Q&A: JCS Vice Chairman Gen. John Hyten 14

Roles and Missions Reboot? 48 | Pilot Training 44 | Cost-Per-Effect Calculus 60

AIR FORCE MAGAZINE

THE NEW ARCTIC STRATEGY

Competition Intensifies in a Critical Region | 52

Published by the Air Force Association

September 2020 $8

0 74470 29757 4 09>

THOSE BORN TO FLY
LIVE TO WALK AWAY

ACES 5®: Proven and ready

Protecting aircrew is our mission. It's why our ACES 5® ejection seat is the world's only production seat proven to meet the exacting standards of MIL-HDBK-516C. Innovative technologies and consistent test results make ACES 5 the most advanced protection for your aircrew. Plus, we leverage 40 years of investment to keep your life-cycle costs at their lowest. ACES 5: Fielded and available today.

The only ejection seat made in the United States.

collinsaerospace.com/aces5

Collins Aerospace

Master Sgt. Christopher Boitz

AIR FORCE

September 2020, Vol. 103, No. 9

DEPARTMENTS

FEATURES

T-38C Talons begin to break away from an echelon formation during instructor pilot training in Southern Texas.

ON THE COVER

Tech. Sgt. Adam Keele

An F-35A flies over the Alaska Highway en route to its new home at Eielson Air Force Base, Alaska.

STAFF

Air Force Magazine (ISSN 0730-6784) September 2020 (Vol. 103, No. 9) 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.

By Tobias Naegele

Seize the High Ground

In the opening scenes of the movie "Gettysburg," the film adaptation of the brilliant Civil War novel "Killer Angels," Union Brig. Gen. John Buford gazes across the rolling Southern Pennsylvania hills and laments the plodding tactics of his commanders. Imagining the battle to come as an inevitable failure, he says: "When our people get here, Lee will have the high ground and there will be the devil to pay."

Buford did not wait for orders from above. Seizing the high ground for the Union, he turned the tables on the Confederates such that it was the Union, and not Lee, that held the high ground and the rocks when the battle began in earnest. Thus it was Lee, and not the Union, whose forces withered and lost the ensuing battle.

The war—and the preeminent place the United States has held in the world ever since—may well have hinged on that decision.

The quest for the high ground is as old as war itself. A castle on a hill was harder to attack and provided the early warning to spot marauders while they were still a long way off. Attacking from on high offered other advantages, including speed and range, factors that remain critical even today. Manned flight—from balloons and dirigibles to powered flight in and beyond the atmosphere—take that concept to its natural conclusions.

"Spacepower," the foundational doctrine of the U.S. Space Force, was released in August. In it, the new military branch defines space as "a critical manifestation of the high ground in modern warfare"—one might even say the ultimate high ground. Providing a God's-eye view of the world beneath, legal, permission-free overflight, and the means to move and manage information globally at unparalleled speed, space is transformational.

Space also is increasingly contested by other ambitious powers and crowded by commercial and military ventures. It may not be crowded like Times Square on New Year's Eve, but as traffic increases, it is becoming more complex. Commercial operators are fixing to launch constellations of thousands of satellites, creating a host of new business opportunities—and potential military targets.

America does not own this high ground outright. The Space Force's objective, according to the doctrine, is to ensure the freedom to operate where, when, and how we wish; to enable the remainder of the Joint Force with precision, strategic warning, and global communications, and the ability to provide—independent of the other services—military options in, from, and to space.

To do this, the Space Force envisions five core competencies: space security, to ensure a stable operating environment for both military and civilian space activities; combat power projection, to enable offensive and defensive actions to deter aggression and fight and win if necessary; space mobility and logistics, to enable movement of people and equipment in space; information mobility, to ensure timely data collection and transmission; and domain awareness, to ensure effective identification and understanding of activity in space.

It is instructive to note that only one of these core competencies explicitly describes people in space. While combat power projection could conceivably involve manned space planes in the future, the near-term and foreseeable reality is that man's role in space will be to manage the domain via remote control, much as we do today. While astronauts assigned to NASA man the International Space Station, our Space Force can expect to do its business from the familiar confines of our terrestrial atmosphere.

Of course, some have more ambitious notions of what the Space Force should be and do. Last winter, when the Air Force Association hosted Elon Musk at the Air Warfare Symposium, he not only silenced the room by declaring "the fighter jet era has passed," but also opined on the brand-new Space Force. It needs "really cool" uniforms, he said, and should cast its gaze outward toward interplanetary travel, rather than back at Earth.

Then we have the comedic Netflix series "Space Force," which presents a new service branch intent on "putting boots on the moon." And this summer, in real life, Rep. Dan Crenshaw (R-Texas) managed to convince his House colleagues—overwhelmingly from the opposite party—to agree to an amendment to the 2020 defense authorization bill that would require the Space Force to adopt Navy ranks. Crenshaw, who was medically retired from the Navy as a lieutenant commander, is a combat-decorated Navy SEAL.

The appeal of naval ranks, of course, flows from the visions conjured up by science fiction writers in the 1950s and '60s, the same romantic souls who scripted Captain Kirk to be a cosmic Casanova with a star-crossed femme fatal on every planet. Our 21st century Space Force needs more appropriate role models.

Proponents argue a new rank structure is essential to help the Space Force peel away from its Air Force roots. But if that's so, why cleave to the Navy instead? How does that advance the cause of an independent Space Force?

Ignore the nonsense. Seize the high ground. Win the fight.

Chief of Space Operations Gen. John "Jay" Raymond is obligated to consider every possibility and deserves the freedom of maneuver to fashion the Space Force as a bold and innovative endeavor. He isn't building just today's Space Force, but one that can stand a century onward. If the Space Force does indeed require a new rank structure, it should invent one.

But, do not be hasty. In an increasingly joint military, are more ranks and more potential for confusion advantageous? Might they instead prove a distraction? If the rank insignia remain the same for ease of recognition, ought not the names of the ranks remain the same, as well? How does changing the second lieutenants into ensigns make the force more lethal? And if it doesn't make the force more lethal, why do it?

America needs a more effective Joint Force to deter aggressors and, if necessary, fight and defeat them in short order. The Space Force was created for that very reason, to focus national attention on the critical fourth domain and its impact on all the others. Every action to define its creed should advance this objective. Actions that fail to advance that ball ought to be rejected.

Here, the Space Force's motto—Semper Supra—Always Above—offers inspiration.

Ignore the nonsense. Seize the high ground. Win the fight. ✪

LETTERS

On Unrest, Race, and USAF

I don't know what it is truly like to be an African American in our Air Force. But, I do know what it's like to be an Air Force commander who thinks that racism is not one of our main challenges.

I recently watched Gen. Charles Q. Brown Jr.'s video as he candidly described his thoughts on racism in our country. I listened, really listened, to what he was saying. His "thoughts" were a punch in my gut. I am a White, male American who proudly wore the blue Air Force uniform for over 38 years. Before watching General Brown's video, I was engaged in a virtual dialogue with members of my family about the current racial crisis gripping our nation. My family has views from the far right to the far left, and while all of us have been disturbed about the current state of affairs, we have different perceptions on the root cause.

In the dialogue, I told my family about Gen. C.Q. Brown, who I have personally known for almost 30 years. I told them about my certainty that this amazing fighter pilot, officer, and leader was the absolute best choice to be the next Chief of Staff of the Air Force. I also mentioned that while some might think his selection, at this point in time, was racially motivated, I personally knew his nomination process had started well before the current crisis. I must admit, I was a bit proud that our "system" had selected C.Q. based on his merits and his incredible ability to lead our Airmen. I hadn't talked to C.Q. in a few months since he was going through the confirmation process, and I wondered what he was thinking about regarding the George Floyd inspired demonstrations. Then, I saw his powerful, brutally honest video ... talk about a reality check.

With just a quick look at General Brown's career, one can see that he was "tested early and often," and he consistently excelled. Graduating at the top of his pilot training class, he was chosen to fly one of the USAF's premier fighters, the F-16. He quickly advanced to instructor pilot and was selected to attend the elite Fighter Weapons School at Nellis AFB, Nev. I was one of C.Q.'s instructors and was immediately impressed by his talent, drive, and attitude to be the best F-16 weapons and tactics instructor. Subsequently, our paths crossed many more times in our careers. I was his squadron commander when he was a flight commander and an F-16 Weapons School instructor pilot. I was his wing commander when he was a fighter squadron commander. And I was his wing commander again when he was serving his group command tour as the Commandant of the USAF Weapons School.

I have long believed that whatever success I had in the military was due, in large part, to the amazing commanders like C.Q. that I was fortunate enough to have working for me.

Being raised in a military family, I believed that if you applied yourself and worked hard enough, particularly in the military, you could achieve anything you dream. I believed that the military was a relatively pure meritocracy—a "system in which the talented are chosen and moved ahead on the basis of their achievement." My career as a single-seat fighter pilot taught me, very quickly, that if I wasn't competent enough to fly, kill, and survive in a high-performance aircraft, I could not only cause the mission to fail, but I put my life and the lives of my teammates at risk. In a fighter formation, the flight lead and wingmen work as a team—everyone relying on each other to do their job to execute the tactic. In all my years of flying, I really didn't care a bit about the race or sex or background of who was in my formation, all that mattered was could

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.

Air Force Association
1501 Lee Highway • Arlington, VA 22209-1198
afa.org
Telephone: **703.247.5800**
Toll-free: **800.727.3337**
Fax: **703.247.5853**

AFA's Mission

Our mission is to promote dominant U.S. Air and Space Forces as the foundation of a strong national defense; honor and support our Airmen, Space professionals, and their families; and to honor and respect our enduring heritage.

To accomplish this, we:

- **Educate** the public on the critical need for unrivaled aerospace power and a technically superior workforce to ensure national security.
- **Advocate** for aerospace power, and promote aerospace and STEM education and professional development.
- **Support** readiness for the Total Air and Space Forces, including Active Duty, National Guard, Reserve, civilians, families and members of the Civil Air Patrol.

Contacts

CyberPatriot .... **info@uscyberpatriot.org**
Field Services ..... **field@afa.org**
Government Relations..... **grl@afa.org**
Insurance ..... **afa.service@mercer.com**
Membership..... **membership@afa.org**
News Media.... **communications@afa.org**
StellarXplorers ..... **STLX_info@afa.org**

Magazine

Advertising..... **kbrown@afa.org**
Editorial Offices ..... **afmag@afa.org**
Letters to Editor Column... **letters@afa.org**

Change of Address/Email

In an effort to stay connected with AFA and your local chapter, please update your mailing and email addresses. Change of address requires four weeks' notice.

To update your contact information:

- **Email:** membership@afa.org
- **Visit:** The Members Only area of our website, afa.org
- **Call:** Our Membership Department at 1-800-727-3337
- **Mail** your magazine label, including your first and last name, to our Membership Department at 1501 Lee Highway, Arlington, VA 22209-1198.

they fly the jet and do their job. Whether I was writing his Weapons School grade sheet when he was a captain or his OPR (Officer Performance Report) or PRF (Promotion Recommendation Form) as a colonel, I always rated officer Brown on his demonstrated abilities—to fly a fighter, command his unit, or lead his Airmen. He was such an intelligent, thoughtful, and competent officer and leader. It never surprised me as he rose through the ranks. It reinforced my belief that the Air Force was a fair meritocracy, and we were turning the corner on racism. I naively thought that every Airmen starts with the equal opportunity to do their job well, gets promoted, and then is given increased responsibility to lead and motivate others to do the same—regardless of the Airman's race.

I was wrong! A meritocracy assumes everyone is on a relatively level playing field. If one works hard to grow and maximize their talents and abilities, and performs exceptionally, they are rewarded. But what if, in sports terms, you're a runner who feels like, in every race, you're carrying a 20-pound rucksack that no one else has? How many times was C.Q. the one of very few African American aircrew members in a packed Red Flag briefing room with some questioning his comments not on their tactical merit, but, because of the color of his skin? How many people questioned his ability to command, before they heard him utter a single word? In the past several decades, the Air Force has made great progress in reducing the crushing effects of racism from our past, but we have a long way to go before we truly get to a "level playing field."

As a commander, I tried to act swiftly and decisively when I became aware of acts of racism in my unit. I had zero tolerance for such acts, but I now realize those behaviors I acted on were just the overt ones—the tip of the iceberg. Much of what General Brown describes in his video were the more subtle actions, comments, perceptions, and expectations that he lived with every day in uniform. He lived with the constant pressure of trying to perform error-free for supervisors who expected less of him as an African American. I was one of his supervisors who couldn't comprehend this toll of existing racism, because it didn't happen to me—I didn't live it. As an F-16 fighter pilot, the early part of General Brown's career was similar to mine. But, he started every flight briefing, every sortie, every job, every assignment, every command with a burden of doubt that others put on him solely due to his skin color. In the Air Force system, I was a fairly successful commander, but in this area of leadership, I was blind and deaf. As I was reminded by Chief Master Sergeant of the Air Force Kaleth O. Wright in a recent article, as a White Airman, I truly didn't have a clue of the challenges of being an African American in our Air Force. When I was his commander, C.Q. never shared his thoughts on racism in our service with me—because I never asked him. I didn't comprehend, because I couldn't see what was right in front of me. I didn't hear, because I didn't ask the right questions of the African American Airmen under my command. Bottom line—I didn't act to make our Air Force better.

I am a White, male American who proudly wore the blue Air Force uniform for over 38 years, but now I'm just an old retired dude living on a farm in South Carolina. For me, there won't be another opportunity to command and lead the best Airmen in the world. But for you supervisors, from the newest staff sergeant to our most experienced general officer, you can make a difference starting today. Our nation is in turmoil because we are not where we should be, with every American being afforded a fair and just opportunity to succeed and make our country great. Don't think your Airmen aren't experiencing some of the same frustrations that are being highlighted by the protests across our country. Listen, and heed your next Chief of Staff. Strive for "the wisdom and knowledge to lead, participate in, and listen to necessary conversations on racism, diversity, and inclusion ... and stay committed to sustain action to make our Air Force better."

Our Air Force is the smallest it has ever been in our history, and you are tasked with the enormous challenge to be ready to fight and win against a peer competitor. We need you supervisors and commanders to establish that level playing field and create an environment to get the absolute best out of every one of your Airmen ... period! I was extremely privileged to be Gen. C.Q. Brown's commander, and for a the first half of his career, one of his mentors. Now, he's mentoring me, and more importantly, all of you. Ask ... hear ... act!

Lt. Gen. William J. Rew,
USAF (Ret.)
Blythewood, S.C.

[I was] on Active duty in the '60s/'70s and retired in the '90s. All of the military went through class after class of military training concerning race relations. What we are going through now is what we went through a generation ago. There is no difference. This generation hasn't been taught the lessons of yesterday and we (the older) have to take the blame for not teaching our children the fundamentals of love and respect for everyone.

CMSgt. Dwight L. Graupman,
USAF (Ret.)
Spotsylvania, Va.

The tragedy of George Floyd should never have happened. An arrest should not have resulted in a death. What concerns me is that the Air Force seems to feel a responsibility for this. I was in the military for 24 years and learned to work with people of various backgrounds and races, and to look after each other, regardless. It is for that reason, as well as others, that I *do* encourage people to join the military.

I have studied military aviation history for many years, and, if anything, the Air Force has lead the nation in providing opportunities for African Americans. An excellent example are the Tuskegee Airmen. Thanks to the Army Air Force, these men were given an opportunity to prove themselves and made an invaluable contribution to our victory in World War II. The Air Force was a leading institution in combating racism. It should be viewed as such, not a racist organization.

TSgt. Joe Domhan,
N.Y. ANG (Ret.)
West Babylon, N.Y.

After reading the current edition of Air Force Magazine, my experience with the promotions system and race relations came roaring back. I served between 1968-1989 in civil engineering. I rose to the rank of master sergeant (E-7) with a short break in service in 1977 that put me behind my peers when I lost all my time in service points. I retired in August 1989, with three college degrees. USAF was very good to me.

Throughout the '70s, I attended race-relations classes and experienced the quota system as the Air Force began to promote Black Airmen to make up for past promotion discrimination practices. There were many promotion cycles where only Black Airmen were promoted. There is no doubt in my mind that these Airmen deserved to be promoted, but it was clear to those who did not get promoted what the AF was doing.

Let's fast forward to today. What was shocking to me was the fact that, in 2020, the U.S. Air Force still has a promotion problem with Black Airmen and women. I am appalled that the problem still exists today. But it does not surprise me. Racism still exists in all the service branches.

Having looked over the Air Force Specialty Code (AFSC) 3E7X1 Fire Protection regulation, I would like to have read more about the missed opportunities E-6 Miles Starr was referring to in the article. It is a shame that USAF missed the opportunity to have her as the first Black woman fire chief.

Let's hope that in another 10 years USAF makes more progress. At least the Air Force admits there is a problem. Now, do something about it.

MSgt. Robert J. Wiebel,
USAF (Ret.)
Melbourne, Fla.

I started in on the latest Air Force Magazine, and right off the bat you talk about combating systemic racism, as though it's a given that it's a real thing.

It is *not* a real thing in my opinion. Think about what you're saying [with] "systemic." I do not, I *will* not, believe that my country is infested with systemic racism. Is there racism, individually? Of course, but it does NOT permeate the country, or the Air Force.

You do a disservice to our country and our military to buy into that lie.

MSgt. Ken Selking,
USAF (Ret.)
Decatur, Ind.

Race relations were an issue in the '60s and '70s, while my dad was Active duty, and we as dependents saw this living off base; yet living on base and attending base schools it was something you never [saw].

In a world where parents are friends rather than being parents—holding their children accountable—they are allowed to be spoiled brats. I did supervise many young Airmen and NCOs and was a part of their lives. We came from many different backgrounds, colors, and creed nation origins. The late Martin Luther King Jr. said it best in his "I have a Dream Speech," that a man should be judged on his integrity not the color of his skin.

This is the 21st century and the world has gone south because of a few bad apples. The Air Force led the way as the first branch to integrate our Airmen, NCOs, and officers, under President Harry S. Truman. Lets continue to lead the way, but manners, respect—all of this begins at home when you are a young child. As former A1C, now actor, Morgan Freeman said, if your child is disrespectful, its not society's fault, video games', music's fault, but yours. Clean up the mess in your own front yard before you tell someone how to clean their backyard.

Dean R. Martinez,
USAF (Ret.)
Litchfield Park, Ariz.

I served from 1966 to 1989. I am forever grateful for the opportunity the Air Force gave me to serve my country. I write this letter because I still believe in our mission. And I want our Air Force to be "the best of the best."

In the early '70s our Air Force mirrored what was happening in our nation. Protests against the war in Vietnam; racial conflict erupting in cities and spilling on to our bases; drugs showing up in our barracks and in urine tests. Officers and enlisted having alcohol-abuse incidents and going to rehabilitation—or out the

INDEX TO ADVERTISERS

door. USAF's response was to organize, train, and deploy a small career field of volunteer enlisted and officers who developed a social actions program to help leaders deal with the racial and substance abuse problems in the force. It was controversial from the start.

In 1977, I volunteered to work in the field. I served for 13 years at wing, major air command, and Air Staff levels. My last social actions assignment was as the Air Force Assistant for Equal Opportunity and Treatment at Hq. AFMPC (Air Force Military Personnel Center) from 1984-87. The program was unpopular. We told people what they did not want to hear. Shortly after I arrived at AFMPC, I heard rumors that the social actions program was to be discontinued. Some senior officers believed "the race problem" had been solved.

Not so. Although far fewer in number, racial conflict incidents and discrimination complaints were still happening. Sexual harassment issues were increasing. Moreover, there was evidence that the Ku Klux Klan and other White supremacist groups were showing up in our ranks and recruiting Airmen. We contacted the Southern Poverty Law Center's intelligence unit for more information. They confirmed the reports. I presented this information to Air Staff personnel with a recommendation to continue the program. The Air Force Assistant for Equal Opportunity and Treatment position was downgraded to a lower organizational level at AFMPC and no longer reported directly to the commander. To me, the message was clear. Top-level support for equal opportunity and treatment had eroded. People at the top no longer felt the need to devote men/women and money significantly to confronting our institutional racial and gender prejudices and discrimination. I resigned in 1987 and was replaced by a major. The Air Force today, as it was 30 years ago, is a reflection of American culture. We should remember that the social issues of the day won't disappear with wishful thinking.

If, as CMSAF Gerald R. Murray, USAF (Ret.) stated, this is a time for a "critical reckoning," whatever we do, whatever we call it, we must sustain the effort to identify and eradicate systemic prejudice and bigotry.

I believe that what CMSAF Kaleth O. Wright had to say was also on target. The number of African-American officers in the force (6.16 percent) speaks loud and clear to me. Our new Chief of Staff has an opportunity to change the culture. I hope he will consider this lesson of history.

Lt. Col. Paul D. Raino,
USAF (Ret.)
Peru, N.Y.

I just viewed the dialogue between the CSAF and the CMSAF discussing the latest tragic death of a Black person. I didn't really hear a defined measurable, step-by-step plan. The problem is cultural. The two Chiefs can't change that. It is a White problem. Bigots raise bigots. As a first sergeant and enlisted adviser, I didn't have any Black, brown, or White Airmen in my units. The uniform is the great equalizer. Our military culture is already more equitable in its treatment of all races. I've talked with lots of young people that feel that the Air Force provides an opportunity for them to control their own destiny. I say to the leadership, start on Day One at basic or the Academy identifying the folks that bring that culture of poison into the Air Force. Give them the standard. Let them make the choice.

Josette Jarrett
Surprise, Ariz.

Just received my July/August issue of Air Force Mag. Wanted to voice my displeasure and disappointment with the cover. Not the fact there is a Black aircrew member shown, who I am sure is just as proud to be a part of the greatest Air Force on the planet as I was from '82-'92, but to use this forum, as so many other entities are doing today, to make political statements is wrong.

Enough already! The person responsible for the death of one of God's creations is being held accountable, as are his coworkers. And, it has started a very much needed review of law enforcement circles, in the hopes of weeding out even more bad apples! 'Bout time! But, we are being force-fed daily, on every news channel, at every broadcast, now in almost every commercial, etc. ALL DAY LONG! This is being taken way too far. It needs to stop. As I see it, this constant bombardment being placed front and center in everyone's faces, in my opinion, is causing even further divide in our country today. The more this is shown and pushed, the more the anger grows on both sides!

Because of this issue and the cover, I may be forced to not renew my membership when it comes due.

Chris Cintron
Parkville, Mo.

I was distressed to read of the apparent bias against Black members of the Air Force. As I read the words I couldn't help but take note of the photos of Gen. Charles Q. Brown, the incoming USAF Chief of Staff, Lt. Gen. Brian T. Kelly, Air Force chief of staff for manpower, personnel, and services, Lt. Gen. Richard M. Clark, the deputy chief of staff for strategic deterrence, and retired Gen. Larry O. Spencer, former AF Vice Chief of Staff, all of whom [except Kelly] are Black. The promotion rate charts indicate inconsistent differences, noting that in the upper NCO ranks Blacks were promoted faster than Whites. The lower rates in the officer ranks certainly can be explained by the comment that "fewer Blacks pursue flying careers." I do not believe the article makes a strong case that racial bias is rampant in today's Air Force.

I served from 1959-1962 in the Strategic Air Command, 310th Bomb Wing, Schilling Air Force Base, Kan., as an aircraft maintenance officer, and can attest there was no racial bias in that organization. My NCOIC, Chief Master Sgt. Albert Harris, was Black and one of the most highly respected and capable member of the squadron, and there were several other Black Airmen who were promoted as fast as was possible because they were such capable and dedicated individuals. Also in the wing was one of the leading standardization team navigators, Maj. Nicolas Washington, a Black man, a great person, and fellow officer. Perhaps SAC was atypical, but I can say the color of a person's skin was not a determinate for advancement, only performance, capability, and dedication to USAF mattered.

Capt. James O. Gundlach,
USAFR (Ret.)
New Orleans

The July/August 2020 magazine article "Black and Air Force Blue" electrifies the need to resurrect a previously established Air Force wing administrative office: Social Actions. Irrespective of the U.S. Army Air Force's forthright and historical establishment of the policy that established the famous Tuskegee Airmen, episodes of racist and sexist attitudes were scattered through Air Force ranks from the 1940s. A case in point is a situation that occurred during the early 1970s at the 94th Airlift Wing, Dobbins Air Reserve Base, Ga.

There is a glorious sign above the 94th's main gate that reads, "Premiere Airlift Wing." It developed when the wing won in competition the award as being the best airlift wing in the free world. But there was racial unrest among C-130 crews before this award.

Thus the wing established a vigorous training program to dismiss disparities in USAF life, culture, and race relations on base. This was given to the Social Actions Office; I was chief of Social Actions at that time.

Apparently the Social Actions career field has been eradicated. It is not mentioned in the latest Air Force Almanac 2020. Perhaps, it should be reestablished to contend with race relations.

Lt. Col. Walter R. Jacobs Jr.,
USAFR (Ret.)
Atlanta

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

I'm both encouraged and impressed by the superb credentials identified for each of the candidates for National Office and the Board of Directors. I can't help but wonder, though, what a lot of others of us might be thinking: How can AFA get more former Air Force pilots involved at the highest levels of the AFA? It appears that only one of the 13 nominees ever piloted Air Force jets. Our AFA founder, Gen. Jimmy Doolittle, might have wondered the same thing.

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

My parents raised us to judge people "by the content of their character," not the color of their skin. Having tried to live my life by the wisdom of Martin Luther King Jr., I find much of today's racial unrest very disturbing. But it was reading the June 2020 edition of Air Force Magazine that finally compelled me to speak out.

A short clip of actor Morgan Freeman being interviewed on "60 Minutes" by Mike Wallace is making the rounds on Facebook. It displays the revealing exchange when Wallace asked Freeman his thoughts on Black History Month (BHM). In short, Freeman responds that he does not support BHM and believes the answer to the question of how to go about healing the racial divide in America is to simply stop talking about race. He challenges Wallace to stop thinking of Freeman as a "Black man" and Freeman will stop thinking of Wallace as "White." They should think of each other simply as "Mike Wallace" and "Morgan Freeman."

Martin Luther King Jr. and Morgan Freeman are true heroes; they had the courage to speak truth to power, and we should all learn from their wisdom. George Floyd, Michael Brown, and Trayvon Martin were not heroes and are not martyrs either. At best they were thugs and bullies who reacted violently to the lawful actions of the police (Floyd and Brown) or, in the

case of Martin, reacted angrily to being questioned by George Zimmerman and was justifiably killed when he attacked Zimmerman, knocked him to the ground, and was in the process of pounding Zimmerman's head into the pavement when Zimmerman unexpectedly produced the unseen weapon and shot him. Surely, a tragic and avoidable death, but Martin initiated the violence.

Even mentioning George Floyd's name in Air Force Magazine as justification for pursuing further racial healing on behalf of those holding up Floyd as a martyr is an insult to all "decent, honest, and hard-working people" (my father's words) who have tried to live honorable, loving, and prosperous lives within the freedoms of America.

I do not believe the United States Air Force has a "systemic" or "institutional" racial problem simply because only 6.16 percent of the officer corps is African American or even because a disproportionate number of the 16.78 percent of the USAF enlisted force—which is African American—experiences a higher rate of judicial punishment than the remaining 83.22 percent. Indeed, the disproportionately high incidents of judicial punishment against Black members seems to indicate a problem, but I offer the opinion below as its true explanation.

Even General Goldfein's experience with the standard box of bandages being labeled as "flesh-colored" is not sufficient justification to turn the Air Force upside-down in search of the racial boogie man. Grown men and women who allow an experience like an innocuous product label to disrupt their day are seriously underchallenged and their leaders should be removed from their positions of responsibility preparing them to wage war and defend America.

My father was largely responsible for guiding me to my career in the Air Force. His strong leadership of our family, love of America, and determination to defend her as an officer in the local Guard unit provided me a vision of how I could live a similarly honorable life. Without my father's love and guidance, I do not know where I would have landed.

Here are several more numbers for [Tobias] Naegele to consider: 70 percent and 65 percent. The first is the approximate percentage of the total number of Black children born in America who are born into a single-parent family and the second is the percentage of Black children who grow up without a father's love and guidance. I submit my life experiences with my loving, guiding father offer a better explanation why "only" 6.16 percent of the USAF officer corps is Black and why a disproportionate percentage of the Black enlisted members experience judicial punishment. I have no idea what the Air Force can do to replace a fatherless childhood, no matter the person's color.

Like Morgan Freeman, I believe we are not solving anything by continuing to talk about race as we are now; only the race-baiters are profiting. Rather, we should turn the conversation to the accomplishments of Gen. Chappie James, Gen. Colin Powell, Condoleezza Rice, Supreme Court Justice Clarence Thomas, Dr. Ben Carson, Dr. Thomas Sowell, Dr. Shelby Steele, Frederick Douglass, Herman Cain, Harriet Tubman, Candace Owens, and the millions of others who have experienced the true American dream and wish it to continue. Their examples should be the center of this discussion, not those of thugs, bullies, and criminals.

Maj. Patrick J. Hoy,
USAF (Ret.)
Billings, Mont.

It's disappointing to me that decades after my own service, Blacks still feel the resistance of racial intolerance. There is no room in USAF, or any military branch, for racial intolerance or animosity.

Still, you open the article with a quote from Lt. Gen. Anthony J. Cotton, who alludes to three Black individuals who experienced untimely deaths at the hands of police, and another who died at the hands of White civilians.

In the case of Breonna Taylor, George Floyd, and Rayshard Brooks, while there was questionable policing involved, an obvious lack of professionalism, there is no evidence of racial bias, intolerance, or hostility. One can blame "implicit bias" but that's no more persuasive than blaming it on pixies.

In the case of Ahmad Aubrey, General Cotton has a valid point. Here was a young Black man minding his own business, killed by three White civilians for no apparent reason other than racial hostility. In addition, it took 74 days to charge the three perpetrators. Here, General Cotton has a reasonable fear, an out-of-control situation tinged with racial animosity.

I bring this up only in the interest of finding a way to a place where the American republic can unite as individuals committed to the same values—including racial equality, tolerance, and comity. It is important to not overreact. It is important to understand the details of each of these errors and mistakes. They do not all point to racial animus, and the distinction must be kept alive if we are to avoid turning Blacks into cynics about the entire American project. And there is little room in my own heart for [Black Lives Matter], which appears to be a Marxist group using Blacks as pawns in a game of collectivizing the U.S.A.

Ron Berti
Orlando

The focus on discrimination in August's Air Force Magazine prompts me to review the development of my experience with Blacks. I grew up in a small eastern Oregon town, Lakeview, where there were no Blacks. In later years, I joked that discrimination there was between the Methodists and the Irish Catholics. The first time I heard the term "racial discrimination" was when I was nine and my parents took us to see the 1949 movie "Pinky" and my mother said that was the focus of the film.

My first contact with any Blacks was at the 1955 Civil Air Patrol summer encampment at Portland Air Force Base. I became friends with Don Pedro Colley, from Klamath Falls, Ore., and I'm sure there were other Blacks. I recall no specific racial reference to any of them. The only such comments that there might have been in the late 40s would more likely have been about the difficulties that members of the Klamath tribe had when the reservation was dissolved.

Blacks were similarly "invisible" during my college years at Oregon and Oregon State. I'm sure there were Black students but I recall none, even in the AFROTC program. It was not until the summer of 1962 that I was sharply made aware of racial issues. When I debarked from the train in Waco, Texas, to attend ROTC summer camp, there was a drinking fountain in front of me with the sign "Blacks Only." Welcome to the new world! Even so, those issues faded to the background. When I returned to Waco a year later to begin undergraduate navigation training (UNT), those signs had disappeared under the strictures of the Civil Rights Act.

At UNT, I had my first extended social interaction with Blacks. My john mate, Rich, in billeting, was Black and I spent lots of time sharing study hours with several Blacks. My consciousness had become sufficiently elevated that I at least thought about the possibilities in the situation when Rich and I went one evening to a club mostly for Spanish-speaking customers. Fortunately, it was a pleasant evening.

During my flying career in bombers and transports, there were few Blacks. In that period, I recall one moment in 1965 at Castle Air Force Base, Calif., where I was crewed with a Black copilot. During flight planning, there was a comment about "Watts bomb plot." The copilot let it roll off his back, but I'm sure that he did not feel at all casual about the remark.

In my subsequent assignments to flying squadrons, there was a few Blacks. Most were NCOs, though the operations officer of the 345th [Tactical Airlift Squadron] at Yokota Air Base, Japan, was for a while a Black officer. There was never in my recollection racial issues in any of those units. The most specific racial references were, on one hand, in the equal opportunity classes that were standard in the early 1970s. They usually opened with the admonition, "You are all racists and sexists." On the other hand, there were the writings on walls across Pacific bases that were crudely specific about racial issues and were never effectively addressed. Those issues reflected the tensions that led to race riots May 21-25 at Travis Air Force Base, Calif. Interestingly, though I was not off station on a Military Airlift Command trip, I have absolutely no recollection of that event.

For me, my Air Force career in retrospect was operating in a nearly all-White world. There was only a few Blacks in any of my squadrons or during some years as an intelligence officer. My perspective was that there weren't any significant issues, though I did not actually spend much mental energy on the subject. That is pretty much how things were from 1963 to 1989. At this point, I have been retired for 31 years and the world has changed a lot. I suspect that these issues will be with us still in 2050 and beyond. I can only wish for improvements.

Lt. Col. Cal Taylor,
USAF (Ret.)
Hood River, Ore.

I have rarely been more disappointed in Air Force Magazine than I was after reading the two articles from the July/August 2020 issue regarding presumed discrimination within the Air Force against Black personnel. The article was singular in its point of view and lacked in necessary investigation. The mission of the Air Force is to fly and fight. Naturally, more senior leadership opportunities, and therefore promotions, will materialize from the rated officer category. Do we really want someone without flying experience commanding a flying wing, or a numbered Air Force? Because of the Air Force mission, that has to be where the majority of senior leadership billets reside.

Moreover, the bar charts showed a vastly more nuanced reality. The single greatest disparity was that Asian officers earned a vastly lower promo-

tion rate to O-6. Yet, the article only wanted to specify allegations of systemic racism against Black personnel. Also, the overall rates for promotion to SNCO were actually better for Black NCOs than for any other race. We should presume that those advantages were due to merit.

All one can really do is comment upon his or hers own experiences. In my nearly 30 years in the Air Force, I never once personally encountered, nor witnessed, a racist action carried out by anyone against anyone. That's a remarkable truth, and one that I feel reflects far more about the reality of the U.S. Air Force.

Recruiters have long made special efforts to attract minorities to flying billets. But the truth is, no one can be forced into an all-volunteer military, which the Air Force has been throughout its history. If the percentage of rated officers in the Air Force is skewed, then one should not expect promotion rates to deviate from that skew. The Air Force cannot promote people who are not in the ranks, with the experiences to excel in the senior leadership billets being competed for. Therefore, a far more valuable analysis would have been to look at promotion rates within rated categories. I suspect that one will find that the promotion percentages of Black officers who are rated is at least as high as for officers in other races, if not higher. And as we saw in the bar charts, the rates of promotion for Blacks to SNCO billets was better than for other races.

One final point, the Air Force has sometimes tried so hard to provide increased opportunities for minorities and women that it enforced actions that were later sanctioned in federal court. One example was the successful lawsuit brought by officers who were selected for involuntary reduction in force in 1992. The selection board was given instructions to assign preferential treatment to the records of women and minorities, and was specifically told to do this due to reduced opportunities for these officers. There was no effort made to justify this discrimination. A federal appeals court ruled that the plaintiffs in that suit had merit, and this forced the Air Force to settle.

The lesson is that the Air Force cannot use unfair methods to discriminate against any group of officers or NCOs. The Air Force has to promote based solely upon talent and experience, and let the results fall wherever they fall. The military needs to keep itself above the political frays that often engulf society. The Air Force has a vital mission, and needs to remain focused on that success, above all else.

Maj. Ken Stallings,
USAF (Ret.)
Douglasville, Ga.

Get Real

John T. Correll's article, "Japan's Last Ditch Force" (June, p. 154), counters revisionist fables concerning the fall of Japan in 1945. He also obliquely highlights a persistent problem in overselling air power.

"On a visit to Guam in June 1945, Gen. Hap Arnold, commander of the Army Air Forces, expressed his belief that the B-29 campaign would 'enable our infantry to walk ashore on Japan with their rifles slung.'"

Demonstrating Army Air Forces hubris is the dismal results from bombing in Normandy that same month. "The U.S. Army Air Corps had made wildly optimistic claims about their 'precision bombing.' [But] in the 30 minutes preceding H-hour, the Liberators and Fortresses of the 8th Air Force dropped 13,000 bombs; none fell on Omaha Beach. 'That's a fat lot of use,'

[Royal Navy Captain] Scott-Bowden said. 'All that's done is wake them up. The Air Corps might as well have stayed home in bed for all the good that their bombing concentration did,' one officer of the 1st Division observed angrily later." (D-Day: The Battle for Normandy by Antony Beevor, p. 91)

Airstrikes are increasingly vital and effective, but we need to stay real. If only to maintain our credibility.

Col. Ron Andrea,
USAF (Ret.)
Elmont, Va.

John T. Correll responds: The comment from Beevor does not say how many of the bombs were supposed to fall on Omaha Beach and how many were aimed at German defenses and fortifications inland. Leading up to D-Day, nearly all of the U.S. bomber strikes were against airfields and other targets in the vicinity of the coast, which forced the Luftwaffe to withdraw from these forward positions. German air power was already severely weakened by Allied strikes earlier in 1944 and was unable to put any significant force over the invasion beaches. On D-Day, the Allied soldiers and ships strung out for 50 miles along the coastline were not endangered by German air attack.

The 1970's Thames TV series, "The World at War," put deaths in Japanese occupied countries at something like 15 million, mostly by starvation, which would make it likely that over 100,000 a month were dying by starvation when Japan surrendered.

Even if it was just half that number, additional starvation deaths would have been several times those from the nuclear bombs had they not been used.

SSgt. Donald S. Schmick,
USAF (Ret.)
Johns Creek, Ga.

Hitler Buzz

By way of introduction, I am one of the many volunteer docents at the Seattle Museum of Flight, sometimes (although falsely) associated with the Boeing Aircraft Company. I am a satellite propulsion engineer of German origin.

Another docent in our museum and subscriber to your Air Force Magazine has provided us with a copy of the magazine article "Hitler's Buzz Bombs" in the March 2020 edition.

The article describes the technology and the design and deployment history of the V-1/Fi 103 quite well. It explains how this aircraft came about, and what its shortcomings were. It is not without reason that the V-1 is sometimes called the first "Cruise Missile," or should I write "Crude Missile?"

A couple of aspects from the article raised my attention, though. In some places, the author, John T. Correll, simplifies the engine to be of "jet engine" design, although fortunately he explains the operational principle of the engine to rather be a "pulsed jet." A small, but significant difference. The pulsed jet has very few moving parts, especially no rotating parts, and thus, lends itself to mass production by unskilled labor.

The article, however, conveys one myth that can be found frequently. It states that the V-1 "air log" (the little propeller in its nose cone) would count the propeller's rotation (i.e., a counter, not a timer!), and if the respective number of rotations have elapsed, it would interrupt the flow of propellant, terminating the flight. That is not correct.

The air log would actually sever the lines of pressurized air that control the elevator to keep the aircraft at a constant altitude, and in doing so, the spring-loaded elevator would provide a full nose-down elevator input to let the aircraft dive for the ground. This high negative-G maneuver would sometimes—unintentionally—interrupt the flow of propellant, and it is this observation that was interpreted as the reason for the flight termination. There were, however, frequent reports that the V-1 engine continued to function through the terminal dive.

The article also somewhat simplifies the organizational structure of the test center in Peenemuende. There were always "Peenemuende East" and "Peenemuende West." P. East was the Army's site, where [Wernher von] Braun and [Walter] Dornberger worked on the A-4 / V-2 ballistic missile since the second half of the 1930s. P. West was the Luftwaffe's site, with its large airfield. A wide range of development projects were worked on on both sides of the airfield. The two sides were cooperating and sharing resources, but were always independent of each other.

The article, and this is my main criticism, neglects to mention one aspect of the German Vengeance weapons V-1 and V-2. As much as we engineers may be fascinated by their advanced technology, we must never forget that these were terror weapons of a political regime for which there was no human price too high to achieve its goal. Both V-1 and V-2 were built by slave labor in some of the most appalling concentration camps that Germany had during WW II, amongst them the Camp Dora in an underground tunnel system in the Harz Mountains in Central Germany. The final tally is that more people (> 24,000 by conservative, i.e., low estimates) were killed in the process of building these weapons than as a result of their military use against Germany's enemies.

It is that legacy that we must remember in these days when we commemorate—and rightfully celebrate!—the end of WW II in Europe. Germany spent more money on the Vengeance weapons than the U.S.A. spent on the Manhattan Project. Which is rather significant, if one considers that the German economy even in peacetime was smaller than the American economy. I for one am glad that Germany squandered its resources on these weapons of questionable efficiency and did not build more Messerschmitts or U-Boats or Tiger Tanks.

Dr. Dieter M. Zube
Kirkland, Wash.

Everything Old is New Again

I always look forward to the annual Almanac issue and this year's, while more complex with the addition of USSF, is even better than previous years! However, search as I did, I could not find the description of any bases located in the state of NEW Mexico (p. 103). I did discover several that I recognized (Cannon, Holloman, & Kirtland) had moved to the state of "Mexico."

To quote an old New Mexico Magazine regular, "One of our 50 states is missing!"

Otherwise, really appreciate this issue!

Maj. Alan D. Resnicke,
USAF (Ret.)
Silver City, N.M.

Several sharp-eyed readers caught the gaffe, which was caused by a software printing error. We apologize to the state of New Mexico, thank our readers for the (mostly) light-hearted ribbing we've received, and have corrected it online.—The Editors

VERBATIM

Few and Far Between

"Whether it's on the ground or in the air, we see each other all the time. ... What you might call harassment, which is less than absolute professional conduct between the Russians and the U.S., occurs on rare occasions."

USAF **Maj. Gen. Kenneth Ekman,** deputy commander of Combined Joint Task Force-Operation Inherent Resolve, [July 22].

North Star Vision

"We don't want to do it the Chinese way. ... We want to do it the United States way, and really using our market-based partnerships and our economic might, as well as our military tools, to make sure that, again, we can create this virtuous cycle that feeds off of itself in terms of space commercial activity."

Col. Eric J Felt, director of the Air Force Research Laboratory's Space Vehicles Directorate on ensuring American leadership in space [C4ISRNET.com, July 28].

USAF

Family Ties

"Trust each other. Trust that we are all worthy individuals, who deserve respect and deserve to serve with dignity. No matter what challenges we face, we can always overcome them if we are united. Please don't let those who are set on dividing us win. Don't let them drive us apart. Treat your teammates like the sisters and the brothers that we are, no matter how different we may seem. Remember that we are all Airmen serving in the World's Greatest Air Force ... and we will always, always be family"

—Former **CMSAF Kaleth O. Wright,** letter to Airmen, Aug. 13.

Jill Pickett

To *Don't* List

"Anybody who tells me that they've got work, family, spiritual, and fitness and health all aligned, perfectly balanced, ... I usually call those people liars. ... We're all pulling and tugging and stressed with what we're trying to do. You've got to be deliberate about [downtime]. And you've got to communicate with the family that may be around you ... we need you for the long-term."

Gen. Arnold W. Bunch Jr., AFMC commander, at virtual town hall with Airmen, July 29.

Teaching Moments

"The 18-year-olds that show up here ... we are fooling ourselves if we think that they're going to walk up our ramp that has the core values on it ... crest the top of the ramp, and that their values flip to ours. We have to develop those values. So, in addition to the instruction about what not to do, we have to teach them what to do."

Outgoing U.S. Air Force Academy Superintendant **Lt. Gen. Jay B. Silveria** during an "Aerospace Nation" event hosted by the Air Force Association's Mitchell Institute for Aerospace Studies, Aug. 17.

Johnny Saldivar/USAF

Gung Ho?

Mike Tsukamoto/staff

"If I gave you an iPhone and a Platinum card with no limit, is there anything you couldn't do? Really? If you have access to the Internet and you have resources, there's virtually nothing you can't do. ... You could probably buy a house ... [or] buy and sell stocks. If, on the other hand, you sat down in front of a very basic Air Force computer with an ID card, you have a very different set of capabilities in 30 minutes. We know that we've got to move into the 21st century."

Gen. Craig D. Wills, commander, 19th Air Force, on the need to proactively embrace new technologies to accelerate USAF technical training, in a July 29 interview with Air Force Magazine.

ABCs

Airman 1st Class William Rio Rosado

"I think the litmus test for the MQ-Next is going to be what other letter can we assign to its name, because it's doing a mission other than ISR and strike."

Air Force Assistant Secretary for Acquisition **Will Roper** told reporters in a July 14 video conference.

Keep Calm ...

Yang Pan/Ministry of Defense

"We need to be extremely cautious. Other than having full military preparedness, we need to also be very careful to avoid letting Taiwan become an excuse for China to declare war or engage militarily."

Taiwanese Foreign Minister **Joseph Wu,** on rising military threat of a clash between Taiwan and China [Washington Post, July 22].

The Joint Focus

Gen. John E. Hyten is Vice Chairman of the Joint Chiefs of Staff, a position he has held since November 2019. In that role, he heads the Joint Requirements Oversight Council. A Harvard engineer with a master's in business from Auburn, he has led Air Force space acquisition, served as commander of Air Force Space Command, and as head of U.S. Strategic Command. He spoke with Air Force Magazine Editorial Director John A. Tirpak in late July about strategic requirements, roles and missions, budget trades, space, and the industrial base. The interview has been edited for length and clarity.

Staff Sgt. Jack Sanders

U.S. Air Force Gen. John Hyten, Vice Chairman of the Joint Chiefs of Staff, briefs reporters on the Defense Department's COVID-19 efforts during a Pentagon news conference, April 22.

Q. Twenty-year hardware programs are a thing of the past. How can you accelerate the JROC process to the speed of relevance?

A. You'd think with the title Joint Requirements Oversight Council (JROC), that our focus would be on joint requirements, but in many cases we just validate service requirements and try to ensure joint interoperability.

I have a good working relationship with both Undersecretary Ellen M. Lord [head of Defense acquisition and sustainment] and the service acquisition executives. We know we have to do something different. The biggest difference is going to be, rather than the JROC just validating service requirements, it will focus first on joint requirements and then hold the services accountable for meeting them.

We'll deliver a new joint warfighting concept late this year, and under that will be a number of joint supporting capabilities: joint all-domain command and control, joint logistics, long-range fires, information advantage. We're going to figure out how to write joint requirements so the services can go fast, but not require every detailed technical requirement to come up through the JROC. That's one way we'll speed things up.

Second, we'll look at cost and schedule as key performance parameters. In certain cases, that can speed up delivery time. It's right in line with a number of the service concepts, including Dr. Will Roper's and the Air Force's Century Series concept, where you go a little bit at a time, and that's how you go fast.

The JROC dates back to 1986, and if you look at what Congress meant for it to do, it's exactly this. We've just slowly drifted away from that over time.

Q. All the services are pursuing missions outside their charters. Do you think we need a new Key West Agreement on roles and missions?

A. I'm one of the Air Force officers that does not believe it's time for another Key West Agreement.

But you've hit on the next big transition in military operations, and if we do it right, it will give us a strategic advantage over any future adversary: joint all-domain command and control.

From the very beginning, everything's been lines on a map. We drew lines to show each service, 'this is your area'; this is theater; this is immediate, the forward edge of the battle area. All those terms really come out of Key West.

As we move into the next generation of capabilities, I think the lines on the map will disappear. Because you'll have Army capabilities that can both defend a maneuver unit or, if used in a different way, can provide theater long-range strike. You'll have Navy platforms that can defend themselves or provide long-range strike from the same platform. You'll have the same capabilities in the Air Force. Each service is going to have the ability to do defense as well as long-range strike, from their own formations.

The Joint Staff and the JROC will have a role in defining long-range fires, but not in terms of dividing it up between services.

Then, we have to seamlessly integrate all those domains—including space and cyber—and command and control them effectively to create the battlespace of the future. That's why JADC2 is really the key to everything. **(See: "Is it Time to Rethink Roles and Missions?" p. 48)**

Q. How do you avoid unnecessary duplication of effort?

A. That's not the role of the JROC; that's the role of the DMAG, the Defense Management Advisory Group, which does the budget. We have joint requirements that have to be met. If there's duplication, we'll eliminate those in the budget.

If we don't walk over each other, we can make great progress. We tend to try to do everybody's job. If we just do our own jobs, that's one of the best ways to move fast.

Q. You've complained that the Pentagon "studies the heck" out of space capabilities. How can that be sped up?

A. If the Space Force needs to develop capabilities to defend themselves in their own domain, they really don't have to come to the JROC for anything. The head of the Space Force can define what he needs, and go as fast as he can, because that's his domain. If the Space Force is developing capabilities to support the other services and commands, then they have to be integrated, and the JROC is the place where you do that.

I signed out a JROC memo, 16 July, which made the intent very clear about how that's going to work.

Q. The National Defense Strategy is two years old. Is it time to refine it?

A. The National Defense Strategy (NDS) was well received because it's coherent—it holds together from beginning to end—but maybe more importantly, it's the first threat-based strategy that we've had in a couple of decades.

Around the turn of the century we transitioned from a threat-based planning structure to a capabilities-based planning structure, because we really didn't understand what the threat was going to be and, therefore, developed capabilities to deal with any threat that comes along. The problem with that is, you

SOAR™ – SCALABLE OPEN ARCHITECTURE RECONNAISSANCE

The New Option for Modern Threats

SOAR, the ground-breaking new ISR solution from L3Harris and General Atomics Aeronautical Systems, Inc., integrates industry-leading, full-band signals intelligence (SIGINT) capability with a medium-altitude, long-endurance Predator B wing-mounted pod to offer unparalleled options for warfighters in the ISR domain. SOAR provides significant mission expansion for MQ-9 operations against threats in new operating domains and a new dimension for remotely piloted aircraft systems.

L3HARRIS.COM

L3HARRIS™
FAST. FORWARD.

tell potential adversaries what the capabilities are, so they can figure out exactly what to do to counter them.

The NDS focuses on the threat and defines modernization we need to deal with great power competition. We also have to maintain readiness to deal with the problems of today. The challenge is how to balance the two.

The only way to pay for that without taking exorbitant near- or long-term risk is by retiring legacy capabilities that are no longer part of our readiness for today or our modernization requirements for the future. We're going to have to work really hard with Congress to figure out how to do that.

Q. In the past, whole systems were retired at once, to obtain the savings of shedding their logistics tails. The services don't seem to be doing that.™

A. It's more cost-effective to retire whole systems. That's a fact. If you go back 5 to10 years, various services tried to do that. Congress, I think rightly, criticized us in many cases because the near-term risk of doing so was too great.

For near-term readiness, you have to maintain a certain amount of legacy capabilities, which will by definition be less efficient than retiring an entire family of capabilities. That means we have to pay a little bit of a premium for them.

But we need to do that consciously, and have a clear plan on when we would retire an entire family in order to reap the full savings.

Q. Even before the pandemic, flat budgets were expected. What will be the priorities in the '22 budget?

A. The National Defense Strategy defines the nuclear enterprise as being right at the top of the list. We decided as a nation to not modernize the nuclear enterprise when we really needed to, and that was about 15 years ago. So now we're doing it. It's affordable—but will be expensive—and we have to make sure we do that right.

Continuing modernization of our critical capabilities is priority two. Readiness is 2A. Then, acquiring the capabilities we need in space and cyber.

Q. Can you give us a preview? The trade space is usually modernization, readiness, and people. Where can you economize?

A. We have to figure out what we're going to stop driving, sailing, and flying, and I don't think we have to impact readiness if we do that correctly. And we have to retain the right people; otherwise all that 'stuff' doesn't matter.

Q. Automation and artificial intelligence is surging. Can you do the job with fewer people?

A. In certain areas. The definition of an unmanned platform is there's no man or woman in the cockpit. But the personnel requirements to operate unmanned aerial systems are actually pretty large. So we have to look at it with a clean sheet of paper.

Space and cyber have huge opportunities for increased automation. The latest littoral combat ship has a very small crew; most of that ship is automated. So we're going to be increasing automation. But moving to unmanned systems doesn't solve the problem.

Q. The Guard and Reserve can scarcely be called a strategic reserve anymore; they're fully engaged. Should those organizations be rethought?

A. I think it's time for us to look at the Guard and Reserve with a fresh set of eyes.

About a month ago we had over 100,000 National Guardsmen on Active duty in support of COVID, and in support of governors around the country for all of the issues after the murder of George Floyd. That's not a strategic reserve; that is an employed force. It puts a huge burden on our civilian employers. At the beginning of the coronavirus, we planned to bring them on for less than 90 days. Well, they're still on, and they're probably going to be through the rest of the year.

Over the last few years, we put so much capability—medical capability being one—into the Guard and Reserve that when we have to do an operation, we can't do it without them.

We are demanding so much from them. We have to figure out a different model.

Q. The Air Force is restructuring the Air and Space Expeditionary Force to improve its presentation of forces for global needs. Are you expecting that from all the services?

A. For the last couple of years, the Joint Staff has been looking at a different Global Force Management construct. We're trying to create blocks of ready forces that can be used both for contingency purposes as well as to support what the Secretary calls Dynamic Force Employment, DFE missions.

The bombers in the Air Force have been very successful in that and are really leading the joint force in defining that DFE construct.

If you can maintain your readiness with a different force management construct, and build your readiness at the same time, and still support the combatant commands, that's the best of both worlds.

This has been there, on paper, for over a year. But we didn't really have the readiness in the force to allow it to be fully realized. Now, we've reached a maturity in readiness that allows this construct to work.

Q. Is the creation of Space Force an opportunity to finally get rid of the 'pass-through' part of the Air Force's budget? What are your thoughts on that?

A. I have pretty strong thoughts on that. That's not the Vice Chairman of the Joint Chiefs of Staff's decision, though.

Budgets have to be transparent. The people responsible for the budget should be accountable for it and with the pass-through—that's not the case.

I will continue to advocate, as an adviser, for transparency and accountability in our budget. Improvements can be made in the pass-through area. I think we'll get there someday. It may not be soon.

Q. In the industrial base, the U.S. is down to one or no suppliers in certain key capabilities. Does the U.S. need to go back to 1980s-like surge capacity?

A. It is a huge issue. Over the last 20 years, we've allowed the second- and third- tier supply chain to deteriorate significantly. We have to have a concerted effort, structured by Secretary Lord, to get after rebuilding that. We have to invest with our prime contractors to make sure that they can have the second- and third-tier vendors they need to build the supply chain.

One of the lessons we've learned the hard way from the coronavirus, is that when you have a supply chain that is dependent on Asia and China, and you really want to move fast, you have a difficult problem. We cannot have a supply chain that does that, so we have to rebuild it. That's going to take investment. But we can do that under the programs we have, if we do it smartly.

That is way up high in my worry list, but it's not high on my things-to-do everyday list, because I am the requirer, not the acquirer. ✪


PRATT & WHITNEY
DEPENDABLE ENGINES
GO BEYOND
PW800
A LEGENDARY BOMBER.
AND THE ENGINE THAT TAKES IT FARTHER.
FOR THE USAF AND THE B-52, THE FUTURE BEGINS NOW.
Pratt & Whitney's revolutionary PW800 changes the game for the United States Air Force – and creates new possibilities for what its B-52 can accomplish. With unmatched fuel efficiency – and significantly lower maintenance costs – the PW800 will take the B-52's capabilities to new heights for decades to come.
SEE HOW THE PW800 ELEVATES THE B-52 AT PRATTWHITNEY.COM/B52

By John A. Tirpak

The Training Renaissance

Sarayuth Pinthong/USAF

A student pilot trains on a virtual reality flight simulator as part of the Pilot Training Next (PTN) program at Joint Base San Antonio-Randolph, Texas. The PTN program is part of Air Education and Training Command's initiative to "re-imagine" how learning is delivered to Airmen.

An Air Force technical training revolution is in full swing, driven both by manpower shortages—in particular, pilots—and a new wave of effective teaching technologies leveraging virtual reality (VR), artificial intelligence (AI), cloud computing, and processing power. Almost every aspect of USAF training will change over the course of this decade.

These technologies "are not coming—they're here," 19th Air Force commander Maj. Gen. Craig D. Wills said in a July interview. He described changes underway for training pilots, maintainers, and RPA (remotely piloted aircraft) operators, as well as survival training.

While cost savings could be a benefit, in the long run, the aim, Wills said, is to help Air Force technical schools produce higher-quality graduates, and to get them through training faster while delivering more ready Airmen to front-line units. In some cases, he said, the new methods can cut training time in half, with no loss to graduates' technical capability.

PILOT TRAINING NEXT

The flagship program is Pilot Training Next, one of a series of so-called "Next" initiatives, Wills said, including Undergraduate Pilot Training (UPT) 2.5—a halfway point between the old methods and those of the future. Using laptops, tablets, online courses, purpose-built video gaming rigs, traditional instruction, and "TED Talk"-style presentations, the aim is to provide "student-centric learning" that connects with every student, regarding of learning style. Since today's Air Force recruits grew up with these varied approaches and technologies, they are already comfortable using them, Wills said.

"Pilot Training Next is about to finish its third class," Wills continued. "The first two classes have finished at their Formal Training Units and they're out at their ops units. All the indications are "Pilot Training Next has done a pretty good job," he said, adding that the program isn't meant to "graduate super men and super women" but "quality graduates in less time."

The physical cornerstone of UPT 2.5 is a repurposed video gaming rig called an Immersive Training Device, or ITD. At a cost of just $10,000 to $15,000, it's a fraction of the millions invested in a full-up simulator, but it's performed well so far in experimental runs with small classes. Including a seat, video screens, virtual reality goggles, control stick, throttle, and rudder pedals. It's a futuristic version of what pilots used to call "chair flying"—practicing procedures and switchology using a broom handle and a couple of bricks. Installed both in common areas and students' dorm rooms, pilot trainees use the ITDs to practice everything from basic procedures to sophisticated maneuvers in the T-6 Texan II, USAF's primary flight training aircraft. The devices will eventually be available to students 24 hours a day.

Previously, students may have needed several real-world sorties to master a particular skill, Wills said. But now, after perhaps a dozen practice runs in the ITD, they often are able to fly the maneuver in the real airplane on the first try.

Students also have access to course materials at all times. If they are struggling with any aspect of the course, they can retake the presentation on that technique. This is cross-referenced to the ITD, which can immediately put them in the flying situation they're having trouble with, so they can practice until they are proficient. This "seamless access" to content recognizes that "each of us learns a little differently," Wills said, allowing individualized instruction to produce a more effective outcome.

If students are doing well in a particular phase and don't need all the rides planned for learning certain skills, they can skip the redundant sorties, Wills stated. That saves time and resources.

The big break from previous methods is that students now are not expected to all move at the same speed, Wills noted. "We can let some students go faster, and some ... go a little left or a little right before they take two or three steps forward."

Among instructors, Wills added, younger ones are taking to the system more readily than old hands. "Innovation flights" at AETC's

Gulfstream™

A General Dynamics Company

STRENGTH OF PURPOSE

Entrust your most sensitive missions to Gulfstream. With more than five decades of high performance, flexible platforms and proven reliability, there is no other choice for civilian and military operations over land and sea.

THE ART OF EXCELLENCE™

pilot training schools are gathering data on the new technology and offering suggestions on new applications. The first formal UPT 2.5 class started July 15 with 11 students at Sheppard Air Force Base, Texas, and 28 at Vance Air Force Base, Okla.

FOUR TRACKS

The T-6 Texan II phase of instruction has been lengthened slightly to between 90 and 100 hours of flying time, at which point pilots get their wings. After that, they progress to the category of aircraft they've been selected to fly. Those going to fighters will move on to the six- to seven-month Fighter Fundamentals course in the T-38 Talon. Bomber-bound pilots attend the four-month Bomber Fundamentals course, also in the T-38.

Mobility pilots take a three-month course now taught in the T-1 Jayhawk, but which "will be simulator-only, using some of these Immersive Training Devices and advanced VR," Wills said. The 30-year-old T-1 is nearing the end of its life expectancy and "there are no plans" to replace it.

Because AETC doesn't have all the ITDs it needs yet, some mobility-bound students will "fly a modified T-1 syllabus, which will also be heavy on simulators," he said. There will be about 11 students per class.

Students going to other kinds of platforms will go directly from UPT to the Flying Training Unit for their aircraft.

While the UPT training devices emulate the T-6, the ones for mobility students will emulate the T-1 at first, while fighter-bomber tracked students get an ITD patterned on the T-38.

Those at Vance will, for a while, continue with the T-1, but with increased simulator time. The program will have "about 100 hours of additional immersive content," Wills noted.

The planned divestiture of the T-1 between 2023 and 2025 is the "elephant in the room," according to Wills. To keep it flying, the T-1 would need new engines and a service-life extension. "We think we can produce an equivalent graduate in less time and still maintain the high standards of the U.S. Air Force" without it, he said.

AETC is partnered with Air Combat Command in developing a new fighter training system, called Reforge, which will coincide with the arrival of the T-27A Red Hawk, using similar technologies (see "Reforging Fighter Pilot Training," p. 44).

"A year from now, we'll be in a much better position" to definitively say what the future of undergraduate pilot training will look like, Wills said. The challenge now is to scale the experiment to produce 1,500 to 1,600 new, fixed-wing pilots per year. "They all need to be consistent and reliable," he said.

Greater reliance on simulators should also save flying hours on the T-1, extending its life. Wills hopes to use that extra life for the "Accelerated Path to Wings," or XPW, a program aimed at civilian-rated USAF officers or cadets who want to become Air Force pilots. The concept has already been tested with civilian-rated "high-time Guardsmen and Reservists ... and to no one's surprise, they did great," Wills said. Inspired by a civilian T-6 test pilot who joined the Air Force but still had to complete the T-6 syllabus, XPW is an abbreviated, accelerated version of UPT that lets candidates skip some sorties intended to teach skills the candidate already has.

Wills declined to speculate on how many additional pilots XPW could yield per year, but said "there's pretty big potential there."

Another initiative, called "Civil Pilot Path to Wings," seeks to make it possible for big-wing airliner or freighter pilots to rapidly get through a streamlined commissioning track. They would have to meet all standards and come in as second lieutenants, Wills said.

A small number of T-1s will be retained at Pensacola, Fla., where USAF and Navy jointly train combat system operators. The Navy, which also flies the T-6, is fully on board, having "adopted—wholesale—our UPT 2.5 and Pilot Training Next plans," Wills said. "They call it project Avenger, and they are going down the same road we are."

As a sign of the maturity of Pilot Training Next, it used to be an initiative reporting directly to the commander of AETC, but on Jan. 1, came under 19th Air Force, making it "operational."

The experimental classes for UPT 2.5—about 15 students each—have had success similar to those in the traditional program. Some finished at the top, some in the middle, some at the bottom, and some washed out, Wills pointed out. Given that the same results were achieved in less time, "we're pretty pleased; we continue to look at the data as it comes in."

HELICOPTERS AND RPA PILOTS

AETC is in the early stages of shifting helicopter-bound pilots out of the T-6 entirely. Over the summer, it launched courseware and contracts to use contractor-provided helicopters instead. As before, students will complete their training at the Army's rotary wing school at Fort Rucker, Ala. Several small experimental classes were successful doing it this way, and the program is being expanded.

First called "Project DaVinci" (after Leonardo's drawings of a helicopter-like machine), the program is now known as Helicopter Training Next (HTN), and Wills says it will free up "60 to 80 slots per year in T-6s," which will in turn increase throughput for fixed-wing pilots.

"It looks to us like a complete win, across the board," Wills said. The same techniques used in UPT 2.5 will be applied to HTN, which will now take "nine to 11 months, instead of 17 or 18 months." The resulting helo pilots will be just as good. The first official HTN course is slated to begin this month.

Remotely Piloted Aircraft operators used a simulation-intensive program from the start, and that has increased in recent months, Wills said.

RPA pilots go through RPA Flying Training in Pueblo, Colo., getting 40 hours of instruction in the DA-20 Katana light aircraft. That program was suspended due to the COVID-19 pandemic, Wills said, but he planned to resume it in late August. "We have relied more on simulation and immersive training in the last couple of months," Wills said, exemplifying how the Air Force used teaching technology to "fly through" the pandemic.

SERE

Wills also pointed to the recent reconfiguration of Survival, Evasion, Resistance, and Escape training, which is being cut from 26 to five, 12 or 19 days, depending on the flying platform.

Wills said the curriculum grew unnecessarily over the years, requiring too much in-person training that could be provided with online academics. Bomber and fighter pilots will get the long course, while mobility aircrews will get the mid-range and other aircrew the short course. These changes, too, were accelerated by the COVID pandemic.

It "just doesn't make sense" to take aircrew away from their jobs for that long, Wills said. The major commands will choose which SERE courses their aircrews attend.

As with pilot training itself, the course could be restructured to put similar things together, use advanced tools, and require students to accomplish more training on their own time and pace. Shortening the course will also allow more SERE instructors to get out in the field to conduct theater-specific refreshers.

In time, quantum computing and better AI will lead to more substantial changes in technical training, Wills said. But he hesitates to call it a revolution.

"We're just updating our learning methodologies," he said. ✪

INTEGRATED. ENDURING. SURVIVABLE.

The ***MQ-9 Block 5 "Ghost Reaper"*** concept fully integrates with the ABMS construct to serve as a force multiplier for 4th and 5th generation aircraft conducting operations and enabling the joint force to connect, know, and act.

- Multi-Domain Situational Awareness for decision advantage
- Freedom Pod with IRST and Freedom 550 to connect the Joint Force
- Rosetta Echo Advanced Payload (REAP) for advanced networking and data sharing
- On-board high-powered computing enables multiple compressed kill chains
- Aircraft survivability pylons for resiliency and self-protection
- Detect and Avoid System for self-separation and weather avoidance

ga-asi.com

GENERAL ATOMICS AERONAUTICAL

Leading The Situational Awareness Revolution

Staff Sgt. Jacob Lieuallen, Senior Airman Tommy Chase, and Airman 1st Class Nathan Fanny, all crew chiefs with the 96th Aircraft Maintenance Unit, walk the wing of a B-52H Stratofortress at Eielson Air Force Base, Alaska, on June 17, 2020. The BUFFs took part in a Bomber Task Force exercise there to demonstrate global strike readiness.

Senior Airman Lillian Miller

Staff Sgt. Samuel Peoples, 911th Maintenance Squadron aerospace propulsion technician, closes the thrust reverser fan duct on a C-17 Globemaster III engine at the Pittsburgh Air Reserve Station, Pa., July 15, 2020. The ARS opened a new, two-bay C-17 hangar in June, marking a milestone in the station's three-year conversion from C-130 aircraft to C-17s.

Joshua Seybert/USAF

A 21st Special Operations Squadron CV-22 Osprey taxis down the flight line during Exercise Gryphon Jet at Yokota Air Base, Japan, June 23, 2020. Gryphon Jet aims to improve interoperability throughout the special operations community. Over a 10-day period, U.S. forces teamed up to execute high altitude-high opening, high altitude-low opening, fast rope, and repel training.

Yasuo Osakabe/USAF

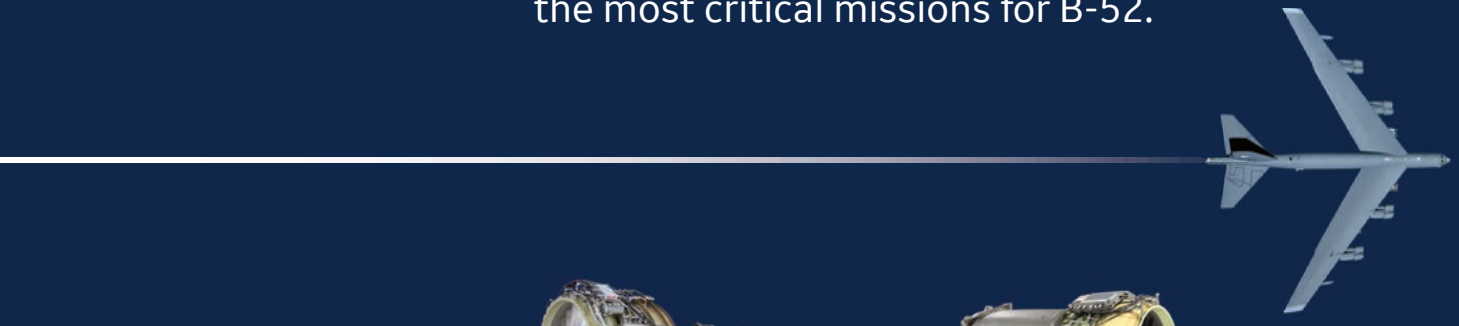

ANY CONDITION


ANY TEMPERATURE


ANY MISSION

GE IS B-52 READY

Proven in the most demanding environments, GE is ready to power the most critical missions for B-52.



CF34-10

GE's most reliable engine even while operating under the harshest conditions — from the highest altitudes in the world to the sweltering heat of the Middle East.

PASSPORT

Our most advanced, digitally capable engine built on proven technologies delivering game-changing performance and fuel burn in the most severe environments.

B-52andGE.com

Andy Morataya/USAF

Air Force Chief of Staff Gen. Charles Q. Brown Jr., left, bumps elbows with Chief Master Sgt. of the Air Force JoAnne Bass during her transfer of responsibility ceremony at Joint Base Andrews, Md., Aug. 14.

With Brown and Bass, USAF Makes History

Goldfein and Wright pass the baton to a new leadership team.

By Amy McCullough, Brian W. Everstine, and John A. Tirpak

Against a backdrop of modern jets and a World War II-era P-51, Gen. Charles Q. Brown Jr. was formally sworn in last month as the 22nd Air Force Chief of Staff in a hangar at Joint Base Andrews, Md. The first Black officer to lead any U.S. military service, Brown was on hand again less than two weeks later as the new Chief Master Sergeant of the Air Force, JoAnne S. Bass, became the first woman and first Asian American to hold such a post.

As Chief, Brown now oversees nearly 700,000 Airmen and will work alongside Chief of Space Operations Gen. John W. "Jay" Raymond as the Space Force stands up as a full-fledged sister service within the Department of the Air Force.

Brown pledged to build on the top three priorities advanced by his predecessor, Gen. David L. Goldfein: empowering squadrons, building the Air Force's contributions to the joint force, and developing the capabilities critical to joint all-domain command and control (JADC2). He also said he would lead by the same four tenets that brought him to the office: "Execute at a high standard, be disciplined in execution, pay attention to details, and have fun."

"Execute at a high standard, be disciplined in execution, pay attention to details, and have fun."
—Gen. Charles Q. Brown Jr., USAF Chief of Staff

A letter to the Air Staff issued the day he took office offered a glimpse into his direct leadership style. "We must make enterprise-wide and clear-eyed judgments about our strategic future as an Air Force and how we enable all Airmen to reach their full potential, quickly adapt to changes in the geopolitical environment, and succeed in a high-end fight," Brown wrote. "The future will pose far more challenging scenarios than those to which we have become accustomed. We must change now—so that we are prepared when the nation next calls upon our Airmen to fly, fight, and win."

A 1984 graduate of Texas Tech University in Lubbock, Texas, Brown is a command pilot with more than 2,900 hours in the cockpit, including more

Chief Master Sgt. JoAnne Bass succeeds Chief Master Sgt. of the Air Force Kaleth Wright as the 19th CMSAF. She is the first woman and first Asian American to become a service's senior enlisted leader.

Eric Dietrich/USAF

than 130 combat hours. He has held combat assignments in hot spots around the world, including the Middle East, Africa, and the Indo-Pacific, was deputy commander of U.S. Central Command, commander of Pacific Air Forces, and also spent time as an instructor and later commander of the Air Force Weapons School. He was aide-de-camp to then-Chief of Staff Gen. Ronald R. Fogleman in the mid-1990s.

Defense Secretary Mark T. Esper, speaking at Brown's official swearing in, lauded the new Chief for having "masterfully orchestrated and led the air war against the Islamic State" group while at Central Command, and for his "humble, approachable, and credible" demeanor.

Esper also praised Goldfein, citing his intuition as he guided the Air Force into a new era of great power competition following the release of the new National Defense Strategy in 2018.

Air Force Secretary Barbara M. Barrett cited Goldfein's two Distinguished Flying Crosses and recalled that after being shot down in the Balkans in 1999, Goldfein evaded capture, was rescued, and then flew another mission "the very next night." An F-16 similar to the one Goldfein flew at the time and an HH-60G Pave Hawk rescue helicopter, commemorating those who rescued him, were on display in the hangar during the ceremony. Also on hand: the T-7A Red Hawk trainer jet, a program awarded during Goldfein's watch, and an F-35A Joint Strike Fighter, the most advanced production aircraft in the fleet today.

"Dave Goldfein is an extraordinary warrior," Barrett said. "He has said that what is best for the joint force is best for the Air Force. Among his legacies are squadron revitalization; force modernization; the B-21 Raider; data management digitization; monumental groundwork behind the Space Force; and the ever-present JADC2," which Goldfein championed among the Joint Chiefs of Staff.

NEW CMSAF

Bass takes the reins as the 19th Chief Master Sergeant of the Air Force, the service's top enlisted member, having completed prior assignments as command chief master sergeant of 2nd Air Force; chief of Air Force Enlisted Development Education; command chief master sergeant of the 17th Training Wing at Goodfellow Air Force Base, Texas; and superintendent at the 86th Operations Group at Ramstein Air Base, Germany. She started her career in 1993 in operations system management, range scheduling, and as a noncommissioned officer in charge and operations scheduler with the 24th Special Tactics Squadron.

"JoAnne has championed Airmen development through programs to improve training and readiness, including basic training, technical training, and medical and distance learning courses," Barrett said. "She advised the commander of 2nd Air Force on the instruction of 93 percent of the force. Chief Bass, your extraordinary record of service has prepared you well to serve as the 19th Chief Master Sergeant of the Air Force."

Brown, speaking of his new top adviser, said she has the "passion, skills, and strength of character we need to lead us to face head-on the demanding challenges of today and the future."

At the transition ceremony where Bass succeeded former Chief Master Sergeant of the Air Force Kaleth O. Wright, Barrett unveiled a new award: the "Goldfein-Wright Inclusive Leadership Award," to be given to the command team that best fosters an inclusive environment. The award is based on the open dialogues on diversity and inclusion that Wright and Goldfein began in June amid civil unrest and protests against racism that took hold across the country.

"As we reflect on the past," Bass said, "we must also look forward to cultivating an environment filled with innovation, with collaboration, moving toward our future, a future where we value the elements that make us the greatest Air Force in the world."

Bass deployed in direct support of Operations Southern Watch, Enduring Freedom, and Iraqi Freedom. As she took over her new post, she said she looked forward to "A future where we embrace true diversity and forge an inclusive culture where our Airmen's talents, what they bring to the fight, are embedded deep in our roots." ✪

Staff Sgt. Preston Cherry

Airman 1st Class Spencer Hartung of the 52nd Logistics Readiness Squadron refuels an F-16 Fighting Falcon at Spangdahlem Air Base, Germany, April 8. The base's fighters will soon relocate to Italy, leaving Spangdahlem searching for a mission.

As DOD Leaves Germany, Spangdahlem Left Hanging

By Brian W. Everstine and Jennifer-Leigh Oprihory

The Defense Department's plan to withdraw nearly 12,000 troops from Germany will not affect Ramstein Air Force Base, the Air Force's biggest base in the region, but raises long-term questions about the future of Spangdahlem Air Base, which will lose its F-16s and fighter mission if the closure is completed.

Plans to move tankers and special operations forces there were canceled with the July 29 announcement by Defense Secretary Mark T. Esper, Vice Chairman of the Joint Chiefs of Staff Gen. John E. Hyten, and U.S. European Command boss Gen. Tod D. Wolters. Among 11,900 jobs to be moved under their new plans, 6,400 would return to the U.S., while the remainder would be relocated elsewhere in Europe.

The plan calls for moving the 480th Fighter Squadron and other parts of the 52nd Fighter Wing at Spangdahlem to Aviano Air Base, Italy, where they will "better increase security along NATO's eastern flank and help preserve peace," according to U.S. Air Forces in Europe.

Rotating units "in perpetuity in multiple locations ... dramatically improves our operational capability to more effectively deter and defend."
—Gen. Tod Wolters, head of U.S. European Command

The announcement threw the Spangdahlem community into an uproar, forcing 52nd Fighter Wing officials to take to social media to assure Airmen and civilians there that ending the fighter mission does not foretell closing the base.

The 480th is Spangdahlem's only flying unit and the U.S. Air Forces in Europe's only suppression of enemy air defenses fighter squadron. Wolters said Spangdahlem's 52nd Civil Engineer Squadron would also move to Italy. The 52nd Fighter Wing includes a single squadron plus a medical group, mission support group, munitions maintenance group, operations group, and other agencies, comprising about 5,000 personnel. The Air Force did not provide details on how such a move would impact force support at the base.

"We know that many of you are concerned about [the] announcement, but please be reassured that these changes are not immediate, and from the highest levels of our military, leaders are keeping families in mind and working to ensure any decisions for moves are made in advance so members and their families have time to prepare," base officials wrote in a Facebook post after the announcement.

Staff Sgt. Vincent Miller examines an an exploded IED during an exercise at Spangdahlem Air Base, Germany, June 10, 2019. Rotating units rather than permanent basing will increase readiness, leaders say.

Airman 1st Class Branden Rae

The last time Spangdahlem saw major reductions was in 2013, when the 81st Fighter Squadron—the last A-10 unit based in Europe—departed. In 2010, the 22nd and 23rd Fighter Squadrons were combined to form the 480th Fighter Squadron.

Meanwhile, two wings that had planned to move to Spangdahlem will now stay put. Both the 100th Air Refueling Wing and the 352nd Special Operations Wing will remain at Mildenhall Air Base in the U.K.

Twenty-four thousand U.S. military personnel will remain in Germany.

Esper estimated the cost of the move to be "several billion dollars … spread out over time." Costs would include military construction and permanent change-of-station moves for Airmen and their families.

BROADER SHIFT

U.S. European Command is broadly restructuring to better address the objectives of the National Defense Strategy and its focus on adversaries such as Russia and China. The U.S. Army is moving its 4,500-member 2nd Cavalry Regiment home to the U.S., rotating Stryker units to the Black Sea region, and moving a lead element of the Army's V Corps in Poland.

Longer term, Esper said the U.S. strategy is to shift from permanent basing to "dynamic force employment," enabling the military to proactively move troops as missions demand. DOD is also rethinking its brick-and-mortar infrastructure amid fears that permanent bases could be vulnerable to attack. This line of thinking is the same as the Air Force's bomber deployments that have become prevalent in the Pacific.

Esper said the Pentagon has observed higher readiness levels from "the deployment of rotational forces from the United States … whether it's the BCTs [brigade combat teams] going from the United States to Korea, to Poland, or the bomber task force" than for forces based in Europe. "And while they are deployed, they are able to sustain a much more fixed focus on their mission and their capabilities," than similar units permanently stationed abroad.

Wolters said that rotating units "in perpetuity in multiple locations … dramatically improves our operational capability to more effectively deter and defend."

To support that, the Air Force is investing in bases across the region, including facilities in Poland, Estonia, and Romania.

President Donald J. Trump said in June he intended to pull U.S. forces from Germany as a punishment for its failure to more rapidly increase defense spending. "Germany's delinquent, they haven't paid their fees, they haven't paid their NATO fees," he said, referring to NATO's stated goal for member nations to invest 2 percent of their gross domestic product in defense. "They're way off, and they've been off for years and they have no intention of paying it. And the United States has been taken advantage of on trade, and on military, and on everything else for many years," the President said. "Germany owes billions and billions of dollars to NATO, and why would we keep all of our troops there?"

Esper, Hyten, and Wolters did not refer to that dispute, couching the reductions as part of an overall strategic shift. They said both EUCOM and U.S. Africa Command will relocate their headquarters from Stuttgart, Germany, with EUCOM joining NATO's headquarters in Belgium, and the ultimate destination for AFRICOM headquarters not yet decided.

NATO Secretary General Jens Stoltenberg said in a statement that the U.S. had consulted with allies ahead of the announcement, underlining "the continued commitment by the United States to NATO and to European security."

But in Washington, lawmakers from both parties criticized the decision. Sen. Mitt Romney (R-Utah), who had offered a failed amendment to the 2021 defense policy bill to block such a move, condemned the plan as a "grave error."

"It is a slap in the face at a friend and ally when we should instead be drawing closer in our mutual commitment to deter Russian and Chinese aggression," Romney said in a statement.

Rep. Adam Smith (D-Wash.), chairman of the House Armed Services Committee, also criticized the administration's plan. "Not only does the plan fail to consider major logistical issues, questions about deterrence and implementation of the National Defense Strategy, and concerns about implications for U.S. efforts in Africa and elsewhere, but also it will almost certainly result in significant costs to the Department," he said in a statement.

But Sen. Jim Inhofe (R-Okla.), chairman of the Senate Armed Services Committee, defended the administration. He said on Twitter the Pentagon's plan is consistent with his view that the Pentagon needs to "maintain a strong forward presence, sustain force projection, and take care of our military families." ✪

New Space Force Doctrine

United Launch Alliance/courtesy

An Atlas V carrying the USSF-7 mission to space lifts off at Cape Canaveral Air Force Station, Fla., May 17. "Space access" is one of seven critical areas of expertise needed to execute in space, as described in the new space power doctrine.

By Rachel S. Cohen

The Space Force rolled out its inaugural space power policy, solidifying the interdependence of civil, military, intelligence, and commercial space as the U.S. tries to return to the moon; push farther to Mars; and protect its satellites from attack.

"Preserving freedom of action in space is the essence of military space power and must be the first priority of military space forces," the new doctrine declares. The capstone policy document, released Aug. 10, is the product of a year's work.

Congress created the Space Force in December 2019 to elevate space power to be on par with air, land, and sea power. Its five core missions are to create a safe environment for the U.S. and its partners on orbit, enable combat operations around the world through GPS and communications, move resources around space in new ways, transfer data more easily, and keep track of debris and activity in space.

The new doctrine argues the Space Force needs seven kinds of experts to achieve its missions, which include:

- Orbital warfare, including changing orbits and firing weapons for both offense and defense
- Electromagnetic warfare
- Cyber
- Intelligence
- Battle management
- Space access and systems sustainment
- Engineering and acquisition.

"Given the development and maturation of space power, and what we're facing from a strategic [and] operational environment, it's really starting to force us to have to look to build more depth," said Col. Casey M. Beard, commander of the Space Delta 9 operations organization at Schriever Air Force Base, Colo., in a press briefing.

The Space Force could begin to pull together teams to deal with high-value assets, offensive and defensive operations, intelligence and surveillance, and cybersecurity. Those force packages could be more responsive and creative than what is possible in daily space operations today.

To do that, the Space Force must better understand a range of questions, Beard posed the questions: "What are the skill sets that are needed? What are the qualification standards that are required to be able to conduct those? How do they interact with one another?"

With space connected to every other domain, the implications and considerations of the application of space power could be huge. For example, attacking a satellite doesn't have implications only in space; it could also have far-reaching consequences for air, land, and sea, affecting location, timing, and communications. Attacking ground controls could disable satellites' ability to share intelligence. And, if an adversary were to shoot at or jam a U.S. spacecraft, how might the U.S. respond?

"The United States Space Force must be joint-smart from its inception, and it must help produce a space-smart joint force," the doctrinal paper said.

Unlike typical combat operations in Earthly domains, which favor kinetic attacks such as missile strikes, space lends itself to more subtle electronic warfare, either to interrupt signals or invade networks.

"The [electromagnetic spectrum] is the primary conduit through which the control and exploitation of the space domain is achieved," the doctrine states.

Cameras on orbit have unfettered access to the Earth below, unlike land, sea, and air surveillance methods that don't have such a broad range and face more restrictions in what they can photograph. Space is harder to reach and return from, and requires immense energy to move around on orbit.

It's harder to hide in the cosmos, too.

"There is no forward edge of the battle area behind which military spacecraft can reconstitute and recover," according to the doctrine. "Spacecraft remain in orbit through peace and war where they are potentially at risk from adversary counter-space capabilities and the hostile space environment."

Still, even as the doctrine frames space as increasingly hostile and potentially violent, it also calls on the military to be responsible stewards of the final frontier. That means setting an example for the safe and open use of space even as

service members study military writers such as Sun Tzu and Carl von Clausewitz for insights into how to fight beyond the atmosphere.

"Just like all forms of warfare, the prosecution of space warfare and the potential generation of collateral damage is judged against the principles of military necessity, distinction, and proportionality," the publication said. "Military space forces balance our responsibilities for operational readiness with the safety and sustainability of the space environment for use by future generations."

Space Force officials plan to publish other doctrinal documents to outline more specific operational goals and tactics. Work will begin on the operational-level publication within the next year, and the military will review and update the final products every few years.

"Agility, innovation, and boldness have always been the cornerstone traits of military space forces," Chief of Space Operations Gen. John W. "Jay" Raymond said in a release. "We must continue to harness these traits as we build our new service and a new professional body of knowledge." ✪

USAF Revives 15th Air Force

By Rachel S. Cohen

Air Combat Command consolidated its fighter, rescue, and command-and-control enterprises under a new numbered air force in August, aiming to help military leaders wield those forces more effectively.

Merging the 9th and 12th Air Forces into the new 15th Air Force will help train, upgrade, and develop tactics for those forces more holistically, said ACC Commander Gen. James M. "Mike" Holmes during an Aug. 14 Air Force Association event. The two organizations encompass numerous types of aircraft, from fighter jets to strike drones to surveillance planes and search and rescue helicopters.

Fifteenth Air Force will take over management of the wings that fell under 9th and 12th Air Forces. That frees 9th Air Force and 12th Air Force to focus on providing troops as Air Forces Central Command and Air Forces Southern, respectively. The combination will be one of Holmes's last initiatives before retiring after more than three years running Air Combat Command. Last year, ACC combined its intelligence, surveillance, reconnaissance, cyber, weather, and other units into a consolidated information warfare command, the 16th Air Force.

Taking over in March 2017, Holmes commanded the bulk of the Air Force's combat assets and personnel, focusing his efforts on creating a more forward-thinking force ready to compete with advanced militaries, mirroring those of Russia and China, while fending off the Islamic State group.

Reorganizing has helped push down responsibility to give commanders more freedom to do what's best for their Airmen and to be more creative in taking the fight to their adversaries. That was evident in how the Air Force responded in the wake of Hurricane Michael, which slammed into Tyndall Air Force Base, Fla., in 2018, and to the ongoing coronavirus pandemic in 2020.

"I'm happy with this refocus in Air Combat Command on pushing authority, responsibility, and decision down and allowing our people to have autonomy, mastery, and purpose in what they do," he said.

The coronavirus pandemic hindered ACC's push to ready its units for a potential new conflict, so the command split Airmen into "blue" and "silver" teams to minimize the number of people each Airman might be exposed to on a regular basis.

Building readiness happens more slowly when young Airmen need to spend more time building their expertise, and when busier-than-expected combat operations take aircraft away from maintenance and upgrades. Still, Holmes said ACC is about as ready to respond to a crisis as it was before COVID-19.

"We have to produce more pilots and navigators and special mission aviators and air battle managers and all the people that operate in the air across Air Combat Command, because every year we don't produce them is another year that there's a hole, and we won't have enough," he added. "It's going to be a challenging couple of years."

Senior Airman Cheyenne Powers

Airmen from the 55th Rescue Squadron at Davis-Monthan Air Force Base, Ariz., are now part of the 15th Air Force.

He also argues the Air Force has to be ready to sacrifice some of its older platforms to make way for more advanced technology, even if it means changing how things are done. Congress should try not to hinder that process—because of parochial concerns or otherwise—by blocking the retirement of systems whose time is up, he added.

"Both on the fighter side and our ISR flight plan, on what's the future of the mix between space and cyber and manned and unmanned aircraft, to bring them the intelligence, surveillance, and reconnaissance tools that we need going forward, there are some decisions that need to be made there that the next [ACC commander] will get to help make," Holmes said.

Those decisions could be choosing to ditch certain platforms or giving the go-ahead to develop new ones.

When Lt. Gen. Mark D. Kelly earns his fourth star and takes over ACC, he will also inherit ongoing challenges to combat discrimination in the ranks and in policies, issues that came to the fore over the summer.

"If I was going to stick around longer, I would really love to be more a part of these efforts to help us reach closer to our ideal of being a place where we can take people from anywhere in our country—from any racial background, from any economic background—and give them an equal opportunity to work hard and move out and become the best person they can be," Holmes said. "We've made great strides, but … I can't escape the fact that we still have a ways to go, and I would love to have the opportunity to keep working on that." ✪

F130 for B-52

Proven. Efficient. Modern.

The Rolls-Royce F130 brings a highly reliable and proven engine to the B-52 Engine Replacement Program. With well over 25 million flight hours in the family of engines, the F130 is already in the US Air Force fleet in numerous applications. F130 engines for the B-52 will be digitally engineered, manufactured, assembled and tested in the US, at Rolls-Royce North America.

American-made power for the B-52.

www.newB-52engines.com

American-Made Engines

The Rolls-Royce F130 engine is the perfect fit for the iconic B-52 aircraft:

- World-class performance
- American-made engines
- 25 million flight hours
- F130 series already in USAF fleet

New Vice Chiefs for USAF and USSF

By Amy McCullough and **Rachel S. Cohen**

President Donald J. Trump nominated Lt. Gen David W. Allvin to become the next Air Force Vice Chief of Staff, and Lt. Gen. David D. Thompson to become the first-ever Vice Chief of Space Operations, the No. 2 post in the U.S. Space Force. If confirmed, each would receive a fourth star.

Allvin has been director of strategy, plans, and policy on the Joint Staff since January 2019 and would succeed Gen. Stephen W. "Seve" Wilson as Vice Chief. Wilson, a command pilot in B-52 and B-1 bombers with more than 4,600 flight hours—including 680 in combat—is expected to retire this fall after more than four years as Vice Chief, the longest anyone has held the post.

Allvin is also a command pilot with more than 4,600 flight hours in a variety of aircraft. He is a senior member of the United States delegation to the United Nations Military Staff Committee and previously oversaw strategy and policy at U.S. European Command in Germany, held various leadership positions for NATO in Afghanistan, and was a leader in the tanker and training communities. He was also a C-17 and C-130J test pilot.

Allvin's experience in joint assignment is extensive, including six of the last 10 years, and indicates the Air Force will continue to emphasize how it values joint experience—a top priority of recently retired Air Force Chief of Staff Gen. David L. Goldfein.

Thompson became vice commander of Air Force Space Command (AFSPC) in April 2018, having held the same position previously from 2015 to 2017. When AFSPC became the Space Force in December 2019, he continued in the post; this nomination establishes Thompson within the Space Force's new leadership structure.

Thompson, a career space operator, previously directed space assets for Air Forces Central Command and held leadership positions in operations and planning at U.S. Strategic Command. He has been a public face of military space operations as the Space Force gets up and running and the Pentagon starts treating the domain as a possible place of conflict.

"He is responsible to the Chief of Space Operations for the U.S. Space Force in carrying out space missions and integrating space policy, guidance, coordination and synchronization of space-related activities and issue resolution for the Department of the Air Force," according to Thompson's official biography. ✪

Jolly Green II Begins Aerial Refueling Tests

By Alyk Russell Kenlan

The Air Force's new combat search and rescue helicopter completed its first aerial refueling on Aug. 5 at Eglin Air Force Base, Fla.

Air Force and Sikorsky pilots flew the HH-60W Jolly Green II at 110 knots and connected with an HC-130J tanker during the initial test. Aerial refueling "is essential for the combat search and rescue mission since it greatly extends the operating range of the aircraft and thus allows the unit to extend their rescue capabilities over a larger battle space," said Joe Whiteaker, 413th Flight Test Squadron Combat Rescue Helicopter flight chief.

Master Sgt. Tristan McIntire

An HH-60W Jolly Green II connected for its first-ever aerial refueling Aug. 5, linking up with a HC-130J tanker.

The aircraft has already gone through an array of other tests, including defensive systems capabilities and handling in different types of weather.

"It's rare for a test pilot to have the opportunity to test a new aircraft replacing the one he or she flew operationally and to be the first one to do something like this," reflected Maj. Andrew Fama. "It was an honor to be the pilot to fly this mission and work with a truly professional test team."

John Biscaino, Sikorsky's test pilot, said "the aircraft performed flawlessly during the testing and met all of the program objectives." Future missions will seek to identify and iron out any remaining issues before the Jolly Green II replaces HH-60G for good.

The Air Force plans to purchase up to 108 HH-60Ws, which will replace the HH-60G Pave Hawk. Jolly Green II's primary mission will be search and rescue operations in hostile environments, but it also will be used in disaster response and civil search and rescue. ✪

USAF, USSF Senate Confirmations

By Brian W. Everstine

The Senate on Aug. 6 confirmed a series of Air Force and Space Force leaders to new roles, including new bosses at U.S. Northern Command, the U.S. Air Force Academy, and staff jobs in the new service.

The recent confirmations include:

■ **Lt. Gen. Glen D. VanHerck** to the rank of general and to be the commander of NORTHCOM and the North American Aerospace Defense Command. VanHerck currently is the director of the Joint Staff.

■ **Lt. Gen. Richard M. Clark** to be the next superintendent of the U.S. Air Force Academy. Clark is the current deputy chief of staff for strategic deterrence and nuclear integration.

■ **Maj. Gen. Sam C. Barrett** to the rank of lieutenant general and to serve as the director of logistics for the Joint Staff. Barrett is the current commander of 18th Air Force.

■ **Maj. Gen. Nina M. Armagno** to the rank of lieutenant general and to serve as the staff director for the Space Force. She is currently the space programs director in the Air Force's acquisition branch.

■ **Maj. Gen. William J. Liquori Jr.** to lieutenant general and to be the deputy chief of space operations for strategy, plans, programs, requirements, and analysis. He is the Space Force's current director of strategic requirements, architectures, and analysis.

■ **Maj. Gen. B. Chance Saltzman** to lieutenant general and to be the deputy chief of space operations overseeing operations and cyber and nuclear forces. Saltzman is Air Forces

(Continued on p. 40.)

AIR FORCE ASSOCIATION

VIRTUAL AIR SPACE CYBER CONFERENCE

A Professional Development Event

AEROSPACE NATION

AIR, SPACE & CYBER FORCES IN THE FIGHT

September 14, 15 & 16

Daily highlights and analysis will be available nightly on AirForceMag.com, on AFA.org, and on the AFA YouTube channel.

Full session videos will be available on October 1st.

Made Possible by LOCKHEED MARTIN

Central Command's deputy commander.

■ **Maj. Gen. Stephen N. Whiting** to lieutenant general and commander of Space Operations Command. He's the deputy commander at headquarters Space Force, previously the deputy of Air Force Space Command. ✪

'Hack-a-Sat' Spurs Cyber Interest

By Alyk Russell Kenlan

Hackers took control of a Department of Defense satellite on Aug. 9 as part of the final challenge in "Hack-A-Sat," a competition run by the Air Force and DOD's Defense Digital Service intended to spur interest in aerospace cybersecurity.

More than 2,000 teams comprising 6,000 people participated in qualification events in late May, and eight teams survived to take part in the final competition Aug. 7-9, where they vied to seize control of a working satellite and take a photograph of the moon.

"Space is an increasingly important contributor to global economies and security," Will Roper, assistant secretary of the Air Force for acquisition, technology, and logistics said in a release. "Letting experts hack an orbiting satellite will teach us how to build more secure systems in the future."

Teams could be formed from any number of people, so long as they included at least one U.S. citizen or permanent resident and did not include anyone on the Department of the Treasury's Specially Designated Nationals list. Both independent groups and teams sponsored by academic institutions and companies were eligible.

The Air Force and DOD collaborated with DEF CON Safe Mode, an annual hacking convention that meets in August to run the competition. This year's event was held virtually due to the COVID-19 pandemic.

Lauren Knausenberger, Chief Innovation Officer for the Department of the Air Force, announced a blanket purchase agreement in March worth up to $75 million to allow Air Force and Space Force program managers to hire hackers to test the security of its systems. ✪

RQ-170 Practices Evading Air Defenses with Stealth Aircraft

By Brian W. Everstine

Some of the Air Force's most secretive aircraft flew together in August to test the service's methods for destroying enemy air defenses, and to see how well older planes work with newer airframes.

The 53rd Test and Evaluation Group's exercise ran from Aug. 4-6 at Nellis Air Force Base, Nev., bringing together the F-35A, F-22, and F-15E fighters, B-2 bomber, RQ-170 reconnaissance drone, a Navy E/A-18G electronic attack plane, and command and control systems from various testing and operations squadrons.

Together, they represent some of the most critical capabilities for penetrating adversary's air space and gaining the upper hand against sophisticated anti-aircraft missiles and jamming weapons.

The experiment tested the F-35's ability to suppress enemy air defenses in order to help the stealthy B-2 and RQ-170 to sneak through unharmed. Scenarios also partnered the fifth-generation F-35 and F-22 with the fourth-generation F-15E and others to test how aircraft can wield new and unique electronic-attack capabilities, according to a USAF release. Tools such as signal jamming can help the Joint Strike Fighter move more freely in contested environments.

The test included tactics, techniques, and procedures established at the service's Weapons and Tactics Conference and never before tried in flight-tests. Among them were the use of advanced airplanes in support of the B-2, complex ingress tactics using stealth, new means of passing data and other communications between fourth- and fifth-generation jets. ✪

USAF

An RQ-170 Sentinel at Andersen Air Force Base in Guam.

Combat Controller Receives Silver Star for 2013 Battle

By Brian W. Everstine

Master Sgt. John Grimesey, the flight chief of the 21st Special Tactics Squadron at Pope Field, N.C., on Aug. 14 received the military's Silver Star Medal for his actions during a 2013 firefight in Afghanistan. He saved the life of one Soldier and killed more than 30 enemy fighters.

Grimesey initially received the Bronze Star Medal for the battle, but the Air Force later upgraded the award as part of a service review of valor medals.

On May 25, 2013, Grimesey, then a senior Airman and combat controller with the 21st Special Tactics Squadron, set out with his team to clear a village in Ghazni Province so Afghan police could establish a presence. American and Afghan forces were working together when one team ran into a large group of Taliban members. The Taliban came between the partner forces and killed and injured Afghans, including the police chief.

A rocket-propelled grenade exploded near Grimesey as he looked around the corner of a wall, giving him a concussion. He sustained other injuries as well. Nevertheless, he returned

Master Sgt. Katherine Novales

U.S. Air Force Lt. Gen. Jim Slife, AFSOC commander, presents the Silver Star Medal to Master Sgt. John Grimesey during a ceremony at Pope Field, N.C.

fire and saved an Army Special Forces Soldier hit in the attack by dragging him 25 feet away from enemy fire.

"I snapped into a problem-solving mode," Grimesey said. "The situation was dire and the only way to solve it was to rely on my extensive training and attempt to break down the large problem into small chunks. I had to prioritize with what I was being faced with."

Grimesey then organized support from Army units in the area and called in multiple airstrikes from F-16s and an AC-130, ultimately killing 31 enemy fighters and saving his team of U.S. and Afghan forces. They recovered the Afghan commander's body.

"You may not call yourself a hero, Master Sgt. Grimesey, but I do," Air Force Special Operations Command boss Lt. Gen. James C. "Jim" Slife said at the ceremony. "Because of your actions that day, families and friends did not experience loss. The men whose lives you saved will continue to positively impact those around them, creating a chain of reaction that ripples across generations."

During the ceremony, Grimesey also received the Bronze Star Medal with the second oak leaf cluster with Valor for his "quick and precise" response to another ambush in Afghanistan in 2017. He is starting his medical retirement process. ✪

F-15EX to Base in Oregon, Florida

By John A. Tirpak

Kingsley Field, Ore., will be the schoolhouse for the new F-15EX, the Air Force's updated version of the Eagle fighter, the service announced Aug. 14. The Air Force also floated other potential Air National Guard operating locations that could adopt the F-15EX and F-35A Joint Strike Fighter.

Kingsley is where the Air Force conducts F-15C/D training today. The first production version F-15EXs will be delivered there in 2022, and Portland Air National Guard Base, Ore., will host the first operational F-15EX unit beginning in 2023, USAF said.

Eglin Air Force Base, Fla., will flight-test the first eight jets starting in early 2021. Eglin aircrews are training with Boeing and an F-15EX simulator this year. The initial phase of combined developmental and operational tests, which will check whether the software and cockpit controls work well together, should take about a year and a half.

"Airmen from the 96th Maintenance Group will undergo familiarization classroom academics and transfer to hands-on training upon the aircraft's arrival," the Air Force said in a July 29 release. "These newly qualified technicians will become the trainers for the maintenance group."

Other ANG bases now operating F-15C/Ds—Barnes Airport, Mass.; Fresno Yosemite Airport, Calif.; and Naval Air Station Joint Reserve Base New Orleans—will phase out the older jets for either F-15EXs or F-35As, the Air Force added. The service did not indicate when it will make those decisions. Naval Air Station Lemoore, Calif., could also receive the F-35A. ✪

■ The War on Terrorism Casualties:

As of Aug.17, 2020, 95 Americans had died in Operation Freedom's Sentinel in Afghanistan, and 99 Americans had died in Operation Inherent Resolve in Iraq, Syria, and other locations.

The total includes 190 troops and four Defense Department civilians. Of these deaths, 87 were killed in action with the enemy, while 107 died in noncombat incidents.

There have been 572 troops wounded in action during OFS and 231 troops in OIR.

Lt. Gen. Brent Scowcroft, 1925-2020

White House photo via National Archives

Brent Scowcroft, center, listens in as President George H. W. Bush discusses the situation in Panama during Operation Just Cause in December 1989. Scowcroft advised five presidents through a series of conflicts over a 30-year span. With Bush and Scowcroft was White House Chief of Staff John Sununu.

By John A. Tirpak

Retired Air Force Lt. Gen. Brent Scowcroft, who twice served as U.S. national security adviser and was an adviser to six U.S. Presidents, died Aug. 6 at age 95.

As a major general, Scowcroft was military assistant to President Richard M. Nixon and, as a three-star general, served Nixon as a deputy assistant for national security affairs. He was national security adviser to President Gerald R. Ford, and later to President George H.W. Bush, who he also served as chairman of the Foreign Intelligence Advisory Board. He advised President Barack H. Obama in choosing a national security team, and headed or served as a principal in many Washington, D.C., think tanks over about 40 years.

USAF

Brent Scowcroft as a major general.

Scowcroft promoted a "realist" U.S. foreign policy, weighted toward reliance on alliances and coalitions, and famously opposed the 2003 U.S. invasion of Iraq, although he remained on good terms with the White House in its aftermath. He maintained collegial and cooperative relations with other advisers, and he was skilled at building foreign policy consensus. He is credited with inclusion and building trust among the various elements of the foreign policy team, and transparency about goals, yet kept a low profile and did not publicly discuss his advice to the President.

Scowcroft attended the U.S. Military Academy and was commissioned into the Army in 1947, transferring to the Air Force when it became a separate service that year. He earned his wings in 1948, but after an accident took him off flying status, staff assignments dominated his career, which included working at times for the Joint Chiefs of Staff; Headquarters, U.S. Air Force; and the Office of the Assistant Secretary of Defense for International Security Affairs. Along the way, he earned both a master's degree and a doctorate in international relations from Columbia University. He taught at both West Point and the U.S. Air Force Academy.

After serving as Nixon's military assistant, Scowcroft became a deputy assistant for national security affairs, working with National Security Adviser Henry Kissinger. He replaced Kissinger in November 1975. He retired from the Air Force a month later, after 28 years of service.

In the George H.W. Bush White House, he helped manage U.S. policy regarding the collapse of the Warsaw Pact and Soviet Union. During the 1991 Gulf War, he advised Bush to end the conflict after Iraq was ejected from Kuwait, warning that to press on to Baghdad would lead to a long, open-ended, and costly occupation that would hurt the U.S. financially and in terms of its international leadership. Though Bush later acknowledged being criticized for not "finishing the job," Scowcroft's advice proved prescient.

Scowcroft chaired or served on numerous blue-ribbon panels and presidential commissions regarding foreign policy. He was also vice chairman of Kissinger Associates, founded the Forum for International Policy, and was president of The Scowcroft Group.

He supported the 2001 invasion of Afghanistan but opposed the 2003 invasion of Iraq, warning in a 2002 Wall Street Journal op-ed that it would hurt U.S. standing in the Middle East and cost the U.S. its international support for the war on terrorism. He later said that a premature withdrawal from Iraq before its new government was stable would turn into "a strategic defeat for American interests with potentially catastrophic consequences."

Scowcroft co-authored "A World Transformed" with former President George H.W. Bush about the end of Soviet communism, and was the author, with President Jimmy Carter's National Security Adviser Zbigniew Brzezinski and David Ignatius, of "America and the World: Conversations on the Future of American Foreign Policy."

Presented with over a dozen honorary doctorates during his career, Scowcroft received the Medal of Freedom in 1991 from then-President George H.W. Bush. ✪

FACES OF THE FORCE

Staff Sgt. Devin Boyer

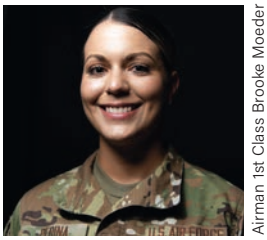
Airman 1st Class Daniel Sanchez—a professional magician turned 86th Airlift Wing Public Affairs broadcast journalist—came up with the Space Force's official motto, "Semper Supra," Latin for "Always Above." Sanchez said "Semper," was meant, among other things, to reflect the service's 24/7 watch over the space domain and its resolve. The "Supra," too, has layers of meaning, he said. It was intended as "a reminder that no matter what we have accomplished, there is no ceiling or boundary. ... [It] represents the age-old impulse of humankind to look up. To see the skies and stars, and wonder what else is out there. It is also symbolic of our standards of excellence. ... Our citizens will rest easier, knowing there is always a shield above them." Gen. John W. Raymond, USSF Chief of Space Operations, called Sanchez to personally thank him for his contribution to Space Force history. "It was the perfect fit," Raymond said. ... We're proud of your motto; we're proud to have it. You're a part of history."

Airman 1st Class Alison Stewart

52nd Operational Support Squadron Air Traffic Control Watch Supervisor **Tech. Sgt. Erron Sayas** prevented a collision between a C-17 Globemaster III and a sweeper vehicle whose driver was tuned into the wrong radio frequency. Such a collision could have caused the loss of a $202 million aircraft or—worse—several lives. He was subsequently nominated for the 52nd Fighter Wing's Chainbreaker Award, which recognizes Airmen whose early interventions in minor events prevent major mishaps.

Airman Anabel Del Valle

325th Security Forces Squadron Resource Adviser **Staff Sgt. Candis Mathews** won an "Angel Award" from Tyndall Air Force Base, Fla., for logging more than 500 hours of volunteering in 2020. Mathews, who also serves as an Air Force Sergeants Association community liaison, has been recognized for her commitment to service before, having been named volunteer of the year for her squadron, wing, and base in 2019. "One of the greatest things you can give is your time," she said.



Airman 1st Class Brooke Moeder

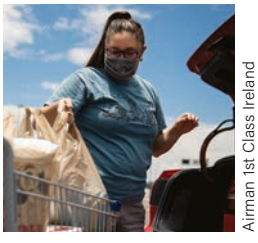
Airman 1st Class Emily Perina, a physical therapist assistant (PTA) with the 56th Healthcare Operations Squadron, recently became the first Airman in her AFSC to skip technical school. She met her technical training requirements before enlisting by earning an associate degree, a license in Florida, and amassing four years of experience. "Her PTA license is a higher qualification than one would earn from graduating tech school," said 56th HCOS Surgical Services Flight Chief, Tech. Sgt. Geoffrey Rigby.

Airman 1st Class Erin Baxter

37th Intelligence Squadron Senior Intelligence Analyst **Staff Sgt. Drew Mayo** de-escalated a mid-air conflict after a commercial passenger locked himself in the plane's bathroom and refused to communicate with anyone but the flight's captain or the FBI. Mayo talked the man down and got him to surrender a pen he'd used to threaten individuals on the flight. Mayo said his SERE training made it possible. "You get a lot of knowledge about how to communicate with hostile individuals and de-escalate situations," he said.

Master Sgt. Alexander Cedillo/ courtesy

52nd Fighter Wing Protocol Specialist **Master Sgt. Alexander Cedillo** helped high-risk families amid the COVID-19 pandemic, soliciting shopping lists and making commissary runs for them, coordinating online Catholic masses for military families, and facilitating a mass donation of PPE and isopropyl alcohol to benefit 51 hospitals in the Philippines. "Difficult situations like these bring out the best in people," he said. "Never underestimate small gestures of love and kindness."



Airman 1st Class Ireland Summers

The **Kirtland Spouses Club** at Kirtland Air Force Base, N.M., hosted a food and supply drive from July 16-17 to benefit the Navajo Nation. "The Navajo Nation has been hit hard with COVID-19, so we really wanted to show our support and participate," said club President Brittni McDonald. "They were in need and that's what we're all about, helping our community." Partner organizations including DreamLab and Women to Be gave out the collected items to Navajo Nation families.

Rachel Kersey/IAAFA

The 37th Training Wing's **Inter American Air Forces Academy**, which primarily provides Spanish-language PME to boost U.S.-partner nation interoperability, won Hq. Air Force's 2019 Enlisted Professional Military Education (EPME) Center of the Year Award. "This award is the result of our efforts, dedication ... culminating in this recognition as the best EPME center of the year" for USAF and USSF, said 837th Training Squadron Director of Operations Maj. Eduardo Barajas.

2nd Lt. Benjamin Aronson

15th Wing Legal Office Assistant Staff Advocate **1st Lt. Arielle Heald,** PACAF Logistics Directorate Weapons System Support Branch Chief **Capt. Christopher Piha**, and an Army soldier helped a Honolulu police officer after a highway collision threw her from her motorcycle. Piha helped assess the officer's condition, Heald directed traffic, and both helped keep her still and alert until first responders arrived. "When things get stressful, you just have to get the job done," Heald said.

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

Senior Master Sgt. Jennifer Shirar/ANG

A student fighter pilot powers up an F-15C for a 2018 training sortie at Kingsley Field, in Klamath Falls, Ore. The new Reforge training program will yield mission-ready flight leads in half the time and give Air Combat Command much more usable iron for real-world contingencies.

Reforging Fighter Pilot Training

The aim is better pilots and more combat capability. The bonus is speed.

By John A. Tirpak

For the first time in decades, the Air Force is preparing to overhaul its fighter pilot training enterprise. The existing system isn't broken, but new teaching technology and the coming T-7A trainer present opportunities to develop even better fighter pilots in less time and at potentially lower cost.

The new concept of operations is called "Rebuilding the Forge," or "Reforge" for short, signed out June 2 by former Air Combat Command chief Gen. James "Mike" Holmes. By consolidating training phases and omitting a change of station, it would shorten the time it takes to grow a flight lead by 12 to 18 months. Freshly minted basic pilots will also be more seasoned in fighter activities before they ever get to their weapon system, and will be able to progress faster once there.

Readiness would be boosted by teaching with the new T-7A Red Hawk rather than front-line combat jets. This would reduce the wear on combat jets and leave more combat capacity for real-world contingencies. Doing this with just the F-22 could yield 60 percent more operational hours for Raptors, and save three to five times the cost per flying hour versus the Raptor.

"We're trying to … see if we could create more capacity without spending more money," Holmes said in a June 22 livestreaming event with the Air Force Association's Mitchell Institute for Aerospace Studies. "We can take some of that training-coded iron and turn it into combat-coded iron." The airplanes and pilots, he noted, are "already paid for."

ACC is working with Air Education and Training Command (AETC) to develop the concept further. AETC owns almost 230 fighters, but Maj. Gen. Craig D. Wills, 19th Air Force commander, said it's too soon to say whether any of those aircraft would ultimately pass back to ACC for front-line service or whether AETC could hand off some of its bases.

"I don't see that Reforge is going to result in a big shift of iron out of AETC right away, but I think it's probably safe to say we have a lot more work to do … before we know exactly how all this is going to pan out," Wills said. AETC has 134 F-16s and 92 F-35s. Training F-22s were consolidated with other operational F-22 squadrons after Hurricane Michael leveled Tyndall AFB, Fla., in 2018, and the National Guard trains F-15 pilots.

It also isn't clear if AETC will still provide the instructor pilots.

"We think … those folks that are going to T-7s at AETC bases would probably be best trained by AETC initially," Wills said. "You could see a scenario where we would provide the initial

checkout—basic proficiency in the airplane—and then they'd move on to take part in the Reforge piece of it."

Under Reforge, fighter pilots will be combat-qualified for more of their initial hitch than today.

"The day you get your wings, you owe the Air Force 10 years," said Lt. Col. Luke Schneider, one of the authors of the Reforge CONOPS (Concepts of Operations). But much of that time is spent training. "We are looking at giving the Air Force back 10 percent or greater of that commitment as a combat-qualified aviator."

Reforge itself has been more than two years in the making. It mirrors AETC's Advanced Pilot Training Experiment and the two commands have compared notes in a series of meetings. The ideas align well.

The arrival of the T-7A will be a watershed in terms of capability, Wills said, and both commands recognized changes were needed to "get this right." So while the two commands are "not quite joined at the hip," Wills noted, they are "perfectly in step."

The T-7A is far more advanced than the T-38 it's succeeding. It handles more like a modern fighter, it has a modern cockpit, it's more forgiving, and it has on-board capability to simulate many kinds of sensors and weapons. It can emulate practically everything a fighter does except the flare of a rocket motor as a missile flies away. Time in the T-7 will generally be far better spent than in the T-38, eliminating the need for specialized training required just to fly the T-38 istelf. In that airplane, because of its quirks, "we spend a lot of time teaching guys not to die," Schneider said.

Once they're finished with the T-38, students have to spend extra time in modern fighters to really learn to employ them. After completing basic flight school and then Introduction to Fighter Fundamentals (IFF), pilots have to spend months at their Flying Training Unit (FTU) in their combat airplane, learning both its unique handling and how to employ its various combat systems

Wills said the Air Force tends to fly new airplanes as it does the ones they replace, regardless of how much a leap in capability they represent. In the early days of the F-22, he noted, pilots would say "we flew it just like the F-15C." Over time, pilots learned to exploit the Raptor's full power.

The T-7A is a major leap forward, however. "We've flown the T-38 for 61 years," Wills said. "The last thing we want to do is take a state-of-the-art airplane like the T-7 and then fly it exactly like the T-38."

ACC and AETC are already exploiting virtual reality, advanced simulation, and artificial intelligence (AI) to let students learn at their own pace and master certain skills without leaving the ground. In pilot training today, Wills said, students "fly" in video gaming rigs that can be installed in their rooms, enabling them to practice missions as many times as needed until they get them right.

Reforge will build on that. AI will monitor student progress, seeing where they need more work and recommending refreshers where necessary. Homework can also be recorded, so human instructors can critique student performance and offer specific tips on problem areas. The AI will also be able to recognize when students have mastered coursework early, allowing them to move on without unnecessary repetition, further accelerating their progress.

Wills said students tend to be "rusty" both when they report to Introduction to Fighter Fundamentals and later at their Flight Training Unit. Eliminating the IFF change of station saves time and money on cross-country moves and reduces the need for refresher training.

According to the CONOPS, students will go from basic flight school to a 12-month Initial Tactical Training program, or ITT, where they'll fly the T-7A. "Compared to the existing timeline, ITT-trained aviators will only need half the time to complete fighter transition to be qualified in a major weapon system airplane," said David L. Timm, the other Reforge author.

Once pilots complete ITT, they will have "the requisite experience to attend the FTU transition course instead of the FTU basic course." Overall, "the expected result is the fighter aviator becoming a mission-ready flight lead 12 to 18 months earlier than the current process," the CONOPS asserts.

According to a notional timeline in the CONOPS, students selected for the fighter track will start getting fighter-specific instruction about five months before receiving their wings. They'll then attend the ITT course for one year's instruction, staying at the same base when they move on to the FTU for four months to become mission-qualified. After that, they can become a flight lead in eight months, or less, depending on their proficiency.

Implementing the new scheme depends on the successful and timely fielding of the T-7A. Planners intend to complete a proof-of-concept program, called RFX, meant to train a cadre of Reforge instructor pilots using eight leased, off-the-shelf advanced trainers. The candidates include the Korea Aerospace Industries/Lockheed Martin T-50 or the Leonardo M-346, both of which lost out to the T-7A when Boeing was awarded the trainer contract in September 2018. Holmes said the leased jets are expected to be available in the summer of 2021.

According to Wills, it's too soon to know if there would be any changes in the T-7A engineering and manufacturing development program, or if more than the planned 351 aircraft are required.

As for Boeing, a spokesman said the T-7A was "designed with growth and flexibility in mind," and if additional capabilities are needed, "we are well-positioned to support our customers' evolving requirements."

At ACC, Schneider said the command is doing "everything we can to not impact [engineering and manufacturing development] and the delivery of T-7s to AETC."

The RFX is seen as a five-year effort to shake out the ideas in Reforge, make course corrections, and put a system in place to take advantage of the T-7A on the first day it's available. The initial plan was to simply lease the T-50, but there was interest from other companies, Holmes said, and "it is in our interest to see who can come in at an affordable price." Leasing trainers is an unplanned expense, and it's still possible such a program may prove unaffordable.

Another unknown is whether more T-7As may be needed to make Reforge work. "That's for the RFX to determine," Timm said. The T-7A contract already gives the Air Force the option to acquire another 100 aircraft beyond the 351 on order.

The Air Force's ongoing pilot shortage could be eased through Reforge. The shortage has three components: production (the number of pilots coming through the pipeline); absorption (USAF's ability to convert new pilots into seasoned combat assets); and retention (to "keep them happy so they don't bail out and go to airlines," as Schneider said).

Reforge "will attack the first two" by accelerating throughput to train more pilots in less time. Absorption is a harder problem.

New pilots coming out of fighter training today have less air time and experience when they arrive at their combat units "compared to the ones 15-20 years ago," Schneider said. Until a pilot makes flight lead, "the next assignment options are

extremely limited," Schneider said. "That causes frustration," and Reforge should help alleviate that, in part by leveraging concepts developed in Red Flag exercises. Reforge will mimic Red Flag, where records show that pilots' survivability rises sharply after 10 realistic missions.

With Reforge, "they get to combat units already experienced, they become flight leads faster. They are more useful."

Four iterations of the Reforge CONOPS were briefed to Holmes before he was satisfied with the plan. Holmes and his successor, Gen. Mark D. Kelly, briefed it to the other four-stars and former Chief of Staff Gen. David L. Goldfein earlier this year.

BUILDING ON AETC PROGRESS

The Reforge concept builds on what AETC is doing with undergraduate pilot training (UPT). The current iteration is called UPT 2.5, and it identifies fighter-bound pilots sooner and gives them a more tailored training program.

Wills explained that when the T-7 arrives in 2024, "If you get your wings in UPT 2.5, you'll get a checkout in the T-7 … and you're qualified to fly the airplane."

By the time students get to a field unit, they will have "a couple of years or 250 hours" of flying time, Wills noted. "Essentially … a two-year-long introduction on how to operate as a fighter pilot." Although the CONOPS eliminates the interim assignment at another base for the Introduction to Fighter Fundamentals course, he added, "it's not a matter of skipping IFF, per se."

Further changes are likely, and new technologies will make it possible to further rebalance the amount of training required in the air versus in simulators, Wills added. For example, within a couple of years, most, if not all, graduate-level air mobility training will take place in simulators.

For now, at least, Reforge is for fighter pilots only; no such program currently exists for bomber pilots, who will also move from the T-38 training to the T-7 when it is ready.

Timm noted that Congress still must be sold on the Reforge idea. Speeding up training will raise alarm bells on Capitol Hill over concern that USAF could be cutting corners and putting new pilots at risk. The idea, though, is to exploit new technology to improve training and eliminate time and expense that no longer contribute to pilot training or safety.

Undergraduate pilot training "has been the same way for the past six decades," Timm said. "We know it works. [But] it's become unaffordable to use front-line fighters to train fighter pilots."

Reforge is an opportunity to avoid "burning out our force structure" while training "for a near-peer adversary." And by teaching skills sooner and more efficiently, "you're able to save 50 percent of the training days."

In terms of combat life on an airplane, Timm noted: 60 percent of today's F-22 sorties are allocated to training in field training units. With a limited number of the stealthy jets available, and replacements still only concepts, saving those hours extends the life and combat-availability of the Air Force's premiere air superiority fighter.

Financial savings may also accrue, but that was never the objective. ACC did not disclose anticipated savings and said any current estimates must still be proven through real-world experience.

"The value is apparent," Schneider said. "We're not looking at cutting hours. We want to repurpose them. If I cut hours, I don't increase readiness beyond what it is right now. … We want to give operational units much more time to focus on the threat, versus how to take off, land, and do patterns."

Wills emphasized that, for now, training remains unchanged. "The worst thing we can do right now … is give everybody the idea that we're going to shake up the entire program," he said. "That's not the plan." Rather, the idea is to ask: "How do you do things smarter … and get it done in a way that all the stakeholders are happy with it? … There are a lot of stakeholders in this, and it's critical we bring everybody along." ✪

Red Air F-22s?

If Reforge pans out, it might be possible to turn over some of Air Combat Command's 60 or so training-dedicated F-22s to combat squadrons. Upgrading them to the modern, full-up combat configuration is a budget conversation "every year," said Gen. James "Mike" Holmes, then-commander of Air Combat Command, but the move always gets elbowed out by higher-priority budget items.

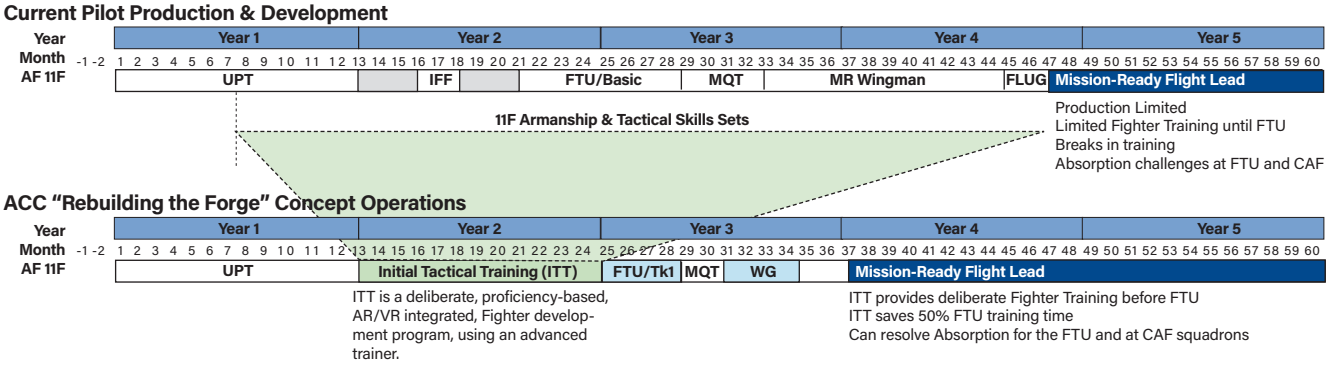
"The older-block F-22s, they're already combat-capable, even without bringing them up to the higher standard," Holmes noted. "I'd certainly pick one of those over some of our legacy airplanes, if I had to go fight."

Minus the upgrade, they could alternatively be used for Red Air, augmenting T-38s that serve in that role now. Indeed, using F-22s as adversaries is likely to become necessary as peer adversaries start to field fifth-generation aircraft.

If ACC opts to use the early block F-22s in that role, Holmes said, "we could also save our limited modernization dollars for those newer airplanes."

Reforging Pilots

Reforge will reduce the time it takes to complete Initial Tactical Training, producing mission-ready pilots up to a year earlier.



SMALLER.
FASTER.
STRONGER.

Meet the all new SimpliSafe.
It's smaller, faster, stronger than ever.
Engineered with a single focus: to protect.
With sensors so small they're practically invisible.
Designed to disappear into your home
And blanket it with protection.
More than easy to use—downright delightful.
All at prices that are fair and honest.
It's home security. Done right.

"Best overall home security system of 2020"

U.S. NEWS & WORLD REPORT
MARCH 2020

"...SimpliSafe belongs at the top of your list..."

CNET EDITORS' CHOICE
3/28/18

"A seamless system"

PCMAG EDITORS' CHOICE
4/2/18

SimpliSafe™

AFA Members exclusive offer
at SimpliSafe.com/AFA

AIR FORCE ASSOCIATION

Time to Rethink Roles and Missions?

Some see a need for revisions, but leaders aren't there—yet.

Mass Communication Specialist 3rd Class Darienne Slack/USN

On Andersen Air Force Base, Guam, a Navy Poseidon P-8, left, waits for an Air Force E-8 Joint STARS to take off during Valiant Shield on Sept. 17, 2018. Valiant Shield is a biennial field training exercise focusing on joint training in a blue-water environment.

By Rachel S. Cohen

Military roles and missions are largely defined by domain: the Army handles ground combat, the Air Force and Space Force manage air and space operations, and the Navy and Marine Corps run sea and amphibious missions. But, it's hardly clear-cut in reality. Each of the services own manned and unmanned aircraft, play offense and defense in cyberspace, and interface with space assets. The Army owns ships, the Navy operates land-based aircraft, and everyone has their own logistics. Overlap is almost everywhere.

The 1948 Key West Agreement, which defined roles and missions in the aftermath of World War II, and the 1986 Goldwater-Nichols Department of Defense Reorganization Act, which redefined the service chiefs as responsible for training, manning, and equipping their forces and the regional combatant commanders for warfighting in their theaters, provide the guidelines under which the modern defense enterprise operates. But as the concept of jointness is shaped by ongoing operations, emerging technologies, and evolving threats, roles and missions have not necessarily kept pace.

In particular, space and cyber operations have spread across the services, which is one reason why Congress and the Pentagon elected to establish the Space Force as an independent service within the Department of the Air Force nearly one year ago.

As the Pentagon budget hovers around $700 billion, the services lament they lack the resources to handle their workload. Is DOD now stretched too thin to maintain so many duplicative efforts?

"Now is the time to reconsider our approaches to air power," Air Force Chief of Staff Gen. Charles Q. Brown Jr. said during his Senate confirmation hearing in May. "I am ready to participate in a meaningful discourse to rethink prior assumptions and take steps toward consolidating and reducing redundancies."

"It has been said that the United States has four air forces, and while that's ironic, it also shows the value of the air to modern combat operations."
—Air Force Chief of Staff Gen. Charles Q. Brown Jr.

There have been several prior attempts to rethink roles and missions. The 1993 Bottom-Up Review was intended to be a no-holds-barred review designed—in the wake of the Cold War— to shake loose a "peace dividend" to taxpayers by casting aside duplicative investment. That was followed by an independent, yearlong Roles and Missions Commission that began its work in 1994. Subsequent Quadrennial Defense Reviews also debated roles and missions, with particularly heated debate regarding overlap in space, close air support, and base defense. In all three cases, little changed.

Now current and former Pentagon officials are again arguing a reboot is warranted and that another bipartisan Commission on Roles and Missions is needed. Others prefer an informal debate. What both sides agree on, however, is that it should matter less which service owns a given mission than how to best accomplish it.

Brown, the newest member of the Joint Chiefs of Staff, said some overlap is necessary, but not all.

"It has been said that the United States has [at least] four air forces, and while that's ironic, it also shows the value of the air to modern combat operations," Brown said. "Some redundancies make sense given the strategic environment, but I agree that there are redundancies that detract from both efficiency and effectiveness of the joint force."

Air Force Gen. John E. Hyten, now Vice Chairman of the Joint Chiefs of Staff, objected to another roles and missions review in an Air Force Magazine interview (See "Q&A: The Joint Focus," p. 14). "Each service is going to develop the capability to defend themselves

Maj. Cody Chiles

Navy Lt. Cmdr. Michael Brock, USAF Master Sgt. Anamelie Salvador, and USMC Staff Sgt. Brian Day review sensor data from the Theater Watch Chief console within the Combined Space Operations Center at Vandenberg Air Force Base, Calif.

with missile defense capabilities, air defense capabilities, and also develop the capabilities to conduct long-range strike if required," he said. "The key will be, in the command and control structure … to be able to integrate all those together so the battlefield is seamless. We've never done that before except by drawing lines, but the lines are going to go away. This is the big challenge as we go forward."

A full-scale review scares people because of the daunting breadth of what it could yield: altering specialized training enterprises, disrupting service cultures, losing control of certain operations, and more. Smaller steps are more easily achieved.

"What we could review is a thorough look at each of the services' core competencies and make sure that we're aligned with those," offered retired Gen. John P. Jumper, who was Air Force Chief of Staff from 2001 to 2005. "There have been some adjustments suggested over the years that we could take in sort of baby steps, rather than trying to separate the ingredients from the cake and try to bake the cake again."

JOINT THINKING

Roles and missions have not remained static since 1947. New commands and new technologies have emerged over time, spawning new capabilities and debates over missions and requirements. New, joint operational commands created in recent years include U.S. Northern Command, responsible for protecting the domestic United States; U.S. Cyber Command, responsible for operations in cyberspace; and U.S. Space Command, responsible for joint space operations. In each case, the services all contribute people and capabilities to the mission.

Conceptually, these joint commands are built on a model where commanders select the best capability for accomplishing any given combat objective—regardless of which service provides it. In practice, however, interservice rivalries, lack of communication and understanding across services, and reliance on the tried and familiar make it hard to break long-established patterns.

The rise in interest in joint all-domain command and control (JADC2), an Air Force concept that has caught on across the services, may spill over into the roles and missions debate as it matures into a real-life means of waging war. Under JADC2,the entire Defense Department would be connected through a massive new data network that could share information in real time and use automation to help route target data and solutions to whatever platform is best suited to the given strike. Theoretically, the Pentagon's entire inventory could be wielded more broadly.

If the idea works, it could move the armed forces away from their territorial tendencies and eliminate some bureaucratic bumps from combat.

Gen. David L. Goldfein, who retired as Air Force Chief of Staff in August after four years in the post, recently noted the Air Force is leading JADC2 networking development while the Navy is working on global strike concepts and the Army handles logistics.

"Joint command and control is an emerging mission area that has not been well-defined or assigned to the services," said Todd Harrison, director of the Aerospace Security Project at the Center for Strategic and International Studies. "To make real progress on building a joint architecture that allows forces to share ISR and C2 resources in a contested environment, a lead service needs to be assigned that owns this mission area."

JADC2 could help define not only warfare, but a whole new approach to weapons development. By focusing on the enabling technologies used to unleash and coordinate weapons, rather than the weapons themselves, it points to a more flexible approach to warfare. The Pentagon and Congress should get away from their "fixation on weapon systems," Jumper said—echoing other current leaders—and instead shape truly joint warfighting plans tailored to specific theaters and potential contingencies.

"If you haven't decided how you're going to fight," Jumper said, "how do you know what to go buy to fight with? That leads to this mentality of, 'Let's just go out and replace what we have right now.'"

That approach gets incremental improvements rather than revolutionary change. "What you tend to get is sort of a Block 50 improvement to the Block 40," according to Jumper. "There's no incentives out there to create a whole new way of doing missions."

For example, Jumper questioned why the Air Force isn't pursuing stealthier or perhaps unmanned tankers, in order to reduce tanker vulnerability close to enemy territory. The Navy, meanwhile, has made progress with the Boeing-built MQ-25 Stingray unmanned tanker. While still in development, Boeing is under contract to build seven of the stealthy UAVs.

Jumper acknowledged that the pressure to make do through constant combat operations can make it hard to invoke such changes, but also noted that operations provide an ideal evolving laboratory for demonstrating new capabilities and testing new ideas. As JADC2 moves ahead, commanders will have the opportunity to put new tools to the test and see which emerging capabilities are most useful before buying.

Meanwhile, the Joint Requirements Oversight Council (JROC), chaired by the Vice Chairman of the Joint Chiefs of Staff, remains the central shaping organization with authority to sort out weapons programs that help fulfill the services' roles-and-missions obligations. The JROC will be responsible for greenlighting those programs that easily connect to each other and to flag those programs that seem out of sync with the rest.

SPACE DOMINANCE

Space operations present a particular opportunity, given the launch of the new Space Force. Carving out space from the Air Force without also extracting the space components from the

other services won't achieve the objectives Congress had for creating the new force in the first place. But as DOD and Space Force officials wrestle with the issue, they're also concerned about unintended consequences and breaking parts that are working well now.

For example, the Army could turn over its ballistic missile tracking work, and the Navy could hand off its own satellite communications operations. But Harrison said the Space Force must take the bulk of space activities.

"The other services can certainly keep some forces that specialize in supporting space operations to help integrate space with terrestrial operations, but space missions should be the exclusive domain of the Space Force," Harrison said. "We should not make the mistakes we made when the Air Force was created that left us with four air forces."

Harrison argues it might be time for the Air Force to hand off its nuclear intercontinental ballistic missiles to the Army, spreading the nuclear triad across all three service departments. ICBMs would fit into the Army's long-range fires portfolio, he said, as well as technology designed to protect against ballistic missile attacks. The Army could likewise fold Air Force missileers into its own missile career field.

"In the 1950s, it made sense because space launch was closely tied to ICBM development, but that is no longer true," Harrison noted. "The closest other mission we have to the ICBM mission is Ground-Based Midcourse Defense [anti-missile system], which resides in the Army. That system has silo-based missiles that operate on a constant 24-hour alert status."

Retired Lt. Gen. David A. Deptula, dean of the Mitchell Institute for Aerospace Studies and a former Air Force deputy chief of staff for intelligence, surveillance, and reconnaissance, worked on multiple roles and missions reviews while on Active duty. He told Congress in 2015 that creating a Space Force could eventually spell an end to the Missile Defense Agency (MDA), as well.

"The promise of a Space Force that consolidates functions that predominantly involve operations in space is fundamental to the rationale for the Space Force in the first place," he said in a July 2020 interview. "The responsibilities of the MDA would seem to fall in that job jar."

Similarly, lawmakers have raised concerns about potential conflict between the Space Development Agency (SDA), which will eventually move into the Space Force, and the Missile Defense Agency, as both pursue a varety of space-based missile tracking and warning tools.

Those closer to these agencies see them as complementary, rather than competitive, with SDA focused on moving faster with input from commercial industry and MDA focused on longer-term projects. But critics counter—that bureaucracy will only stifle the innovation promised by SDA and the Space Force.

Goldfein recently endorsed the idea that long-range strike could be an area where budget constraints could force the Defense Department to limit investments from services other than the Air Force.

The Air Force has long been the primary provider of long-range strike options, complemented by the Navy's sea-based ballistic and cruise missiles and tactical aviation. Traditionally, the Army's range is short, inside a few hundred miles, and Navy Tomahawk cruise missiles are good only to about 1,500 miles. For longer-range targets, the Air Force is best-equipped to strike targets from afar. Yet with the National Defense Strategy highlighting the need to counter China across the vast Indo-Pacific theater, as well as Russia in Europe, the Pacific and the Arctic, both the Navy and Army are investing in longer-range capabilities. New weapons such as the Long-Range Anti-Ship Missile and Precision Strike Missiles are under development.

Senior Airman Clayton Wear

An unarmed Minuteman III ICBM during a developmental test on Feb. 5 at Vandenberg Air Force Base, Calif. The advent of Space Force has made roles and missions questions more urgent.

Jumper argues long-range strike should remain an Air Force mission, urging defense officials to take a closer look at whether the Navy and Army weapons now under development are truly necessary.

The military has 100 ways to kill a fixed target, he argues. Where it needs to improve is finding the best way to rapidly find, track, and take out mobile and fleeting targets, whether incoming ballistic missiles, enemy aircraft, or insurgent forces.

"Why don't we do a [concept of operations] that talks about deep strike and the various ways that we are able to do it right now, and see what capabilities we're missing?" Jumper asked. "If we are missing capabilities, that's when you turn around and look at things like hypersonics."

The Defense Department plans to invest about $2.9 billion developing hypersonic weapons technology in fiscal 2021, Breaking Defense reported in April. More than $1 billion of that is for the Navy's submarine-launched Conventional Prompt Strike weapon.

"Hypersonics offer new opportunities, but have we ever asked ourselves the question, where does it fit?" Jumper said. "Is it just another way to hit fixed targets? Is it able to deal with the most difficult situations we have out there, like mobile targets? What do hypersonics actually do for us?"

Hypersonics are an answer to a problem, not a mission unto themselves, Jumper said. "It's a question we owe ourselves before we dive into trying to say something which I think is not very smart, like 'Who's got the hypersonics mission?' There's no such thing. Because hypersonics is a means to an end."

C4ISR

While convincing the services to do away with overlapping legacy aircraft may be harder than assigning new weapons to one of the armed forces, the intelligence, surveillance, and reconnaissance portfolio could be an easy place to start.

For example, the Air Force, Navy, NATO, and other foreign countries all have platforms similar to the RQ-4 Global Hawk. Perhaps, as Brown suggested earlier this year, the Air Force no longer needs to provide that capability. Or perhaps, as Harrison suggests, the Navy could cede its MQ-4 Broad Area Maritime Surveillance mission to the Air Force, which along with the Navy owns other comparable assets: The Air Force's E-8C Joint STARS tracks targets on the ground, while the Navy's P-8 Poseidon does the same job at sea.

Jumper recalled trying to reach agreement with the Navy in the early 2000s to deconflict overlap in signals intelligence. USAF RC-135 Rivet Joint planes were starting to get old, and the Navy was developing the P-8s to replace its P-3 Orions. The Air Force tracked signals on the ground and the Navy tracked signals from ships and submarines, but the underlying objectives were the same.

"If you went around to the bases around the globe, you'd see Navy P-3s and Air Force Rivet Joints sitting side by side on the same ramp, doing the same mission," Jumper said. "We were going to have—as far as I was concerned—U.S. Air Force painted on one side of the airplane and U.S. Navy on the other, and mixed crews inside."

The two services never overcame their differences, and the idea fell through.

"I thought we could probably reduce the fleet required to do that mission by 15 or 20 percent, in order to get the job done in a joint way," Jumper said.

BASE DEFENSE

The Iranian missile attack on Iraq's al Asad Air Base in January highlighted another issue of pressing concern to Airmen: Who's responsible for defending air bases from attack? The Air Force is in charge of defending its own installations overseas, after ending an agreement with the Army to protect USAF facilities.

Last year, Brown suggested mounting a new roles and missions study to look at whether the Air Force should take on base defense. Handing the issue to USAF could "better defend the fence line against all threats from small [unmanned aerial systems], all the way through hypersonics," he said.

Each of the armed forces is now pursuing technologies to defend against small drones and swarms of drones using lasers, microwave weapons, and kinetic solutions like guns. While the Army has the lead for countering small unmanned systems, the Air Force is pursuing more powerful variants to defend against incoming cruise missiles.

For these more advanced threats, the Mitchell Institute's Deptula argues it may be time to transfer the Army's Patriot air defense system to the Air Force.

"It is time for a review of which service has the greatest [assets] at stake [and] is reliant on the Patriot for protection," Deptula said in July. "Since the Army has abrogated their Key West Agreement-assigned role of the air base defense mission, it may also be an appropriate time to reconsider at least a shared responsibility and ownership of Patriot missile systems."

Meaningful mission reform won't come from the bottom-up, however. For that to happen, it will require a concerted push from leadership, Harrison said, perhaps with a strong nudge from Congress.

"To make this work, it needs to be the priority of the SecDef," he said. "Without the personal involvement and leadership of the Secretary, the services will continue to stifle this conversation and protect the status quo."

Flexing In the Arctic

USAF warms to a new strategy and increased competition in the vital polar region.

By Amy McCullough

Capt. Brian Hudanich, a B-2 pilot assigned to the 509th Bomb Wing, took off from Whiteman Air Force Base, Mo., June 18 for a 25-hour, two-ship bomber sortie across the Atlantic Ocean. They flew north of the Arctic Circle, met up with a KC-135 from the 100th Air Refueling Wing at RAF Mildenhall, U.K.—refueled, rendezvoused with two Norwegian F-35 strike fighters off the coast of Norway for interoperability training, and returned home—all without ever seeing the sunset.

No B-2 Spirit ever flew so far north.

It was the second time in three months the nuclear-capable bomber flew in the Arctic, and one of at least five missions U.S. strategic bombers conducted with Norway between March and June.

"The Arctic is a strategic region with growing geopolitical and global importance," explained Gen. Jeffrey L. Harrigian, U.S. Air Forces in Europe and Air Forces Africa commander. "These Bomber Task Force missions demonstrate our commitment to our partners and allies and our capability to deter, assure, and defend together in an increasingly complex environment. The integration of our bombers across Europe and the Arctic is key to enhancing regional security."

The increasingly congested and contested Arctic region is only becoming more important. Russia is building up its military presence in the region; China, though it has no territorial claim there, presents itself as an Arctic nation as the receding polar ice cap opens up sea lanes and opportunities for oil and mineral exploration. Climate change also creates the potential for increased rescue operations, said Air Force Secretary Barbara M. Barrett, during a virtual rollout of the Department of the Air Force's first-ever Arctic Strategy on July 21.

Among the U.S. military assets in the region, 79 percent belong to the Air Force and Space Force, including two large bases in Alaska and a string of remote radar and early warning sites spread throughout Alaska, Canada, and Greenland. Yet, most Americans are unaware of the department's Arctic role.

"Given the Arctic's vast distances and challenges to surface operations, air and space capabilities have long been essential to gain rapid access and provide all-domain awareness, early warning, satellite command and control, and effective deterrence," the new strategy states. "Offering a solid foundation on which to build and project power across the region, the Department of the Air Force is the most active and invested U.S. military department in the Arctic."

The strategy has four main pillars:

- Power projection
- Cooperation with allies and partners
- Vigilance in all domains
- Preparedness.

Alaskan air bases are key launching points not only for Arctic defense across the polar ice cap but also to critical areas in the Pacific and Europe. Joint Base Elmendorf-Richardson (JBER),

An E-3 Sentry, two F-22 Raptors, and two F-35A Lightning II aircraft fly over Alaska May 5 in a Total Force exercise in support of a free and open Indo-Pacific region.

Tech. Sgt. Jerilyn Quintanilla

Alaska, which hosts F-22 Raptors and E-3 Sentry Airborne Warning and Control System (AWACS) aircraft, supports U.S. Indo-Pacific Command and U.S. Northern Command. The base also hosts C-12s, C-130s, HC-130s, HH-60Gs, and the Alaskan Rescue Coordination Center. Eielson Air Force Base, only about 100 miles from the Arctic Circle, is home to USAF's northernmost fighter wing. It is currently bedding down the first two F-35 squadrons in Pacific Air Forces—USAF's second and third operational Joint Strike Fighter squadrons—and it also hosts F-16 aggressors, Air National Guard KC-135s, and the Arctic Survival School.

"If you take the globe and you spin it up on end, it really provides you a unique power-projection location where you can reach places into Europe, to all of North Asia, and then of course into the East Asia area, so I think that's of course very, very, critical," said Col. Shawn E. Anger, commander of the 354th Fighter Wing at Eielson. "You could draw an eight-hour aircraft flight mark from our installation, and you can reach some of our most strategic locations, places that the National Defense Strategy calls out specifically as great power competition."

Those same attributes make Arctic shipping lanes cost-effective routes for Chinese firms transporting goods across the globe, cutting weeks off some delivery times, as well as to potential adversaries that could seek to exploit the polar region to reach the U.S. homeland.

Lt. Gen. David A. Krumm, who as head of Alaskan Command is the most senior military officer in Alaska, is responsible for defending against such incursions. The North American Aerospace Defense Command intercepted Russian aircraft off the coast of Alaska at least 10 times in the first half of the year. Most of the intercepts of Russian bombers, fighters, and maritime patrol aircraft occurred in June.

"If you go back in history, Russia has always operated with long-range aviation and out-of-area flights that come into our Air Defense Identification Zone," Krumm noted. "We see that as a continuation of those efforts in the past," said Krumm. Why the increase in flights now? "It could have been … more training was required after some COVID-19 issues that struck all over the world. Regardless, we've always been able to, and ready to, intercept and defend our borders."

F-22s from Elmendorf, supported by E-3 AWACS and KC-135 tankers, responded to the Russian flights and the addition of F-35s will reinforce U.S. defenses there, Krumm said. Once the beddown is complete, Alaska will have "the largest concentration of operational fifth-generation capability in the world."

The new Air Force strategy calls on the Department of the Air Force to work with the other services to "develop Arctic basing concepts that complicate enemy targeting systems." USAF will not be "constrained to the Cold War model of employment," but instead distribute air assets more widely. Rather than operating from a few large bases, Arctic defense forces will adopt Agile Combat Employment, frequently repositioning assets to different locations. Developed in response to anti-access strategies in the Pacific that seek to put America's forward bases at risk, U.S. European Command is also adopting the concept. Distributing forces unpredictably makes planning attacks and counterattacks on U.S. forces more complicated. The problem—for now—is that the U.S. lacks sufficient infrastructure in the polar region.

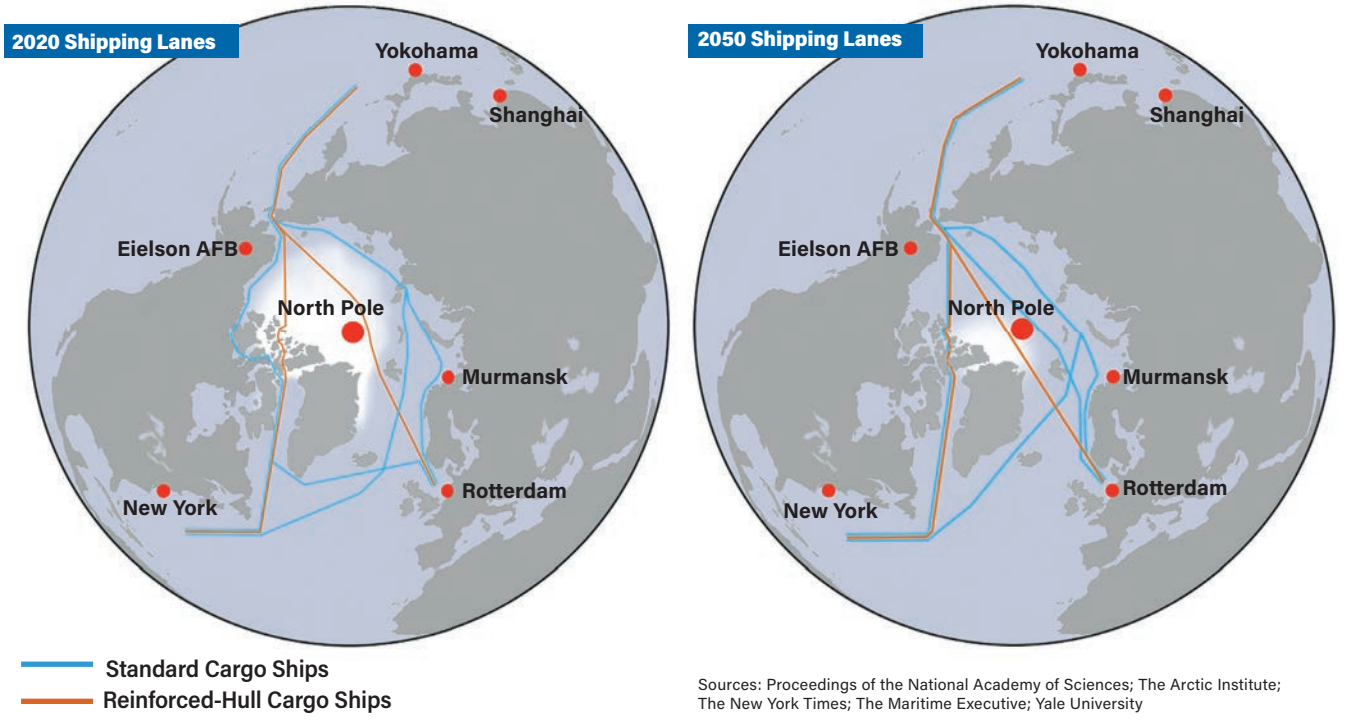
"In the North American Arctic, some of that [infrastructure] is from the Cold War-era. Obviously, we still have those large infrastructure bases … such as JBER, Eielson, and Thule [Air Base, Greenland], but the Finnish, their ability to use the disbursed basing and land on highways, etc., that's a totally different operating model," said the strategy's author, Iris Ferguson, who also serves as the senior adviser to the Department of the Air Force's deputy chief of staff for strategy, integration, and requirements. "We certainly have been working with our

Airman 1st Class Aaron Guerrisky

Lt. Col. Russell Reese briefs Secretary of the Air Force Barbara Barrett on the Joint Pacific Alaska Range Complex (JPARC) during her visit to Eielson Air Force Base, Alaska, July 7.

The Future of Arctic Transit

Continued Arctic warming could open new shipping lanes, allowing standard cargo ships and those with ice-breaking capability to save time and money transiting the northern trade route. During the summer, Arctic sea ice is at its thinnest and researchers believe that a transpolar shipping route over the North Pole might be possible by mid-century.



Mike Tsukamoto/staff

Sources: Proceedings of the National Academy of Sciences; The Arctic Institute; The New York Times; The Maritime Executive; Yale University

allies to ... co-use locations, whether that be in the European theater or in Canada. ... There's a lot that exists there, but I think we're still in the early stages of developing this kind of agile combat land for the region."

Barrett said the Air and Space Forces will improve weather forecasting, communications, and threat detection and tracking. The strategy notes, for example, that a new Long-Range Discriminating Radar at Clear Air Force Station, Alaska, "provides persistent long-range, mid-course discrimination, precision, and tracking of missile threats." U.S. forces co-own with Canada the North Warning System, which stretches from Barrow, Alaska, in the north, to Labrador to the east.

Built in the late 1980s and early 1990s, the North Warning System "has done a spectacular job," Ferguson said, but as the range and precision of adversaries increases, the system has been pressed to its limits. Air Combat Command and its Canadian counterparts are evaluating modernization alternatives now.

"The Department of the Air Force is enhancing existing defenses and embracing new air and space technologies," said Barrett. "Our commitment to collaboration with our Canadian allies remains strong as we reinvigorate aging warning systems that benefit our mutual security."

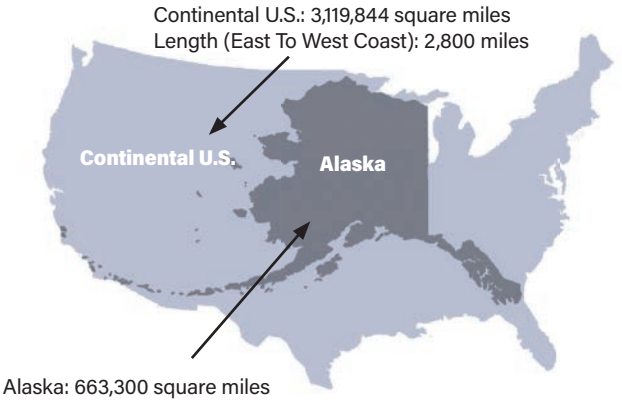
The new investment will contribute to joint all-domain command and control, which will integrate missile warning, space, and air capabilities into a single network, promised then-USAF Chief of Staff, Gen. David L. Goldfein, at the strategy's rollout.

"As we look at the future of warfare, data will be the currency that we operate on with allies and partners," Goldfein said. "The investment strategy you've seen the Air Force bring forward ... is focused on this integration of capabilities. ... We're focused on highways, not so much on trucks. And so, how we get these highways built—how we build a network that we can operate seamlessly on—[that] is where you're going to see most of our investment."

The joint force will develop an Arctic communications roadmap to evaluate existing capabilities and emerging technologies, the strategy says. But it must do so, according to Chief of Space Operations Gen. John. W. "Jay" Raymond, in the face of new challenges in space. In short, the United States can no longer assume space superiority.

"China has really gone from zero to 60 in space, very quickly, and they are developing a robust set of capabilities for their own use to provide them the same advantages that we've enjoyed over the years," said Raymond. "They're also developing a robust set of capabilities that threaten our access to space in the Arctic at both Clear Air Force Station and Thule Air Base [in Greenland]. Those missile warning radars also provide space domain awareness for understanding what's going on

How Big Is Alaska?



Mike Tsukamoto/staff

Sources: USAF, USGS

Master Sgt. Jaclyn Lyons

A ski-equipped LC-130 Hercules participates in Exercise Arctic Eagle 2020 on March 8. Arctic Eagle is an unclassified joint, interagency, intergovernmental, and multinational exercise series.

in that domain, and we are going to continue to invest and modernize those capabilities to make sure that we have a really good understanding of the capabilities that are being lost and operated in that domain."

COOPERATIVE EFFORT

There are eight Arctic nations including the U.S. The United States has strong defense ties to six: Canada, Denmark (including Greenland), Iceland, and Norway (all NATO members); as well as Finland and Sweden, both NATO Enhanced Opportunity Partners. Russia is the eighth.

"Interoperability is especially critical in the Arctic region," the strategy says. "Through the centuries, regional allies and partners have developed concepts, tactics, techniques, and procedures from which the joint force can greatly benefit." Further enhancing those opportunities: Norway and Denmark are also buying F-35s.

"By having our partner nations and our allies with that airplane, we can almost effortlessly integrate and really enhance our combat capabilities and capacity," Krumm said. "It is a key cornerstone of our interoperability with our allies."

PREPARATION

U.S. Northern Command boss Gen. Terrence J. O'Shaughnessy often says you cannot be successful in the Arctic if you don't prepare. With temperatures that can dip to minus 60 degrees Fahrenheit, mistakes can be fatal.

Senior Airman Beaux Hebert

Staff Sgt. Zachary Rumke, an Arctic Survival School instructor, tests an F-35A survival gear kit in Fairbanks, Alaska, Nov. 5, 2019. He sat in minus 65 degree temperatures for six hours to test the new gear that could be used to protect F-35 pilots from subzero temperatures in the event of an ejection.

"The environment's always trying to kill you in the Arctic," said Maj. Tyler Williams, commander of USAF's Arctic Survival School. "This isn't something you can go read in a book or watch a YouTube video about and then go out and be successful in. You have to get training, you have to know how your gear is going to respond, you have to know how you're going to respond not only to the cold weather conditions, but also to the dark environment—there's a psychological aspect to it."

The Air Force has offered Arctic survival training since its inception in 1947 and the school—often referred to as "Cool School"—has been based at Eielson since 1960. It can train as many as 780 students a year, with its primary emphasis teaching Alaska-based aircrew how to survive in the Arctic environment long enough to be rescued. Williams said the school also trains members of the Army, Navy, Coast Guard, and government civilians, as well as law enforcement and international students. Classes are offered October through March. "The colder, the better, I suppose," Williams said.

In addition to the Cool School, 11th Air Force has been developing a plan over the last 18 months to "professionalize Arctic service," Chief Master Sgt. David R. Wolfe, senior enlisted adviser of the Alaskan NORAD Region and Command Chief Master Sergeant of 11th Air Force, told Air Force Magazine.

Alaska-based Airmen can now earn an Arctic leadership identifier after working on station for a year and completing certain academic coursework. The identifier will help when leaders need to find Airmen with specific Arctic skills and experience. For example, what if a cruise ship ran aground and USAF was called in to get passengers off that ship?

"Who are the people in the Air Force that have the experience to do that?" Wolfe asked. "Now, obviously, since we have a lot of people stationed here, we can pull from that pool of available folks locally, but what if the situation was overwhelming the number of people we needed, and we needed to bring people up from the lower 48? We would be able to identify who has an Arctic background, and very easily ... send folks in."

Wolfe said the identifier will also help out small teams of Airmen operating at very remote locations. For example, if USAF sends a communication team up to Barrow, in the northern tip of the state, to work on one of its radar sites, "We want somebody on that team to have that Arctic leadership identifier, so that they can help our folks stay safe and come back—you know, with all the fingers that they left with." ✪

An F-35A flies near Al-Tanf Garrison, Syria, on April 10, 2019. The jet, from the 34th Expeditionary Fighter Squadron, conducted a show-of-force flight to protect U.S. forces at the remote base as part of the fight against the Islamic State group.

Staff Sgt. William Howard/USA

Combat Tested

The F-35A still isn't in full production, but it's proving its effectiveness daily.

By Brian W. Everstine

F-35As and Airmen with the 34th Fighter Squadron were flying in a Phase II exercise at Hill Air Force Base, Utah, in October 2019 when the order came.

"I got recalled by the command post while I was airborne to return to base and land," recalled Lt. Col. Aaron Cavazos, commander of the 34th Fighter Squadron. "As a commander, that normally means somebody got hurt or we're being deployed. It ended up being that we were heading out for AFCENT (Air Forces Central Command) on a short-notice tasking. A couple weeks later, we had people flying combat sorties."

Hill is the Air Force's only operational F-35 base in the continental U.S." Eielson AFB, Alaska, recently received F-35s. Hill's two fighter wings—the Active-duty 388th and the Reserve 419th—have had F-35s flying combat operations in the Middle East consistently since April 2019, with the 421st Fighter Squadron taking over after the 34th left in June 2020, resuming the fifth-generation role in theater as F-22s headed home for much-needed maintenance in early 2019.

"We proved that with the F-35, we can carry out a variety of mission sets."
—Lt. Col. Aaron Cavazos, commander of the 34th Fighter Squadron

The deployments have evolved from primarily focusing on airstrikes and close air support in the fight against Islamic State group, to protecting U.S. naval assets in the Persian Gulf and flying deterrence missions as tensions increased with Iran—missions more aligned with the aircraft's unique capabilities.

"We proved that with the F-35, we can carry out a variety of mission sets," Cavazos said of his unit's deployment. "The requirements in CENTCOM go from close air support, all the way to opposed offensive and defensive counterair and maritime support in the swing of a single day. You have to be ready for everything. We were doing everything from strafing in close air support, which wouldn't normally compute in your brain with the capabilities a fifth-generation fighter brings, to running maritime escort for carrier strike groups."

RISING TENSIONS

In the early hours of Jan. 8, Iran launched more than a dozen ballistic missiles at U.S. bases in Iraq, with the bulk striking al Asad Air Base where more than 100 troops suffered traumatic brain injuries. The strike was in retaliation for a U.S. drone attack

in Iraq that killed Iranian Maj. Gen. Qassem Soleimani, commander of Iran's elite Quds Force and an architect of proxy attacks throughout the Middle East. After the attack, Iranian forces allegedly tracked six U.S. F-35s near Iran's borders, spooking air defense crews to the point that one crew shot down a Ukrainian civilian airliner by accident.

Just six months before, Iran shot down an American RQ-4A Global Hawk BAMS-D (Broad Area Maritime Surveillance-Demonstrator) remotely piloted aircraft over the Strait of Hormuz, where it was flying reconnaissance for U.S. vessels in the region. Soon after, the U.S. military prepared to respond with strikes on Iran, but that strike was abruptly called off at the last moment by President Donald J. Trump.

"It is no surprise that the aircraft were deployed during periods of heightened tension within the Middle East," said Brig. Gen. David W. Abba, the director of the Air Force's F-35 Integration Office. "All I can tell you is that our aircrew and our jets were ready to respond on a moment's notice."

The public deployment of the F-35, and AFCENT's public discussion of how it is using its air power, shows growing confidence in the aircraft. Although USAF F-35s had been deployed consistently for 15 months, it wasn't until July that F-35s went on alert status in theater. Until then, F-35 sorties were operating only as part of the air tasking order out of the Combined Air Operations Center—strikes or combat patrols planned in advance with a clear mission. Now, after proof-of-concept exercises, F-35s are ready at a moment's notice to respond to immediate threats.

"This hasn't been done before with F-35s and operational control, or at [Al Dhafra Air Base, United Arab Emirates] with F-35s," Lt. Col. Stephen Redmond, commander of the squadron, said in an announcement. "It effectively adds another capability or tool in leadership's toolkit for how to deter, defend, or respond to events in the region."

CENTCOM boss Marine Corps Gen. Kenneth F. McKenzie Jr., described the command's posture in June as "... designed to deter Iran from acting either indirectly or directly against United States, partner, or coalition forces in theater." The aim, he added, is "to convince them that, should they contemplate some malign activity, the cost of doing so would be greater than any object they might achieve by carrying out that action."

F-35s have also proved to be effective bombers against the Islamic State group. During the 4th Fighter Squadron's deployment, from April to November 2019, the unit flew 1,300 combat sorties, totaling about 7,300 combat hours, and deployed about 150 weapons with no malfunctions.

"Really remarkable," Abba said. "We didn't have any bad bombs that were attributable to either aircrew error or to weapon system malfunction."

Within two weeks of arriving at Al Dhafra in 2019, the jets attacked an IS group tunnel network with Joint Direct Attack Munitions. By comparison, F-22s were introduced in the Middle East five years before conducting their first strike, Abba said.

In September 2019 the 4th Fighter Squadron's F-35s joined F-15Es in a massive strike, dropping more than 80,000 pounds of bombs on the IS forces in Qanus Island in the Euphrates River.

On another mission on an undisclosed date, two F-35As flying on an air tasking order sortie in the region sensed a surface-to-air missile system from "really far away," Abba said. The pilots were able to geolocate it and take a radar map of its location for targetable coordinates. Although they did not strike it that day, the data was passed along to command and control and the Intelligence Community. Abba calls this "drive by ISR."

Senior Master Sgt. Ralph Branson

Airmen of the 34th Expeditionary Fighter Squadron prepare to launch an F-35A Lightning II on March 9, at an undisclosed location in Southwest Asia.

"The ability of this aircraft to find targets of value even when that's not what it was specifically tasked to go after is absolutely remarkable," Abba said.

Readiness also impressed Abba. The 4th Fighter Squadron's maintainers managed a 70 percent mission capable rate at first for the squadron's 12 Lightning IIs, but improved over time.

"They brought a truly representative set of maintainers that finished that deployment over 90 percent," Abba said.

That's particularly impressive given the challenges maintainers have had overall with the F-35. In 2019, the fleetwide mission capable rate for F-35s was 61.6 percent, about 10 percent lower than legacy fighters.

When the 34th replaced the 4th in October, the unit split its aircraft between Al Dhafra Air Base in the United Arab Emirates and an undisclosed location for about three months. It was the F-35's first-ever sustained agile combat deployment.

"It gave us the ability to project power across thousands of miles and numerous countries from a single fighter unit," Cavazos said. "This has numerous implications to every single combatant command."

Major bases such as Al Dhafra and others in Qatar, Kuwait, and Saudi Arabia, are known entities and other countries expect USAF forces to operate there.

"They know it. We know it," Cavazos said. Being able to operate from austere locations adds "unpredictability against potential adversaries" to commanders' options. "Now we proved we can be more agile. That principal can carry over operationally to other regions and any potential adversaries there. We took away some lessons, and we're only going to get better at it."

Like the 4th before it, the 34th kept its planes flying, not dropping a single sortie due to maintenance during the deployment, said Capt. Susan McLeod, the officer in charge of the 34th Aircraft Maintenance Unit.

That wasn't easy, said Senior Master Sgt. Westley Calloway, the lead production superintendent with the 34th Aircraft Maintenance Unit. "We had to think creatively to solve logistics and communication challenges, because in a lot of ways, we're writing the playbook. But once those

Senior Master Sgt. Ralph Branson

Airmen prepare to launch F-35 Lightning IIs on April 16 in Southwest Asia. The 34th EFS is demonstrating the Rapid Unit Dynamic Employment, a fifth-generation concept which forward deploys a small team of aircraft, maintainers, and pilots who get the aircraft ready to fly.

chains are established, we were able to maintain the health of our fleet and complete every task asked of us."

The squadron returned home in May and early June and were replaced by Hill's newest unit, the 421st Fighter Squadron, which stood up just months before, in December 2019.

"This demonstrates the readiness of our Airmen, our weapons system, and the importance of both to the Air Force and our national defense mission," said Col. Steven Behmer, commander of the 388th Fighter Wing, when the squadron deployed.

While the F-35 has been cutting its teeth in combat in the Middle East, that's not the mission the Air Force envisions for the jet long-term, Abba said.

"We did not buy this aircraft for the Middle East fight ... this weapon system is optimized to the near-peer competition that is articulated in the National Defense Strategy," Abba continued. "Make no bones about it. This aircraft is the preeminent suppression and destruction of enemy air defenses platform, and that's what we need to optimize it for."

Hill's combat deployments are helping prepare for those more demanding missions, especially in terms of maintenance. In the combat environment, maintainers are under pressure to keep planes ready, and they continue to struggle with the jet's Autonomic Logistics Information System (ALIS)—a comprehensive, complex computer system intended to track flight data and maintenance information. Maintainers across the service have long complained the system is slow, buggy, and cumbersome, and the Government Accountability Office (GAO) reported in July that ALIS is even worse when deployed.

"Taking ALIS on a deployment can be challenging because the required hardware is bulky to transport, internet connectivity is frequently limited, and significant advanced planning is required," the GAO wrote.

ALIS will be replaced beginning late this year with a new system, the Operational Data Integrated Network, developed cooperatively by the Air Force's Kessel Run software coding group, the 309th Software Engineering Group, and Lockheed Martin.

For operators, it will be a boon. "What we're focused on is minimizing touch points ... to do things like accelerate combat turn times, so that we can get the aircraft back in the fight faster," Abba said. "We don't want the IT system supporting the aircraft to be the long pole in the tent for combat sortie generation timelines."

In a large-scale conflict, "we're going to need to generate more sorties more rapidly, with quicker turns for the airplanes, and more sorties in a day ... than we're seeing in the Central Command area of responsibility right now," Abba said.

Missions are also longer than originally anticipated.

"When we bought the airplane ... the sortie-duration requirement isn't that long," Abba said. "We weren't talking about flying seven-hour sorties in CENTCOM. And that's what we're doing. That creates its own unique challenges with pilot flight equipment, with comfort in the seat, and those kinds of things. And those are things that we're working through out there."

Even as they fly combat missions, F-35 testing continues and several deficiencies must still need to be addressed before full-rate production begins. As of December 2019, nine category one deficiencies—those that could cause injury or damage or loss of aircraft—remained. Another 861 category two deficiencies must also be resolved, a process that could take years.

The GAO report warned that even deployed aircraft don't meet the F-35 Joint Program Office's overall reliability and maintainability goals. Ultimately, they will need retrofits to fix the issues.

But for those who deployed with the F-35, their recent combat experience proved both the jets' and their own capabilities.

"We didn't leave anyone behind, and I had guys straight from the basic F-35 course who got to see live combat, see how joint operations work, and the unpredictability of warfare," Cavazos said. "This experience is only going to help them going forward. It was a confidence booster and that perspective will improve how they train back home.

"Operationally, we're becoming our own F-35 community. We aren't just a hodgepodge of pilots from other airframes anymore. It's really cool to have that experience with the younger guys in the squadron and see them progress on their first deployment." ✪

Master Sgt. Ralph Branson

F-35s are still working out reliability and maintainability issues, according to the GAO—all while continuing to fly combat missions. Experience in the cockpit and confidence in the aircraft will improve how training is conducted and guide the warfighter into leading a more lethal joint force.

Advertisement Sponsored by The Edwards Air Force Base Civilian-Millitary Support Group

A community organization supporting the Airmen, other Military Members and their Families at Edwards AFB

For more information visit: www.eafbcivmil.org

Aircraft of the 379th Air Expeditionary Wing and coalition counterparts stationed together in a deployed location in southwest Asia fly over the desert April 14, 2003. Aircraft include KC-135 Stratotanker, F-15E Strike Eagle, F-117 Nighthawk, F-16CJ Fighting Falcon, British GR-4 Tornado, and Australian F/A-18 Hornet.

Master Sgt. Ron Przysucha

A Better Way to Measure Combat Value

Conventional Measures Mask the True Cost of Operations—Cost-Per-Effect Does Not.

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

Lt. Gen. David A. Deptula, *USAF (Ret.) is the dean of the Mitchell Institute for Aerospace Studies.* ***Douglas A. Birkey*** *is the executive director of Mitchell. This article is adapted from the Mitchell Institute's research study, "Resolving America's Defense Strategy-Resource Mismatch: The Case for Cost-Per-Effect Analysis," which can be downloaded in its entirety at: www.mitchellaerospacepower.org.*

"While cost per flying hour is a common metric ... such measures are far from infallible."
—William LaPlante, former assistant secretary of the Air Force for acquisition

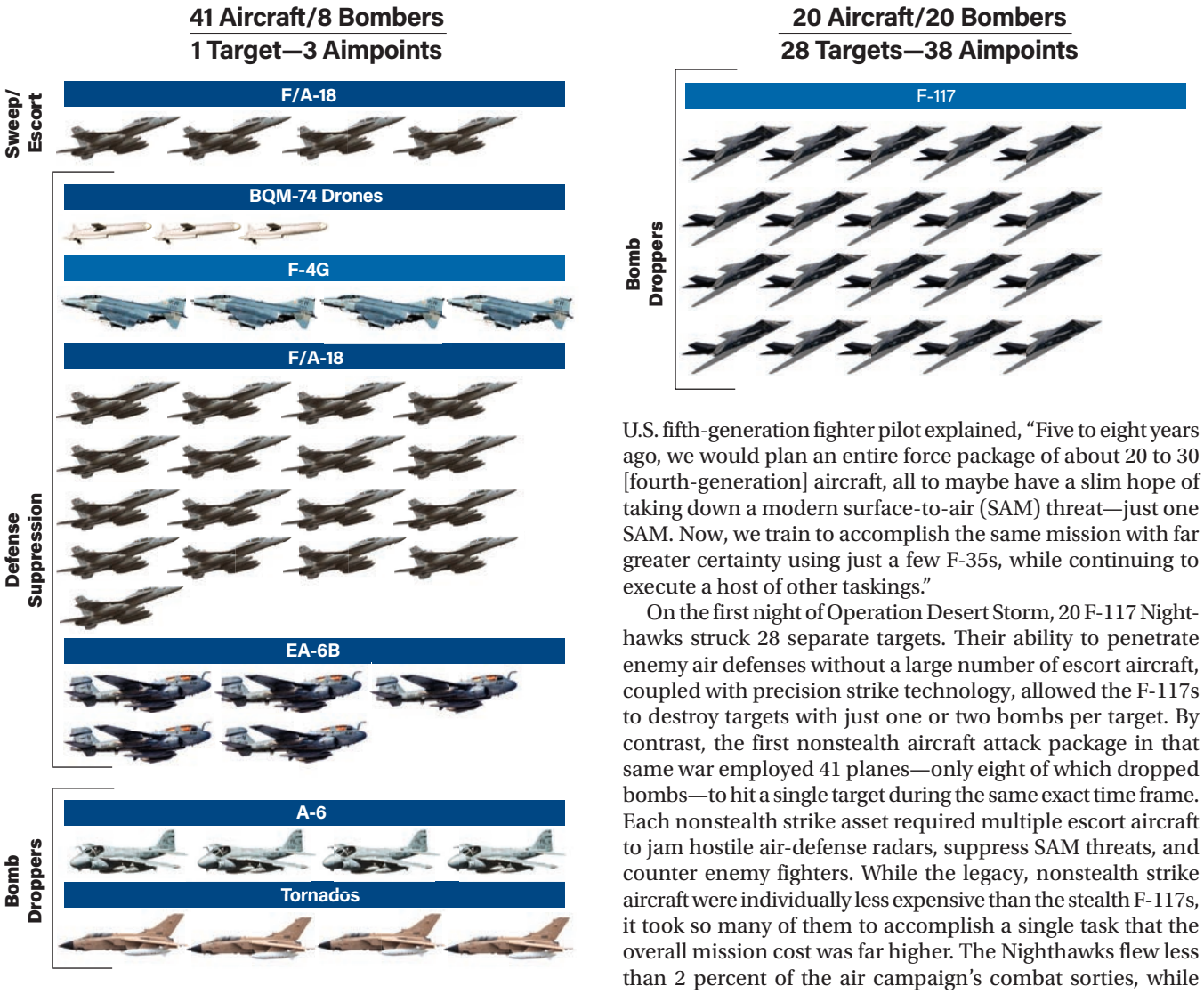
Nearly every form of U.S. joint power projection relies on effects delivered by modern air forces: air superiority; the kinetic or nonkinetic destruction of targets; air mobility; persistent intelligence, surveillance, and reconnaissance (ISR); and secure command and control (C2). Every joint force operation involves some element of the Department of the Air Force. This cannot be said of the other services. To ensure victory in future conflicts, the United States should prioritize investments in aerospace capabilities that provide the greatest mission value in the types of conflicts in which the nation is most likely to engage.

Harnessing an analytical cost-per-effect assessment system will be essential to making these best-value choices.

Yet cost-per-effect assessment should not be limited to the Air Force. It should be adopted and applied across the Department of Defense (DOD) as the preferred means of evaluating weapon system choices. Cost-per-effect can be used to explore comparative "business cases," driving competing systems to increase mission effectiveness and fiscal efficiency. Today's penchant to compare upfront unit costs uses an input measure without considering mission effec-

Less Is More

Stealth adds cost to an aircraft, but ultimately saves money because fewer aircraft are needed to achieve the same or greater effects. A real-world examples from the 1991 Gulf War:



tiveness, which is an "output" measure. Instead, DOD should use cost-per-effect throughout the future-force development process.

In a recent hearing, a senator posed this concern about operating cost of the F-35: "It comes down to an issue of numbers: The Air Force would like to see 1,763 F-35 aircraft, but if it costs $35,000 an hour, how can we afford that going forward?"

The senator missed the broader issue: To derive the same mission effects as an F-35 would require multiple, less-capable aircraft and higher risk to the mission and the aircrews.

Indeed, William A. LaPlante, former assistant secretary of the Air Force for acquisition, warns of "overreliance on traditional units of assessment."

"While cost per flying hour is a common metric ... such measures are far from infallible," he said. "For example, we actually saw cost per flying hour decrease during sequestration because we were flying less. Modern operations—including fifth-generation technology and distributed family-of-systems approaches—require a far more rational and informing cost-capability analysis."

If aircraft like the F-35 and B-21 can successfully meet the same mission goals with smaller teams and less support overhead, the cost to conduct specific missions will be less. As one U.S. fifth-generation fighter pilot explained, "Five to eight years ago, we would plan an entire force package of about 20 to 30 [fourth-generation] aircraft, all to maybe have a slim hope of taking down a modern surface-to-air (SAM) threat—just one SAM. Now, we train to accomplish the same mission with far greater certainty using just a few F-35s, while continuing to execute a host of other taskings."

On the first night of Operation Desert Storm, 20 F-117 Nighthawks struck 28 separate targets. Their ability to penetrate enemy air defenses without a large number of escort aircraft, coupled with precision strike technology, allowed the F-117s to destroy targets with just one or two bombs per target. By contrast, the first nonstealth aircraft attack package in that same war employed 41 planes—only eight of which dropped bombs—to hit a single target during the same exact time frame. Each nonstealth strike asset required multiple escort aircraft to jam hostile air-defense radars, suppress SAM threats, and counter enemy fighters. While the legacy, nonstealth strike aircraft were individually less expensive than the stealth F-117s, it took so many of them to accomplish a single task that the overall mission cost was far higher. The Nighthawks flew less than 2 percent of the air campaign's combat sorties, while striking over 40 percent of the fixed targets.

The Joint Capabilities Integration and Development System (JCIDS) uses key performance parameters (KPPs) to differentiate and compare competing systems during the acquisition process. Cost-per-effect should be one of these KPPs. Investing in new capabilities and concepts of operation that achieve objectives—such as delivering bombs on target, attaining air superiority, or gathering information across the battlespace—will yield the greatest cost-per-effect.

HOW TO ASSESS COST-PER-EFFECT

Cost-per-effect (CPE) assessments of future high-end capabilities should focus on peer conflict, following the direction of the National Defense Strategy, which emphasizes deterring—and if necessary, defeating—great power aggression. For future Air Force air superiority and strike combat systems, key factors should include:

■ **Precision.** The more a discrete resource (i.e., kinetic bombing, cyber-attack, electronic warfare) can focus on a specific aimpoint to net a specific desired effect, the greater the chance of mission success. This streamlined approach reduces the need for redundant force support.

■ **Survivability.** Ensuring that an aircraft can execute its

USAF

An F-4D Phantom from the 435th Tactical Fighter Squadron, Udorn Royal Thai Air Force Base, Thailand, armed with two GBU-10s. F-4s with such laser guided bombs were finally successful in taking down the notorious Thanh Hơa Bridge in Vietnam.

tasks safely and return to its base ready for a future mission reduces attrition and the need for reserve aircraft. The more an aircraft can organically ensure its own survival within the existing battle network, without the need for air superiority and electronic warfare escorts, the more cost-effective the strike package. That frees other aircraft to be tasked with other priority objectives.

■ **Fifth-generation attributes.** Stealth, electronic warfare, sensors, processing power, communication links, fusion engines, and real-time command and control are critical attributes that greatly increase force effectiveness and efficiency. Choosing not to invest in these capabilities is penny-wise and pound-foolish, driving significantly higher force structure requirements to achieve the same objectives.

■ **Range and payload.** Aircraft with greater range and payload capacity are more efficient solutions for missions that span significant distances, entail long in-flight loiter times, or involve attacking a large number of targets per sortie.

Cost-per-effect assessments should extend to all domains when determining the most favorable business case for any combat objective. For example, investments in ground-based long-range fires should be evaluated in parallel with air- and sea-based alternatives, rather than within a ground-centric universe. With limited resources, only the most prudent solutions should be funded.

THE CASE FOR PRECISION

Whether striking an aimpoint with a bomb, launching a missile against an air-to-air target, or securing a nonkinetic effect through electronic or cyber warfare, campaign objectives and overarching force efficiency will radically improve when a specific action can be tied to a desired effect. Nowhere is this better exhibited than with the emergence of precision weaponry in the Vietnam conflict. Between 1966 and 1968, aircraft dropping unguided munitions on specific targets averaged an accuracy rate—termed "circular error probable" (CEP)—of about 420 feet. That meant that half the bombs fell within 420 feet of their targets, and the other half impacted outside this radius. Air commanders employed large force packages of bomb-laden combat aircraft and multiple strike missions to ensure each target was destroyed. In other words, commanders used mass to make up for the lack of precision. Costs mounted in fuel, ordnance, and the loss of aircrews and aircraft. The Air Force had to sustain greater equipment and personnel margins to backfill losses.

Starting in 1968, however, laser-guided and electro-optically guided munitions known as "smart bombs" could achieve CEPs of about 30 feet. The real-world impact of these new technologies was immense. The struggle to take down the Thanh Hóa Bridge in North Vietnam between 1965 and 1972 demonstrates the game-changing value of precision strike: The first U.S. Air Force attack on the bridge was launched on April 3, 1965, and consisted of 46 F-105s with unguided bombs, 21 F-100s providing air cover, two McDonnell RF-101s to execute bomb-damage photo reconnaissance, and 10 aerial tankers to refuel the strike package in-flight. The mission failed to destroy the bridge, and two U.S. aircraft were shot down, with another severely damaged. The following day, a strike mission launched with a similar force package; two more aircraft were lost, and the bridge remained standing. Over the following seven years, American combat aircrews flew 871 more sorties against the bridge, which remained standing. Another 11 aircraft were lost. Finally, on May 13, 1972, a strike package of just 14 F-4s with laser-guided bombs succeed in destroying the bridge.

Today, precision guidance is a baseline assumption that has fundamentally changed how air campaigns are waged. As one Air Force pilot explained: "Precision targeting opens a host of options that otherwise would not be available with unguided munitions. You give senior leaders the ability to pursue dynamic targets in vehicles and on foot; strike targets in narrow alleyways or canyons; or even in specific rooms within a multitiered building."

Adversaries have observed the power of precision and spent considerable time, energy, and resources countering it. They seek to degrade weapons guidance by jamming global positioning satellite signals, burying and hardening important facilities, and attempting to shoot down munitions in-flight.

Airstrikes in peer-to-peer conflict will largely come down to knowing with great accuracy what to strike; having the means to rapidly transmit that information to relevant combat platforms and munitions; and to create multiple redundant pathways to achieve the desired effects in the face of sophisticated defenses.

Thus, to truly understand the value and cost of any given weapon system, the officials judging the capability must fully understand how modern strike packages are assembled; alternatives to accomplish the same or similar missions; the cost of potential restrikes; and the risk and costs of incurring losses during a mission. As illustrated by the Vietnam conflict example, determining acquisition decisions on the cost of acquiring an aircraft alone risks choosing less-expensive capabilities that will actually drive up costs in combat.

THE CASE FOR SURVIVABILITY

The imperative to execute a mission, safely return to base, and fly again tomorrow is as old as air warfare itself. Aircraft shot down by an enemy must be replaced and new aircrews

U.S. Air Force F-35A Lightning IIs assigned to the 388th and 419th Fighter Wings stage for combat training sorties at Hill Air Force Base, Utah, on July 14. The fighter wings are the Air Force's only F-35A combat capable units.

R. Nial Bradshaw/USAF

trained to take the place of those lost. Large-scale attrition robs commanders of the ability to secure multiple concurrent effects in a decisive fashion. At extremes, attrition can deprive commanders of the resources they need to win.

This is exactly what happened to the 8th Air Force during World War II in Europe. In 1942 and 1943, stiff German resistance cost substantial American bomber losses. Without the capacity to supply the 8th Air Force with enough replacement aircraft and the training capacity to supply more pilots, leaders had to conserve resources rather than take the war to the enemy. As 8th Air Force Commander Gen. Ira C. Eaker later explained: "It became my duty to make certain that we did not, through unwise or careless or hasty action, sacrifice our whole force. We could have taken, say, our first 100 bombers at such a rate and against such [long] distance targets that we would have lost them all in 10 days, because on some of those targets we lost 10 percent on a mission. But I always said and reported to General [Hap] Arnold that I would never operate that force at a rate of loss which we could not replace."

Stealth and other technologies developed in the Cold War to improve survivability in the face of Soviet-era air defenses. In Vietnam, the Air Force suffered high combat-loss rates because the enemy had defenses furnished by the Soviet Union. In Operation Linebacker II, in December 1972, the Air Force lost 15 B-52 heavy bombers in 12 days to the Soviet-built SA-2 SAM systems.

Less than a year later, Soviet-built air defenses cost Israel 102 combat aircraft from an inventory of 390 in the Yom Kippur War, which lasted less than a month. Of particular concern to U.S. defense officials, 32 of the downed aircraft were F-4 Phantoms, and 53 were A-4 Skyhawks, U.S.-built fighters that comprised a significant percentage of the U.S combat aircraft inventory at the time. Applying this loss rate to potential European conflict with the Warsaw Pact led U.S. leaders to conclude that a similar loss rate would expend the U.S. Air Force's combat aircraft inventory after just two weeks.

The U.S. needed to markedly increase combat-aircraft survivability. Thus began DOD's impetus to develop stealth aircraft with outer mold line (OML) shaping, radar-absorbent coatings, and other technologies intended to prevent Soviet air defense systems from completing their find, fix, track, target, and engage kill chains.

It worked. The first combat aircraft of this type, the F-117, suffered just one combat loss in its entire operational history against complex defensive systems that were far more advanced than those used during the Vietnam and Yom Kippur conflicts. The B-2 bomber, the second operational stealth aircraft fielded, has experienced no combat losses, despite regular use during some of the most dangerous phases of several post-Cold War operations, including the opening hours of conflicts when defenses were at peak lethality.

Subsequent generations of stealth added powerful sensors and on-board processors to help pilots understand threats in the battlespace and manage their relative positions to reduce exposure to danger. Equipped with advanced electronic warfare technologies that can jam and deceive enemy defenses, they are today the envy of air forces around the world, and allies and adversaries, alike, aim to develop and field similar technologies.

Today, DOD air power inventories lack sufficient stealth capacity to challenge peer competitors. The U.S. Air Force has only 20 B-2s, 186 F-22s, and less than 400 F-35s, compared to several thousand nonstealth airframes. Today's USAF fighter aircraft inventory is an 80/20 mix of nonstealth to stealth aircraft.

The decision to prematurely curtail B-2 stealth bomber procurement at 21 airframes from an original plan for 132 aircraft, followed by the later decision to cap F-22 purchases at 187 aircraft, rather than 381, came about because of the perceived lack of threat. Looking back at the B-2 experience, former Secretary of Defense Robert M. Gates explained, "By the time the research, development, and requirements processes ran their course, the aircraft—despite its great capability—turned out to be so expensive."

But, had the B-2 and F-22 decisions been informed by cost-per-effect capability assessments, would that have been the case?

Using the Operation Desert Storm example, it took 19 legacy aircraft to achieve the same effects as one F-117. Procuring, manning, sustaining, basing, and operating 19 legacy aircraft costs far more than a single F-117.

As potential adversaries field more advanced defensive technologies, the combination of stealth, networked all-domain sensors, situational awareness, and advanced electronic warfare capabilities will remain the baseline for U.S. air operations. The force-protection requirements for older, nonstealth aircraft designs are growing, and targets and other operational objectives accessible to them are rapidly diminishing. In future capability competitions, models must explore the value of a new capability against the value of seemingly "less-expensive" alternatives. Survivability must be a key part of this evaluation.

FIFTH-GENERATION TECHNOLOGIES

Fifth-generation stealth fighter aircraft such as the F-22, F-35, and eventually the B-21, are often criticized for their high cost.

But those who have employed these aircraft see the advantages. "What was once nearly impossible has become common-

place with the advantages brought by fifth-generation aircraft like the F-35," noted one F-35 pilot.

Three attributes explain why: survivability; mission performance; and the power to gather tremendous quantities of information, process it, fuse it with data from other sources, and then display highly intelligible and actionable knowledge in real time.

"It used to be, as a fighter pilot that speed was life, and more was better," said one pilot who has flown F-22, F-35, and fourth-generation fighter aircraft. "Today, information is life, and more is better. Period." Added another F-22 pilot: "A complete, comprehensive information picture of the adversary threat environment is what we need to best position ourselves to fight and win. Fifth-generation's sensors, processing power, and fusion with other assets in the region does that. … It helps the pilot identify points of weakness in the adversary system by analyzing it as an integrated ecosystem."

Legacy aircraft also feature a range of sensors and processing capability, but these systems are generally federated, presenting stovepiped information streams to pilots, rather than a fused and integrated single picture. Pilots must then interpret and fuse the streams themselves. Even with tremendous training and continual practice, pilot experience variances in the amount of information they can process in demanding combat scenarios. Improved sensors in the F-15EX or late block F-16s feature help, but the lack of stealth greatly limits when and where these aircraft can fly

Fifth-generation aircraft generally fly in much smaller groups, requiring far less support from systems that degrade enemy defenses. By comparison, even the most capable, nonstealth combat aircraft require relatively large supporting packages of fighters to provide air superiority, adversary defense-suppression aircraft, and radar jamming systems. These force packages can often exceed two dozen aircraft. The acquisition cost for this array of aircraft, plus the cost of aircrew and associated maintainers, logistical demands, basing requirements, and basic consumables like fuel, makes this is a tremendously expensive proposition—and delivers a more vulnerable threat than do fifth-generation alternatives. In comparison, a small number of F-22s, F-35s, or B-21s are capable of accomplishing the same missions with far less support, and—all things considered—ultimately costs less to procure, sustain, and employ.

The initial tranche of F-15EX "fourth-generation-plus" fighter aircraft will cost roughly $98.3 million each, with follow-on tails hopefully costing closer to $80 million per unit. The cost of the F-35, by contrast, is falling from $89.2 million for production Lot 11 to $77.9 million for Lot 14. Hence, F-35, though more advanced, is slated to cost about the same or less than the F-15EX.

Flying hour costs are also similar. While the F-35A currently has higher operating costs than the anticipated F-15EX—$35,000 per flying hour versus a projected $27,000 for the EX,—cost-per-effect assessments favor the F-35A. The most significant cost drivers are associated with a combat aircraft's sensors, processing power, and data links. For instance, if one inflates the unit cost of F-15Es procured in 1998 to 2020 dollars, they come in around $50 million per jet. The difference between the F-15E at $50 million and an F-15EX at $80 million is largely the result of the upgraded sensors, processing power, and data fusion.

EFFICIENCIES DO MATTER: RANGE AND PAYLOAD

Airframes with long range and sizable payload capacity may cost more to buy, but they also afford distinct operational efficiencies. For operations over vast distance, or where loiter time in the battlespace is important, or where there are a high number of targets, these efficiencies are particularly valuable.

Between Aug. 8-20, 2014, in the opening stages of Operation Inherent Resolve (OIR) against the Islamic State group, the Navy flew 30 strikes with a nominal load of two 500-pound PGMs off the deck of the aircraft carrier USS George H.W. Bush. A single B-1 with unguided munitions or a single B-2 with guided munitions could have delivered more combat effects in a single sortie in a single day. Putting aside that aircraft carriers conduct a variety of missions other than strike, on a pure cost-per-effect basis for this missions, bombers were more efficient.

B-2s flew just 3 percent of the strike sorties during Operation Allied Force over Kosovo and Serbia, but struck 33 percent of the targets. B-1s flew 2 percent of the sorties, but delivered 20 percent of the bomb tonnage. In the opening phases of Operation Enduring Freedom over Afghanistan, USAF bombers few 20 percent of the sorties, yet dropped 76 percent of the munition tonnage.

Comparing the rough cost-per-flying hour for one bomber versus 12 fighters, the cost to operate fighters is 371 percent higher. It is a simple matter of efficiency: 12 aircraft versus four consuming fuel, 12 pilots versus four aircrew in the bomber, plus sustainment costs. Factor in variables like long-range mission support, or the operating and personnel costs of an entire aircraft carrier battle group to host those fighters, and the difference only grows.

In the Pacific theater, where distances extend dramatically, bombers can cover more ground without refueling—6,000 miles for the B-2; 7,500 for the B-1; and 8,800 for the B-52H. In comparison, fighters like the F-16C, F-15E, and F-18E/F offer an unrefueled range of only about 1,000 miles, depending on flight profiles and weapon loads. While reach can be extended with in-flight refueling, that adds to cost, operational complexity, and risk.

A prime example of this increased mission complexity and cost occurred in the opening days of Operation Enduring Freedom when theater air base availability limitations required F-15Es to fly from Kuwait to strike targets in Afghanistan. In an incredibly impressive display of airmanship, four F-15Es, each carrying nine 500-pound GBU-12s, two AIM-9Ms, and two AIM-120Cs flew a 15.5-hour mission from Kuwait to Afghanistan and back, spending nine hours over the target area. Each of the F-15Es refueled 12 times in the air. Yet two B-1s could have executed a similar mission carrying 48 GBU-31 2,000-pound JDAMs with the support of four to six aerial refuelings. That's 12 more bombs on target by two fewer aircraft, with half the aerial refueling requirement: a more efficient operation by anyone's calculus.

COST-PER-EFFECT ASSESSMENTS

The JCIDS process begins with a capabilities-based assessment. Procurement officials evaluate mission demands, desired capabilities, current capability gaps, and alternate solutions, producing in the process an Initial Capabilities Document (ICD), which scopes the solution that could best meet desired outcomes. From there, leaders can agree with the ICD document and press for a material solution; address the shortcomings through improved processes; or do nothing and make the most of existing options. When a material option is the favored course of action, leaders devise a Capability Development Document (CDD), creating a set of requirements and KPPs; this is when cost-per-effect matters the most. Models must evaluate how a system is expected to perform in given scenarios based upon specific factors:

Fewer Planes, More Capacity

Weapons capacity is critical to determining cost-per-effect. The more aircraft needed to deliver an effect, the greater the cost. A single bomber can deliver the same or greater effects than a dozen F-16s:

QUANTITY	AIRCRAFT	PAYLOAD
12	F-16	24 2,000-pound GBU-31 JDAMs
1	B-1B	84 500-pound unguided weapons, or 24 AGM-154 Joint Standoff Weapons (JSOW), or 24 AGM-158 Joint Air-to-Surface Standoff Munitions (JASSM) and 15 GPS-guided Joint Direct Attack Munitions (JDAM)
1	B-52H	20 2,000-pound class JDAMs
1	B-2	80 independently targeted 500-pound class GBU-38 JDAMs

■ Number of effects that could be generated on a mission and supporting elements, such as protective escort aircraft and aerial refueling required.

■ Ability to team with other battlespace assets to yield collaborative effects.

■ Expected combat casualty rates.

■ Basing support requirements for the aircraft and its supporting enterprise, such as escort fighters, tankers, aircraft carriers, support ships, personnel, logistics requirements, and so on.

This sort of evaluation would force strengths and weaknesses to emerge based on mission demands, allowing leaders to make informed decisions. As LaPlante explained: "An upfront analysis, much like was done at the front end of what became the B-21, is crucial in driving effective, efficient superior choices from the beginning of a program. ... We need to adopt this approach."

CONCLUSION

While air power technologies and operational concepts evolved over the course of World War II, Airmen realized the theory of strategic attack from the air was valid. Over the ensuing decades, they remained committed to investing in mission tools that would better meet air combat requirements. In 1991, their success was dramatically demonstrated by the F-117 stealth fighters that struck across the breadth and depth of Iraq during Operation Desert Storm with disproportionate effects relative to nonstealth aircraft. Thanks to the protections afforded by stealth technology, precision weapons, and an innovative effects-based targeting strategy, these aircraft did not require fighter escort.

With both sums normalized for 2019 dollars, the F-117, at a unit cost of $50,560,960, was dramatically more expensive to acquire than the B-17 with a unit cost of $3,383,450. However, where it took 863 World War II-era bombers to eliminate one target then, only 20 F-117s were used to strike 28 separate targets in just one hour, 50 years later. Using a simple cost-per-effect model and normalized dollar figures, the cost per target in 1991 was $36 million, down from $292 million per target during World War II. Add in the cost of fighter escorts, the larger crews for World War II bombers, the relative cost of spare parts, fuel, logistical support, and basing infrastructure, and the difference grows.

Congress should require DOD to devise new measures to assess cost-per-effect for key mission areas and then implement such evaluations in the future force-development process. Such measures should be domain-, service-, and platform-agnostic, and instead focus on how best to achieve mission goals in future operations.

Sir Frederick Handley Page, a British aviation pioneer, said: "Nobody has ever won a war by trying to run it on the cheap. Nothing is so expensive as losing a war by saving money. If you want the cheapest possible Air Force today, it is very easy to standardize on a whole lot of aircraft that will be of no use when the war comes."

The sanctuary that America enjoyed in the decades after the Cold War is over. The threats posed by Russia, China, and a host of other nations like Iran and North Korea are very real. As Senate Armed Services Committee Chairman Sen. Jim Inhofe (R-Okla.) recently concluded, "I really believe we're in the most dangerous situation we've been in this world in my lifetime."

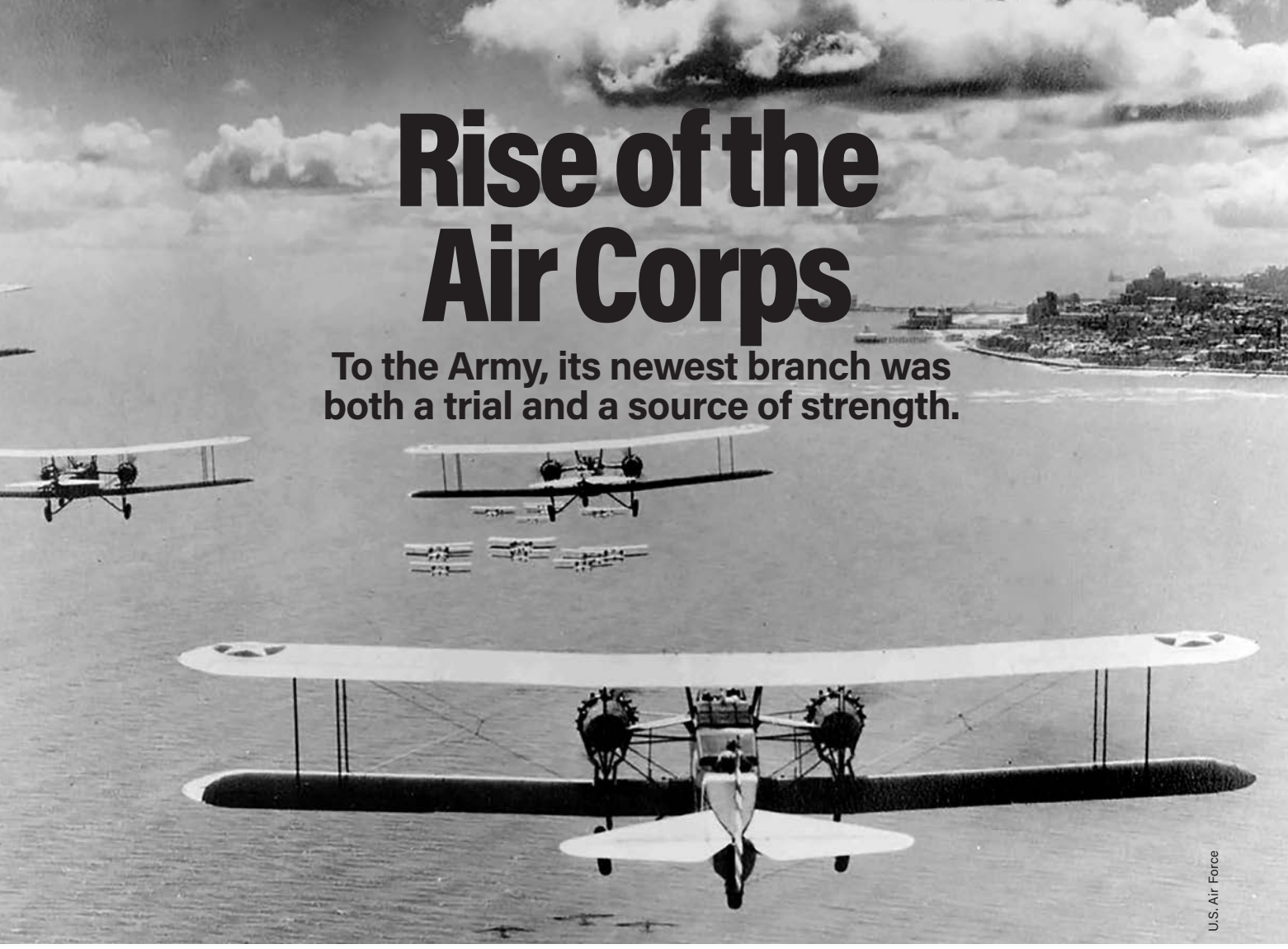
Meeting those threats demands accurately aligning DOD's weapon procurements with tactics, operational concepts, and warfighting strategy. Cost-per-effect must be harnessed as a tool by the Air Force, Department of Defense, OMB, and Congress to ensure tomorrow's military personnel are equipped to meet the nation's security requirements. ✪

George Letzer/American Air Museum/Imperial War Museum

B-17 Flying Fortresses during World War II. A cost-per-effect model using normalized dollar figures puts the cost-per-effect at $292 million per target during that war—and $36 million just 50 years later with precision weapons.

Rise of the Air Corps

To the Army, its newest branch was both a trial and a source of strength.



U.S. Air Force

Growth of the Air Corps in the 1930s was marked by range and capability of the bomber, progressing from the B-3A (above) at the beginning of the decade to the B-17.

By John T. Correll

In 1934, Maj. Gen. Hugh Drum, Army deputy chief of staff—the second-ranking officer in the Army—said there was no reason for airplanes to fly further than three days' march ahead of the infantry.

Drum said there should be "no operations not contributing to the success of the ground campaign" and that independent air operations "would likely be wasted and might be entirely ineffective."

The Air Service had been a combatant branch of the Army since 1920 and was reorganized as the Air Corps in July 1926. It was—supposedly—on an organizational par with infantry, armor, artillery.

However, not all branches were equal. Army doctrine, as laid down in March 1914, identified infantry as "the principal and most important arm," with artillery and cavalry in support. That order was still in effect. In 1926, the Army declared that the mission of air units "is to aid the ground forces to gain decisive success."

In the 1930s, it became increasingly difficult for the Army to keep its energetic Air Corps on a short leash in view of the great leap in capabilities and importance of air power.

U.S. Army

Operations "not contributing to the success of the ground campaign would likely be wasted and might be entirely ineffective."
—Maj. Gen. Hugh Drum

At the beginning of the decade, the best Air Corps bomber was the Keystone B-3A, a fabric-covered biplane with a cruising speed of 98 mph and a top speed of 114 mph. The P-26 "Peashooter" fighter, which entered Air Corps service in 1933, had an open cockpit and fixed landing gear.

The rapid advance of aeronautical progress made a huge difference in a few years. By 1939, the B-17 Flying Fortress was in service and had completely redefined the range and scope of warfare. The P-40 Warhawk was in production, and the P-51 Mustang was almost ready for flight-testing.

The Air Corps had begun to gain some acceptance in the early 1930s, conditional on a supporting role within the Army. When budgets were driven down by the onset of the Depression, much of the criticism of air power focused on cost rather doctrine or precedent.

It could have been worse. The Air Corps budget declined every year from 1931 to 1934, but then recovered enough to grow in funding, personnel, and aircraft every year from 1935 to 1939.

A negative attitude toward air power—especially the B-17 bomber—was resurgent among Army and War Department leaders in the middle 1930s, and did not abate until the appointment of Gen. George C.

AFA Library

Lt. Col. Henry "Hap" Arnold on a 1st Wing Martin B-10 bomber.

Marshall as Army Chief of Staff in 1939 and Henry L. Stimson as Secretary of War in 1940.

The critical support was from President Franklin D. Roosevelt, who said, "I know of no single item in our defense today that is more important than a large four-engine bomber."

THE JUNIOR BRANCH

The Army Reorganization Act of 1920, which made the Air Service a combatant arm of the Army, gave the rank of major general to the chief of the Air Service. Tactical air units were placed under the nine Army corps area commanders to be employed primarily in support of ground forces.

The Air Corps Act of 1926 basically changed the name to the Air Corps and gave it control of training, materiel, engineers, and procurement. It also established the Office of Assistant Secretary of War for Air, a provision that did not sit well with the Army, which wanted to keep tighter control of the Air Corps. When the incumbent assistant secretary left office in 1932, no successor was named. The position was vacant until 1941.

When Gen. Charles P. Summerall departed as Chief of Staff in 1930, Airmen "may have hoped for more sympathy from General [Douglas] MacArthur, the new Chief of Staff, but they would not get it," said historian James P. Tate. "MacArthur strongly concurred [with] the conservative views of his predecessor. For the next five years, he would fight for a balanced Army and vigorously oppose congressional proponents of air power."

Congressional and public opinion tended to support air power, and the Air Corps was unrelenting in its effort to generate favorable attention by breaking and setting new records for altitude, speed, distance, and endurance.

Within the Army, though, the Air Corps was regarded emphatically as the junior branch and was expected to defer to the customs and traditions of the senior branches. Air Corps leaders, from Maj. Gen. Benjamin Foulois to Lt. Col. Henry H. "Hap" Arnold, wore riding breeches as part of the Army service uniform.

"Early in the 1930s, the War Department had been willing to permit the development of long-range bombers, apparently because General MacArthur held a permissive attitude toward such an endeavor," said Air University senior historian Robert Frank Futrell.

"The attitude of the War Department general staff switched abruptly after October 1935, when General [Malin] Craig became Army Chief of Staff. Beginning in 1936, General Craig and his deputy chief of staff, Maj. Gen. Stanley D. Embrick, pressed the entire army to reduce expenditures for research and development."

In 1938, Embrick stated the general staff position that "the military superiority of a B-17, over two or three smaller planes that could be procured with the same funds, remains to be established."

A similar view was held by Henry W. Woodring, Secretary of War from 1936 to 1940, whose background was in banking and politics. By Woodring's order, the Army dropped plans for purchase in 1939 of 67 B-17s previously projected. In October 1938, Woodring decided that no four-engine bombers—only twin-engine B-18s—would be bought in 1939.

Woodring, an isolationist from Kansas, was at odds with Roosevelt's policies, but FDR did not fire him because Woodring could deliver votes. The War Department's position did not change until Stimson replaced Woodring in 1940.

NAVY DISCOVERS AIR POWER

The Army was careful not to reject bombers completely because the Navy was standing by, ready to take over the roles and budgets for air power should the Army abandon them. In 1927, the Navy proposed to acquire shore-based aircraft for "attacking enemy vessels over the sea by torpedoing and bombing."

In so doing, ironically, the Navy was following in the footsteps of the despised Airman, Billy Mitchell, whose bombers sank a surplus battleship in 1921, contrary to Navy assurances that he could not do it.

The Army also wanted to retain the coastal defense mission and the funding that went with it. Traditionalists managed to ignore the inconvenient fact that in coastal defense, the Air Corps performed a mission in which air power was not tied directly to ground units.

U.S. Air Force

Brig. Gen. Billy Mitchell

The Air Corps reaped worldwide publicity with a promotional flight in May 1938 that embarrassed both the Army and Navy leadership. Three B-17s, flying from Mitchel Field in New York, found and "intercepted" the Italian cruise liner Rex, 725 miles out at sea. Passengers on the deck waved as the B-17s flew over, and the aircrews exchanged radio greetings with the Rex.

The Navy was not amused and complained to the Army. General Craig limited operations of Air Corps to within 100 miles of the US shoreline.

"As far as I know, that directive has never been rescinded," Hap Arnold said in his memoir, "Global Mission," published in 1949. "A literal-minded judge advocate might be able to find that every B-17, B-24, or B-29 that bombed Germany or Japan did so in violation of a standing order."

BUDGETS AND SHARES

The Air Corps Act authorized a five-year program to expand the air arm to 16,650 members and 1,800 airplanes, but be-

U.S. Air Force

Boeing B-17s intercept the Italian liner "Rex," on May 12, 1938, about 800 miles east of New York City. The interception was a training exercise, but the Navy was not pleased with the attention it received. Afterward, the Army restricted training flights to within 100 miles of the U.S. shoreline.

fore it could be completed, the Great Depression curtailed federal spending. Owing to the procurement of aircraft that had already taken place and the transfer of more than 6,000 men from the other branches, however, the strength of the Air Corps in 1932 was 14,700 with 1,709 airplanes.

Budgets were meager for the next few years, but in "The Army and Its Air Corps" (1998), James P. Tate argues that the Air Corps fared better than others during these times.

In 1932, General MacArthur attracted considerable notice with a statement that aviation was the most expensive branch of the Army, and that between 25 and 35 percent of the Army budget was devoted to aviation.

Air power advocates have declared this preposterous, citing an Army historical report showing the Air Corps getting only 9.6 percent of the Army budget in 1932. MacArthur did not say where he got his percentages, which were almost certainly too high.

However, the Army report cited in rebuttal was based on a funding subtotal of "direct appropriations." It did not count indirect Army appropriations—pay for personnel, equipment, medical services, food and supplies, and other things—which more than doubled the numbers. Inclusion of "equipment" would surely have affected the air power percentage.

A study in 1987 by the Office of Air Force History found that from 1920 to 1934, aviation accounted for between 13.1 and 22.7 percent of total military expenditures, with an average of 18.2 percent.

Air Corps budgets, personnel strength, and aircraft began climbing in 1936, and many of the older airplanes were replaced with newer ones. By the summer of 1939, the Air Corps had 22,387 people and 2,402 aircraft, although only about 800 of them were first-line bombers and fighters.

BOMBERS TO THE FOREFRONT

The driving factor in the rise of the Air Corps in the 1930s was the bomber. With dramatic improvements in speed, range, and delivery of ordnance, it transcended local and tactical limits and became a weapon of strategic warfare.

The evolution was already apparent in the differences between the Martin B-10, which first flew in 1932, and the Keystone B-3A two years earlier. The B-10 was bigger and faster, of all-metal construction, a monoplane rather than a biplane. It had retractable landing gear and variable pitch propellers. Even so, developments in aeronautical technology soon promised more and better.

The Air Corps in 1933 requested design proposals for a new long-range bomber to succeed the B-10. The four-engine Boeing 299 Flying Fortress—which went on to become the classic B-17 of World War II—was expected to win the competition easily.

In the 1935 trials, the Boeing prototype crashed shortly after takeoff, not for any mechanical failure but because the pilot forgot to unlock the elevator and rudder controls. The winner was declared to be the two-engine Douglas DB-1, later the B-18 Bolo.

Following the competition, the War Department ordered the B-18. It had less range and payload than the Flying Fortress, but it cost only half as much. It was the standard bomber for most of the decade.

The Air Corps eventually got the B-17, the first 13 of them delivered in 1937, but not as many as it wanted and not as soon. When the Japanese attacked Pearl Harbor in December 1941, the Air Corps had 198 B-17s, with 93 more coming off the production line that month.

Fighters, still called "pursuits," gained in capability, too, but not to the extent that bombers did, and they no longer dominated the structure of the air arm. The new bombers were almost as fast as the best pursuits. By the middle 1930s, bomber advocates—the disciples of Billy Mitchell—were in the ascendency in the Air Corps. The Air Corps Tactics School at Maxwell Field in Alabama was a hotbed of Mitchellism.

One of the few champions of pursuits was Claire L. Chennault, who later organized and commanded the Flying Tigers in China. He was never on good terms with his Air Corps colleagues, who thought the future belonged to the bomber. "Who is this damned fellow Chennault?" Hap Arnold asked.

The standard Air Corps fighter in 1939 was the Curtiss P-36 Hawk, forerunner of the P-36 Warhawk, which was coming on strong. A few of the open-cockpit P-26 Peashooters were still around in 1941. The United States had the best bomber in the world in the B-17, but it lagged other nations, including Germany, Japan, and Britain, in pursuits.

GHQ AIR FORCE

Five months before Gen. Malin Craig became Chief of Staff and the clampdown on the Air Corps resumed, the Army made an amazing organizational concession to air power. General Headquarters (GHQ) Air Force was established, in March 1935, at Langley Field, Va.

GHQ Air Force took all of the air tactical units away from the individual Army field commands and put them under a single organization headed by an Airman. The concept of a general headquarters in the field to command a deployed force had been used by Gen. Ulysses S. Grant in the Civil War and by Gen. John J. Pershing in World War I.

War Department motives in 1935 are not entirely clear. In part, the Army hoped to head off recurring agitation for air power as a separate service. The change also provided an operational framework into which the growing capabilities of air power were a better fit.

For most of its existence, GHQ Air Force was led by the hard-charging Brig. Gen. Frank M. Andrews. Approximately 40 percent of the Air Corps strength was in GHQ Air Force. The chief of the Air Corps—Maj. Gen. Arnold from 1938 on—was responsible for training, schools, procurement, and supply. There was no single leader for the air arm.

Arnold was all for GHQ Air Force. "It was the nearest thing to an independent Air Force yet realized," he said. It also set a powerful precedent from which the Army was unable to retreat. In June 1941, both GHQ Air Force and the Air Corps were incorporated into the new Army Air Forces, headed by Arnold.

FDR SETS THE COURSE

Between the world wars, the leading politicians in both political parties were staunchly isolationist. President Franklin D. Roosevelt was ahead of the country and the Congress on the need to prepare for war, but he had to move more gradually than he liked.

FDR was a former assistant secretary of the Navy and notoriously partial to that service. At one juncture, General Marshall implored him to "stop speaking of the Army as 'they' and the Navy as 'us.'" Even so, Roosevelt was the advocate of air power who mattered most.

At a White House meeting in November 1938, Roosevelt said he wanted an Army Air Force of 20,000 planes and annual production capacity of 24,000 planes, but recognized that Congress would not approve that many. He directed development of a program for 10,000 Air Corps planes, of which 2,500 would be training planes, 3,750 line combat, and 3,750 reserve combat. FDR said he did not want to talk about ground forces, that a new barracks in Wyoming would not scare Hitler one goddamned bit.

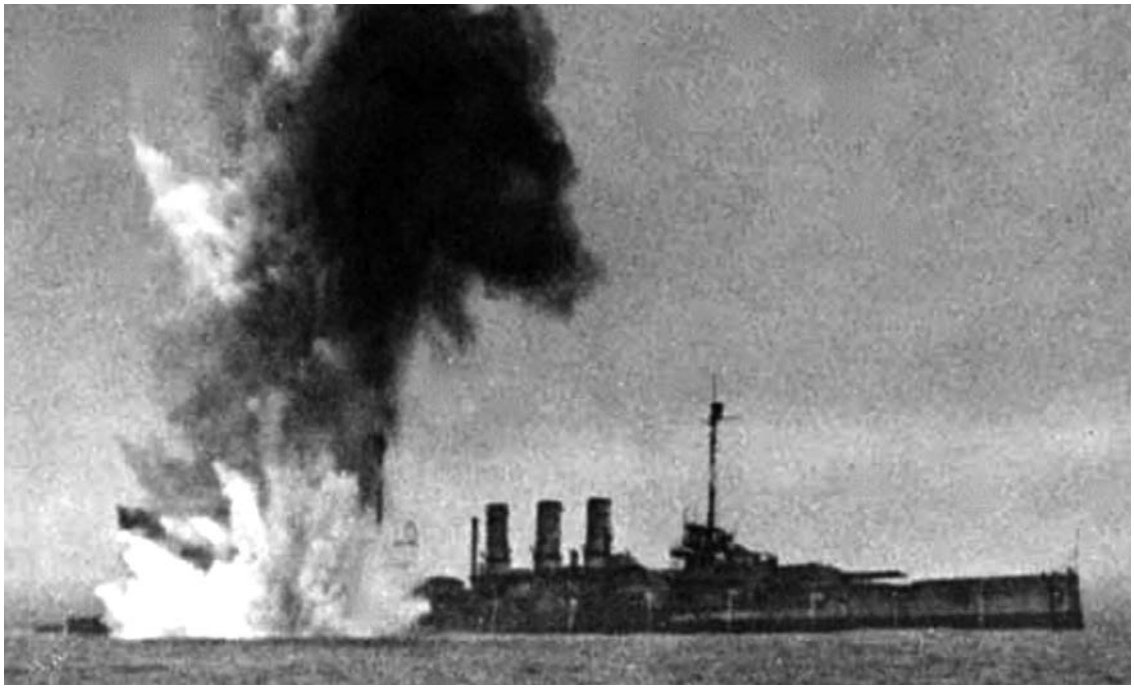
Marshall, who replaced Craig as Chief in September 1939, supported the B-17. When he was deputy chief in 1938, he made the case for the long-range bomber, using arguments similar to those long stated by Air Corps officers. Stimson, who became Secretary of War in July 1940, said, "It's clear that air warfare involves independent action quite divorced from both the land and the sea."

The National Defense Act passed by Congress in 1939 had authorized up to 6,000 airplanes for the Air Corps. In May 1940, Roosevelt called for 50,000 planes—36,500 for the Army and 13,500 for the Navy—and production of 50,000 airplanes a year.

By the summer of 1941, with the clock ticking down toward Pearl Harbor, the Army Air Forces possessed 6,777 aircraft, of which 120 were heavy bombers (B-17, B-24), 903 were light and medium bombers, and 477 were fighters. The B-17 was in significant production, and the P-51 prototype had made its first flight.

In 1942, the Army was divided into three autonomous commands: Army Air Forces, Army Ground Forces, (replacing GHQ Army), and Army Service Forces. During World War II, Arnold as Chief of the AAF was a member of the Joint Chiefs of Staff, alongside Marshall and Adm. Ernest J. King, the Chief of Naval Operations. Adm. William D. Leahy, FDR's personal chief of staff, presided. The Chief of Army Ground Forces was not a member of the Joint Chiefs. ✪

John T. Correll *was editor in chief of* Air Force Magazine *for 18 years and is a frequent contributor. His most recent article,* "The Spaceplane: 60 Years On," *appeared in the July/August issue.*



U.S. Navy

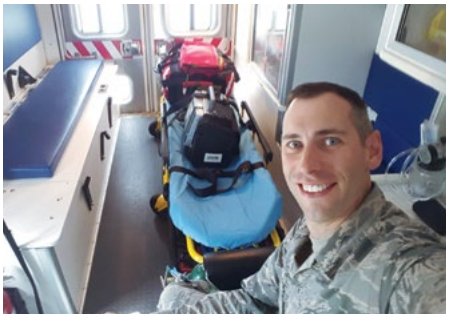
Ex-German battleship Ostfriesland takes a gigantic blow from a 2,000-lb. aerial bomb burst far enough below the surface that fountains of water erupt high above both sides of the ship. Minutes later, the target ship sank by the stern. This was the finale of Billy Mitchell's anti-ship bombing demonstration in July 1921.

Make 'Em Laugh: Helping Vets Through Improv

By Jennifer-Leigh Oprihory

When a cancer diagnosis forced former Air Force Reserve medic Gerald J. "B.J." Lange Jr. onto the Temporary Disability Retired List in 2016, comedy and improv helped pull him through. Now he's using those same skills to help veterans overcome their disabilities.

"My love for acting has always been my biggest passion," Lange said in a recent interview with Air Force Magazine. "But I constantly kept looking over my shoulder, wishing that I would have joined the military." He was 35 by the time he raised his right hand.



Courtesy B.J. Lange

A1C Gerald J. "B.J." Lange Jr. works ambulance services at Joint Base San Antonio-Lackland, Texas, in May 2016. He's since been placed on the Permanent Disability Retired List.

Lange's civilian acting career took him to The Second City—the legendary improv theatre and school with stages in Chicago, Hollywood, and Toronto. This is the same outfit that developed comedians Gilda Radner and Stephen Colbert, and after graduating from the Hollywood Conservatory, Lange wanted to teach. Eventually, he connected teaching and the military by developing a Hollywood version of Second City's Chicago-based Improv for Veterans program.

Lange created a veterans-specific program in which they have a distinct educational process, their own sketch teams, and more. The connection between improv and the military is simple, he says. "We always say the key to air power is flexibility. Well, that is ingrained in us as improvisers, too."

Improv builds life skills. "Listening, problem-solving, thinking outside the box, connecting with one another," Lange said. "Building that confidence is so important."

In the field, this is called applied improvisation, according to the Indiana Institute on Disability and Community at Indiana University. "You know, I'm not teaching them how to necessarily get the laughs," he said. "I'm teaching them how to connect with one another and be able to do team building and trust exercises."

Lange maintains his military connections as an Air Force Wounded Warrior Program ambassador; a volunteer public affairs officer with Civil Air Patrol; and as a member of the Artist Council of the Armed Services Arts Partnership.

His mission is the same, whether as a medic or a volunteer, he said: "Take care of people."

LIFE DOESN'T FOLLOW A PLAN.

Therefore, you need to be prepared.

An accident can happen anytime, anywhere, and all the planning in the world can't change that. But, having a plan can change how a serious accident could impact the financial future and well-being of your loved ones.

That's why AFA offers its eligible members under age 70 the **Group Accidental Death & Dismemberment (AD&D) Insurance Plan**, with guaranteed acceptance regardless of health. This plan pays your beneficiary a lump-sum, cash benefit of up to $500,000 if your death is due to a covered accident. Whether that accident occurred at work or at play, at home or while traveling anywhere in the world, 24/7.

These benefits are paid in addition to any other coverage you may have and can help supplement a life or medical plan, allowing you to lessen the impact on your family from a sudden loss. And once enrolled, you'll have 30 DAYS, RISK FREE, to look over the plan and decide if you wish to continue coverage.

AFA AD&D Insurance Plan offers:

- **Guaranteed acceptance.** As an eligible member, you cannot be turned down, regardless of health conditions.
- **Select the Principal Sum right for you:** $50,000 to $500,000 (in increments of $50,000).
- **Benefits for military air travel** up to $150,000.
- **Additional benefits paid** for common carrier, common disaster, and use of seat belt and airbag.
- **Additional benefits paid** to help cover expenses such as education, rehabilitation, elderly care, day care and more.
- **Competitive rates.**

Learn more about the AFA AD&D Insurance Plan*.
Call 1-800-291-8480
or visit www.afainsure.com

*Information includes costs, exclusions, eligibility, renewability, limitations and terms of coverage. Coverage is not available in some states.

Program Administered by Mercer Health & Benefits Administration LLC
AR Insurance License #100102691 • CA Insurance License #0G39709
In CA d/b/a Mercer Health & Benefits Insurance Services LLC

G-29319-0

Underwritten by New York Life Insurance Company, 51 Madison Avenue, New York, NY 10010 on Policy Form GMR

Courtesy; J.M. Eddins Jr.; Kirtland Air Force Base, N.M.

1 Col. George V. Holloman. **2** MQ-9 Reapers at Holloman Air Force Base. **3** L-R: Crane, Holloman,and Stout, Aug. 23, 1937.

HOLLOMAN

Radio Flier

It would be no exaggeration to say that George V. Holloman's life revolved around the radio and that military aviation revolved right along with him.

Holloman, in whose honor USAF named a base in New Mexico, enlisted the radio for pioneering work in avionics, remote control systems, and guided missiles. The remotely piloted aircraft of today are traceable to work by Holloman in the late 1930s.

George Vernon Holloman was born in 1902 in tiny Rich Square, N.C. He graduated from high school in 1919, just as the first radio receiver arrived in town.

Holloman was fascinated, so much so that he enrolled in Southern Radio College in Norfolk, Va., from which he was hired by the American Marconi Company (now, RCA). He took an electrical engineering degree at North Carolina State University as a Reserve Officer Training Corps student.

In 1925, he was commissioned into the Army infantry and rose to regimental communications officer.

In 1927, he transferred to the Air Corps and went to Brooks Field, Tex., for flight training. After receiving his wings in June 1928, he became an engineering officer of the 88th Observation Squadron, where he helped revive its reconnaissance capabilities.

Holloman's big break came in 1934, when he spent a summer at the Air Corps Technical School at Chanute Field, Ill., for advanced study in communications. He then sought and received assignment to Air Corps Engineering School at Wright Field, Ohio, where he soon became head of the Instrument and Navigation Laboratories.

This unit was researching the feasibility of automatic pilots, instrument landing systems, and day/night, all-weather automatic flight and landing equipment.

In 1937, Holloman helped aviation take a giant step. He and Capt. Carl J. Crane invented, developed, and demonstrated the first fully automatic landing system. On Aug. 23, 1937, Holloman, Crane, and observer R.K. Stout took off from Wright Field in a modified Fokker C-14B and landed at Patterson Field, Ohio, guided only by a ground radio system of five transmitting beacons. It was the first completely automatic "hands off" airplane landing in history.

Holloman and Crane were awarded the Mackay Trophy for the most meritorious flight of 1937, and were also awarded Distinguished Flying Crosses.

In World War II, Holloman commanded a group of laboratories, known as the Special Weapons Unit, which helped lay the foundation for the powerful air fleets that helped defeat the Axis powers.

He was transferred to the Pacific theater on secret assignment, but the project—whatever it was—was still-born. That is because Holloman and nine others were killed on March 19, 1946, when their B-17 slammed into a mountainside on Taiwan.

Holloman's remains were interred at Arlington National Cemetery. The Air Force several years later renamed Alamogordo Army Air Field, N.M., in his honor. Today, this air base is home of the 49th Wing, a large training organization for MQ-9 Reaper RPAs. ✪

GEORGE VERNON HOLLOMAN

Born: Sept. 17, 1902, Rich Square, N.C.
Died: March 19, 1946, Taiwan
College: North Carolina State University
Occupation: Electrical engineer, U.S. military officer
Services: U.S. Army—Infantry, Air Corps, Air Forces
Main Eras: Interwar Period, World War II
Years Active: 1925-46
Final Grade: Colonel
Honors: Distinguished Flying Cross; Mackay Trophy for 1937
Resting Place: Arlington National Cemetery

HOLLOMAN AIR FORCE BASE

State: New Mexico
Nearest City: Alamogordo
Area: 93.2 sq mi / 59,639 acres
Status: Open, operational
Opened as Alamogordo Gunnery Range: May 14, 1942
Renamed Alamogordo Field Training Station: May 27, 1942
Renamed Alamogordo Army Air Base: June 10, 1942
Renamed Alamogordo Army Air Field: Nov. 21, 1942
Renamed Holloman Air Force Base: Jan. 13, 1948
Current owner: Air Education and Training Command
Former owners: Second Air Force, Continental Air Forces, Strategic Air Command, Air Materiel Command, Air Research and Development Command, Air Force Systems Command, Tactical Air Command, Air Combat Command
Home of: 49th Wing

LOCKHEED MARTIN

The integrated solutions you already trust, now at hypersonic speeds.

When you need next generation strike technology, you can rely on us. We've successfully integrated cruise missile technology into all existing US Navy and Air Force aircraft, so we're familiar with advancing the capabilities of the aerial battlespace. Now, we're leveraging our expertise to bring hypersonic weapons to your platforms with speed, agility, and ingenuity. We've mastered cutting-edge integration. Together, we'll do the same at speeds over Mach 5.

www.lockheedmartin.com/hypersonics

Lockheed Martin. Your Mission is Ours.®