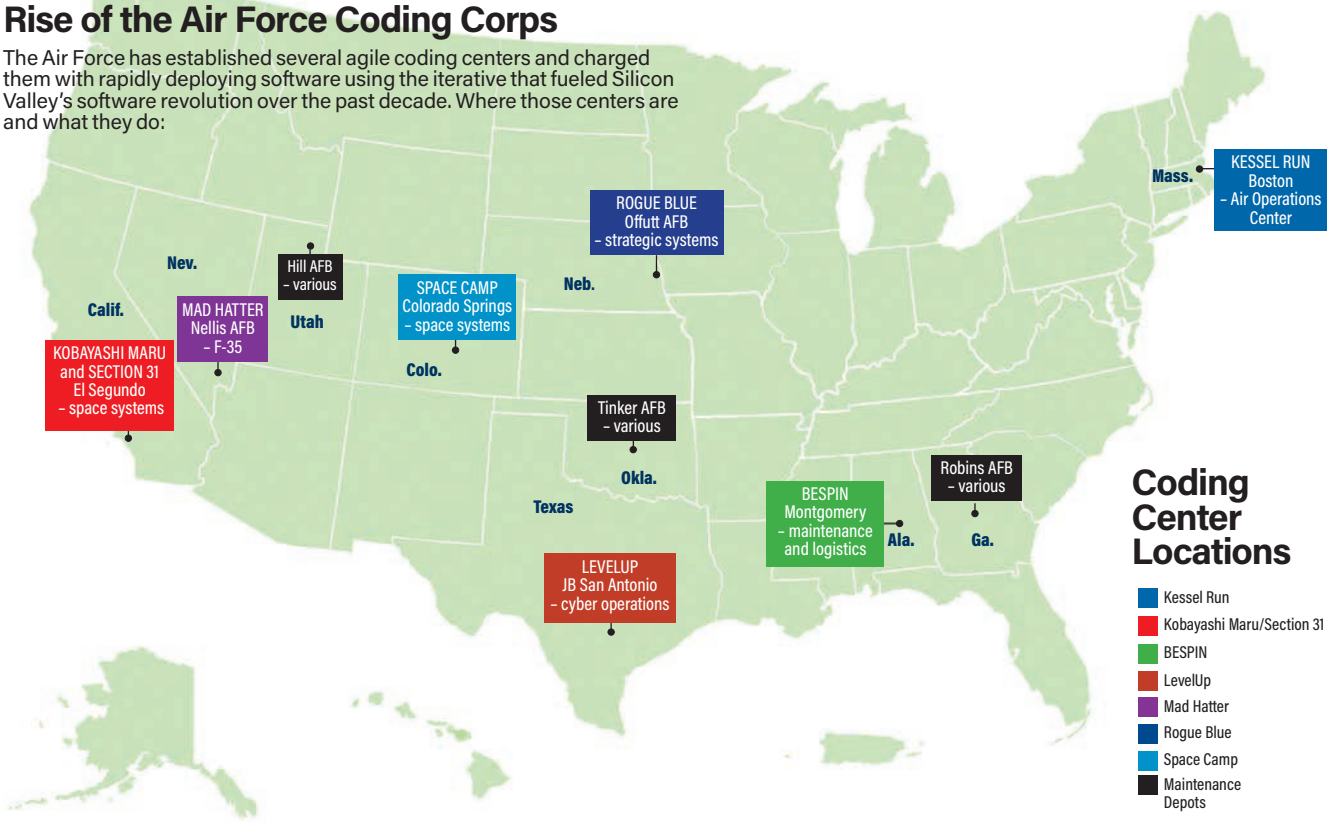
In May 2018, the Air Force said it had about 300 airmen who are dedicated software engineers.

The service said in July that it's difficult to quantify the number of coders, but noted about 3,000 airmen attest to having various levels of coding experience. More than 300 of those airmen have worked in coding groups in the last two years, and about 200 contractors support the three Software Engineering Groups in Oklahoma, Utah, and Georgia.

Will coding centers save money on development? That depends on who you ask. Some say yes, others suggest costs could rise as the Air Force becomes increasingly focused on software, and still others say it doesn't matter, because doing

## Rise of the Air Force Coding Corps

The Air Force has established several agile coding centers and charged them with rapidly deploying software using the iterative that fueled Silicon Valley's software revolution over the past decade. Where those centers are and what they do:




software like the tech giants is just a smarter way to work.

Krolikowski says she already sees tools becoming cheaper because she isn't waiting five years before deciding if a product works.

Last year, the Air Force said Kessel Run's tanker planning tool saved about $214,000 a day in logistics and fuel, and also slashed the time airmen spent in combat airspace. Similarly, targeting tools cut the time it takes to plan out targets by up to 85 percent.

Aldridge said the Pentagon is working with Capitol Hill on a two-year "digital technology management" appropriation for research and development budgets starting in 2021, to try to make funding more predictable. For now, software coding funds are often spread out among multiple categories, making budgeting and planning difficult.

The biggest shift is the idea that capability can always improve, and new features can always be added. "Software never ends," Krolikowski said. "You never really have a switch over from development to sustainment. There's not that kind of artificial milestone."

Aldridge also hopes Congress will allow the Air Force to designate a single enterprise infrastructure on which all other apps can be built, making the overall development environments more efficient. "Those are the conversations we're all having amongst each other: 'Does it make sense for each of us to build our own factory, or can I leverage what you're doing?' " he said.

But Oti argues that it would be a mistake to dictate how to create and run coding centers through a central Air Force policy because it could hinder innovation and the natural evolution of these groups.

Wert sees benefits in standardization, however. "I think the nature of the different programs that they'll focus on will drive some differences," he said. Additionally, " I think the standards will be in the most important principles of getting to a release cadence, really leveraging automated tools and automation, and working directly with end users. Those principles have to be there. We will—over time—home in on a set of metrics that make sense, regardless of the differences in practice."

Over the next few years, the Air Force may settle on a few different models that work well. One could be like Kessel Run, where government leads the work and plays a large role in the product teams, working alongside a talent pool of contractor engineers. Another could look more like a group at Offutt AFB, Neb., where industry comes together to solve problems but government handles the engineering. A third model may take shape in the future.

From Oti's perspective, that will come as airmen and government civilian staff become more involved in coding themselves. "As more and more government personnel are hands-on keyboarding, building out cloud architectures, building out networks, building out software and writing code, now you have a cadre that's going to grow up in this next generation of acquisition leadership," he said. "Which means they can actually make better decisions on technologies." That, in turn, will lead to smarter contracting and development down the road.

Each software factory is like a startup business. They work through organizational structures, try out different technologies, and experiment with processes until they find what works. For example, at Kessel Run, they tried different-sized teams before deciding that about eight people make up the ideal product team. They also learned not every big idea worked as planned. But what felt like a gamble two years ago now seems much more promising.

"I know we've screwed up in the past. We've wasted tons of money on stupid software," Aldridge said of traditional acquisition programs. But Kessel Run has ushered in a whole new era. "This is brilliant, and it's the right way to go."

## Vipers and Reapers in Transylvania:

# USAF's Summer Deployment in Romania

By Brian W. Everstine

CAMPIA TURZII, Romania—One small base here in the rolling hills of Transylvania is hosting both a Theater Security Package of F-16s training with Romanian allies and a new, unheralded operational surveillance presence to keep watch over the region. The build up at Romanian Air Base 71 is part of the Pentagon's European Deterrence Initiative to stand up to a resurgent Russia. F-16s have long deployed to Eastern Bloc countries to trade knowledge and practice joint tactics with local air forces. What's new is persistent ISR in the region. Just a few hundred feet from where a dozen F-16s from Texas were based this summer, a Reaper control unit—including a few bright blue shipping containers used as offices and ground control stations, as well as radars—was set up next to a hangar. They were there to manage the small—but classified—number of MQ-9s deployed here.

The Air Force started Reaper operations in Poland in May with the 52nd Expeditionary Operations Group Det. 2, at Miroslawiec AB, Poland. The unarmed, remotely piloted aircraft are owned and flown by contractors. By early July, USAF shifted the Reapers south to the Romanian base to watch a different part of Eastern Europe. Officially, the move

**"It's a small presence, but a big enough presence that it assures our Polish partners and our Baltic partners ... of that postured and ready force."**
—Lt. Col. Clayton Sanders, commander of 52nd EOG Det. 2.

Romanian Air Force MiGs flying near Campia Turzii, Romania.

Photo: Brian Everstine/staff

Photo: MSgt. Megan Crusher

**Romanian Air Force Capt. Adrian Tanase (l) and USAF Maj. Bryan Spence discuss a training flight at 71st AB, Romania. Trading knowledge and practicing joint tactics increases USAF theater response time.**

was prompted by runway construction at the Polish base, but now USAF and NATO have far better overwatch capability in the Balkans and Black Sea region. The capability is essential as Russia continues incursions into Ukraine and the Donbass regions, moves that make Eastern European nations uneasy.

Endurance is the "key factor" in choosing the MQ-9 for this work, Lt. Col. Clayton Sanders, commander of the detachment, said in a June interview at the Polish base. The fact that the MQ-9s are contractor-owned and few in number "allows us to have the agility to move" if necessary, he said.

The detachment reached initial operational capability at Miroslawiec on March 1. While the unarmed Reapers are contractor-owned and flown—the aircraft themselves have Federal Aviation Administration-required N registration numbers painted on the fuselage—the operation is overseen by US Air Forces in Europe.

In Poland, the Reaper detachment worked out of a dozen mobile containers next to a modern NATO-built hangar and a Block 30 ground control station, fenced off from the rest of the base. A skeleton crew of USAF personnel—commanders, communications, security forces, intelligence, etc.—added to the detachment and its Block 5 Reapers.

"It's a small presence, but a big enough presence that it assures our Polish partners and our Baltic partners … of that postured and ready force," Sanders said shortly before the Reaper deployment to Romania.

Gen. Tod D. Wolters, NATO Supreme Allied Commander and commander of US European Command—and previously USAFE commander—told *Air Force Magazine* in March that having Reapers in the region allows USAF "to improve our understanding of the battle space in the vicinity of Poland plus the Baltics. That's the whole purpose, to improve our indications and warnings so that if tasked, we can respond quicker than we ever have in the past, and the MQ-9 addition will do exactly that."

The Pentagon's European Deterrence Initiative provides about $40 million to fund the MQ-9 detachment, which brought new life to a Polish base where the only permanent presence was small hand-launched drones. Poland is now planning extensive renovations, which will include upgrades to the base's tower and maintenance facilities, in addition to an enhanced flight line.

"There's no better way to integrate and operate with your allies and partners than actually being there," said Lt. Gen. Steven L. Basham, deputy commander of US Air Forces in Europe-Air Forces Africa, in a June interview. "It's always important to understand that while we might have a certain way of operating, if you go out and see a different way of doing things from your partners, we actually gain knowledge from that."

Poland has been a "very stable ally and partner" that provides a "very strategic location" from which USAF can fly the Reapers, Basham said. This presence gives the Air Force the ability to "understand the environment you're operating in," as well as having forces in place to spin up quickly if needed.

While day-to-day operations are handled by contractors, the Air Force brings in its own MQ-9 operators for training exercises with allies or other US military units in the region, Sanders said. Their presence in Poland and Romania provides MQ-9 operators practice in a very different environment from the desert landscapes they've operated in for most of the past 20 years.

"There's a lot of different considerations that we have to take into account for launch, recovery, and even airspace-wise," Sanders said.

Photo: Brian Everstine/staff

**A contractor-owned MQ-9 with the 52nd Expeditionary Operations Group Det. 2 taxis after landing at Miroslawiec AB, Poland. In July, the Air Force moved its small detachment of Reapers from the Polish base to Romania.**

The daily Reaper operations give the US the ability to watch for "any adversarial threat in the region," Sanders said. "The ISR provides that key foundation for us and our NATO partners and allies in the region, we maintain those ready and postured forces. It gives us that force protection data we need."

Seeing American Vipers flying alongside Romanian MiG-21s remains a curious sight, nearly 30 years after the dissolution of the Warsaw Pact.

About 300 airmen and 12 aircraft from the 457th Fighter Squadron at NAS JRB Fort Worth, Texas, deployed to Romania in late spring.

Throughout the summer, US pilots flew alongside the MiGs in local airspace, trained with Italian Air Force Eurofighter Typhoons—deployed to another Romanian base—and conducted local training, demonstrations, and flyovers in the region.

On Romania's Flag Day, Vipers from the 457th Expeditionary Fighter Squadron and MiG-21s from Romanian Air Force Base 71 flew in a fighting wing formation, taking turns breaking behind the Romanian C-27J.

The F-16s had mostly been flying local training on their own and had just started integrating with Romanian MiG-21s and pilots who by now are well-versed in American fighter tactics.

Since TSP deployments in Europe began in 2015, USAF aircraft have made frequent visits to the Romanian base; so much so that the base's commander said some US units have become "brothers" for his MiG-21 pilots.

"It's just cool to look out on the wing and either see a Typhoon piloted by an Italian or a MiG piloted by a Romanian," said Capt. Andrew See, an F-16 pilot with the 457th FS. "We kind of all look the same at a certain point, we're just out there doing our job."

With the MiGs, the F-16s have focused on dissimilar air combat training, or DACT. Sometimes two F-16s go hunting for a MiG, trying to get the quickest simulated kill, said Lt. Col. Paul Batish, commander of the 457th. Other times, the F-16 has been the bad guy for MiGs to hunt.

"The guys have loved that. The Romanians have loved doing dissimilar training with us," Batish said. "It's been great training to see a Soviet-era aircraft, what it's like to merge with him, to visually ID that aircraft, and then what it's like to be in a turning fight with those guys."

Romanian Air Force Col. Marius Oatu, commander of the 71st Air Base, has flown with USAF aircraft at the base for about 10 years now. Oatu, himself a graduate of USAF's Air War College, said this training is a "great opportunity" to practice their own tactics, but also to get to know an ally that has grown very important to Romania.

"It's not only beating the F-15s or the F-16s, it's about training together and trying to be ready to fly together against our enemy, our adversary, whoever this might be," he said. "If it will be to go to war with the American allies, with American pilots, I'm sure that there will be no problems in any phase of the war—organizing, planning, executing."

The TSP has given the US airmen an up-close view of a new NATO ally's tactics, "so it allows our guys to understand what sort of potential contingencies you might have to deal with," Batish said. Instead of only flying alongside US pilots, using established US tactics from the same manual, "now we're having to use more broad NATO tactics and NATO standards. It ... gives them info for their bag of tricks in the future."

The deployed airmen are mostly Reserve members, with a mix of Active Duty from the Total Force Integration unit at


**Two F-16Cs (l) from the 457th Expeditionary Fighter Squadron, NAS JRB Fort Worth, Texas, fly with two Romanian Air Force MiGs. In central Romania, Transylvania—known by most in the West as the home of Dracula—hosts the integrated training effort as part of the Pentagon's European Deterrence Initiative.**

Fort Worth. For some, it's their first deployment, while for others who have been in the unit for decades, it's old hat. The maintainers planned long in advance for the deployment, bringing everything they need with them to maintain a high mission capable rate, said Capt. Matthew Poe, the squadron's maintenance officer in charge.

Campia Turzii is a "bare base" with some hangar space, but not much more maintenance infrastructure that can be used for F-16s. Despite a couple of "curveballs," the maintainers have been able to register a high success rate for the almost daily flight operations, Poe said.

"This is what we do, and our guys are excited to be here," Poe stated. "They're excited to showcase their abilities and make sure that we're getting all the mission sets accomplished, and we've been executing that quite well. We've maintained a 99 percent success rate on all the missions that have been planned."

While pilots with different nationalities have developed camaraderie, there's not as much direct interaction between Romanian and US maintainers because their aircraft are so different. However, there are times when they help each other out. For example, early in the deployment a Romanian MiG had a stripped bolt that their maintainers had trouble with, so they reached out to the Americans, who walked them through their processes of fixing it, Poe said. Additionally, civil engineers deployed with the squadron have helped the Romanians repair parts of their flight line with quick-mix concrete, Batish said.

Day to day, the long-established TSP presence in Romania has meant that regular operations are "very smooth, not that much different than at home integrating with another service," said Lt. Col. Dave Snodgrass, the director of operations for the 457th EFS.

Unlike at-home training, it's a Soviet-designed aircraft instead of another USAF airframe. The Romanian aircrews proudly show off their jets, quick to point out that their MiG-21s—the most widely produced fighter jet in the world, dating to the 1950s—have been upgraded in Israel and are flying with modern avionics, with the designation "LanceR."

Romania first began flying the MiG-21 in 1962, but Russia stopped offering spares in the early 1990s. Other nations stepped up to modernize the jets. While the base in Campia Turzii plans to eventually shift to F-16s—which Romania flies at other locations—that shift is still far off, and the MiGs will remain a mainstay in Transylvania.

The F-16s and Romanian MiGs, now accompanied by operational MQ-9s providing intelligence, surveillance, and reconnaissance, provide a strong message to both local allies and Russia in the region.

The US presence shows "nobody will ever consider violating the sovereign skies, lands, and seas of NATO countries in the region," according to Wolters. ✪

## Maritime Strike:

# Airpower Can Counter Naval Threats in the Asia-Pacific

By Lt. Gen. David A. Deptula, USAF (Ret.)


Vol. 18, February 2019

MITCHELL INSTITUTE
Policy Papers

Key Points

Bombers for Maritime Strike:
An Asymmetric Counter to China's Navy

By Lt Gen David A. Deptula, USAF (Ret.)

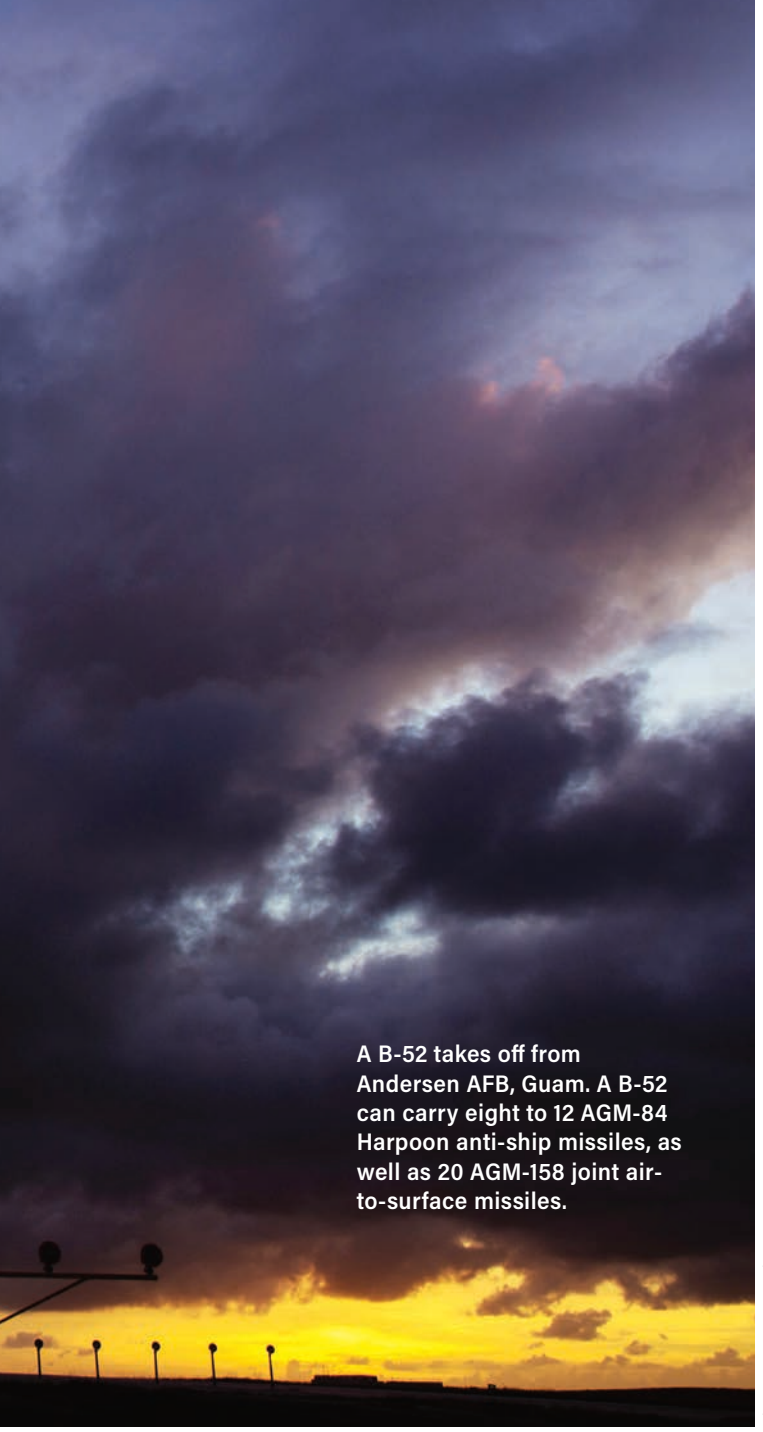
Abstract

***Lt. Gen. David A. Deptula, USAF (Ret.)*** *is Dean of the Mitchell Institute for Aerospace Studies. This article is adapted from the Mitchell Institute Policy Paper,* Bombers for Maritime Strike: An Asymmetric Counter to China's Navy, *which can be downloaded in its entirety at: www.mitchellaerospacepower.org.*

On July 21, 1921, US Army Air Service Brig. Gen. Billy Mitchell sank the decommissioned German battleship SMS *Ostfriesland*, shattering the conventional military wisdom that such ships were invulnerable to air attack. Combat aircraft have been sinking ships from the air ever since.

Modern combat aircraft can travel hundreds of miles an hour, patrol vast expanses of geography, and extend their reach with standoff weapons. US Air Force bomber forces, with their speed, maneuverability, stealth and advanced weapons and sensors afford superior survivability compared to naval vessels. In a modern threat environment, especially in the Asia-Pacific region, the advantages of using bombers in a maritime strike role is becoming more relevant to future military strategies, plans, and budget priorities.

Indeed, US Indo-Pacific Command (INDOPACOM) has already carried out test exercises to demonstrate



A B-52 takes off from Andersen AFB, Guam. A B-52 can carry eight to 12 AGM-84 Harpoon anti-ship missiles, as well as 20 AGM-158 joint air-to-surface missiles.

Photo: SrA. Ryan Brooks

bombers' great capability and operational flexibility against potential adversaries with significant offensive naval capability. Modern weapons, such as the long-range anti-ship missile (LRASM), give the US a significant capability from bomber aircraft against hostile surface vessels. Pairing LRASM with modern sensors, bomber aircraft can now conduct all-weather precision engagements against mobile maritime targets with less risk than naval vessels, and do so in hours, rather than days or weeks.

## HISTORY OF AIRPOWER AND MARITIME STRIKE

American military interest in employing land-based airpower in counter maritime operations has risen and fallen over the decades, along with the perceived naval surface threat of enemies and potential adversaries. In World War II, the US Army Air Forces conducted reconnaissance, anti-submarine warfare, mine laying, and anti-shipping attacks against the German and Japanese navies. But for decades after World War II, interest in the Air Force's maritime operations languished with a lack of significant enemy naval threats. In that era, the Air Force realigned to focus on nuclear bombardment and minimized conventional maritime operations while the Navy de-emphasized surface warfare and focused on building up naval aviation.

That changed in the 1970s, as the Soviet Union built up and deployed a large, global fleet equipped with powerful, long-range anti-ship weapons. The Soviet buildup occurred as the US Navy was shrinking and the Vietnam War was winding down. Between 1969 and 1979, the US Navy's active fleet shrunk from 1,007 to 540 ships. In contrast, the Soviets built powerful new surface ships with large missile payloads, deploying weapons such as the SS-N-19 "Shipwreck" anti-ship missile aboard the nuclear-powered *Kirov*-class cruisers. By 1979, the Soviet navy fleet stood at 1,764 active vessels. Soviet naval aviation also deployed land-based bombers, such as the Tu-95 Bear, Tu-16 Badger, and Tu-22 Backfire, all armed with long-range anti-ship missiles.

In response to this buildup, interest in the Air Force's contribution to maritime operations resurged. In 1975, the Air Force agreed to train air crews in ocean surveillance, maritime strike, and aerial mine laying in cooperation with the Navy. B-52s began conducting ocean surveillance missions in the Atlantic and Pacific and regularly trained with the Navy in the conduct of these missions. By 1983, B-52 bombers armed with AGM-84 Harpoon anti-ship missiles were stationed in Maine and Guam to counter Soviet naval forces. A concept of operations took shape that envisaged groups of B-52s under the control of a Navy E-2C or P-3, or an Air Force E-3A AWACS, attacking Soviet naval surface forces. As many as 10 B-52s could descend to low altitude, approach from different directions, and launch salvos of Harpoons to saturate defenses. In addition to the B-52's large missile capacity, and the fact that it could replenish its weapons in hours versus the days or weeks ships required, it also had the range to attack enemy naval surface groups before they came within range of US Navy ships.

With the end of the Cold War, however, the military services downsized these capabilities as part of the "peace dividend." Without the Soviet threat, the US Navy shrank again, from a total active force of 592 vessels at the end of the Cold War to 287 today. This reduction was ostensibly offset by an increase in the number of missile tubes aboard each ship. In the late 1980s, the surface fleet boasted some 5,000 missile launch tubes. These were composed of around 3,300 vertical launch system (VLS) tubes and 1,600 others, such as those for the AGM-84 Harpoon missile. Today's Navy surface fleet has nearly 9,000 VLS tubes.

In reality, more missile tubes do not necessarily translate into more maritime strike power. Most of those tubes are armed with defensive anti-aircraft missiles to protect the battle group and ballistic missiles; offensive missiles amount to only one-quarter to one-third of a typical ship's VLS loadout, and most of these are Tomahawk land-attack cruise missiles (TLAM)—not anti-ship or anti-submarine weapons.

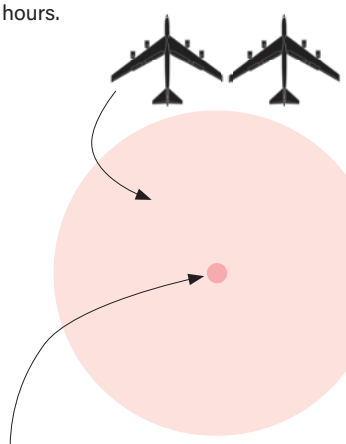
In a crisis, the Navy would have to make tradeoffs in its standard loadout, adding more anti-ship and anti-submarine weapons and likely giving up TLAM capacity in the process—provided it had time and warning to do so. VLS tubes cannot be loaded while underway, requiring a port call unless an ungainly crane is added—at the cost of three

# How US Airpower Can Offset China's Expanding Naval Power

US Air Force bombers can cover more ocean faster than ships at sea, providing a critical counter to China's new, longer-range anti-ship defenses.

## Bombers' Range Advantage

Two B-52s flying at 600 knots can cover 140,000 square miles of ocean area in two hours.



Traveling at 20 knots, two Navy destroyers cover only 4,666 square miles in two hours—1/30th of the area.


## China Extends Its Reach

The Chinese surface fleet has grown not only in size, but also capability. The DF-21D anti-ship ballistic missile (ASBM) has a range of around 810 nm and features maneuverable re-entry vehicles and the ability to strike moving targets, such as US Navy aircraft carriers.

Graphic: Mike Tsukamoto and Dashton Parham

VLS tubes. The air-defense missile loadout would have to be preserved or expanded as well to defend against air attacks.

In the Asia-Pacific area of operations, with its vast distances, land-based airpower's maritime strike capacity could prove vital. New weapons have increased airpower's capability for this mission. The Navy has developed the AGM-158C long-range anti-ship missile, an anti-ship variant of the SM-6 standard missile, and the naval strike missile (NSM). The SM-6 has a range exceeding 250 nautical miles (nm), and though it has a light warhead, it boasts enormous kinetic energy due to its Mach 3.5 speed. The LRASM has a range over 200 miles, and like the Tomahawk, has a 1,000-lb warhead. Surface Navy ships, the F/A-18 Super Hornet, and the B-1B bomber are all slated to employ LRASM. The NSM, as well, is considered a very stealthy weapon with a range of around 100 nm.

The capabilities of Air Force bombers are also being considered while the Navy is trying to halt and then reverse the decline in the size of its active fleet. The Navy's plan anticipates a 342-ship active fleet by 2040, an upward trend but short of its goal of 355 ships. Only a portion will be deployed in the Western Pacific at any given time, however, and only about 100 ships will be forward deployed on any given day in peacetime. The remainder are either in maintenance or training or in transit to or from forward locations. In 2015, out of 272 ships, there were around 54 in the Western Pacific, 24 in the Indian Ocean, and 13 in the Mediterranean; plans call for increasing presence in the Western Pacific to around 67 ships by the 2020s. In the event of a conflict with China, the US Navy would be at a tactical disadvantage as the Chinese would be able to surge most of its naval assets from nearby ports against only 20 percent of the entire American Navy.

### THE CHALLENGE OF CHINESE NAVAL POWER

This situation harkens back to the Soviet naval buildup of the 1970s. Having built up its naval power over the past two decades, China can now pose a challenge to the US Navy in the region. The Chinese surface fleet grown not only in size, but also capability. China has invested in new ground- and air-launched anti-ship cruise missiles (ASCMs), ballistic missiles, new submarines, modern aircraft, large-deck aircraft carriers, and other naval assets.

This modernization effort has accelerated as the Chinese have shed older force structure. In 2000, the Chinese surface fleet consisted of 21 destroyers, 35 frigates, and 87 missile patrol boats, most of which were built before 1990. Today, China boasts 27 destroyers, 49 frigates, 40 corvettes, and 112 missile patrol boats—60 percent more assets than it had in 2000. Three-quarters of its surface fleet today was built after 2000. These ships have modern VLS tubes and phased array radars, as well as fleet air defense systems such as the HHQ-9 surface-to-air missile system (SAM), with a range of around 108 nm. China has also modernized its submarine and naval aviation fleets and developed new weapons, such as the DF-21D anti-ship ballistic missile (ASBM), a new form of anti-ship weapon with a range of around 810 nm that features maneuverable re-entry vehicles and the ability to strike moving targets such as, specifically, US Navy aircraft carriers. Tying all of these capabilities together is a ground-based, over-the-horizon targeting radar that detects, identifies, and targets US ships in the Western Pacific. Collectively, these assets could deny American surface vessels access to waters from which these ships could strike Chinese land and naval targets.

While the operational potency of this force is subject to debate, the Chinese navy is now conducting increasingly complex, sustained, and combined arms training; is more proficient than ever in anti-surface warfare; and has proved increasingly capable in air defense. Given this evolving threat, what are the options for increasing US offensive striking power?

Photo: Zhang Lei/China Ministry of Defense

**Chinese aircraft carrier *Liaoning* underway in the western Pacific Ocean in 2018. China has accelerated its modernization effort in recent years, including adding new submarines, large-deck aircraft carriers, and ballistic missiles to its inventory.**

The US Navy wants to build more ships and submarines to keep parity with the Chinese navy, but this option is a very costly way to increase offensive power. The Congressional Budget Office in 2017 estimated that the cost to increase the Navy fleet from 308 ships to 355 would add 13 percent to the budget ($102 billion versus $90 billion a year) and would necessitate increasing Navy personnel strength by 48,000 people. Yet more ships do not yield a proportional boost in operationally significant fire power. For each additional *Burke*-class guided missile destroyer, for example, only 20 to 30 of its 96 VLS tubes could be used for anti-ship missiles.

Nor could those ships rely on submarines, which would almost certainly be focused on anti-submarine warfare and land attack using TLAMs in the opening days of any conflict. Carrier-based strike aircraft, meanwhile, have relatively limited payloads and range. The F/A-18 can only carry a pair of LRASMs, for example, and even with the capabilities of an F-35C to draw on, if a carrier had to remain east of Guam due to anti-ship missile threats, a maximum-range LRASM strike would not penetrate far into the Philippine Sea. This means carrier-based aircraft would have extreme difficulty approaching enemy targets in the Western Pacific and East Asia, and any subsequent strikes would depend on the availability of munitions onboard aircraft carriers and replenishment ships.

## BOMBERS—ASYMMETRIC MARITIME STRIKE

Rather than a costly naval buildup that might not achieve the necessary increase in maritime striking power to meet the demands of our national military strategy, an asymmetric—and truly joint—approach is to rely on Air Force bombers to increase US maritime strike capability.

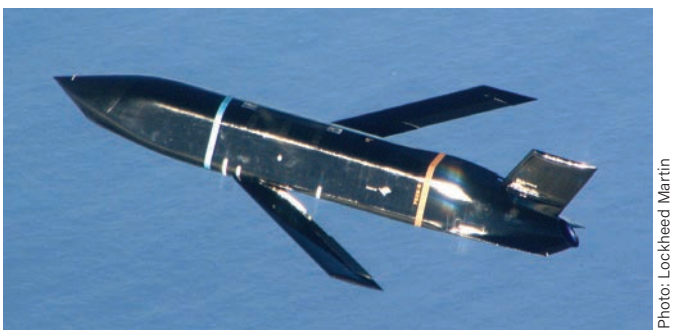


Photo: Lockheed Martin

**Long-Range Anti-Ship Missiles (LRASM), with 1,000-pound warheads and a range of more than 200 miles, are slated to be employed by USAF B-1Bs as well as Navy assets.**

This is by far the most cost-effective option available to achieve the desired effect. B-52, B-1B, and B-2 bombers are developed, deployed, and operational today and the B-21 now in development will also conduct maritime strike. The B-21 is already programmed into the Air Force's budget and will add to this capability once deployed. The primary cost to the Air Force will come from developing additional naval-strike capabilities for these aircraft such as acquiring new ASCMs, training bomber crews in maritime operations, and expanding efforts to ensure robust Air Force-Navy maritime strike interoperability.

The reasoning behind using bombers today is very similar to why they were called on in World War II and during the Cold War. These are large aircraft, designed to carry large payloads and travel long distances at speeds 30 to 40 times faster than ships, while requiring a fraction of the resources and manpower to achieve commensurate combat effects. A B-52H can carry 8 to 12 Harpoon anti-ship missiles, along with 20 AGM-158 joint air-to-surface standoff munition (JASSM) weapons. The JASSM is the weapon the LRASM is based on and has the same size and weight characteristics. In comparison, the B-1B can carry 24 JASSM-class weapons, and the B-2 can carry 16. To date, the B-1B is the only one of the three that has launched an LRASM, but both the B-52 and B-2 could be adapted easily to carry them. Other weapons could also be used in the maritime strike mission aboard bombers. Though Air Force aircraft have never launched Tomahawk cruise missiles, it is slightly smaller and lighter than the AGM-86C/D conventional air-launched cruise missile—of which a B-52 can carry 20. The US Navy is slated to deploy an anti-ship variant of the Tomahawk in the 2020s. Thus, the possibility of integrating an anti-ship variant of the Tomahawk onto B-52s and B-1Bs should be investigated as a possibility to enhance maritime attack capabilities for little additional investment.

Long-range strike weapons and cruise missiles could generate a large amount of flexible strike capacity onboard Air Force bombers. Putting Tomahawks on bombers could hold vessels in the Chinese littorals at risk, outside the range of ground-based air defenses, while a single bomber equipped with LRASMs could launch a salvo equal to that of a destroyer or submarine—and two bombers could launch as many as an entire carrier air wing. In addition

A B-1B bomber tests a LRASM prototype in 2013. DARPA and the Office of Naval Research collaborated on the weapon.

Photo: DARPA

to the strike flexibility of their weapons, the range and speed of bombers allow for great operational flexibility in the maritime mission. All three Air Force bomber types have flown numerous long-range sorties from bases in the United States to strike targets in Asia, then safely returned home. The unrefueled combat radius of Air Force bombers—the maximum distance they can travel to a target and return—is between 2,500 and 4,500 nm, depending on the variant and payload. With this range bombers can strike from distant bases safe from enemy attack, approach from unpredictable directions, and attack from multiple azimuths simultaneously.

Bombers' relative speed advantage over surface naval vessels enables these aircraft to strike targets on short notice, anywhere on Earth. Bombers can also be deployed from bases within the Asia-Pacific theater to increase their flexibility. A B-1B, for example, could strike maritime targets in the Western Pacific within 13 hours of taking off from the continental US, while a bomber in Hawaii could strike the same targets in under nine hours, with a single refueling each way. Bombers in Australia could reach the Western Pacific in under six hours with no refueling. Speed also gives bombers rapid re-strike capability, as they could return to base, reload, and launch new strikes in hours. By contrast, submarines and ships could take over a week to replenish their weapons stocks. Even accounting for forward anchorages or replenishment underway, bombers could launch far more weapons in a comparable timeframe.

The mobility of maritime targets presents a complex targeting and cueing problem. However, in just two hours, two B-52s can monitor 140,000 square miles (364,000 square kilometers) of ocean surface—orders of magnitude greater than possible with two surface ships. This mission area also epitomizes the potential to engage via a "combat cloud" approach that links together various sensor and shooter aircraft and surface platforms. In the 1980s, the Air Force and Navy practiced strike cueing by using the E-2C, P-3, and E-3A AWACS to cue B-52s. In 2004, as Pacific Air Force's director of operations, I orchestrated the "Resultant Fury" test exercise demonstrating that an E-8 JSTARS aircraft could find and track maritime targets and pass that information to B-52s and their weapons to strike ships under way. The Navy's P-8 and MQ-4C remotely piloted aircraft can also detect and track maritime targets and share that information to bombers. Networking capability has steadily improved across the Air Force and Navy. With improved sensor technology, continued experimentation, and exercising, further improvements can be made, enhancing joint strike capacity for combatant commanders. At the same time, improving survivability for non-stealthy bombers will require increased attention as ship-based air defense missiles will increase in range and effectiveness over time.

A compelling operational solution for finding and tracking maritime targets in an environment filled with high-threat air defenses is to employ stealth aircraft such as the B-2 and the B-21. These bombers have the range and endurance to find enemy surface ships within close proximity of their targets, and then are capable of transmitting precise data to both stealthy and non-stealthy shooters to take advantage of the ranges of their respective weapons. Stealth bombers can also attack maritime targets in closer proximity with larger numbers of smaller weapons, while B-1Bs could strike at distance using LRASMs—severely complicating the defensive problem for Chinese surface ships or other adversary forces.

## COST-EFFICIENT COUNTER TO CHINA'S NAVY

In summary, there is an emerging gap in US naval anti-surface warfare capability, particularly in the Western Pacific region. China is deploying a large and growing number of capable combatant ships, submarines, and aircraft armed with short and long-range ASCMs. The ability of the US Navy alone to counter these threats with its surface ships, submarines, and carrier-based aircraft is limited. The US Air Force can provide a cost-effect solution to meet the challenges posed by China in the Pacific by renewing training and equipping its bombers for maritime strike missions.

Air Force bombers can launch large salvos of ASCMs and other weapons at short notice and from multiple directions. Stealth bombers can penetrate the umbrella of Chinese air defenses to threaten and destroy Chinese naval assets. These aircraft can also cue non-stealthy aircraft and other shooters for over-the-horizon strikes, further complicating adversary defensive calculations.

US Air Force bombers offer joint and combined combatant commanders a strong, cost-effective, and efficient deterrent to Chinese naval power; bolster US Navy and allied forces in continuing efforts to counter China; and enhance American national security options to respond to potential Chinese aggression in the Asia-Pacific theater and around the globe. ✪


Photo: Courtesy of Roadside Attractions

**The movie "The Last Full Measure" documents the long struggle to get A1C William Pitsenbarger recognized with the Medal of Honor for his sacrifices as a pararescueman on the Vietnam battlefield. The process took 34 years.**

# Pitsenbarger on the Big Screen

By: Jennifer-Leigh Oprihory

It took 34 years to get A1C William H. Pitsenbarger's Air Force Cross upgraded to a Medal of Honor—one of only a few ever bestowed upon an enlisted airman. And the struggle to tell that Vietnam War story in a movie took nearly 20 years more.

Now, more than five decades after Pitsenbarger gave his life for the sake of his fellow service members, his story is about to make the big screen.

Todd Robinson first learned about the pararescue jumper's (PJ) story while doing research for another movie in 1999. Robinson was visiting Air Force training schools to learn how PJs are made, and he kept hearing one name evoked to express their ethos.

"Nearly every place I went, the young trainees wanted to be sure that I knew the story of William Pitsenbarger," Robinson told *Air Force Magazine*.

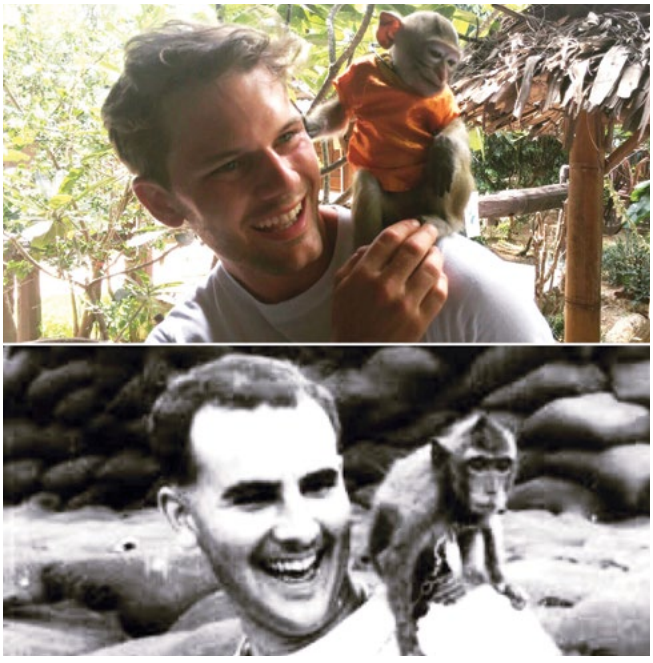
Pitsenbarger was a 21-year-old PJ aboard an Air Force rescue helicopter called in for medical evacuation duty to rescue wounded airmen after an Army unit was ambushed on April 11, 1966, near Cam My. When the helicopter was ready to head home, he volunteered to stay to care for the wounded and dying. Within 90 minutes, he was dead, but many credited their survival to the man they remember as "Pits."

**"I had this great community of people who were tracking the progress of this movie and stuck with us, for lo these 20 years,"**
—Todd Robinson, writer and director of "The Last Full Measure "

The story intrigued Robinson, and not just because Pitsenbarger had selflessly put himself into harm's way. He was just as fascinated with the aftermath, when wives of the soldiers who'd fought in that battle learned that Pitsenbarger had earned an Air Force Cross for his heroism, rather than a Medal of Honor. Once their spouses had reconnected, the men "put forth this effort to petition Congress to reconsider it," according to Robinson.

Later, he heard William F. "Frank" Pitsenbarger, the airman's father, speak on his son's legacy at Kirtland AFB, N.M.

"The whole thing gelled for me in that moment, and it made it very personal because I had a little boy, and I suddenly had to consider what it might be like to send a child into harm's way and maybe not get them back,



Photos: Courtesy of Roadside Attractions

**Actor Jeremy Irvine (top) in Thailand while filming "The Last Full Measure," portraying A1C William Pitsenbarger (pictured below) in Vietnam. USAF as well as the pararescue community have supported the making of this film for nearly 20 years.**

Photo: USAF

**Pitsenbarger standing next to an HH-43 helicopter in Vietnam. Pits stayed behind to care for the wounded and fight the enemy when his helicopter returned to base.**

or maybe not get them back whole, and that's when I knew that there was a story to tell," Robinson said.

Convincing others wasn't so easy.

Robinson and Executive Producer Sidney Sherman pitched the film idea to more than 50 production companies. No one bit. "And then, we looked at each other, and I said, 'You know, I still believe in this,' " Robinson said. "I'm just gonna write it."

After finishing the script, the duo gave selling the film a second go, and New Line Cinema won the deal. But not long after, New Line was sold to Warner Bros., and the project was canceled. Robinson and Sherman were again without a backer. Over the course of the next decade, they finally lined up funding and kicked off production in 2017, shooting in the US, Costa Rica, and Thailand. Titled "The Last Full Measure," the movie is now slated for an Oct. 25 release by Lionsgate subsidiary Roadside Attractions.

## A DIFFERENT KIND OF WAR STORY

"The Last Full Measure" is not traditional war-movie fare. The film tells the story through the perspective of a fictional Pentagon official charged with investigating the merits of the case and the veterans who survived the battle in which Pitsenbarger died. It's a story of survival, honor, heroism, acceptance, and the lasting trauma of combat.

While getting financial backers was hard, winning over interested A-list actors was a breeze.

British stage and screen star Jeremy Irvine plays Pitsenbarger; Christopher Plummer and Diane Ladd play his parents, Frank and Alice; Ed Harris, William Hurt, Samuel L. Jackson, and Peter Fonda play some of the veterans struggling with the aftermath of the battle. Sebastian Stan, who plays the Winter Soldier in Marvel's *Captain America* series, plays the civilian investigator.

Robinson said the Army and Air Force supported the project from start to finish, but the pararescue community was especially helpful.

"I had this great community of people who were tracking the progress of this movie and stuck with us, for lo these 20 years," he said.

## ATTENTION TO DETAIL

Once the project was a go, the production still had its challenges.

Coordinating conflicting filming schedules for busy actors was one problem; time and funds were another. Capturing a realistic depiction of the Vietnam battlefield took meticulous planning, Sherman told *Air Force Magazine* via email.

"Getting the battle right was key, and Todd spent thousands of hours talking to veterans of Operation Abilene and military experts in order to carefully plan our shoot," he said. "Every scene was storyboarded down to the smallest detail."

Two of the film's advisers, retired Air Force SMSgt. John Pighini and retired Marine Corps Gunnery Sgt. Quay Terry, helped train the actors for their battlefield roles, Sherman said. Co-producer, cast member, and former Marine Travis Aaron Wade provided backup. Pighini went to Thailand with the cast and crew to ensure the PJs were depicted accurately, Sherman noted.

"John is a Vietnam-era, highly decorated PJ ... so he knew the lay of that land very well," Robinson said, noting that Pighini paid special attention to the small details that distinguished the members of the US Army's Charlie Company from the Air Force PJs that came to their rescue to ensure Pitsenbarger didn't become "just another military guy in a movie."

Pitsenbarger was only 21 at the time of his death, but Robinson said the historical record was rich. The documentation assembled in support of his MOH upgrade, along with extensive conversations with a former roommate and others, helped Jeremy Irvine embrace the role.

"Whenever you get the opportunity to play a role based on someone's real life—let alone an individual who gave the ultimate sacrifice, like Pits—there is a huge responsibility to do them justice," Irvine told *Air Force Magazine*.

It wasn't all perfect. "We made some mistakes," Robinson said. He noted the choice to use Huey helos over Pedros due to their scarcity and the cost of getting them to Thailand as the biggest one. "There are some things that aren't quite right. But hopefully, people who would notice them look past them because the movie works." ✪

# From Out of the Shadows

**Despite occasional leaks and glimpses, stealth was developed in secrecy along two separate tracks.**

Two F-117s on the ramp at Al Jaber AB, Kuwait, ready for a mission in support of Operation Southern Watch in 1998.

Photo: TSgt. James Mossman

By John T. Correll

The existence of a new technology called "stealth" was announced by Secretary of Defense Harold Brown at a Pentagon news conference Aug. 22, 1980.

The special contribution of stealth was that it could reduce the radar cross section of an aircraft to approximately that of a bird, enabling a bomber to penetrate deep into enemy airspace without being detected or intercepted.

"It is not too soon to say that by making existing air defense systems essentially ineffective, this alters the military balance significantly," Brown said.

What he did not say was that a stealth fighter prototype—which would lead eventually to the F-117 Nighthawk—had been test flown in 1977, or that a forerunner of a stealth bomber—the future B-2 Spirit—was already on contract.

Stealth was developed and fielded under tight secrecy. Despite occasional leaks and glimpses, the stealthy aircraft would not appear in the open for almost 10 years. The public rollout of the B-2 was in November 1988. The F-117 was publicly revealed in April 1990, four months after its combat debut in the Panama invasion of 1989.

Photo: Frank Hall/DOD

**"It is not too soon to say that by making existing air defense systems essentially ineffective, this alters the military balance significantly."**
Secretary of Defense Harold Brown

The immediate reaction to Brown's announcement in 1980 centered on politics. Critics said the reason for the disclosure—coming three months before the elections in November—was to take the heat off President Jimmy Carter for having canceled the non-stealthy B-1 bomber in 1977. Carter and Brown were also accused of recklessly releasing a critical defense secret for political purposes.

Republican presidential candidate Ronald Reagan, who would defeat Carter in the election, joined in the criticism. Upon taking office, though, Reagan decided on a two-bomber approach, reinstating the B-1 but proceeding concurrently with what would become the B-2. Development of the stealth fighter, concealed by even greater classification than the B-2, continued apace.

Stealth came under severe attack in the 1990s by those who wanted to cut defense spending. The harsh judgments were not lessened appreciably by the outstanding performance of the F-117 in the Gulf War in 1991 and that of the B-2 and the F-117 in regional conflicts later in the decade. Production was sharply curtailed for both aircraft.

## THE STEALTH ADVANTAGE

Looking back from the perspective of 40 years,

**1947:** Northrop's YB-49 over Muroc Army Airfield, Calif. Stealth aircraft technology is often traced to the flying wing's smooth surfaces, rounded edges, and lack of tail and fuselage.

Photo: AFGSC History Office

**1977:** Have Blue was Lockheed's stealth demonstrator, which was 60 percent the size of the F-117, covered with facets, and set at unusual angles to scatter radar beams.

**1991:** F-117 Nighthawks on the ramp at Langley AFB, Va., preparing to deploy to Saudi Arabia in Operation Desert Shield.

Photo: USAF via National Archives

**1997:** F-22s over Syria. The Raptor, USAF's first fifth-generation fighter, can fly at Mach 2.

the significance of stealth has been enormous. No major countermeasures have emerged to negate it. The United States maintained its monopoly on the technology well into the 21st century.

Stealth, also known as "low observable" technology, still conveys an overwhelming combat advantage. It reduces exposure by a full range of signatures—electromagnetic, infrared, visual, and acoustic—but the main one is radar.

Stealth makes an object seem smaller on the radar screen by diffusing the reflection of the beam instead of bouncing it directly back to the radar receiver. Fighters and bombers with low radar cross sections can get close to their targets before they are detected. Nonstealthy aircraft pitted against stealthy opponents will almost certainly be shot down.

USAF's F-15 Eagle, for example, was introduced in the 1970s as the world's premier air superiority fighter. However, its radar cross section is 5,000 times greater than that of the F-35. Radar can pick up the F-15 more than 200 miles out, whereas the F-35 gets within 21 miles before it can be detected.

In recent years, the Chinese and the Russians have begun flying stealth fighters. US allies in Europe and the Pacific are partners in the stealthy F-35 Joint Strike Fighter program. For its stealth fighter needs, the US Air Force will rely on a mix of F-35s and a smaller number of older but even more capable F-22 Raptors. A new stealth bomber is in development.

Depending on budgets and politics, the Air Force anticipates a steady increase in the percentage of stealth aircraft in its combat units.

## ORIGINS

The roots of stealth can be traced to experimental aircraft of the 1940s, particularly Jack Northrop's fabled YB-49 flying wing, which had smooth surfaces and rounded edges but no tail or fuselage. The all-wing configuration generated a relatively small image on radar screens, but that was of no great interest at the time, and the YB-49 was canceled in 1949.

In an obscure technical paper in the 1960s, Russian physicist Pyotr Ufimtsev theorized that electromagnetic waves bouncing off a flat surface could be calculated and used to estimate the return on radar. His findings were ignored by everyone, including the Russians.

By the 1970s, bombers and fighters were increasingly vulnerable to radar-controlled air defenses. In 1974, the Defense Advanced Research Projects Agency and the Air Force began a major effort to develop combat aircraft with low radar signatures.

Two of the principal aircraft companies, McDonnell Douglas and General Dynamics, were occupied on the new F-15 and F-16 fighters so the tasking for stealth fell to Lockheed and Northrop. Both of them were awarded contracts in 1975 to build static models for the Experimental Survivable Testbed (XST).

Lockheed and Northrop took distinctly different approaches in their development of stealth. Ufimtsev's paper on calculating radar refraction had been translated by the Air Force Foreign Technology Division in 1971, and Lockheed engineer Denys D. Overholser blended it into his own work for a computer program called "Echo 1."

Echo 1, which computed the radar cross section from various angles over a range of wavelengths, was the enabling step to stealth for Lockheed. The catch was that the best available computers of the day could handle results only from flat surfaces. Thus, the calculations were spread out over hundreds of facets. The results were then combined to determine the radar cross section of the aircraft as a whole.

By contrast, Northrop relied on modeling of compound

Photo: USAF via DARPA

**1982:** Northrop's Tacit Blue stealth test bed was called a "butter dish with wings" for its odd shape. The "box," with low-observable material wrapped around it, flew more than 130 times.

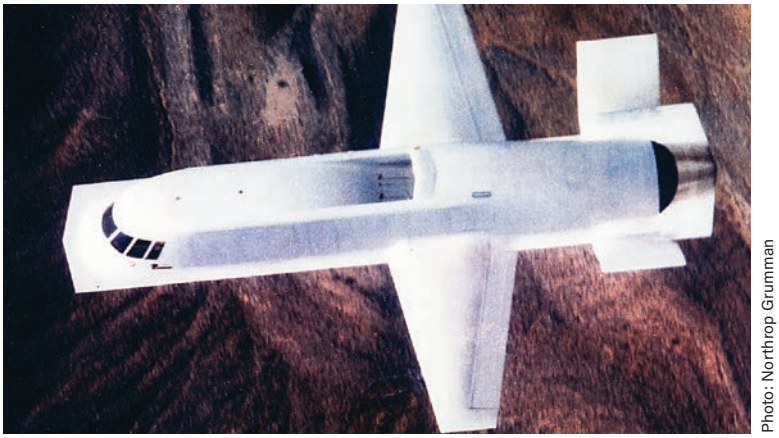


Photo: Northrop Grumman

Photo: SSgt. Colton Elliott/ANG

**2019:** F-35s fly exercises over the North Sea. USAF, the US Navy, and the US Marine Corps all fly a variant. Allied countries such as Japan and the UK are also buying the stealthy fighter.

Photo: SrA. Benjamin Cooper

curves and shaping of the edges to achieve stealth. When the B-2 bomber was subsequently revealed to be a flying wing, the popular assumption was that it descended directly from Jack Northrop's YB-49. Corporate heritage and culture no doubt played a part, but the engineers insisted that they started with a clean sheet of paper.

The XST models were mounted on poles and bombarded with electromagnetic waves to compare their radar cross sections. Northrop's shaping approach worked well enough in deflecting radar beams from head on but was less effective than the Lockheed faceting when results from the sides and rear were considered.

Lockheed won the "pole off" and was selected in 1976 to proceed with a technology demonstrator to validate the pole test results.

In a separate venture—but with the additional objective of preserving Northrop's stealth experience in the defense industrial base—DARPA in 1978 awarded Northrop a contract to design the Battlefield Surveillance Aircraft (BSAX). It was part of a broader program called "Assault Breaker," intended to repel a massive tank attack in Europe. BSAX had to be stealthy enough to operate close to the forward edge of battle.

## INTO THE AIR

The Lockheed fighter was at least five years, sometimes more, ahead of the Northrop bomber in the stealth timeline. The next step after the XST pole tests was "Have Blue," Lockheed's manned technology demonstrator that entered flight testing in April 1977.

Have Blue was a sharp-nosed single-engine aircraft with swept wings and stark planar surfaces. It was 60 percent the size of the F-117 fighter, which would come afterward. The facets, set at unusual angles, scattered the incoming radar beams.

The F-117 made its first flight in June 1981. Strictly speaking, the F-117 was an attack aircraft rather than a fighter. It was intended to drop bombs, not engage in aerial combat. However, Gen. Robert J. Dixon at Tactical Air Command believed that an "F" (for fighter) designation would be more attractive to the best pilots better than would an "A" (for attack).

Northrop's BSAX demonstrator, "Tacit Blue," made its first flight in February 1982. It was one of the strangest-looking aircraft ever built. For reasons needful to testing of the surveillance radar it carried, Tacit Blue was essentially a box with low-observable features wrapped around it. As Northrop acknowledged, "Tacit Blue's shape looked like a butter dish with wings." Between 1982 and 1985, Tacit Blue made 135 test flights.

Northrop had been announced in 1981 as winner of the contract for the Advanced Technology Bomber, which would be designated the B-2 in 1984. The Tacit Blue test results built confidence in Northrop's approach to stealth.

In the interval since Lockheed's Have Blue, computing power had increased exponentially, and it was no longer necessary to estimate radar cross section by figuring the results for individual panels one by one. The faceting route to stealth was largely abandoned.

The B-2 would not make its first flight until July 1989, only six months before the F-117 Nighthawk flew its first combat mission.

## THE STEALTH REGIME

Stealth imposed penalties and trade-offs—chiefly in speed and aerodynamics—on the F-117 and the B-2. They had no afterburners and were limited to subsonic speeds. Supersonic flight would have undercut the benefits of stealth by announc-

China's J-20 displays its weapons bay during an air show in 2018. Another Chinese fifth-gen fighter, the J-31, is an F-35 look-alike and could be operational soon.

Photo: Emperornie

ing the presence of the aircraft, with both a sonic boom and a big thermal signature from the hot-burning engines.

Mach speeds would also have consumed more fuel, already at a premium since internal carriage of the engines did not leave much space for additional fuel tanks. Gas-guzzling afterburners would have diminished the operational range.

The early stealth airframes were aerodynamically unstable. Flight was made possible by digital "fly-by-wire" technology that employed computers to constantly adjust the flight controls.

Stealth designers addressed seven types of observable signatures: radar, infrared, visual, contrails, engine smoke, acoustic, and electromagnetic. Reduction of the critical radar cross section was achieved with 90 percent by shaping of the aircraft and 10 percent by radar-absorbent materials.

The radar-absorbent coatings were fairly thick in places and added weight to the aircraft. Repairing the coating and applying fresh material after each mission was expensive and time consuming.

## SHOTS IN THE DARK

Seeking to defuse criticism that his announcement of stealth had been for political gain, Defense Secretary Brown said in 1980 that because of leaks about stealth "in the last few days" to the press and television, "it is not appropriate or credible for us to deny the existence of the program."

Indeed, there had been several recent leaks—at least one of them by a high Pentagon official and presumably with Brown's blessing—but they were not the first disclosures of stealth.

The first public mention of stealth was in May 1975 by *Defense Daily,* a trade publication, which reported a design study for a "high Stealth-2 aircraft." Under the heading "Lockheed 'Stealth Fighter,'" the 1977-1978 edition of *Jane's All the World's Aircraft* said that the Lockheed Skunk Works at Burbank, Calif., was building "a small 'stealth fighter' of which a primary feature will be low radar, infrared, and optical signature."

Bits and pieces of the stealth story appeared intermittently in the 1980s. In particular, George Wilson of the *Washington Post* had good sources. In May 1982, he reported that the stealth bomber "is shaping up as a radically advanced flying wing." That was confirmed in 1985 by Sen. Barry Goldwater (R-Ariz.), who had seen a model of the airplane.

Secrecy about the F-117 was tighter than that surrounding the B-2, and the guesswork was less accurate. There was scattered speculation that the stealth fighter would be the "F-19." That designation was used on a plastic model kit marketed by Testor in 1985. The picture on the box was a gracefully rounded delta shape. The forward fuselage resembled an SR-71. It attracted attention, but nothing about it was correct.

Testing of the F-117 was conducted at the Tonopah Test Range in the Nevada desert. Every week for eight years, pilots and ground crews from Nellis Air Force Base at Las Vegas flew up to Tonopah on Monday and returned home on Friday. Operations at Tonopah did not begin until an hour after sunset.

Security at Tonopah was breached in July 1986 when an F-117 on a night mission crashed near Bakersfield, Calif. Within a month, Wilson and the *Washington Post* reported that the crashed airplane was one of 50 stealth fighters flying out of Tonopah.

The Pentagon, deciding in 1988 that it could no longer justify the cost and effort to keep a total lid on the program, released a grainy photo of the F-117 but deliberately blurred its features to avoid revealing too much about the design. Wilson in the *Post* pronounced it "awkward looking."

## INTO OPERATION

The stealth aircraft were developed in secrecy—the F-117 as a "black" program and the B-2 as a "gray" one—and were not subjected to much criticism during their formative years. That changed with the rollouts of the aircraft.

Relaxation of security on stealth coincided with the end of the Cold War and top-to-bottom reductions in the defense program. The stealth aircraft, especially the B-2, were favorite targets for defense critics in Congress and the news media.

Strong performance in the Gulf War and in regional conflicts in the Balkans did not make a difference. Only 59 F-117s were delivered to the Air Force, and the B-2 total was capped at 21.

The next generation of stealth arrived with the Lockheed Martin F-22 Raptor, an air-to-air fighter that first flew in 1997. The radar cross section of the F-22 is sometimes described as comparable to that of a golf ball, at other times as equal to that of a bumblebee.

The Lockheed Martin F-35 Joint Strike Fighter—designed for both aerial combat and ground attack—flew in 2006. It has a single engine and is smaller than the twin-engine F-22.

Improvements in technology allowed the new stealth aircraft to escape some of the limitations of their predecessors. Supersonic speed is now an available option. The F-22 can reach Mach 2 and for the F-35 Mach 1.6.

The Air Force initially planned on 750 F-22s and 1,763 F-35s, but the F-22 program was terminated at 187 aircraft, and USAF so far has taken delivery of fewer than 200 F-35s. At present, stealth aircraft account for less than 20 percent of the fighter forces of US services.

The successor to the B-2 will be the Northrop Grumman B-21 Raider. It will enter flight testing in 2021, but the number to be built is not yet decided. It is the fulfillment of the Long-Range Strike Bomber program, and in concept drawings, it has a strong family resemblance to the B-2.

## PROLIFERATION

The US monopoly on stealth could not last forever, and it didn't. Both the Russians and the Chinese flew stealth fighters in tests in 2010.

The Russians have 10 flyable prototypes of the Su-57—also known as the T-50, its internal name at manufacturer Sukhoi—at various stages of test and evaluation. Reports say the program is "troubled" and behind schedule, but Sukhoi claims that the first operational Su-57s will be delivered soon to the Russian air force.

The Chinese are well ahead of the Russians and have two stealthy fighters. The first was the J-20, which has some features akin to those of the F-22 and F-35 and draws heavily on technology presumed to be stolen from the United States. The J-31 has been called "an F-35 look-alike" and may soon be ready for mass production. The Chinese are reported to be working on a J-31 variant that could fly from an aircraft carrier.

In addition, the Chinese have a stealth bomber, the Xian H-20, in development. The predicted range would be sufficient to target US bases on Guam.

A significant source of stealth proliferation is the US itself. The F-35, operational with the Air Force, Navy, and Marine Corps, will be operated by a dozen US allies in Europe and on the Pacific rim, and also Israel. About half of them have already begun receiving airplanes.

In a study for the Air Force Association's Mitchell Institute in 2017, Maj. Gen. Mark A. Barrett and Col. Mace Carpenter concluded that stealth has become an "imperative" in the digital age. "The capability to significantly reduce the range and effectiveness of modern radars and other threat sensors is now a basic requirement for aircraft survival," they said. ✪

**John T. Correll** *was editor in chief of* Air Force Magazine *for 18 years and is a frequent contributor. His most recent article,* "The Counter Revolution in Military Affairs," *appeared in the July/August issue.*

# CyberPatriot National Finals XI


**CyberPatriot Commissioner Bernie Skoch (l) and Air Force Association Chairman of the Board F. Whitten Peters pose with Open Division National Champions from Troy High School in Fullerton, Calif. (L-r) Clement Chan, Joseph Xu, Christos Bakis, Jimmy Li, Timothy Kim, and Rahil Shah, team mentor John-Michael Linares, Northrop Grumman's Vice President and General Manager for Cyber and Intelligence Solutions Jennifer Walsmith, and team coach Allen Stubblefield.**

**By Rebecca Dalton**

Each year, the Air Force Association's CyberPatriot program holds a national youth cyber defense competition, and each year, tens of thousands of students find their passion for STEM and cybersecurity. This year was no different, with nearly 24,000 students from across the country competing in the 11th season of CyberPatriot—the largest competition to date.

To qualify for the CyberPatriot National Finals is no small feat. From an initial field of nearly 6,400 teams split between three divisions, only the best of the best—the top 28 teams to be exact—get to experience the high-stakes atmosphere of the in-person National Finals event.

Keynote speaker David J. Hickton, former US attorney for the Western District of Pennsylvania and current director and founder of the University of Pittsburgh Institute for Cyber Law, Policy, and Security, found himself in awe of the national finalists while sharing some words of wisdom with them at the awards banquet. "You have demonstrated at an early age that you are a patriot, … but I urge you to take advantage of what has been provided here and cross the threshold and become a cyber leader. In addition to the fact that you will never starve and will always have a job—our country, its future, and the world depends upon it," said Hickton.

Commander of US Cyber Command, Gen. Paul M. Nakasone, was also impressed with the level of talent the CyberPatriot competitors possess, calling the high school- and middle school-aged students "vital for the security of our nation."

Recognition is in order for the teams whose hard work earned them a spot on the stage at the CyberPatriot XI Awards Banquet:

## OPEN DIVISION WINNERS:

National Champion: Team Troy Tech Support, Troy High School (Fullerton, Calif.)

Runner-Up: Team Mendenhall, North Hollywood High School (North Hollywood, Calif.)

Third Place: Team CyberAegis Chobani, Del Norte High School (San Diego)

## ALL SERVICE DIVISION WINNERS:

National Champion: Team Byte Sized Falcons, Scripps Ranch High School Air Force JROTC (San Diego)

Runner-Up: Team CyberD3lta, Troy High School Navy JROTC (Fullerton, Calif.)

Third Place: Team Roosevelt Rough Riders, Engineering and

Cadet Lt. Col. Annabelle Klosterman from the CAP Big Sioux Composite Squadron in Brookings, S.D., competes in the finals. Competition began in September 2018 with online training sessions. Teams then proceeded through rounds one and two, a state round, a semifinal round, and the finals, culminating at the Inner Harbor Hyatt Regency Hotel in Baltimore.

Technologies Academy at Roosevelt High School Army JROTC (San Antonio)

### MIDDLE SCHOOL DIVISION WINNERS:

National Champion: Team CyberAegis Chaos, Oak Valley Middle School (San Diego)

Runner-Up: Team CyberAegis Kronos, Design 39 Campus (San Diego)

Third Place: Team CyberAegis Aether, Oak Valley Middle School (San Diego)

### AT&T MOBILE DEVICE COMPONENT WINNER:

Team Byte Sized Falcons, Scripps Ranch High School Air Force JROTC (San Diego)

### CISCO NETWORKING CHALLENGE WINNERS:

Open Division: Team Troy Tech Support, Troy High School (Fullerton, Calif.)

All Service Division: Team Roosevelt Rough Riders, Engineering and Technologies Academy at Roosevelt High School Army JROTC (San Antonio)

Middle School Division: Team CyberAegis Kronos, Design 39 Campus (San Diego)

Northrop Grumman awarded $49,500 to the Open and All Service winners of CyberPatriot XI, bringing its total scholarship contribution to more than $450,000 since becoming presenting sponsor in 2011. Scholarships are awarded to each member of the first-place, runner-up, and third-place teams in the two high school divisions.

The competitors, however, are not the only ones who received recognition. Betty Hemby of The Boeing Company and Meghan Barnes of AT&T were awarded the CyberPatriot Order of Merit, recognizing their sustained superior achievement in promoting the STEM education objectives of the program. They are among a small group of individuals to be awarded such an honor.

"With the generous support of Northrop Grumman and our other benefactors, we have been able to grow remarkably every year, reaching more and more students of all backgrounds and attracting them to STEM education and careers," CyberPatriot National Commissioner Bernard Skoch said. "The champions we crowned in Baltimore are brilliant competitors in a field our nation so desperately needs them in. We congratulate them, along with all our thousands of participants nationwide. We look forward to yet another exciting—and even more challenging—season this coming year." ✪

Photos: Mike Tsukamoto/staff

Open and Middle School Divisions at the Network Security Master Challenge use AT&T mobile device components.

**CyberPatriot,** *the nation's largest and fastest growing youth cyber education program, is AFA's flagship STEM program dedicated to strengthening cyber skills among students. The program features the National Youth Cyber Defense Competition for high school and middle school students, AFA CyberCamps, an Elementary School Cyber Education Initiative, a Cyber Education Literature Series, and CyberGenerations, a program promoting cyber awareness among senior citizens. https://www.uscyberpatriot.org*

# 2019 DOD Warrior Games

## AFA's Wounded Airman Program Hosts Hospitality Suite

**By Christine Brown**

First-time host US Special Operations Command organized 300 wounded warriors from around the country to compete in the 2019 DOD Warrior Games held at MacDill Air Force Base in Tampa, Fla., from June 21–30. The athletes showed their strength through competition in archery, cycling, shooting, golf, wheelchair basketball, rugby, tennis, swimming, and track and field events.

As the wounded warriors worked hard going for the gold, family members across all military branches cheered. The adaptive sports used in the Warrior Games competition inspire recovery, support rehabilitation, and encourage the warriors to overcome illness and injury, whether it be physical or mental.

Then-USAF Vice Chairman of the Joint Chiefs of Staff Gen. Paul J. Selva spoke with athletes and families during the Warrior Games opening ceremony, comedian Jon Stewart was back as master of ceremonies, and in addition to the team spirit and support from their care teams, the wounded warriors and their family members also received support from the Air Force Association (AFA) team.

The Wounded Airman Program (WAP) is the premier program for airmen and families at AFA, providing life-changing and life-saving support. In addition to Warrior Games support for wounded warriors across all branches, AFA's Wounded Airman Program is the leading nonprofit support partner of the Air Force Wounded Warrior Program with more than 8,400 enrolled airmen. WAP has provided over $625,000 to wounded airmen and their families since its inception in 2011 and continues to support the growing needs of the Air Force family.

The AFA staff supported our warriors and families with a Family Hospitality Suite located at the Long Aquatic Center, which held the swimming competitions. The line was out the door as AFA welcomed 1,000 participants and family members with complimentary snacks, beverages, coffee, and morning and afternoon treats.

The highlight of the hospitality event was the children's activities room that featured an "Under the Sea" theme. "Little warriors" enjoyed playing board games and cards with their parents and other children. The face painting, arts and crafts, reading, and photo booth stations were also popular with the children and even adults.

"It was such an honor and a privilege to help so many veterans who experienced both visible and invisible, mild to extremely serious, injuries. Working with AFA's Wounded Airman Program, I spent most of the day glad-handing guests—passing out coffee, refreshments, snacks, and fruit, and thanking both competitors and their family members," said Barry Taylor, an AFA hospitality event volunteer.

Team Air Force finished the competition by winning 128 medals, followed by the Army with 111 medals, and the Navy claiming 94 medals.

Retired SrA. Brett Campfield, Ultimate Champion Silver Medalist for Team Air Force, thanked all of the supporters and AFA's Wounded Airman Program. "My family and I have greatly benefitted from AFA's Wounded Airman Program support. They helped to cover my travel to the Warrior Games and even gave me a stipend to assist with my out-of-pocket costs. We are forever grateful for AFA and all of their support that has greatly blessed my family," said Campfield.

Photo: Christine Brown

**AFA welcomed numerous athletes and guests throughout the competition at their "Family Hospitality Suite."**

Photo: SrA. Daniella Peña-Pavao

**Team Air Force's, MSgt. Melissa Martinez, 33rd FW, Eglin AFB, Okla., competes in the Shot Put and said, "from the bottom of my heart, I am so thankful to be here."**

AFA's WAP, along with its strategic partners, sponsored the 14 veteran wounded warriors who made the Air Force Team to compete at the Warrior Games with Airman for Life Travel Assistance grants. Without this support, some airmen would not have had the opportunity to compete. The program's mission is to help as many airmen as it can to attend rehabilitative events in order to stay connected with their Air Force family. Support at events like the Warrior Games continues to keep our wounded heroes strong.

AFA is committed to caring for our wounded heroes and family members, and providing the support they deserve. ✪

# AIRMAN FOR LIFE

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

## Mountain Home AFB, Idaho

The Air Force Association held a luncheon with the 366th Wing from Mountain Home AFB, Idaho, and the surrounding community on June 27. Col. Joseph "Solo" Kunkel, former 366th Wing commander and his wife, Jenney, were in attendance as well as AFA President Bruce A. Wright, AFA Northwest Region President Bill Striegel, and local AFA Chapter leader Roger Fogleman. A Q&A session was held with former Idaho State Senator and US Senate Chief of Staff John Sandy, who offered thoughts on improving the Idaho legislature and how to garner congressional support for the 366th Wing and USAF mission.

Colonel Klunkel emphasized his appreciation for the Air Force Association and pointed out that as a teenager he came across an issue of *Air Force Magazine* which motivated him to attend the Air Force Academy. That particular issue featured an F-15E on the cover, and he still has it today. He went on to command the 366th Wing Gunfighters.

Among the nearly 20 attendees were leadership from the Mountain Home Military Affairs Committee, the new Idaho Defense Alliance initiative which promotes veteran hiring, and Ethan Huffman from the Idaho National Laboratory (INL). Some of the projects being discussed involved potable water availability in the Mountain Home area due to deep wells with declining aquifier levels, the child development center which needs an overhaul, as well as possibly adding an additional AFA Idaho State Chapter to focus on nuclear research, cyber, and advanced technology.

Photo: Roger Fogleman/Idaho AFA

**Attending a luncheon at Mountain Home AFB, Idaho (l-r) Kevin Coates, MSgt. Travis Stubblefied, AFA President Lt. Gen. Bruce Wright, and Maj. Carl Mortensen work to strengthen AFA's presence in the community.**

Leaders at AFA headquarters, in conjunction with the AFA Vice Chairman for Field Operations and regional/state AFA leadership, will continue to encourage congressional and state legislative support for the 366th Wing as well as ANG units in the state, such as the 124th Wing at Gowen Field in Boise.

## Mount Clemens Chapter

Photo: Randy Whitmire/Michigan AFA

**L-r: Brig. Gen. Leonard Isabelle, assistant adjutant general of the Michigan ANG; Michigan Senate Appropriations Committee Chairma, Sen. Jim Stamas; 127th Wing Commander, Brig. Gen. John Slocum; Michigan State Senate Majority Leader, Sen. Mike Shirkey; Sen. Michael MacDonald; and Sen. Peter Lucido enjoying a tour of Selfridge ANGB, Michigan.**

Previous AFA **Michigan State Chapter** Vice President, Sen. Michael D. MacDonald (R-Mich.), was chosen as the chapter's Vice President for Government Relations. In his role as senator, MacDonald serves on the Appropriations Committee and co-chairs a new Michigan Legislative Aerospace and Defense Caucus, which raises awareness and promotes Michigan's role in aerospace and defense issues. It also enables aerospace and defense experts and legislators to share their unique perspectives.

Senator MacDonald supported a supplemental state funding bill that includes a $2 million state grant for the Michigan Launch Initiative that will conduct surveys of possible locations for an $80 million launch site and satellite command center. "Michigan's geography, access to talent, existing manufacturing infrastructure, and global positioning make our state uniquely situated for polar orbit launches and technical support for post-launch satellite operations," MacDonald said. "We must attract new investment and job creators to our region and state, and I look forward to continuing to work with the Michigan AFA on the proposed Michigan Launch Initiative and other projects that offer exciting opportunities for Macomb [County] and the entire state."

## Arkansas Teachers of the Year

**The Lewis E. Lyle Chapter** (Ark.) selected teachers Jason McMullen of Springdale Har-Bar High School and John P. Stokes of Hot Springs World Class High School as Arkansas Chapter Teachers of the Year. McMullen teaches mathematics and created an aviation club for students, which gave them an opportunity to pursue aerospace and aviation careers. Stokes, the Education Accelerated by Service and Technology (EAST) facilitator, guided students in creating a project to help solve future flooding in the floodplain of downtown Arkansas, which was adopted by the city council as their new plan of attack, and he was also selected as Arkansas State Teacher of the Year.

Photos: Arkansas State Chapter

**Left: Jason McMullen with his Arkansas Chapter Teacher of the Year Award. Right: John Stokes was also named an Arkansas Chapter Teacher of the Year and also the State Teacher of the Year.**

1/Lt. Col. Leon Robert Vance Jr. 2/A T-38 Talon trainer soaring over Vance AFB, Okla. 3/The gate at Vance, 1950s.

Photos: USAF (1,2); 71st Flying Training Wing History Office

# VANCE

## The Fast Burner

Leon Robert Vance Jr., born Aug. 11, 1916, in Enid, Okla., seemed destined for the air. His father was a flight instructor and his uncle, a World War I pilot, was killed in France. Growing up, Vance ached to join the Army Air Corps.

In summer 1939, he got his chance, and he made the most of it.

Young Bob Vance graduated from West Point and was assigned to the infantry, but he wrangled a transfer into aviation. On Sept. 13, 1939, he arrived in Texas for his primary flight training.

From that point, it took Vance a mere four years to become a lieutenant colonel and deputy commander of a large combat force. He was truly a fast burner.


In late 1943, Vance trained on the B-24 bomber and became second in command of the 489th Bomb Group. In April 1944, the group formed up at RAF Halesworth, UK. Vance led the group on its first mission—a May 30, 1944, raid on a Luftwaffe base in Germany.

On June 5, 1944, the day before D-Day, the 489th attacked German coastal defenses at Wimereux, France. Vance commanded from the lead aircraft, positioned between the aircraft commander and copilot.

As the B-24 reached the target, German gunners unleashed intense flak. Vance's B-24 took heavy damage. It continued its bomb run and hit the target. A final burst of flak killed the pilot and wounded the copilot and others. Vance himself suffered a grievous injury—his right foot was nearly severed from his leg.

Three engines were dead, the fourth was laboring, and the bomber was rapidly losing altitude. The copilot prevented a stall by putting the bomber into a steep glide. Despite his injuries, Vance took command of the ship, feathered the three dead props, and shut down the fourth engine, optimizing a glide to the English Channel.

Reaching the English coast, Vance determined the bomber was too badly damaged to land. Plus, a 500-pound bomb was hung in the bomb bay. He ordered most of the crew to bail out over England. Vance then turned the stricken bomber back to sea, over which jumped the remaining crew members—all except two: Vance and a radio operator who was too seriously injured to move.

Vance hoped to save that crew member by ditching in the Channel. From a semi-prone position on the island between the crew seats, Vance coaxed the B-24 to a water landing. An explosion blew Vance clear of the wreckage. He never found the radio operator.

Vance was soon plucked from the sea by an RAF rescue team.

For his extraordinary valor and selflessness that day, Vance was awarded the Medal of Honor. There is a sad coda to the tale.

The award of the nation's highest decoration for valor was made posthumously. Two months after the crash, Vance was returning to the US for treatment when his C-54 vanished and was presumed to have crashed in the Atlantic Ocean. His body was never recovered.

In 1949, the new United States Air Force renamed Enid AFB, Okla., in his honor. Today, Vance Air Force Base is the home of the 71st Flying Training Wing, a major unit responsible for training Air Force and allied student pilots. ✪

### LEON ROBERT VANCE JR.

**Born:** Aug. 11, 1916, Enid, Okla.
**Died:** July 26, 1944, North Atlantic Ocean
**Nicknames:** "Bob" and "Philo"
**College:** US Military Academy, West Point, N.Y.
**Occupation:** US military officer
**Services:** Army Air Corps, Army Air Forces
**Main Era:** World War II, Years Active: 1939-44
**Combat:** European Theater
**Final Grade:** Lieutenant Colonel
**Honors:** Medal of Honor, Purple Heart
**Resting Place:** Lost at sea

### VANCE AIR FORCE BASE

**State:** Oklahoma
**Nearest City:** Enid
**Area:** 3.3 sq mi / 2,122 acres
**Status:** Open, operational
**Opened as Basic Flying School-Enid:** Nov. 21, 1941
**Renamed Enid Army Flying School:** Feb. 11, 1942
**Renamed Enid Army Air Field:** May 7, 1943
**Deactivated:** Jan. 31, 1947
**Reactivated as Enid Air Force Base:** Jan. 13, 1948
**Renamed Vance Air Force Base:** July 9, 1949
**Current owner:** Air Education and Training Command
**Former owners:** Gulf Coast Training Center, Flying Training Command, Training Command, Air Training Command

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