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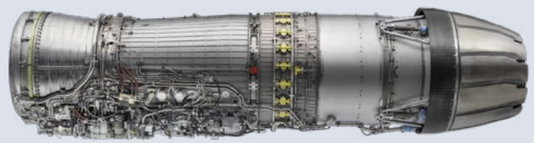

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June/July 2021, Vol. 104, No. 6 and 7

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ON THE COVER

Michael R. Turner/Getty Images

Two Bald Eagles share a post while hunting.

Air Force Magazine (ISSN 0730-6784) June/July 2021 (Vol. 104, Nos. 6 and 7) is published monthly, except for two double issues in January/February and June/July, by the Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Phone (703) 247-5800. Periodical postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** $50 per year; $35 e-Membership; $125 for three-year membership. **Subscription Rate:** $50 per year; $29 per year additional for postage to foreign addresses (except Canada and Mexico, which are $10 per year additional). Regular issues $8 each. USAF Almanac issue $18 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send changes of address to Air Force Association, 1501 Lee Highway, Arlington, VA 22209-1198. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air Force Association.

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By Tobias Naegele

Two Services, One Budget

Freeing the Space Force from living within the Air Force's budget was intended to ensure satellites didn't need to compete for funding with airplanes; the ancillary benefit should have been that airplanes, likewise, should not need to compete for funding solely with space programs.

If there's a takeaway from the Biden administration's fiscal 2022 defense budget, it's this: The Air Force remains the billpayer for space capabilities, and it does so at the nation's peril.

Among the five military services, only two are indispensable in every future conflict, and both reside within the Department of the Air Force. Each military service takes the lead in its own domain, yet victory in each depends—to the extreme—on what the Air Force and Space Force bring to the fight. Winning demands success in the air and from outer space.

To meet that need, the administration proposes to raise Space Force spending by 13 percent in 2022, to $17.4 billion. Space procurement grows even faster, by 19.7 percent, while research increases by a healthy 6.9 percent. This is exactly what planners wanted in giving the Space Force equal and independent status as a military service; it's also clear that such growth is double or triple what would have been possible had space remained an Air Force domain.

Yet America is not investing what it should in the Air Force. Worse, enduring budget practices burden both the Air Force and Space Force with a weighty pass-through charge that in 2022 alone would divert 18.4 cents of every Department of the Air Force dollar to programs controlled and operated by agencies outside the department.

This pass-through funding adds up to $39 billion for intelligence programs and amounts to 5.5 percent of all defense spending. For the Air and Space Forces, it is a black hole, sucking sustenance from their fiscal lifeline.

The pass-through imposes a massive distortion on every aspect of the defense budget, but its impact on air and space is greatest. Without the pass-through, the Air Force and Space Force budget is a tad less than the Army budget and substantially less than the Department of the Navy (to compare these in detail, see the defense budget breakdowns on page 70). With the pass-through included, however, the Department of the Air Force appears to spend more than the Army and about as much as the Navy and Marines.

The net result: When leaders look at top-line budget numbers, they are fooled into believing their investment in defense is balanced among the services. In fact, however, the department budgets are not on par, and American air power and our national defense suffer as a result.

The pass-through problem is only getting worse. The proposed budget increases pass-through spending by nearly $3.3 billion, or 9.1 percent. By contrast, the Air Force grows by less than the rate of inflation, just 2.2 percent.

To get to that level, Air Force leaders had to take drastic actions that run counter to long-held policy:

■ Cutting Air Force aircraft procurement by $3.2 billion in 2022 and munitions purchases by about $500 million undermines modernization and readiness. The planned buy of just 48—rather than 60—F-35s, with spare parts and related systems and components, saves $1.73 billion in the short term, but pushes up unit costs in the out-years and slows progress toward modernizing the fleet.

■ Retiring 201 aircraft saves $1.4 billion in operating costs near-term, but leaves the Air Force with fewer planes to meet the same mission in the short term. The Air Force suffers both a shortfall in capability—that is, stealthy 5th-generation fighters vs. older 4th-generation planes—and a capacity gap, meaning it lacks enough jets to take to war when needed. Two years ago, acquiring 72 fighter jets per year—60 F-35s and 12 F-15EXs—was the service's highest priority. It should remain so today.

■ Prioritizing research over procurement, the Air Force is boosting its research, development, test, and engineering spending by $2.2 billion. Those funds support critical needs like the B-21 bomber, the Ground-Based Strategic Deterrent nuclear missile to replace Minuteman III, and the Next-Generation Air Dominance program, which the service hopes can deliver the first in a series of 6th-generation fighters and related systems by the end of this decade.

America has grown accustomed to the idea that we never lose jets in combat; that accidents rather than surface-to-air missiles are the primary threats to pilots' lives; and that we dominate the skies in every fight. Believing that today is to imagine the next wars will be like the last. They won't be. In the future, should America face war with China, Russia, or even some well-equipped proxy force, sophisticated integrated air defense systems will challenge American air power. Combat losses will be inevitable. Our Air Force must be sized to sustain a war that inflicts losses. We can't do that building just 60 fighters a year.

The Air Force struggles to tell this story, largely because leaders are constrained by the budget reality imposed on them. It's time to free the Air Force from the constraints of the pass-through, just as independence freed the Space Force from the limitations of competition inside the Air Force.

Moving the entire pass-through account to the Office of the Secretary of Defense will expose the ruse obscuring the Air Force's and Space Force's budgetary reality and provide the maneuver room necessary to gradually build up Air Force and Space Force spending to the levels necessary to meet their obligations under the National Security Strategy.

That strategy starts with deterrence. As long as the United States maintains a formidable and credible threat in the form of highly capable and ready forces, potential adversaries will steer clear of conflict. But if ever the balance of forces tips in their favor, deterrence will fail. The growing sophistication and scale of China's military is increasing the risk and shortening the time frame to such an inflection point.

Our nation has a choice. It can continue shortchanging our Airmen and Guardians and wait for the day when we no longer possess the credible military power to undergird American diplomacy and deter aggression. Or we can appropriately invest in building up our Air and Space Forces to ensure they match our nation's strategic aims.

The surest way to make that happen is to take a simple administrative first step: Remove that pass-through account from the Department of the Air Force and free the Air and Space Forces from a $39 billion roadblock to parity.

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LETTERS

Dishonorable Honor

I am joined by a number of my peers in disbelief after reading the Air Force Magazine March article titled "Widespread Cheating at USAFA" [p. 28]. [We are] filled with dismay. Disturbing as the news is to us that "most of the 249 (cadets) admitted to cheating," thereby confirming Honor Code violations, we consider shameful the tap-dancing reactions of senior academy officials to the scope and seriousness of these violations. In light of their statements, we cannot avoid the conclusion that political correctness and graduation rates now carry more weight than adherence to the time-honored, bedrock foundations of the code. Cadets (not to be confused with 'students' as they are described in this article) do not lie, do not steal, do not cheat, and do not tolerate those among them who do, the operative words being LIE, STEAL, CHEAT, TOLERATE. Regardless of what is now considered acceptable in today's society, honor has no variations—a person is either honorable or is not—and being honorable stands above all other measures of character and should still be the most basic criteria used in accepting someone as a cadet. It is stunning that only one of those 249 cadets was expelled and only one has resigned. Rather, the others are offered months of "probation" and "remediation." Remediation? That is defined as the act or process of remedying or overcoming learning disabilities or problems.

Well, there sure are problems. Senior leadership appears to lay much of the blame on increased digital education and the pandemic. Really? The very existence of "do-overs" such as those mentioned above should be expunged from [the academy's] program—there will be no "do-overs" in the life-or-death crucible of combat. Lame excuses diminishing the magnitude of this scandal do nothing but further undermine the code and cast additional doubt on the character-enhancement mission of the academy. Stating that the embarrassment is an opportunity to "overhaul the code" (just how does one overhaul perfection?) and "to effectively achieve cadet character development" is a travesty in and of itself. The truth is quite the opposite—this debacle is an unfortunate opportunity to REAFFIRM the code, exactly as it is written, with renewed emphasis on the critical role it plays in meeting the demands of a career in the military service and beyond. When senior leadership proffers the intention that cadets "are internalizing" and "understanding what it means to live honorably" they are speaking to those qualities that should be inherent in any cadet. Is it being inferred that the extremely thorough process of awarding Air Force Academy appointments no longer includes the strength of personal character block being checked off? That Doolies [USAFA freshman] now arrive with their personal character in question? And is political correctness so ingrained/feared that firm discipline can no longer be rendered? Cadets are no longer adolescents—they are adults, having volunteered for a serious profession where actions and decisions have serious consequences and must be treated as such. In addition, senior academy officers and those throughout the services need to reassess their commitment and accept the qualities of character necessary in the military and which cannot and must not be compromised or trivialized by current trends in societal license.

I am not a graduate of the academy, but I did have the privilege of serving as an AOC [air officers commanding]. I hold great pride in having been there with my fellow officers and with the cadets, especially those cadets whom I was honored to have as "my squadron."

Col. Doyle C. Ruff, USAF (Ret.)
Reno, Nev.

On Race, Unrest, and USAF

In publishing letters with a racist component, thinly disguised or overt, your purpose must be to either expose a subtle undercurrent of racism in the services

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or to decry it (and your purpose is not necessarily obvious). For example, you publish the letter of Lt. Col. Tom Currie who chastises Chief of Staff, Gen. [Charles Q.] Brown over his concern relating to the continuing low percentage of Black pilots, as though the Chief's observation was a non-issue, or alternatively, not related to racism. The lieutenant colonel continues by conjuring an imaginary population of Black pilots "who couldn't handle his/her aircraft"—which, to my mind, constitutes a breathtaking insult to African American pilots and pilot-aspirants, even if it was just a hypothetical!

Lt. Col. Currie is not to be outdone by Lt. Col. Michael Wells who mischaracterizes the Chief's observation by saying the Chief posits "barriers" to Black pilot accessions. The Chief posited no such thing; all he did was note the percentage: you can draw your own conclusions. Lieutenant Colonel Wells then creates a strawman of supposed "barriers to entry," only to knock it down with his challenge to General Brown to trot out his proofs of barriers. Low Black pilot percentages does not imply barriers (so easy to knock down!) so much as it points to a lack of effective recruiting among Blacks in colleges and universities in combination with, and I advance a supportable speculation here—a probable lack of "visibility" of military-piloting opportunities in the Black community.

Continuing with the problematic letters theme, I advert to the letter of CMSgt. Jerald Akers who spouts the incredibly insensitive epithet that low percentages of Black pilot aspirants is "the Black family's fault." Where did that come from? I'll tell you: It comes from a severe lack of insight into the many subtle (i.e., things you might not see if you're White) realities that affect Blacks' perception of the world and its opportunities. Not necessarily true for all, this hypothesized worldview, to the extent that it exists, can be effectively attacked by making the military pilot career possibility more visible to Blacks. It is not the Black family; it is us.

R.D. Truitt
Red Bank, N.J.

▪ *Our purpose is to provide our readers with an outlet to discuss the serious issues raised by the content of Air Force Magazine, including, of course, the racial unrest in USAF and the country as a whole.—The Editors*

Sometimes, we assume that if the members of an organization are predominantly of one race, that is automatic proof that that race has been preferred over others, and members of other races have been discriminated against. That charge has been made in reference to the United States Air Force. After all, 71 percent of USAF personnel are White, and only 15 percent is Black. Yet, in the total population of the United States, 76 percent of the population is White, and less than 13 percent of the population is Black. That does not indicate discrimination in favor of Whites and against Blacks. But, when we look at the officer population, we get different figures. Eighty percent of USAF officers are white, while only 6 percent of them are African American. Only 2 percent of USAF pilots are Black. Can we assume then that the Air Force discriminates against Blacks as officers or as pilots? Not necessarily. In the National Basketball Association, 74 percent of the players today are Black, while only 17 percent are White, while in the total population, 76 percent of the people are White, while only 13 percent of the people are Black. Should we assume that the NBA discriminates in favor of Blacks and against Whites? I think not.

Daniel Haulman
Montgomery, Ala.

As a Caucasian (OK—white) male, I was both shocked and dismayed by retired Chief Master Sgt. Akers' letter (in the

April 2021 edition), essentially stating the USAF was not racist. His claim is a unique position, as people are the Air Force; not weapons, IT, or support systems. In my 30-year career, I saw and experienced racism (and sexism) way too often.; and every incident damaged our Air Force in some way. To put the blame on anyone other than "the person in the mirror" discounts the responsibility we all have to epitomize our AF core values and build an organizational culture that embraces racial (and gender) equity.

My only hope is the Air Force Magazine editorial staff chose to publish the referenced letter with the goal of receiving tens of thousands of letters like mine expressing the same theme—while we serve or served the greatest Air Force in the world, we still have a long way to go to mitigate, and eventually eliminate, racism and sexism within our amazing organization. 'Be the change' to make it happen!

CMSgt. David Babcock,
USAF (Ret.)
Enon, Ohio

Learn From Your Mistakes

After reading ["Know They Enemy," March, p. 45], I was convinced the individuals who proposed the 90s [Expeditionary Air and Space Force] concept of 10 deployable groups with only seven groups' worth of airplanes had been recalled from retirement.

The words and the final graph are out of sync with each other and reality in many details.

The T-7 replacement of the T-38 appears to be the Reforge "magic key." But the Air Force is only buying 75 percent of the current T-38 numbers. The number of T-38s is currently insufficient for the present number of student pilots. In addition, the Air Force is currently not meeting it's need for graduates from UPT [undergraduate pilot training].

Currently, UPT grads have around 200 hours in a year. The Reforge UPT 2.5 offers 250 hrs in two years. Of course, the sims and AR/VR [augmented reality/virtual reality] are going to augment those "real" hrs. Remote learning—what can possibly go wrong with that concept.

During that 19-month time, the pilot will learn high-speed jet operations, advanced instrument procedures, and fighter tactics again using the T-7 and nonflying devices.

Reforge replaces six months of "downtime," two months of IFF [identification, friend or foe], and the first four months of FTU [formal training unit], in the current plan, with 12 months of ITT [initial tactical training], plus five months during UPT 2.5.

While remaining at the same UPT base will save PCS funds and some time, it also mean more pressure on the same insufficient number of T-7s and devices.

Each UPT base will have to run its own ITT squadrons for the different phases, instead of a common base for IFF. [Instructor Pilots] will be needed with fighter experience, which will drain fighter units and lead to a caste structure for IPs as either UPT or ITT.

With ITT ending at 24 months, the T-7 qualified 1st lieutenant "fighter pilot" will now move on to a new base for FTU in a fourth-, 4.5-, or fifth-gen fighter and master it in only four months.

In the past, the "short course" was reversed for "highly experienced/senior ranking" fighter pilots changing jets or returning to flight status.

Following that, it's a move to the first operational assignment for MQT [Mission Qualification Training]—two months—again in half the current time. After flight, as a MR [mission ready]wingman for a mere additional four months, the pilot begins FLUG [Flight Lead Upgrade] for two months to become a MR Flight Lead within a total of 37 months from first UPT flight.

It's not stated whether this is a two-ship or four-ship flight lead, but for the sake of sanity let's say two-ship.

Bottom line: Under this Reforger plan, the newly minted MR FL, still a first lieutenant, would probably have only 400 to 450 hours total "flight" time and only one year total in the jet. This program represents a two-month reduction in total time to MR status with four less months of new jet experience.

Someone needs to "wave the flag" from the front of the briefing room and look at the number of magic assumptions in this plan.

It sounds exactly like the mid '70s solution when there weren't enough "experienced" pilots based upon hours in fighters. Puff, one day the number of required hours dropped by one-third, and all the briefing charts and letters of Xs were updated and made acceptable. Problem solved.

Charlie McCormack
Danville, Calif.

What's the Money, Man?

Re: John A. Tirpak's article: "The Raider Comes Out Of The Black" in your March 2021 issue [p. 37]—his report revealed some interesting details of the B-21 stealth bomber, including a projected payload of 30,000 pounds. But the "stealthiest" aspect of this plane seems to be its price tag. The Air Force has not publicly disclosed the cost since an early estimate of $550 million per plane in 2010 (Wikipedia) to the best of my knowledge. Factoring an annual average inflation rate of 2 percent over the past 11 years brings to the cost per plane to more than $650 million, a rough calculation. The initial order of 100 planes would cost taxpayers at least $65 billion.

Why doesn't the Air Force publicly reveal the Raider's current cost? Is it more concerned about operational security or an angry reaction from Congress, the media, and taxpayers. It's a safe bet that our adversaries already know or can easily learn the B-21's cost. The Air Force may be more worried about the price tag's PR impact. USAF Chief of Staff Gen. Charles Q. Brown Jr. can demonstrate a commitment to transparency by telling us accurately what this plane will cost.

Richard A. Reif
Flushing, N.Y.

In Colonel Gallagher's letter (March 2021 magazine) his recommendation to remove the life raft in the C-17 reminds me that the B-52Ds I flew in the 1970s—a high-wing design somewhat similar to the C-17—had a life raft compartment in the upper fuselage just forward of the wing carry through structure. The compartment was empty! In fact, the compartment was removed in subsequent models of the aircraft. Our tech order stated: "Ditching is not recommended in this aircraft."

Capt. Francis H. Marlow,
USAF (Ret.)
Riverside, Calif.

INDEX TO ADVERTISERS

Conformal Confirmation

In April's ["Letters: Fighter Fight," p. 8] MSgt. Chris Dierkes asked why USAF never fit conformal tanks to C and D models of the F-15 as on the F-15E and EX models and as the Israelis had done for all their air-to-air F-15s. The answer is, they did.

I flew F-15Cs with conformal tanks in the 57th Fighter Interceptor Squadron at Keflavik, Iceland, in 1987-88. From my experience, conformal tanks are a mixed bag of more good than bad effects on F-15 performance.

Having first flown the much lighter and more nimble F-15A with 49th Tactical Fighter Wing at Holloman Air Force Base, N.M., I dreaded converting to the heavier F-15C with conformal tanks—not to mention the move from the warm desert to the Arctic Circle! Installation of conformal tanks added over a ton of empty weight to the F-15 before a drop of fuel was added. Full fuel added another 12,000 pounds to the C model's internal tankage of about 16,000 pounds and shifted the center of gravity forward, which noticeably reduced pitch authority. For that reason, the stabilators were given an extra couple of degrees of movement and some of the nose weights were removed. The extra weight also limited the F-15 to 6.33 Gs when full and 7.5 Gs when half full, near as I recall. With the conformals empty, the center of gravity moved further aft and full 9-G maneuvering was permitted. Aerodynamically, conformal tanks actually lowered the F-15's drag index very slightly, contrary to most comments I've read.

For our primary mission of intercepting Soviet aircraft transiting the GIUK gap or stalking NATO submarines, conformal tanks were a real asset. In 1987, the last year of extensive Soviet air activity in the North Atlantic, 57th Fighter Interceptor Squadron logged 283 intercepts of Bear D, F, G, and H models. With a couple of air refuelings from Iceland-based KC-135s, we sometimes flew "escort" missions of eight hours or more to let the Russians know we'd always be there for them.

Our training missions consisted of practice intercepts on each other until we burned the fuel out of the conformals. Then we could do full-up air combat maneuvering. With weather at Kef notoriously unpredictable, we often planned to arrive at the instrument approach high fix with 10,000 pounds of fuel remaining, in case we couldn't get in. I once had to divert to RAF Leuchars in Scotland on Major "Ant" Hill's wing when Keflavik closed due to ice fog. By the time we landed, the weather back in Iceland had cleared and we were instructed to return ASAP, provided we could land before sunset. We took off from Scotland with the sun already well below the horizon, kept the afterburners lit and cruised at Mach 1.4 all the way back to Keflavik, making the sunrise in the West!

One final illustration of the benefits of conformal tanks: My squadron deployed to Zaragossa, Spain, for dissimilar air-to-air training. Our opponents were F-16s deployed from Spangdahlem Air Base, Germany, I believe. Since the missions would be relatively short, just over an hour, we put only a thousand pounds of fuel in each of our conformal tanks so we'd be full-up to dogfight at the "Fight's on!" call. The F-16s had no radar missiles, so we agreed to fight "guns and knives" only, meaning kills could only be made by short-range AIM-9s from the rear quarter or a valid tracking gun shot. Following a highly successful first day of engagements for my guys, we were "debriefing" with the Spang boys at the Zaragossa club over cold beers when one of my opponents remarked, "Man, I thought the F-15 with conformal tanks was supposed to be a real dog in a turning fight." I looked at him squarely and replied, "It is." So I had a full dance card for the next two weeks!

Lt. Col. Gary "Waldo" Peppers,
USAF (Ret.)
Cape Coral, Fla.

Air Base Defense Revolution

Who should defend air bases, and how

["Defending Forward Bases," April, p. 39]? It's a classic roles and missions struggle, with associated money at stake. The question has been alive since the Cold War, and before, but the nature of the threat has evolved. At the Tactical Air Command HQs in the mid-1980s we perused a doctrinal agreement with the Army's nearby Training and Doctrine Command (at Fort MacPherson, Ga.). Back then, the tactical missile threat against air bases was not as advanced as today, but the Soviet Spetsnaz (special forces) posed a ground threat. The Army agreed in principal to defend the areas outside bases, while the USAF manned the perimeters. How the Army would have provided that while they battled the Soviet onslaught further east was another matter, thankfully never tested.

Lt. Col. David Skilling,
USAF (Ret.)
Marietta, Ga.

Failure to Remember

I read the two articles in the January/February 2021 magazine, "Mishaps Rise Due to Lack of Training, Shortage of Maintainers, Report Says," p. 25, and "Repairing Broken Bones," p. 32. I was more than amused, frustrated, and outright angered by both articles. I have been a maintainer my whole career until I retired in 2003. I filled in many positions from knuckle dragger on the flight line to mid-level and senior-management positions, culminating as a maintenance superintendent of a B-1B Squadron in South Dakota and then retiring as a command maintenance functional manager in Air Force Materiel Command. During my career I have been able to see the many times that the Air Force has had to deal with a shortage of qualified maintenance personnel. Many of these times were created by politically driven, self-inflicted gunshot wounds created by politicos whose focus was on their own agenda instead of maintaining a highly qualified combat-ready fleet of aircraft and qualified pilots and maintainers.

Personnel management is a constant battle between competing priorities, but maintaining a qualified and combat-ready fighting force should always be the priority. Decisions that have impacted these goals are:

Involuntary retraining of skilled personnel from one career field to another when recruiting cannot keep them filled. This directly impacts the available technical skill and system knowledge required to maintain constantly changing and involving weapons platforms and the morale of personnel who made a conscious decision to pick a field they love and enjoy doing every day.

The wholesale outsourcing of career fields that are critical to combat operations around the world, i.e. powered and non-powered Aerospace Ground Support Equipment, multiple career fields in Civil Engineers, Security Forces, just to name a few.

The senseless movement of personnel and equipment from one location to another only to be reversed later, requiring the relocation of these same personnel and aircraft back to their original locations or dispersed to other bases. The example being the relocation of a squadron of B-1B aircraft and personnel from Ellsworth Air Force Base, S.D., to Mountain Home Air Force Base, Idaho, and then back again. The disruption to the lives of those involved and the millions of dollars wasted on personnel movements, construction costs, and the impact to pilot/maintainer training was cost-prohibitive.

Maintaining legacy aircraft without sufficient funding/staffing to support additional flying hours, training, parts, depot maintenance while not providing the resources to allow the fielding of new technologies and weapons systems required.

The newest impact to these goals is purchasing aircraft that cannot be considered operational and combat-capable but still must be maintained and flown for training, but not in fully operational condition.

For our flying officers and enlisted personnel reduced flying hours and an increased reliance on simulators-based training does not put them in a realistic combat environment. This will not make them ready for the real flying environment they will be exposed to when we have a real-world war with a peer adversary in the future.

These types of situations have occurred so many times over the past decades, and the results are always the same. We end up with a shortage of qualified maintainers, funding shortages, flying hour reductions, increased deployment times, training impacts, negative impact to morale, and an exodus of pilots and enlisted personnel. When will we start learning from mistakes, we have already made so we do not make them again?

Now, with regards to the broken bones. We have taken an aircraft that was converted from a nuclear to conventional aircraft, changed its flying profile, increased its missions but have not completed the structural fatigue testing to ensure that the remaining aircraft will be viable until the replacement B-21 aircraft will be successfully introduced into the inventory. We made that mistake with the KC-47 already and have had to retain additional KC-135 aircraft to compensate for the lack of KC-47 operational capability, resulting in an increased workload for the maintainers and operators.

All these decisions were made at the highest levels and while the aircraft was more than capable to accomplish them, I do not believe the Air Force was prepared for the fallout the wear and tear of these new missions had on the airframe, systems, and those that must maintain them. The B-1 is an awesome platform, I spent eight years with them at Ellsworth AFB, and while it has its issues, we have found that when it is properly staffed, logistically supported and flown on a regular basis, it can do the job while maintaining an impressive fully mission capable rate. This was a direct tribute to the maintainers who kept them flying and aircrews who executed the mission each day. We proved this during the congressionally mandated B-1B operational testing conducted at Ellsworth in the mid-90s. The number of assigned missions flown at home station and while deployed to Roswell, New Mexico exceeded what was expected, while maintaining mission capable rates exceeding 80-plus percent.

Until the B-21 is fielded, fully operational existing platforms, B-52, B-1, and B-2 should all be maintained and supported as if they were ready to go to war tomorrow. We owe this level of support to the operators/warfighters and maintainers who work their butts off every day to ensure our aircrews have the safest and most capable platforms to execute the mission and bring them safely home to their families at the end of the day or conflict. To do anything less would be a disservice and injustice to our Airmen, their families, and our nation.

CMSgt. John P. Fedarko,
Xenia, Ohio

In the January/February issue of Air Force Magazine, Brian Everstine's article "Mishaps Rise Due to Lack of Training,

Shortage of Maintainers, Report Says" [p. 25] is a summary of the National Commission on Military Aviation Safety report. Everstine provided a good summary of the report. In the report, the commission met with service members from the various military branches, reviewed data, conducted interviews, visited numerous military installations, assessed operational tempos, and wrote their findings to include recommendations.

The commission analyzed aviation Class A through C mishaps during the 2013 to 2018 years in which 157 aircraft were destroyed and service members and civilians died. The commission identified a number of factors, such as training (for aircrew and maintenance personnel), the logistical supply chain deficiencies, reduced force structure, and proficiency levels in aircrew and maintenance. The report did "briefly" mention inconsistent budget appropriations and continual resolutions as factors. However, the commission didn't particularly focus on the main factor into these Class A through C mishaps, which is the lack of congressional support to appropriate the requested DOD fiscal year (FY) budget submissions.

The 2011 Budget Control Act was a factor into DOD's next 10 FYs in which DOD had to reduce it's budget request by a total of nearly 1 trillion dollars. Congress authorized the Budget Control Act and it became law after President [Barack] Obama signed it. As a result of nearly 1 trillion dollars in reduced DOD budget planning, there are definite direct impacts to military readiness, reduced flight hours, reduced training and joint exercises; it impacted the logistical supply chain and depot maintenance, decreased our force structure, drastically increased DOD's ops tempo (a surge in Afghanistan, involvement in Libya, Syria, Somalia, and Yemen), and reduced training opportunities, which led to less proficient skills levels for our service members.

The bottom line is, whenever Congress supports defunding our DOD, it directly impacts our military readiness and the nation's security. During my Air Force career as an aviator and logistics readiness officer, I saw first hand that when Congress supported DOD's FY budget requests as military readiness, training, logistical support, proficiency levels were bolstered. Every congressional member who supported the 2011 Budget Control Act defunding DOD by 1 trillion dollars is at fault with the 157 aircraft destroyed and 198 patriotic service members and civilians who passed. All veterans, no matter one's political par-ty, should voice their advocacy to their respective congressional representatives to fully fund our DOD FY budget requests. If the cycle of defunding DOD's budget requests and reprogramming the funding to social programs continues, it will continue to erode our military readiness and increase vulnerability to our national security. With a new administration in-place the signs are clear, the DOD budget will be reduced, resulting in military readiness deficiencies and once again our national security at risk.

Our superb Airmen have demonstrated great dedication, have overcome significant challengers, and are extremely patriotic. In order to correct the findings from the National Commission on Military Aviation Safety's report DOD needs a fully funded budget and not for one FY. Fellow veterans be sure to advocate sustaining the required DOD FY budget requests to your respective congressional representatives, just remember when it wasn't when you wore the uniform!

Col. Steven L. Amato,
USAF (Ret.)
Woodbridge, Va.

Get Them Flying

There has been a lot of mention in both your magazine and the popular press about the pilot shortage facing the Air Force. I believe an aspect of this issue has not been mentioned or investigated. And that is the pilot training pipeline (Undergraduate Pilot Training or UPT) and how the Air Force is managing the training of new pilots. I suggest that this is a source of part of the problem based on the personal interaction with someone who currently is in the UPT program. This individual has been assigned to his UPT base for over one year and has only had five (5!) training flights.

Part of the problem is obviously the restrictions based on the COVID virus. But that aside, my information is that the base does not have enough or qualified training staff. Apparently, while a training sortie may be scheduled, whether if goes or not is based on whether there is an Instructor to take the sortie. Even in the simulation part of the curriculum, a scheduled training period depends on if an instructor can be scheduled, and some of the instructors are retired pilots and not Active-duty cadre. I recommend the Air Force review its approach to UPT and see if it is not part of the pilot shortage problem, and what might be done to improve the output of new, qualified pilots from the UPT program.

Col. Duane H. Zieg,
USAF (Ret.)
Springfield, Va.

VERBATIM

Does It Hurt Yet?

Mike Tsukamoto/staff; DOD; Thomas Breher

"I want the Pentagon to feel some measure of physical pain every time they spend a dollar."

—**Rep. Adam Smith** (D-Wash.), Chairman, HASC, at a hearing of the committee on April 22.

Service Members

USN

"The nuclear disaster in Palomares [Spain], caused untold suffering and harm to the service members sent in to clean up radioactive material without adequate protective gear or warning of severe health risks. Yet 55 years on, the VA still hasn't recognized radiation risks at Palomares, cutting off benefits and health care for these deserving veterans."

—U.S. **Sen. Richard Blumenthal** (D-Conn.), press release April 15.

DOD

Looks are Deceiving

"When I got to the program office, four years ago, and I was a one-star ... I was talking to a Navy captain in the hallway, and ... I said, 'Hey captain, it's good to see how the Navy runs programs because, boy, this isn't how the Air Force runs a program.' And he looked at me with terror in his eyes and said, 'gosh, sir, I thought this was how the Air Force ran programs.' So at that point, it dawned on me that we were very unusual. And so we started to look at ways that we can make this program look and feel much more like a normal program."

—**Air Force Lt. Gen. Eric Fick,** Program Executive Office director, Joint Strike Fighter, at a House Armed Services Committee hearing to discuss chronic sustainment cost issues on the F-35, April 22.

Twister: right hand blue, left hand red

"What we saw taking place in the country and in the military, frankly, during this past year especially was reminiscent of Mao's cultural revolution where you had to toe a certain party line."

—**Lt. Col. Matthew Lohmeier,** 11th Space Warning Squadron, fired for comments in his recently self-published book, on a radio show alleging a Marxist plot to infiltrate the military and overthrow the U.S. government [Washington Post, May 17].

Know-It-Alls

"We seem to have more and more people spouting off about Marxism, communism, and socialism who don't seem to have a clue what they're talking about."

—**John Sipher,** former CIA operative and fellow at the Atlantic Council, in a tweet responding to fired Lt. Col. Matthew Lohmeier's comments on a radio show [Washington Post, May 17].

Mike Tsukamoto/staff; Tumisu

Details, Details

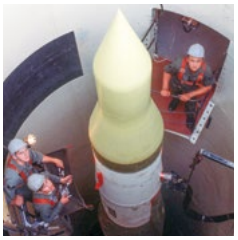
"If we are serious about spending taxpayer dollars wisely and effectively, we have got to end the absurdity of the Pentagon being the only agency in the federal government that has not passed an independent audit."

—**Joint statement from Sens. Bernie Sanders** (I-Vt.), **Chuck Grassley** (R-Iowa), **Ron Wyden** (D-Ore.), and **Mike Lee** (R-Utah) on a proposed bill that would penalize the Pentagon for failing to pass an audit. Beginning in fiscal 2022, any of the agencies failing to obtain a clean audit, 1 percent of their budget would be returned to the Treasury Department [The Hill, May 19].

Cyber Deterrence

"Russia harbors [them], then won't extradite them and, at the same time, Russia uses them. ... So they may not have directed this cyber ransom that's happening right now, but they certainly are culpable ... if that's the way they want to play, then, yes: We should respond in-kind and in an irregular warfare manner."

—**Ruben Gallego,** (D-Ariz.), chairman of the House Armed Services Committee Subcommittee on Intelligence and Special Operations at a Global SOF Foundation's SOF Imperatives Roundtable, May 11.



Tech Sgt. Bob Wickle via National Archives

Sure-Fire

"Nothing lasts forever. ... You cannot indefinitely life-extend anything. I cannot deter with the leftovers of the Cold War forever. ... I need a weapons system that will actually work and actually make it to the target."

—**Adm. Charles A. Richard,** commander, U.S. Strategic Command, describing the Minuteman III ICBM before the Senate Armed Services Committee April 20.

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Future Force

As Deputy Chief of Staff for Strategy, Integration, and Requirements at Air Force Headquarters in the Pentagon, Lt. Gen. S. Clinton Hinote is sometimes dubbed "the Air Force futurist." He is responsible for developing Air Force strategy and multi-domain operating concepts, and for integrating through centralized design and validation the service's operational requirements. Air Force Magazine Editors Amy McCullough, Tobias Naegele, and John A. Tirpak interviewed him via Zoom in late April.

Nicholas De La Pena/USAF

U.S. Air Force Maj. Josh Gunderson, F-22 Demo Team commander, conducts a practice over Joint Base Langley-Eustis, Va., May 21.

Q. Air Force Chief of Staff Gen. Charles Q. Brown Jr. recently divulged that the F-22 Raptor is not in the Air Force's long-range fighter plan. In effect, fourth-generation fighters will continue long after this fifth-gen fighter retired. Why?

A. I did a senior thesis at the Air Force Academy on the fly-off between the YF-22 and the YF-23. I was a senior in 1991, so I'm a little older now, about 30 years older, [but the point is] the technology that went into the F-22 is in the neighborhood of 30 years old. ... The airframe itself is still very capable today, and will be capable for some time, but now is a good time to talk about how we're going to bridge [from] the leading air superiority tool of today, the F 22, to the [Next-Generation Air Dominance family of systems]. ... We're going to invest in the F-22 In the short-term, because it needs to bridge us to that NGAD capability in the medium to long term. ...The time frame [to potentially retire the F-22] is 10 to 15 years...

Q. Is the NGAD going to be like Dr. Will Roper, the former acquisition chief, described, where you don't build it to be a 30-year airplane, but you build it for 10 or 11 or 12 years?

A. Exactly. That's exactly what we're thinking. There's an interesting analysis that we're undergoing to understand what is the optimum time frame if you didn't want to send an airplane to depot. We haven't answered that question yet, but it's a fascinating question because what we have generally done is fly the airplanes for a certain amount of time, send them to Tinker [Air Force Base, Okla.], or we send them to Hill [Air Force Base, Utah], and we basically tear them down and rebuild them. But what if that wasn't the model? What if the model was, you fly them until their service life is ended, ... and you're constantly spiraling to a new platform? ... We are inventing how to think about an Air Force this way.

Q. With the NGAD, the idea is develop it quickly, field it quickly, and by the time you've fielded it, you're already halfway done with the next one. Right?

A. Certainly the next one is in design, yes.

Q. So the second NGAD is already in design?

A. I can't confirm or deny that one. But what you can expect is that as we get into the NGAD development cycle, what we envision is we're going to have one being developed, integrated, and fielded [and] one in design. And you're constantly allowing the great companies of our industrial base to re-enter the competition at the design phase, as opposed to crowding them out in the sustainability phase, which is where we're headed right now with a couple of our programs.

Q. So is that on a five-year cycle? A 10-year cycle?

A. We don't know yet. We're still trying to figure out what the right level is.... So, for example you field the platform and as you're spiraling the software and the ... weapons, maybe some of the centers are plug-and-play. So you're

still allowing that platform to mature, through a spiral series [of upgrades], as you're designing the next platform. And at some point you incorporate the newest of the software, maybe the sensor technology and integration into the new platform, and you jump over that one. So yes, it could be every five years, it could be every eight years.

Q. So when does the NGAD enter the force?

A. We're going to take an event-driven approach to it. ... We're anticipating that's in the 2030-ish time frame.

Q. The Air Force has had difficulty convincing Congress to let it retire older systems. Your future plan depends on that. How will you convince the Hill this is the right way forward?

A. In a specific sense, I have personally taken members of Congress out to go see some of the developments of the NGAD program. They typically come away, at a minimum, fairly impressed. ... We still have to make it real and there's a lot to do in the program, but when you see what is going on, and you hear it from the Airmen who are flying it, you get a chance to really understand where we're going. ... We've also had a chance, within the Pentagon, to take some of our senior [Office of the Secretary of Defense] leaders to go through the same trip. And it's made a big difference. Seeing is believing. ...

[In a broader sense,] about divesting, this idea of iron for iron. ... comes up in every discussion we have with every member [of Congress]. And one of the things that we are seeing is, we think we see a change in the conversation ... [in] the willingness of Congress as a whole.

Q. Are you at all concerned that there will be pressure not to fund F-22 updates, and that you could find it harder to keep it going another 10 to 15 years?

A. We are concerned, of course, but what we believe is that we have a good story and our story is we keep the F-22 viable as a bridge to get to the new capability. This is not an area of the Air Force where we feel we can take a lot of risk. ... We're going to have to have a really tight transition plan. And in order to make that work, we are going to continue to invest in the F-22, mainly center upgrades to keep it going. And knowing that it has its limitations and we ... really do need that modern capability, ... we are developing this sea change in the way that we field capability in the NGAD family.

Q. What about the A-10—your "plus one." The plan now is to keep them around till the 2030s also. What are the risks with trying to divest both platforms at the same time?

A. It's going to be very different when you talk about the transition plans for these aircraft. The F-22, of course, will have a capability that may not look 100 percent like iron for iron because you're talking about a set of capabilities for the NGAD, and some of that may be unmanned, some of it may be optionally manned. So it's not one for one. ... Whereas, by the time that we divest the A-10s, we're not looking on building another non-survivable close air support aircraft like it. We're going to be doing the mission in a very different way. And, in fact some of the ways that the joint force is developing means that by the time we're talking about divesting the A-10, you're not even really talking about the same concepts of close air support. ... It's probably going to look much more distributed. ... I will tell you that as the Army emphasizes fires, maneuver is not quite as important, especially in Asia where the maneuver is between islands and things like that. So then close air support feels much different. It just is a different type of mission. ... The question will be how do we use the capabilities we're developing to do the types of missions in the types of environments that the A 10 was dealing? Typically, that's going to be in the counterterrorism environment, and we are developing new concepts and new capabilities that I think will be pretty compelling [there]. By that point in time, I think it'll be pretty evident that we need to just go ahead and divest the A-10.

Q. What about the "clean-sheet" idea that the chief has talked about for replacing the F-16? Is that related to the A-10 or is he really just talking design philosophy?

A. When you think about the types of missions that we may want fighters to do in the future, they're likely to be the homeland defense mission. ... And those don't necessarily require the high level of survivability that we will be able to have in a program like NGAD. So it may well be that, as an example, radar-Stealth is not as necessary in a design for that [mission], but I would tell you the way that I think they're absolutely related is in this: How we will design the product and how we will use our government reference architecture to get capability that we can spiral over time.

Q. Recently the Navy revealed it is going to go to at least half-and-half manned/unmanned aircraft on carriers. And in the 2030s, maybe even a 60/40 mix. What kind of a mix will USAF want?

A. So, so as we think about what constitutes sixth-generation, certainly we think manned-unmanned teaming has a big role to play. ... I absolutely see us moving to autonomous platforms, some that operate in close proximity to manned platforms and act as a support agent or a force multiplier, but also some that act on, on relatively their own and they are able to swarm. A good example of how we see unmanned aircraft playing a high value proposition is in the idea of a sensing grid, the ability to remotely connect many of the platforms and connect their sensors to the ... combat cloud ... [and] we would be able to get the data correlated, fuse it, and use it. ... We actually see that as being something that plays really, really well in our wargames. And we also see it as something where we can share technologies with our allies and partners to be able to create a large number of these and be able to field a grid of sensors that's going to be really difficult to deny. ... That's part of this idea of what keeps the joint force survivable ... you field a lot of these systems that allows you some degree of resilience. ...

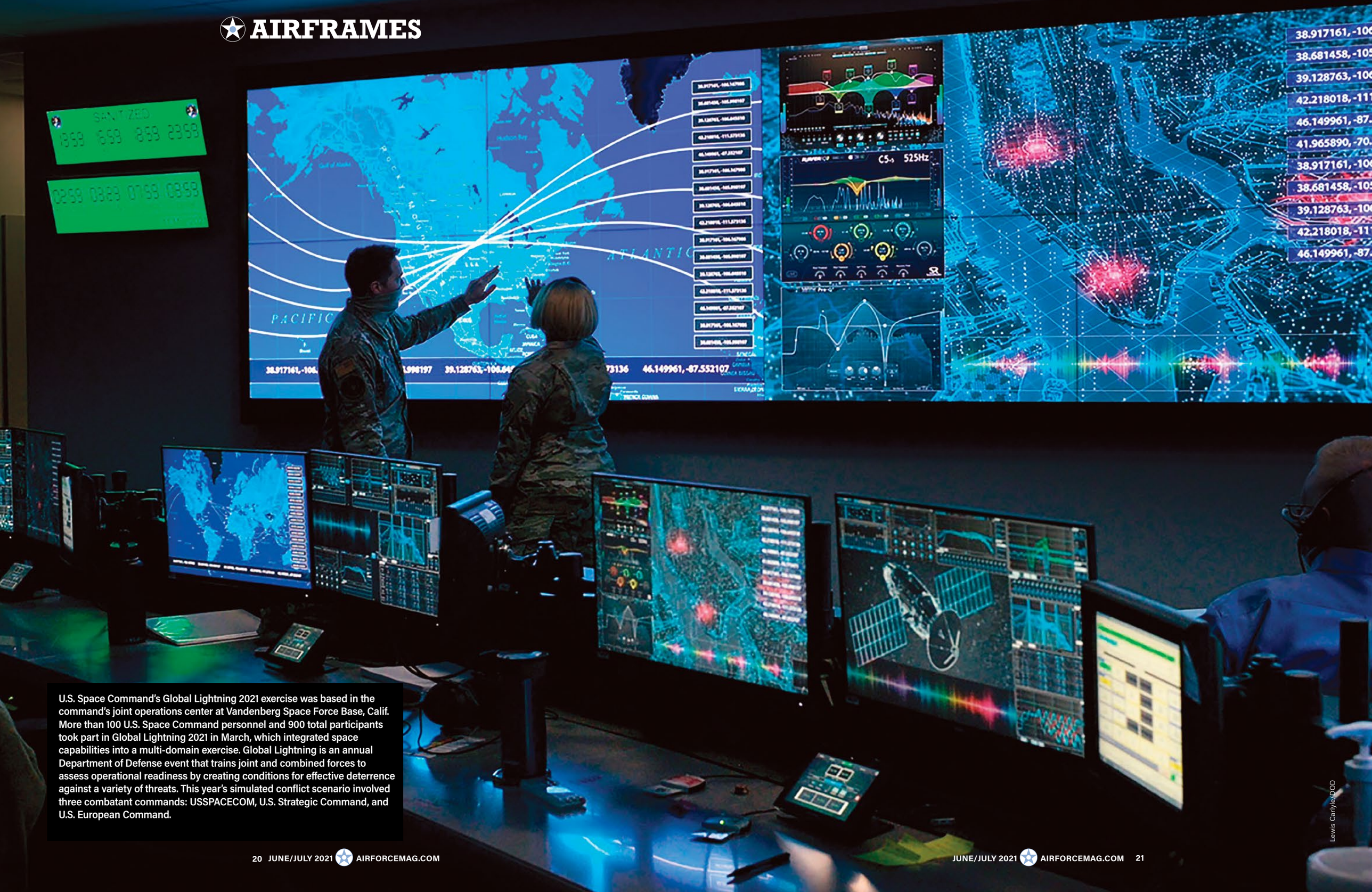
One of the experiments that I followed, I think it was this week, we released a video of an unmanned aircraft that took off with a rocket assist and came back to earth with a parachute. ... If this idea of launching away from a runway and recovering away from a runway becomes something that's both capable and affordable, now you've really moved to a different era of air power. It's an era where you can generate combat power far away from 1,000-foot runways. That's compelling. That's the type of thing we need if we're going to survive and operate in the battlefield of tomorrow, especially when all the missiles of the Chinese A2AD [anti-access/area denial weapons] start raining down on our Airmen. ✪

The Air Force Academy Class of 2021 shed their masks and tossed their covers as the Air Force Thunderbird demonstration team flew overhead May 26. Gen. Mark Milley, Army general and Chairman of the Joint Chiefs of Staff told the new Airmen and Guardian officers that he owes his life to Airmen who had the courage to roll on close air support missions. "We didn't care about the color of your uniform," he said. "We're a joint force—one team, one fight, every day, all day, day and night, and the enemy should never forget it." Milley also hinted that his successor will most likely come from the Air or Space Forces. "The next Chairman of the Joint Chiefs of Staff—it's going to be either Brown or Raymond," Milley said. "Take your pick, Space or Air Force." It's high time: Milley is the 10th Army Chairman, compared to just four from the Air Force. Gen. Richard Myers was the last Airman to be Chairman, taking over Oct. 1, 2001, weeks after 9/11, and completing his four-year term on September 30, 2005.

Chief Master Sgt. Daniel Kenemore

A Royal Australian Air Force E-7A Wedgetail Airborne Early Warning and Control aircraft, right, operated by No. 2 Squadron based at RAAF Base Williamtown, Australia, flies with a Hawaii Air National Guard F-22 Raptor near Oahu, Hawaii. The AWACS traveled to Hawaii to participate in exercise Pacific Edge 21 and provide airborne early warning support to airborne participants. The exercise enhances air-combat proficiencies through the integration of allied units.

Staff Sgt. John Linzmeier/ANG



U.S. Space Command's Global Lightning 2021 exercise was based in the command's joint operations center at Vandenberg Space Force Base, Calif. More than 100 U.S. Space Command personnel and 900 total participants took part in Global Lightning 2021 in March, which integrated space capabilities into a multi-domain exercise. Global Lightning is an annual Department of Defense event that trains joint and combined forces to assess operational readiness by creating conditions for effective deterrence against a variety of threats. This year's simulated conflict scenario involved three combatant commands: USSPACECOM, U.S. Strategic Command, and U.S. European Command.

Lewis Carlyle/DOD

By John A. Tirpak

Familiar Themes

June 7, 2021

The interim National Security Strategy guidance, together with the fiscal 2022 defense budget request, make clear that whatever their other differences, the Biden administration will stick with the National Defense Strategy put forward by the Trump administration.

President Biden's security policy strongly echoes that of the 2018 strategy, putting competition with China and deterrence of the Chinese and Russians front and center. It will continue the shift away from small wars in favor of preparing for a big one. The themes have been consistent since Biden's inaugural address in January, when he promised allies that the U.S. would treat them with more respect and appreciation than they got from his predecessor, though the 2018 strategy, produced when James Mattis was Defense Secretary, also touted the importance of alliances and partners.

Feared deep cuts in the 2022 defense budget request did not materialize. The strategic deterrence modernization program was fully funded, calming the worries of deterrence hawks that the two nuclear weapons—the Ground-Based Strategic Deterrent, which will replace Minuteman III missiles, and the Long-Range Standoff cruise missile—would be killed off. The Navy's new sea-launched cruise missile also survived the change of administrations. A fresh nuclear posture review is expected, however, so changes could still follow.

The Air Force plan to divest legacy systems to free up funds for modernization survived in the administration's budget review. Hundreds of aircraft will be retired if the plan wins congressional approval, allowing investment in hypersonic weapons, next-generation combat aircraft, and more.

Any fears that the new administration would seek to dissolve or reduce the Space Force evaporated. The new service is seeking a 13 percent budget increase over 2021, up $2 billion. The Biden administration said the funds are needed to counter aggressive Chinese and Russian moves in space.

Consistent with a focus on the Indo-Pacific, where naval and air forces are best matched to the vast region, the Army was slightly de-emphasized, but the Army was allowed to continue funding its long-range strike weapons programs intended to make it more relevant in the Indo-Pacific.

It's unclear when Defense Secretary Lloyd J. Austin's new defense strategy will be ready, but Pentagon officials said the interim National Security Strategic Guidance, issued in March, is sufficient for now. That document calls China "the only competitor potentially capable of combining its economic, diplomatic, military, and technological power to mount a sustained challenge to a stable and open international system." Russia, it argues, is simply determined to "enhance its global influence" by playing the role of spoiler on the world stage.

Both countries have "invested heavily" to "check U.S. strengths and prevent us from defending our interests and allies around the world," the interim strategy states. The document repeatedly cites the need for alliances and a mantra of "build back better" to meet strategic challenges "from a position of strength."

Senior Airman Duncan Bevan

A U.S. Air Force and Pacific coalition aircraft formation flies over Guam during exercise Cope North 21, which was held near Andersen Air Force Base in February. Alliances are back in focus for the U.S.

ALLIANCE RELIANCE

The U.S. will "reclaim our place in international institutions; live up to our values at home and speak out to defend them around the world; modernize our military capabilities, while leading first with diplomacy, and revitalize America's unmatched network of alliances and partnerships," Biden wrote in the forward to the interim strategy.

The main differences between the Biden and Trump versions boil down to the way the military will posture itself to fight future pandemics, protect the rights of minorities, and "invest in solutions" as part of an all-of-government approach to problems abroad—before things get messy.

Pandemics, terrorism, humanitarian crises, cyber attacks, climate change and many other threats pose "in some cases, existential dangers," but recognize no borders. They demand collective responses from like-minded nations.

Underlying all of this is "a revolution in technology that poses both peril and promise," the strategy warns. The first to exploit artificial intelligence and quantum computing in both the military and commercial worlds will have a strategic advantage, and the U.S. must invest to remain a leader. Those advances could help combat climate change and cure disease; emerging 5G networking technology will "set the stage for huge advances in commerce and access to information."

While the 2018 strategy pushed for technological dominance of potential allies, the Biden administration's take is to instead rely on establishing a "favorable distribution of power" to prevent adversaries from threatening the U.S. and its allies or denying them access to the global commons.

The U.S. will also seek to "share responsibilities equitably," a nod to the Trump administration's persistent complaint that U.S. allies in Europe and the Pacific did not invest enough in their own defenses. The new administration will also "address the existential threat posed by nuclear weapons" and seek to "head off costly arms races and re-establish our credibility as a leader in arms control." Case in point, Biden reversed course on extension of the New START Treaty with Russia and extended it, rather than letting it expire, as President Trump had planned.

"Where possible, we will also pursue new arms control, arrangements," the document states, something to which the Trump administration offered little more than lip service.

"We will take steps to reduce the role of nuclear weapons in our national security strategy, while ensuring our strategic deterrent remains safe, secure and effective," the NSS states. America's deterrence capabilities and commitments to allies will "remain strong and credible," but it will again try to assert "nonproliferation leadership."

KENDALL NEEDS NO CONVINCING

The presumed next Air Force Secretary, Frank Kendall, expected to be confirmed by the Senate in June, spent years managing the Pentagon's acquisition system during the Obama administration, including four years as the undersecretary of defense for acquisition, technology, and logistics. Before that, Kendall was the principal deputy to that position for two years.

The China threat, he testified, "is the reason, perhaps, that I'm interested in coming back into government." In prepared answers, Kendall wrote that China went to school on America's 1991 victory in the Gulf War and has since emulated its capabilities and structure "with the clear goal to defeat the ability of the United States to project power near China."

Kendall said he supports a bigger defense budget but called the Biden administration's fiscal 2022 request "adequate." He said he would fight for the resources necessary to modernize the Air Force, pledging to "fight for the budget that's necessary."

The Air Force's requirement for the B-21 bomber, now 145 aircraft, is "a reasonable number at this point," Kendall said. Today's bomber fleet of 220 aircraft, including 75 upgraded B-52s, would be "right sized" in the coming years, he said.

Kendall defended the A-10, given his own Army background and the jet's "unique" capabilities in close air support, he told the Senate Armed Services Committee (SASC). The fact that the fleet has been partially re-winged to extend its service life works in its favor, but he acknowledged that "there remain hard trades to be made." Recent Air Force planning documents obtained by Air Force Magazine show the service intends to retain the A-10 until the early 2030s, after which leaders believe it will no longer be a survivable platform in even lightly defended airspace.

BACKING THE F-35

The F-35 "is the best tactical aircraft of its type in the world," Kendall told the SASC. He acknowledged its costliness, but also called it the "cornerstone" of the force. Acknowledging his own "long history" with the joint program, he said despite its struggles, he would support continuing the program.

"The key is getting the cost down," and the main way to do that is "getting the numbers up," Kendall told Sen. James Inhofe (R-Okla.) "There's a very strong correlation between the size of the fleet and the cost to sustain the fleet." Buying more F-35s "would continue to drive [sustainment] costs down, overall."

But while Kendall wants to buy F-35s at a rate "that makes sense," the Air Force's plans actually slow acquisition from recent years. The Air Force requested 48 F-35s in its fiscal 2022 budget and did not include additional jets on its unfunded priorities list as it did in the past three years; Congress obliged each time by adding 12 more jets to its spending plan. Now Air Force plans indicate the service expects to scale back requests in the coming years, as well. The Future Years Defense Program that is typically released with the budget and shows the next four years out was not included with the fiscal '22 budget request. But the "pre-decisional" version seen by Air Force Magazine showed cuts of 10 percent until F-35 sustainment costs come down and the Block 4 version starts to roll off the assembly line. ✪

Air Force Budget Seeks Addition By Subtraction

By John A. Tirpak

DOD is requesting $715 billion for defense in fiscal 2022, a modest adjustment compared to what Congress appropriated for 2021. But within the Department of the Air Force's slice of that spending, numerous changes are in store.

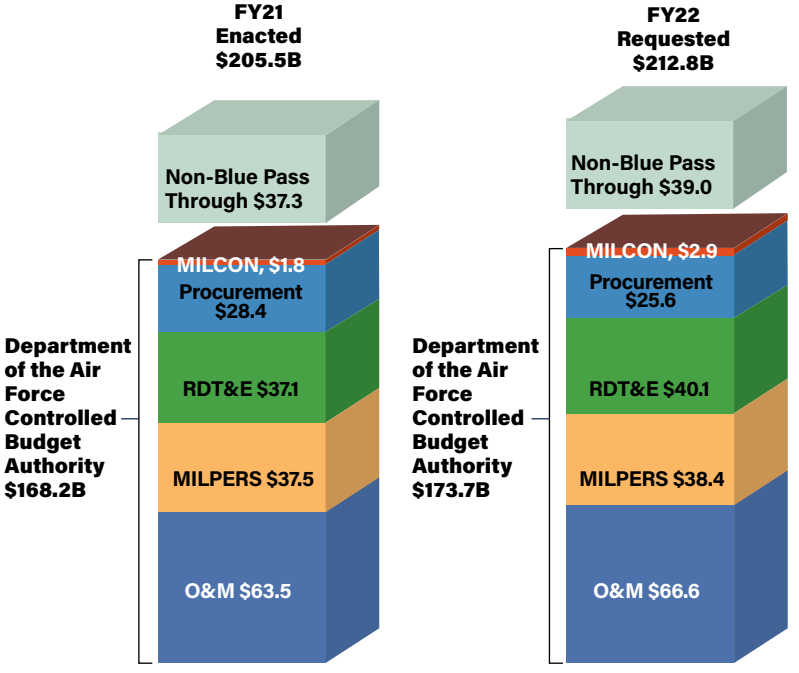
The department, which comprises the Air Force, Space Force, and a sizable "pass-through" account that goes directly to intelligence programs, is asking for $212.8 billion in fiscal 2022. That includes $173.7 billion for the Air Force, $17.4 billion for the Space Force, and $39 billion in pass-through funding for classified defense intelligence programs. The combined total represents an increase of $7.3 billion over the enacted 2021 budget of $205.5 billion, or about 3.3 percent.

The overall defense strategy remains squarely focused on China as the pacing threat to U.S. security, emphasizing modernization and aiming to shed legacy systems that do not lend themselves to high-end conflicts with peer competitors. For the Air Force, that means planning to divest 201 aircraft in 2022 while investing in just 91 new airplanes. The short-term payoff is about $1.4 billion in 2022 savings that can be invested in developing new weapons and systems.

Included is a 2.7 percent increase in military and civilian pay, and an increase in the Defense Department's Total Force, which would grow by 3,400 to 515,300 in 2022. The Space Force would gain about 2,000 of those positions, while the Air Force would give up about 750, finishing the year with a force of around 328,300.

Breaking Down the 2022 Budget Request

President Joe Biden's fiscal 2022 budget request looks like it includes $212.8 billion for the Department of the Air Force, up $7.3 billion from what Congress enacted for 2021. On closer examination, however, it's clear that $39 billion of that—or 18.3 cents of every dollar—funds programs having nothing to do with either the Air Force or the Space Force. This pass-through spending funds classified intelligence programs. One result of the pass-through is to inflate the apparent levels of Air Force and Space Force funding in comparison to the other services.



Source: Department of the Air Force

AIR FORCE SPENDING

Air Force leaders say they "fully funded" the nuclear enterprise, including the Ground Based Strategic Deterrent to replace the Minuteman III ICBM force, the National Command, Control, and Communications (NC3) infrastructure program, the Long-Range Standoff missile, and the B-21 bomber. Other priority development investments include the Next-Generation Air Dominance (NGAD), to succeed today's fifth-generation fighters; boost-glide and air-breathing hypersonic missiles; and B-52 modernization, including new radar, engines, and communications connectivity.

Munition purchases will decline in 2022, said Maj. Gen. James D. Peccia III, deputy assistant secretary for budget. He said both the Joint Direct Attack Munition and Small-Diameter Bomb "are at, or approaching, healthy inventory levels," and the Air Force intends instead to invest in developing advanced systems like the Joint Air-to-Surface Standoff Missile-Extended Range, the stealthy conventional Long Range Anti-Ship Missile, and new hypersonic weapons, such as the AGM-183 Air-launched Rapid Response Weapon.

The budget invests $22.9 billion—or about 15 percent of its total—for new weapons. Those include just 48 new F-35A fighters, down from 60 approved by Congress the past three years; the Air Force did not include more F-35s on its unfunded priority list released a week later, as it has in the past, instead asking for an additional 12 F-15EX fighters on top of the 12 included in the proposed budget. The new-build F-15EX, a two-seat model that can be flown by a single pilot, is needed to replace aging F-15C/D models, the Air Force says, "to ensure near-term readiness."

Meanwhile, the Air Force will continue to update and improve the F-22 fighter, spending about $480 million on advanced sensors.

The Advanced Battle Management System, new weapons systems like NGAD, and the rest of the research, development, test, and evaluation (RDT&E) program add up to 18 percent of the Air Force budget, a total of $28.8 billion.

Some 40 percent of the Air Force budget, or $63.2 billion, would

fund operations and maintenance, with flying hours reduced slightly from $7.8 billion enacted in 2021, to $7.6 billion in 2022. In total, that's a reduction of 87,000 hours. Air Force Deputy Assistant Secretary for Budget Maj. Gen. James D. Peccia III, briefing the press on the budget, attributed the reduced flying hours to "the change in global posture overseas," saying reduced operations in Afghanistan accounted for 66,000 of the 87,000 of the reduction.

The remaining cut in hours "were really risk that we could take on peacetime flying," Peccia said, noting that the Air Force had not spent down its full flying hour budget in recent years.

The 2022 budget plan eliminates the Overseas Contingency Operations account, the separate war account known as OCO. Instead, USAF's base budget absorbs those charges, including $7.9 billion in "Direct War and Enduring Costs" included under operations and maintenance.

The pay raise adds $573 million for uniformed personnel and $361 million for civilians, plus another $183 million for civilian bonuses and awards. To keep up with the rising cost of housing, the department is asking for 3.8 percent more to fund the basic allowance for housing, at a cost of $221 million. Another $56 million would cover a 2.3 percent increase in the basic allowance for subsistence.

RESEARCH AND PROCUREMENT

The $28.8 billion requested for RDT&E represents an increase of less than 1 percent, up $200 million over the 2021 enacted amount. The B-21 represents the biggest R&D program, with $2.873 billion, up $30 million from the year before. The biggest increase is in funds for GBSD, which nearly doubles from $1.447 billion to $2.554 billion. USAF wants to increase investment in NGAD by more than 50 percent, from $902 million to $1.525 billion.

RDT&E for the F-35 would increase from $816 million to $1.055 billion as Block 4 upgrades and Tech Refresh 3 advance. Development of B-52 upgrades would grow from $483 million to $716 million. Meanwhile, the much discussed Advanced Battle Management System, the centerpiece of USAF's connectivity push, would grow by $46 million, to $204 million to fund "info sharing across fifth-gen [fighter] and [command and control] nodes."

Prototyping of the Air-launched Rapid Response Weapon (ARRW), Southern Cross Integrated Flight Research Experiment (SCIFIRE), and Hypersonic Attack Cruise Missile (HACM) systems would also see increased investment, rising from $386 million to $438 million.

Air Force procurement accounts drop from $26.1 billion in 2021 to $22.9 billion in 2022. The 48 F-35 fighters it wants would cost $5.095 billion, while 12 F-15EX fighters cost $1.335 billion. The Air Force also wants to acquire 14 more KC-46A tankers for $2.6 billion and 14 HH-60W Combat Rescue Helicopters for $930 million.

USAF requested a steep drop in procurement of Joint Direct Attack Munition (JDAM) bombs, from 16,800 in 2021 to just 1,919 in 2022. Peccia said the service is "comfortable with where we are" on JDAM inventories and decided to reduce the buy and put the money toward developing new weapons.

Purchases of Small Diameter Bomb 1 would likewise decrease from 2,462 in fiscal '21 to 998 in '22. The SDB II buy would grow slightly, from 743 in '21 to 998 in '22. The AGM-114 Hellfire, AIM-9 Sidewinder, and AIM-120 AMRAAM missiles all would see reductions, as well.

Senior Pentagon leaders touted sharply increased production of the stealthy, long-range AGM-158 JASSM-ER, from 400 units in '21 to 525 rounds in '22, describing the missile as key to a counter-China strategy.

For the first time, the Air Force gave procurement numbers for the AGM-183A ARRW hypersonic missile, saying USAF will buy 12 rounds in 2022 at a cost of $161 million, for a unit price of $13.4 million each. Pentagon officials said the objective price of the weapon will be much lower, but the Air Force did not offer any official out-years insight into its cost.

One area of substantial growth is Air Force military construction. The service is pursuing projects worth $2.8 billion, up 75 percent from the $1.6 billion enacted in 2021 and more than double the $1.27 billion requested last year. It is the largest year-over-year increase in military construction and family housing for the department in more than a decade. USAF officials have cited a $30 billion maintenance and repair backlog that can no longer be deferred.

Military construction investment is "almost double from the current level, but a lot of this is stuff that has been expected or long overdue," said Todd Harrison, director of defense budget analysis and the Aerospace Security Project at the Center for Strategic and International Studies. "[Only] about $1.4 billion of it is for what they classify as new construction and facilities."

The Air Force would build two new dormitories for basic military training and fund $185 million in projects under the European Deterrence Initiative. It also invests $572 million for 13 projects in the Indo-Pacific region and $105 million for family housing projects around the world.

Retired Lt. Gen. Bruce "Orville" Wright, president of the Air Force Association, said Chief of Staff Gen. Charles Q. Brown Jr. is "doing what he promised: accelerating change." Congress and the Defense Department, he added, "need to do their part to ensure that capacity traded away today for capability tomorrow is not lost forever. They must be replaced with the capacity needed to deter any and all adversaries and to fight and win when needed."

One way the Pentagon and Congress can help, Wright said, would be to move the "pass-through" out of the Department of the Air Force budget and instead put it with other agency funding not included in the services' budgets. Leaving it in the Air Force budget "deprives both the Air Force and Space Force of the funds they need to modernize and equip their forces." ✪

The Fiscal 2022 budget request identifies these 201 aircraft to be divested:

AIRCRAFT TYPE	FY 2022 DIVESTMENTS	FY 2022 SAVINGS (in millions)
A-10 Thunderbolt	(42)	($343.9)
F-15C/D	(48)	($248.9)
F-16C/D	(47)	($30.9)
KC-135	(18)	($112.7)
KC-10	(14)	($174.0)
C-130H	(8)	($83.1)
E-8 (JSTARS)	(4)	($106.5)
RQ-4 Block 30 Global Hawk	(20)	($273.3)
TOTAL	**(201)**	**($1,373.3)**

Source: USAF budget documents

The Fiscal 2022 budget request would fund the purchase of these 91 aircraft:

AIRCRAFT TYPE	FY21 ENACTED	FY22 BUDGETED
F-35A Lightning II	60	48
HH-60W Combat Rescue Helicopter	19	14
KC-46A Pegasus	15	14
F-15EX	12	12
MC-130J Commando II	4	3
TOTAL	**110**	**91**

Source: USAF budget documents

Space Force Spending Starts to Grow

Growing the force and its capabilities is on the agenda, but funding is still tight.

DOD

Air Force Maj. Gen. James Peccia III, deputy assistant secretary for budget, briefs the news media on President Joe Biden's fiscal 2022 defense budget on May 28.

By Amanda Miller

The Space Force budget would grow by 13 percent under the Pentagon's fiscal 2022 budget plan. At $17.4 billion, it will account for $1 of every $10 spent by the Department of the Air Force on USAF programs in 2022, representing a $2 billion increase from the $15.4 billion Congress approved for 2021.

USSF would grow to 8,400 Guardians under the plan, acquire satellites from the Army and Navy, and invest $800 million in new classified programs. But it's total investment is still dwarfed by the $39 billion in "non-blue" funding buried in the Department of the Air Force's budget. Those so-called pass-through funds are neither controlled—nor even touched—by the department.

Air Force Maj. Gen. James D. Peccia III, the department's deputy assistant secretary for budget, said much of the $2 billion increase simply funds operations and maintenance of USSF facilities that will cut over to USSF ownership and funding over the course of the next year. He estimated that transferring satellites and space missions, such as the Army's Defense Wideband Enterprise SATCOM System and the Navy's Mobile User Objective System, amount to about half of the increase.

In addition, Peccia said, "there are well over $800 million in classified programs that went to the Space Force this year for new programs."

The Space Force proposes adding another 1,966 more Active-duty members in fiscal 2022, transferring in 900 Airmen, 302 soldiers, 17 sailors and officers, and 747 brand new Guardians.

The Space Force's 2022 budget also includes:

■ $37 million for the Space Warfighting Analysis Center to "generate new operational expertise with unique analytical tools, datasets, and intelligence to develop operational architecture options to fulfill space missions."

■ A $132 million increase to keep the Next-Generation Overhead Persistent Infrared missile warning system on schedule, so it can replace the Space-Based Infrared System in 2028 and "provide increased missile warning, missile defense, battlespace awareness, and technical intelligence capabilities with resilience and defensive features."

■ $68 million for two more GPS III satellites and $64 million for "enhanced on-orbit management."

■ $341 million for five National Security Space Launch vehicles, up from three in fiscal 2021.

Separately, the Defense Department budget proposes more than a threefold increase in research, development, test, and evaluation spending by the Space Development Agency. SDA would increase RDT&E spending from $267.1 million in fiscal 2021 to $808.8 million in fiscal 2022, as it seeks to create a constellation of low-cost, open-architecture, data-relay and missile-tracking satellites.

SDA's first-ever procurement request is also in the 2022 budget plan: $74.1 million. Established in 2019, SDA is part of the Office of the Secretary of Defense but is supposed to become part of the Space Force eventually.

UNFUNDED PRIORITIES

The Space Force may be poised for a $2 billion budget boost, but there are other priorities on its list that aren't yet funded. In a list of non-budgeted items it counts as priorities sent to Congress, it said it is seeking an additional $832 million to protect existing assets, make its space architecture more resilient, better train Guardians as warfighters, and support new missions, according to the service's unfunded priorities list submitted to Congress.

The list details priorities not funded by the Space Force's $17.4 billion budget request for 2022 and is in addition to $4.2 billion in Air Force unfunded priorities. This is the first year the Space Force has submitted its own UPL—last year

the Department of the Air Force requested $4.2 billion, of which $3.2 billion was for the Air Force and $1 billion was for the fledging Space Force.

This year's Space Force list includes $225 million "to protect and sustain what we have today," including $122 million in weapons system sustainment to bring it up to a "moderate risk" at 83 percent funded, according to the UPL.

It also includes $66 million to fix space facilities and infrastructure.

"Resilient and 'right-sized' infrastructure is needed to effectively deliver capability to support the current and emerging contested space domain," states the service's UPL. The funding would address "critical blast door, water, ventilation, and sewer improvements at the Cheyenne Mountain Complex in Colorado."

More than half of the additional funding the Space Force wants—$431 million—is for developing a "warfighting punch." It aims to invest $279 million in five classified programs for which no additional information was available, and $86 million to accelerate development of a unique Space Force professional military education program for 100 resident and 3,000 online students annually by fiscal 2023. Included in this training would be a new digital test prototype, undergraduate space training, and advanced warfighter courses, according to the unfunded priority list documents obtained by Air Force Magazine.

The Space Force also wants an additional $33.3 million to buy "Space Test and Training Range and Advanced Threat Simulation Environment support" and to "deliver multi-domain range integration of space, cyber, and air to the warfighter ... and develop realistic network emulators and range control." Another $1.8 million would modernize its space aggressor equipment to realistically replicate threats.

The Space Force is also asking for $113 million to "grow new missions," including $28 million to expand the Blackjack radio frequency payloads for tactical surveillance, $70 million to accelerate an Air Force Research Laboratory program for cislunar operations and deep space domain awareness, $8 million to develop a Long Duration Propulsive EELV Secondary Payload Adapter, and $7 million to operationalize the Air Force Maui Optical and Supercomputing Observatory.

The Blackjack RF payload supports tactical surveillance, air domain awareness, and threat assessment for Air Combat Command. "Funding supports completion of nonrecurring engineering, initial hardware delivery, data processing, and space vehicle integration required to demonstrate on-orbit capability," states the document. "If approved, funding would be applied to DARPA Blackjack contracts within one to two months. Space-to-surface ISR capability demonstration would occur in FY22/23 and will inform investment decisions by the Air Force and Space Force."

And finally, the Space Force wants $63 million to help it build more resilient architectures, including fixing procurement for space-rated crypto devices that support satellite launches and systems, such as GPS III, the Wideband Global Satellite Communications system, and next-generation space-based missile warning systems. ✪

Pentagon Budget Boosts R&D to Counter China

By Brian W. Everstine

The Pentagon's $715 billion budget request for fiscal 2022 seeks to increase research and development, focusing on the Indo-Pacific region and what it will take to win there.

The Biden administration's first budget request, released May 28, includes the biggest research budget in Defense Department history—$112 billion, up 5.1 percent over the 2021 request. The services need new weapons and technology to "meet the array of security challenges that we face today and in the future," said Deputy Secretary of Defense Kathleen H. Hicks.

"To deter aggression, the U.S. military will need to be ready," Hicks said at a roll-out briefing on the new budget plan. "The FY 2022 request provides the resources necessary to ensure that DOD maintains that credible deterrent by sustaining readiness and protecting investments in critical capabilities. The budget also documents some of the tough choices we had to make. We lessen our reliance on vulnerable systems that are no longer suited for today's advanced threat environment or are too costly to sustain."

As previewed in the "skinny budget" announcement released in April, the 2022 request does away with the Overseas Contingency Operations fund, moving $42.1 billion in "enduring" operations funding into the base budget. Compared to the former OCO account, that's down 22 percent from 2021, showing the savings as the U.S. withdraws from Afghanistan and draws down in Iraq and Syria.

A new $5.1 billion Pacific Deterrence Initiative (PDI) seeks to invest in long-range strike capability, new ships, and more exercises to help the U.S. expand its influence in the region. Similarly, the Pentagon continues to invest in its European Deterrence Initiative, now several years old, seeking $3.7 billion to continue programs there intended to secure Europe and counter Russian aggression toward its neighbors.

"To defend the nation, the department in this budget takes a clear-eyed approach to Beijing and provides the investments to prioritize China as our pacing challenge," Hicks said. "The [People's Republic of China] has become increasingly competitive in the Indo-Pacific region and around the world. It has the economic, military, and technological capability to change the international system and American interests within it."

The request includes $617 million for climate-related spending, largely for strengthening installation resilience in the aftermath of major damage to bases such as Tyndall Air Force Base, Fla., and Offutt Air Force Base, Neb., from natural disasters. The spending also includes science and technology investments aimed at reducing the department's energy demand and research to improve energy efficiency of current platforms. ✪

Alejandro Peña/USAF

F-15EX Wins Some, Loses Some in Northern Edge

Far from disappointed, USAF says the exercise was not designed for "zero losses."

An F-15EX Eagle supports Northern Edge 21 at Joint Base Elmendorf-Richardson, Alaska, May 12, in its first appearance in a major force exercise. Statistics on the airplanes' performance have not been tabulated, but the fighters flew 33 sorties and tallied both kills and losses.

By John A. Tirpak

The F-15EX both shot down somᵒᵒe adversaries and was shot down itself during the recent Northern Edge wargame in Alaska, and work is underway to analyze the results of its first appearance in the major force exercise, according to a test pilot who participated.

Statistics such as the mission capable rates of the aircraft have not yet been tabulated, but the jets flew a combined 33 sorties during the exercise from April 28 through May 14.

The two first-of-their-kind F-15EXs—being used for concurrent operational and developmental test—played in Northern Edge only two weeks after they were delivered to the Air Force. The goal was to see if they could play the part now met in the Combat Air Forces by the F-15C, plus add some capability to that mission, according to Lt. Col. John O'Rear of the 84th Test and Evaluation Squadron.

Among the test points were how the F-15EXs could integrate with F-15Cs as well as larger forces, including fifth-generation F-22s and F-35s, O'Rear said.

"We flew them with two-ships of F-15C models, two-ships of F-15E models, ... two-ships of EXs supporting other fourth-gen [flights], and integrating with the F-22 and F-35," he said.

"The more clutter, the more electronic attack you have out there, the more difficult it is for enemy sensors to work through that."—Lt. Col. John O'Rear, 84th Test and Evaluation Squadron

Though the F-15EXs "tallied some kills while they were up there," O'Rear acknowledged there were also some losses.

"If you go into any large force exercise and you come back with everybody—with no blue losses—I would probably say that your threat is not as robust as it needs to be, in order to get the learning," he said. Northern Edge was meant to be a multi-service exercise against a near-peer threat having some low-observable capabilities.

Although O'Rear couldn't speak to the incidents where the F-15EXs were shot down, "in this kind of environment, most of your blue 'deaths' are probably going to be outside of visual range, just because of the threat we're replicating," he said. Visual-range dogfights are "not something that happens a whole bunch."

The jets also exercised the Eagle Passive Active Warning Survivability System (EPAWSS), an electronic warfare suite meant to buy the jet more survivability against modern threats. It was the second wargame outing for the EPAWSS, after a Black Flag exercise in December 2020 at Nellis Air Force Base, Nev.

"We're still gathering data" on how the EPAWSS performed, but the initial, "anecdotal" results "look promising," O'Rear said. "In general, it's looking like it was on track for what we were expecting to see" at Northern Edge.

The exercises pitted about 50 Red team aircraft against a like number of Blue forces, he said. The EPAWSS "was able to integrate in a large force environment with multiple sources of … radio frequency being transmitted across the airspace. … It was able to process that."

In addition to the self-protection features of EPAWSS, a test point was to see if it could help stealthy F-22 and F-35s operating in proximity. The additional jamming "can help the F-35 get closer to the adversary," O'Rear said. "The more clutter, the more electronic attack you have out there, the more difficult it is for enemy sensors to work through that." The EPAWSS was able to integrate with "a coordinated electronic attack throughout the force package."

The exercise also imposed severe jamming of communications and Global Positioning System data, compelling pilots to operate around those limitations and rely on "contracts" with other USAF aircraft, aircraft from other services, and ground fires to "be where they're supposed to be" at the appointed time, O'Rear said.

The F-15EX has "full air-to-ground capabilities," but those were not exercised in the wargame, he said. "The EX's primary goal was to go up there and execute the current C-model mission." It performed air dominance as well as homeland defense missions, he said.

The threat was meant to be one "where we don't have the ability to go out … and take zero losses," he said.

The point "is not winning every match. It's to learn where our weaknesses are and how we mitigate those capability gaps," added O'Rear.

In connecting with other-service assets in a "degraded ops environment," he said, "we saw a lot of places where we're doing really well, and places where we need some work." Alternative communication methods included Link 16 and "gateway options" in which an interpreter aircraft translates the special waveforms of stealth aircraft to each other and fourth-gen aircraft. There was "redundancy and effectiveness across the entire force package," he said.

Capabilities that the F-15EX adds to the F-15C are its fly-by-wire system; two extra weapon stations—which O'Rear said was "pretty impressive" in the overall mix—an updated cockpit with touch-screen color displays; EPAWSS and advanced radar capabilities.

"I'm a big fan of the touch screen," he said.

Planning for the F-15EX's participation in Northern Edge started more than a year ahead of time, he said—long before the aircraft were delivered, or even built.

"We set the milestones" for the EX test program "over a year ago," he said. The test team looked at whether they thought they could be ready in time, but inserting the EX into a large force exercise—the next one won't happen for two years—was an opportunity too valuable to pass up, he said. The EXs were used to evaluate new tactics and techniques, as well as being put through their paces.

Northern Edge is different from a Red Flag, O'Rear explained.

"You have the option to use baseline tactics, but the emphasis is not just getting upgrades for [Combat Air Forces] wingmen and flight leads. It's to go out there and do high-end tests in a high-end, highly contested, and degraded environment, and to see if the new tactics we're developing are helpful—or a hindrance."

The F-15EX has been touted as being capable of carrying and launching "outsize" air-to-air and air-to-ground munitions, but none of these was exercised, even in simulated form, during the event. However, a B-52 involved in the wargame launched a simulated AGM-183 Air-launched Rapid Response hypersonic missile during the exercise.

Another lesson relearned, O'Rear said, is that the various services have a different language that must be learned to properly coordinate. "Everybody has their own doctrinal language," he said. ✪

1st Lt Savanah Bray

An F-15EX Eagle II takes flight for the first time out of Eglin Air Force Base, Fla., April 26, before departing for Northern Edge 2021. USAF officials say they are not disappointed by the aircraft's performance, despite some losses in beyond-visual-range dogfights.

Airman 1st Class Jayden Ford

The Air Force continues to invest in upgrades for the F-22 Raptor, including new sensors in 2022, but long-term plans suggest the F-22 will be retired sometime in the 2030s.

First Peak at USAF's Fighter Road Map: Fewer Jets and Types

By **John A. Tirpak** and **Tobias Naegele**

The Biden administration's fiscal 2022 budget plan came without the typical projection for the next five years of spending contained in the Future Year Defense Program (FYDP), giving budget watchers in Congress and industry less insight than normal on where the force is headed.

But hints from Chief of Staff Gen. Charles Q. Brown Jr. and talking points obtained by the Air Force—that officials later called "pre-decisional"—point to controversial decisions coming down the pike. These include retiring the F-22 in the 2030s and cutting back near-term purchases of F-35 fighters while waiting for the much anticipated Block 4 update to come online and sustainment costs to come down.

Brown said May 12, two weeks before the budget release, that his pending tactical aviation study, launched earlier this year, aims to settle on a plan to have a range of options that can shift as the threat does. "What I'm looking for," Brown said, is not necessarily "the exact answer of what is the exact mix" of combat aircraft for the future, but rather, "I'm really looking for a window of options."

The point, he said, is "the facts and assumptions based on the threat will change over time."

While the budget seeks permission to retire 201 aircraft in fiscal 2022, the talking points go further, defining a plan to retire 421 legacy fighters over the next five years while acquiring just 304 new F-35As and F-15EXs. The Air Force would then invest its savings in developing and fielding the Next-Generation Air Dominance fighter in eight to 15 years, and building a future Multi-Role fighter, called MR-X, in the 2030s.

The Air Force would phase out its 234 F-15C/Ds by October 2026 and retire 124 pre-Block F-16s in the same time frame. It would also retire 63 A-10s between now and October 2023. Meanwhile, 84 new F-15EX and 220 F-35A fighters would join the force, for a net reduction of 117 jets over five years.

Brown called his tac-air study an "internal document" for the service, rather than the public. "It's really designed to help me shape the '23 [budget]," Brown said. The Joint Staff and the Pentagon's Cost Assessment and Program Evaluation office are contributing to the review.

But if the study isn't complete, a picture is emerging of where the force is heading. The extant seven-fleet mix of fighters will eventually be reduced to "four … plus one," Brown said, with the F-35A as the heart of the fleet, supplemented by the F-15EX, the F-16 or its successor, the Next -Generation Air Dominance (NGAD) family of systems and, for the time being, the A-10.

NGAD will be the "air superiority fighter of the future," Brown said, adding that he's counting on digital design and acquisition to provide system flexibility to evolve the capability as the threats change.

The long-term plan means the Air Force does not expect to get more than another 15 or 18 years out of the F-22, and that the F-15E will also be phased out in the 2030s. The last F-15Es were bought in the late 1990s, but the bulk of the force is much older. The F-15EX is more like a new-build F-15E than the C/D models it is replacing, and Air Force contract with Boeing allows for acquiring as many as 200 EX models.

Final decisions on how many of each of the four-plus-one fighters in the plan are needed may not be finalized for another eight years or so, Brown said. "But you need to start shaping the thought process," he added. "I can't do all this in one year. This is why the collaboration with Congress is so important. I've got to lay this out with some analysis and then have a conversation [about] where we're headed.

ACCELERATE CHANGE OR LOSE

Since becoming Chief last August, Brown has pounded on his bumper-sticker objective to "accelerate change, or lose," applying the concept to operations, people, and weapons development. Software and its capacity for updates and shifts is changing the way he and others look at hardware design. They want open architectures that can be more flexible and allow for new capabilities to roll out over time, just as new apps and operating system enhancements are rolled out on mobile phones and computers.

"It is a different mindset," Brown said later in May. "It's a different approach. And as we've worked with our industry partners, I'm seeing that we are moving in that direction. And we've got to continue moving in that direction."

All that entails risk, which is OK with him. "You can't be innovative and risk-averse at the same time," Brown added. "We've got to be able to take a little bit of risk, and some things are not going to work. But as long as we're failing forward, that's [what] we need to be, so we can accelerate change. So we don't lose."

F-35 PURCHASES

Curiously, the Air Force's pre-decisional talking points don't accelerate F-35 purchases. Not only did the Air Force ask for just 48 in 2022, but it left the aircraft off its unfunded priority list. More surprising to many: USAF's proposed buying plan drops annual F-35 purchases to 43 in the out-years. Whether this is a serious plan or more of a warning to its manufacturer, Lockheed Martin, because of soaring sustainment costs, remains to be seen. But the budget talking points obtained by Air Force Magazine appear to offer Lockheed an ultimatum: Bring those costs down in the coming years or expect sharply reduced purchases. Ironically, perhaps, incoming Air Force Secretary Frank Kendall, who was not involved in preparing these plans, testified an opposing view. He suggested the route to lower operating costs is faster acquisition. Where the service comes out may not be known until the 2023 plan—and its Future Years Defense Program—is published.

Early in the program, the Air Force set an operating cost goal of $4.1 million per airplane per year. That plan, in constant 2012 dollars, based those projections on F-16 operating costs. But the F-16 is a far less sophisticated aircraft, lacking the stealth coatings and materials and advanced sensors and electronics on the F-35. Air Combat Command boss Gen. Mark D. Kelly said in February he was not "brimming with confidence" that actual F-35 support costs could match those levels.

In fact, according to the USAF talking points, the service expects sustainment cost per tail per year to be $7.8 million in 2036 (again, in 2012 base year dollars).

"This is an unaffordable sustainability model," the talking points conclude. "The Air Force needs the F-35's advanced capabilities, [but] in affordable capacity." ✪

China Accelerates its Nuclear Rise

By John A. Tirpak

China's strategic portfolio is advancing at a "breathtaking" pace, even faster than the U.S. anticipated, said Air Force Global Strike Command boss Gen. Timothy M. Ray.

Multiple times over the past six months China demonstrated capabilities that the U.S. intelligence assessment had failed to see. Those assessments fell far "short of what they were accomplishing," Ray said during an AFA Mitchell Institute for Aerospace Studies streaming event June 3.

As China works to secure its regional sphere of influence, U.S. allies and partners "need to know we're there for them," Ray said. China's capabilities are growing, he added. "I think [China is] thinking very clearly about the regional and global problem set. I think they're building the arsenal to address it."

China's nuclear prowess is "pretty intimidating," Ray said. "They're working through the problem—warheads, delivery systems, command and control, warning—how fast, and how you field it." The pace of China's progress, and the "diversity of their approach … commands respect."

This is why the U.S. Ground-Based Strategic Deterrent missile program is so essential. Building GBSD will be $38 billion less costly than upgrading and extending the life of the Minuteman III missiles now on standby, and every time the program is pushed out or delayed "the price tag has gotten bigger."

Giving up the land-based missile leg of the nuclear triad doesn't eliminate the threat; the U.S. would need other ways to deter potential aggression. "We'll need more bombers, tankers, crews," he said. They will have to be on constant alert, and that would be a new "bill to pay that would come at the expense of other things."

Meanwhile, bombers are needed for other requirements. Ray said AFGSC has "tripled the number" of bomber task force deployments over the last year, a pace that cannot be sustained indefinitely.

B-52s were simultaneously deployed in Europe, the Middle East, and the Indo-Pacific in April. Following a year in which AFGSC conducted 18 bomber task force deployments, the rate is now "about 50 percent higher this year," Ray said. That's "a fourfold increase from '19 to '21."

This is a pace "that we can keep up just a little bit longer, but then I think we need to slow down just a touch, and get a little bit better at what we do," Ray said. While the rest of the force scaled back its operating tempo during the COVID-19 pandemic, "we got better," he said. "We had the best bomber readiness in the history of the command . … The B-1s slowed me down a little bit recently, [but] … nuclear readiness stayed high." ✪

USAF

A communications pod installed in a KC-46 Pegasus will allow the F-35 Lightning II (foreground) and F-22 Raptor (left) to connect and instantly receive and transmit the most up-to-date information to ensure the warfighters maintain decision superiority. This concept is known as Capability Release No. 1 under ABMS.

ABMS, in New Phase, Prepares to Start Fielding

It's time to move ABMS forward.

By Amy McCullough

The Air Force is ready to start buying some of the technology that will make up the Advanced Battle Management System (ABMS), moving the program from theory into development.

"Nearly two years of rigorous development and experimentation have shown beyond a doubt the promise of ABMS," USAF Chief of Staff Gen. Charles Q. Brown Jr. said in a May 21 press release. "We've demonstrated that our ABMS efforts can collect vast amounts of data from air, land, sea, space, and cyber domains; process that information; and share it in a way that allows for faster and better decisions."

ABMS, which was conceived as a replacement for the canceled E-8 Joint STARS recapitalization program, is envisioned as a network of sensors and connected technologies intended to promote rapid data sharing among a plethora of weapon systems.

"It's time to move ABMS forward so we can realize—and ultimately use—the power and capability."—CSAF Gen. Charles Q. Brown Jr.

ABMS is really a new way of fighting that will provide the "backbone of a network-centric approach to battle management."

Brig. Gen. Jeffery D. Valenzia is director of Joint Force Integration and head of the cross-functional team responsible for establishing the manpower, resources, and doctrinal infrastructure for the ABMS program. "Command and control (C2) is as timeless as warfare," Valenzia said. "As the character of war changes, so, too, does the art and science of C2. In a data-dependent and data-saturated world, victory belongs to the side with decision superiority—the ability to ... make sense of a complex and adaptive environment, and act smarter, faster, and better."

Under this next ABMS phase, the Department of the Air Force's Rapid Capabilities Office will begin to field and install equipment and software on existing military aircraft, beginning with new communications pods for the KC-46 Pegasus tanker. In effect, these will become an airborne hotspot connecting USAF's fifth-generation F-22 and F-35 fighters so they can

communicate with each other in real time.

Will Roper, who was then USAF's assistant secretary of acquisition, predicted in December that the KC-46 pod was the most likely ABMS capability to be deployed soon. And Air Mobility Command boss Gen. Jacqueline D. Van Ovost alluded to a new concept of operations for tankers, now dubbed "Capability Release No 1," during an April virtual event hosted by AFA's Mitchell Institute for Aerospace Studies. "Why wouldn't we change the calculus by doing different things, moving away from the antiquated view that AMC just brings stuff when they're called ... to be a maneuver force inside the threat ring?" Van Ovost asked.

In addition to outfitting the KC-46 with the communications pod, Randy Walden, program executive officer for the Rapid Capabilities Office, said the department is gearing up a host of other new digital capabilities.

"To build ABMS, you must first build the digital structures and pathways over which critical data is stored, computed, and moved," he said in a press release. "The Department of the Air Force needs a smart, fast, and resilient 'system of systems' to establish information and decision superiority, and ABMS will be that solution."

The Air Force requested $203.8 million for ABMS in its fiscal 2022 budget request, released in late May, a $45.4 million increase over the 2021 enacted funds.

The Air Force actually requested $302.3 million in fiscal 2021, but lawmakers remain skeptical, effectively slashing the ABMS budget in half. "While the committee continues to support the Air Force's new approach to command and control, the committee notes that the ABMS requirements and acquisition strategy remain unclear," wrote members of the Senate Appropriations Committee in November 2020.

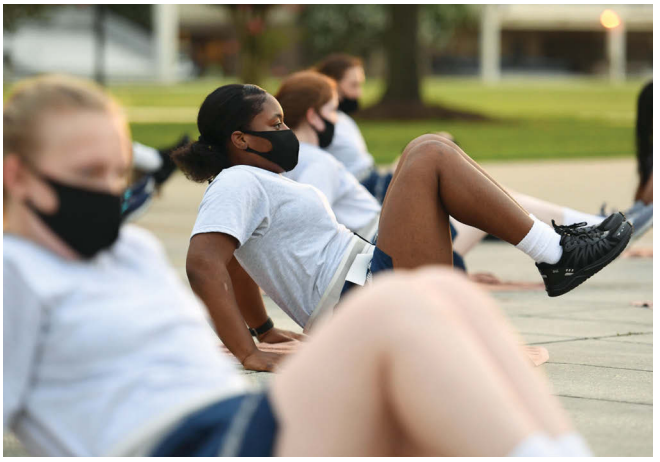
The Air Force has said the first phase of the ABMS program would last into the early 2020s, but Congress also wants a more specific timeline for when the program will reach initial operational capability.

Eric Dietrich/USAF

Air Force Chief of Staff Gen. Charles Brown Jr. is convinced ABMS is a game changer.

Program managers emphasized in the May 21 release that "the goal is speed and utility," falling in line with Brown's directive to "accelerate change or lose." As such, whenever possible, components of ABMS will be derived from commercially available technology, requiring a close working relationship with industry. As of late last year, there were nearly 100 companies involved in the program.

"This ability gives us a clear advantage, and it's time to move ABMS forward so we can realize and ultimately use the power and capability it will provide," Brown said in the release.



Kemberly Groue/USAF

Air Force Basic Military Training trainee Chris-Ann Wilmoth (center), and others participate in a physical training session as part of the first female flight to complete the six-week BMT course at Keesler Air Force Base, Miss., July 1, 2020.

Scoring Charts for the Air Force's New Fitness Test

By Greg Hadley

As Airmen prepare for the return of physical fitness tests July 1, the Air Force released updated scoring charts May 26 to reflect the changes to those tests.

As previously announced, PT tests will no longer include the controversial waist measurement as a scored component, though Airmen will still be tape-tested once a year. Without the waist measurement, the maximum point value of the sit-up and push-up components will increase from 10 each to 20. The 1.5-mile run will remain at 60 points.

Airmen will now be scored in five-year age groups, instead of 10-year cohorts like the previous test. The new age ranges start with all Airmen younger than 25 and then increase every five years until reaching 60 years or older. In order to pass, Airmen need to accumulate 75 total points and meet the minimum requirements for their age and sex in each individual component.

The minimum requirements in the new scoring charts are lower across every age category for both men and women, while the standards for a maximum score were lowered for those who now are in the 25 to 29, 35 to 39, 45 to 49, and 55 to 59 age ranges.

"Physical fitness is an important part of our everyday lives. It's more than just a test—it's a way of life, our readiness, and ultimately our future success," Chief Master Sgt. of the Air Force JoAnne S. Bass said in a press release. "July 1 is a chance to refocus on building a lifestyle of fitness and health, and I know our Airmen will be ready."

The Space Force will continue to follow these new guidelines until service-specific fitness policies are developed and fielded.

The Air Force also has developed alternative "strength and cardiovascular testing exercise options" and plans to release them in the coming weeks, with the aim of Airmen being able to select which testing option is best for them, according to the release.

Those new testing options, however, won't be available until January 2022. While the May 26 announcement didn't detail what new exercises would be included, some of the options explored by the Air Force Fitness Working Group included a 20-meter shuttle run, row ergometry, planks, and burpees. ✪

NATO Buys, Operates Kessel Run's Tanker Planning AP

By Brian W. Everstine

NATO has bought and already used an application known as Jigsaw, which was developed by the Air Force's in-house software development team, Kessel Run, to handle refueling tanker planning in the Middle East.

The alliance used Jigsaw to plan air-to-air refueling operations during the two-week exercise Ramstein Ambition 21, according to a press release.

"The use of the application during the NATO exercise showcases how far reaching and influential the modernization efforts of Kessel Run have become," said Col. Brian Beachkofski, commander of Kessel Run, in the press release. "Our efforts to enhance our AOC Weapon Systems, now seem to be positively enhancing the abilities of our allies as well."

Jigsaw first rolled out in 2017 at the Combined Air Operations Center at Al Udeid Air Base, Qatar, and NATO purchased the application in late 2020. The program brings together data

OR-9 Sebastien Raffin/French Army/NATO

NATO used the Jigsaw app, developed by the U.S. Air Force's in-house software development team Kessel Run, to plan air-to-air refueling operations during exercise Ramstein Ambition 21.

from current, previous, and planned tanker operations to plan the most effective missions for deployed aircraft. It replaced a previous process in which five or six people would to spend up to eight hours each day drawing tanker plans on a whiteboard. USAF officials told Air Force Magazine in 2018 that they estimate the application has saved 400,000 to 500,000 pounds of fuel each week.

Kessel Run said the program has saved the Pentagon more than $500 million in fuel costs and "has provided the DOD with enhanced combat capabilities through its increased coordination in the planning of refueling missions," according to the release.

NATO's Allied Command Transformation also wanted Jigsaw to alleviate its "manpower intensive" refueling planning process. The software will be in use at NATO Air Operations Centers around the world.

"To keep our nations safe in such an unpredictable environment, we need to keep our Alliance strong," said project lead Lt. Col. Jonathan Clow in the release. "Innovation and experimentation are critical components of NATO's future defense, security, and deterrence." ✪

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Draken International

A Draken Mirage F1 conducts its first adversary air flight against Air Force F-15E Strike Eagles at Nellis Air Force Base, Nev., in 2020. A Draken F1 crashed, killing the pilot, during Red Air exercises at the base in May.

Contract Red Air Jet Crashes at Nellis, Killing Pilot

By Amy McCullough

A contract-owned and -operated Mirage F1 crashed on the south side of Nellis Air Force Base, Nev., around 2:30 p.m. May 24. The pilot, who worked for Florida-based Draken International, was killed in the crash.

The pilot's name has not yet been released. No one else was on board at the time of the crash, according to a release.

"Draken has received news of a downed aircraft out of Nellis ... and the tragic loss of one of our pilots," the company said in a statement. "Our thoughts and prayers go out to the people and families affected by this event. We are doing everything in our power to assist them in this time of need, and we are working closely with federal, state, and local authorities. Draken U.S. is also cooperating with investigating agencies to determine what led to this tragic accident."

An Air Combat Command spokesperson told Air Force Magazine, "there's no immediate operational impacts that we're aware of," and referred any addition questions to Draken. A company spokesperson said no additional information is available at this time.

Draken originally started flying so-called "Red Air" missions at Nellis in 2015, using L-159 Honey Badgers and A-4 Skyhawks. The company recently started introducing French-built Mirage F1s, acquired from the Spanish air force, and Atlas Cheetahs, acquired from South Africa. The first F1 adversary air flight was just over a year ago, when F1s challenged USAF F-15E Strike Eagles on March 18, 2020.

In June 2018, Draken won a $280 million contract, which runs through December 2023, to continue flying at Nellis. Draken contractors fly from 18 to 24 adversary air sorties a day at the base, "supporting the USAF Weapons School, operational test missions, Red Flag exercises, Formal Training Unit (FTU) syllabus rides from Luke Air Force Base, Ariz., as well as combat readiness training out of Hill Air Force Base, Utah," according to a 2018 release.

In addition, the Draken is under contract to provide adversary air in support of the F-15E FTU at Seymour Johnson Air Force Base, N.C., and the F-16 FTU at Kelly Field, Texas. They also support exercises at locations such as Holloman Air Force Base, N. M.; Edwards Air Force Base, Calif.; Marine Corps Air Station Yuma, Ariz.; MCAS Cherry Point, N.C.; MCAS Miramar, Calif.; and Naval Air Station Patuxent River, Md.

At the time of the crash, Draken aircraft were assigned to provide Red Air support for Air Mobility Command's Mobility Guardian 2021 exercise in Michigan. They flew on May 24, but did not fly the day after the crash. Air Force Magazine was embedded with USAF forces during the exercise.

The company owns 22 F1s, 12 supersonic Cheetahs, nine Aermacchi MB-339s, 27 MiG-21s, 21 L-159s, 13 A-4s, five L-39s, and one T-33, a company official previously told Air Force Magazine.

The last time a contractor-owned and operated adversary aircraft crashed while supporting USAF operations was in February at Tyndall Air Force Base, Fla. Two Airborne Tactical Advantage Company (ATAC) Mirage F1 pilots were treated for non-life-threatening injuries at the time. In 2018, the Hawaii Air National Guard also temporarily suspended Exercise Sentry Aloha after an ATAC Hawker Hunter crashed in the water a few miles off the coast. The pilot safely ejected and was rescued by a civilian sailboat.

Draken and ATAC were among three companies awarded contracts in July 2020 worth up to $433.6 million to provide 5,418 annual sorties of adversary air at five bases. Tactical Air Support also received a contract. The awards are part of a potential $6.4 billion Combat Air Force/Contracted Air Support (CAF/CAS) indefinite delivery, indefinite quantity contract that could include up to 40,000 hours of adversary air at 12 fighter bases, plus 10,000 hours of close air support at nine bases.

The service has authorized a total of seven companies to bid on contracts, and Nellis is expected to be the next big award. In addition to Draken, ATAC, and Tactical Air Support, other companies include Top Aces Corp., Air USA, Blue Air Training, and Coastal Defense.

"The CAF/CAS contract remains in the base year execution phase, with requirement adaptations ongoing as anticipated," an ACC spokesperson said. "However, any mishap of this magnitude always has an impact on the flying community. Our thoughts and deepest condolences are with the family, friends, and our partners at Draken during this time."

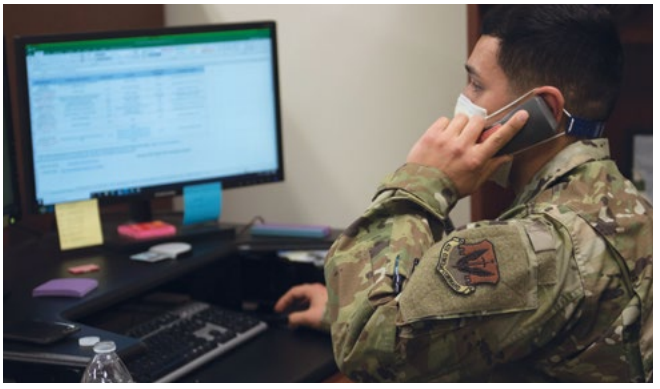
Airmen, Guardians Could Work Remotely Full Time Under New Guidance

By Brian W. Everstine

Uniformed Total Force Airmen and Guardians can telework and work remotely under new guidance from the Department of the Air Force, building on lessons learned from the past year.

The Air Force on May 18 released updated guidance on telework, which gives service members the chance to work from a location other than their unit's duty station—provided their job allows for it and commanders sign off on it. The new guidance also includes guidelines for civilian personnel.

"The Department of the Air Force is using lessons learned about teleworking and remote work during the pandemic as an opportunity to grow," said John A. Fedrigo, acting assistant secretary of the Air Force for manpower and reserve affairs, in a release. "The pandemic has shown we can be successful using telework in many areas of our mission, and it helps to bridge our current force structure to the force we need for the future."



Airman Francesca Skridulis/ANG

An Airman in the 102nd Intelligence Wing works in the Mission Support Group staff office at Otis Air National Guard Base, Mass., April 11. Airmen returned to full, in-person drilling for the first time since the COVID-19 pandemic swept the nation.

The new guidance opens the door for an Airman or Guardian to work remotely if the squadron commander or equivalent, with input from supervisors, allows it. The ultimate decision will depend on the nature of work performed and whether allowing telework or remote work would diminish the service member's ability to perform the work successfully or negatively impact the mission, according to the release. Even if a position is deemed to be ineligible for remote work or telework, there could be circumstances in which it can be considered "on an emergency or situational basis," according to the Air Force.

Remote work refers to personnel working permanently from an operating location other than their unit's station. Telework, by contrast, is establishing a regular schedule to periodically work from home or another location, though that individual is still assigned to the unit's location, according to the guidance.

If a service member is approved for full remote work, there will be arrangements made to get support from the nearest installation, such as access to health care and a commissary.

Air Force officials said the new policy can help recruit and retain more personnel who may have avoided working with the service or staying in uniform because of the requirements to work at a base.

"With remote work, we can now attract someone with the specialized skills we need and not require them to relocate when it makes sense for the mission, the individual, and a member's development," said Lt. Gen. Brian T. Kelly, the deputy chief of staff for manpower, personnel, and services. "We recognize the value these flexible work arrangements can have, in some circumstances, to enhance work-life balance and maximize organizational productivity."

The Air Force released an extensive 27-page document detailing the new rules, including how to pursue the opportunity. Because each decision is made on a case-by-case basis, the Air Force does not have an estimate of how many personnel might eventually telework or work from home ✪

Next Round of Active, Reserve KC-46 Bases Picked

By Brian W. Everstine

The Air Force is considering two bases for the next Active-duty KC-46 component and six bases for the next Pegasus Reserve unit, with a decision expected this fall.

The service announced May 13 it is looking at Fairchild Air Force Base, Wash., and MacDill Air Force Base, Fla., as candidate locations. One of the bases will be selected to host 24 KC-46s. The USAF is also looking at Beale Air Force Base, Calif.; Grissom Air Reserve Base, Ind.; Joint Base Andrews, Md.; March Air Reserve Base, Calif.; Niagara Falls Air Reserve Station, N.Y.; and Tinker Air Force Base, Okla., as candidate bases. One of the six will be chosen to host 12 KC-46s.

All the bases currently fly the KC-135 Stratotanker, which the KC-46 is slated to replace. The Air Force will now conduct site surveys at each location over the summer, which "will be assessed against operational requirements, potential impacts to existing missions, housing, infrastructure, and manpower," the Air Force said in a release

The Air Force already bases Active-duty KC-46s at McConnell Air Force Base, Kan.; Reserve tankers at Seymour Johnson Air Force Base, S. C.; and Air National Guard aircraft at Pease Air National Guard Base, N.H. Air Education and Training Command hosts KC-46 training at Altus Air Force Base, Okla. Construction for future operations is underway at Joint Base McGuire-Dix-Lakehurst, N.J., and Travis Air Force Base, Calif. Tinker will also host maintenance for the aircraft.

Fairchild recently became a "super" tanker wing as it received 12 more KC-135s in 2019 and reactivated the 97th Air Refueling Squadron. "Super" tanker wings include four squadrons, and the base was expected to operate a total of 60 of the tankers. MacDill's 6th Air Refueling Wing and Reserve 927th Air Refueling Wing operate 24 KC-135s.

The Air Force recently received its 45th KC-46, as deliveries have slowed in recent months.

Air Mobility Command and U.S. Transportation Command are working to free up KC-46s to fly some limited operational missions, in a step to alleviate stress on the legacy KC-135 and KC-10 fleets. ✪

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Senior Airman Aaron Irvin

Col. John Schutte, 19th Airlift Wing commander, presents the Distinguished Flying Cross to Maj. Christopher Richardson, a 61st Airlift Squadron pilot, at Little Rock Air Force Base, Ark., May 10.

C-130 Crew Receives DFC, Air Medals for Afghanistan Mission

By Brian W. Everstine

A C-130J pilot received the Distinguished Flying Cross while another pilot and two loadmasters received Air Medals on May 10 for their actions last September in Afghanistan, when their aircraft took enemy fire, injuring one on board and damaging the aircraft's controls.

After getting hit, the team returned to base, loaded another C-130J, and the remaining aircrew finished the mission.

"Receiving the DFC was extremely humbling," said Maj. Christopher Richardson, 61st Airlift Squadron pilot, in a release. "As aviators, we put a lot of time and effort into making sure everything goes as planned—sometimes that isn't how it works out."

On Sept. 19, 2020, the team was deployed from Little Rock Air Force Base, Ark., to Bagram Airfield where they were supporting the ingress of a Theater Response Force to a forward operating base (FOB) in Afghanistan. During the approach, the C-130 received effective enemy fire, which injured one of the aircrew.

Senior Airman Dimitrious Carden, the loadmaster on the flight, worked with the onboard combat control team to apply self-aid buddy care.

"I knew what I needed to do and how to do it," Carden said in the release. "I remember quite clearly being able to think back to times spent practicing for these types of events and using that to guide my actions."

Richardson tried to make another approach to the FOB, but the aircraft's flight controls malfunctioned because of the small arms fire, and he decided to return to Bagram.

"For me, it was a continual balancing of priorities," Richardson said in the release. "First, was to get the crew and the plane out of harm's way. Second, was assessing if the mission was worth the risk. If you are an expert at your job, you'll know what to do in a stressful situation. Knowing where your efforts fit into the mission allows you to assess the risk of what's happening and work as a team to get the job done."

At the May 10 ceremony at Little Rock, Richardson received the DFC, while his fellow pilot, 1st Lt. Christian Grochowski, and two loadmastsers, Carden and Staff Sgt. Jade Morin, received Air Medals.

"I certainly would not have succeeded alone. We all worked together and relied on each other that night," Carden said. "Everybody on that plane played a significant role in carrying out the mission and bringing everyone home safely."

Al-Udeid Operating New Counter-drone System Amid Growing UAS Threat

By Brian W. Everstine

The Air Force's key operating base in the Middle East has adopted a new counter-drone system, first deployed to the nation's nuclear bases to protect them from the growing threat of unmanned aerial systems.

Al-Udeid Air Base, Qatar, recently deployed the counter-small unmanned aerial systems (UAS) tool to protect the sprawling base, which is home to the nerve center of Middle East air operations, mobility and refueling, and strike aircraft including B-52s. The new system lets its operators identify incoming threats and sever the connection between drone and operator, according to an Air Forces Central Command release.

"The goal of the program is to build countermeasures for Al-Udeid AB that would pose as a last line of defense against all small UAS threats," said Staff Sgt. Ryan Walters, the 379th Expeditionary Security Forces Squadron's noncommissioned officer in charge of the C-UAS program.

Air Force Global Strike Command and U.S. Strategic Command first deployed the system to an undisclosed number of sites in 2019. The service said at the time that the system uses command and control, detection, and jamming to counter drones.

At Al-Udeid, operators take a 40-hour course, which includes hands-on work, before they can operate the system, which is "tailored" to threats specific to the region.

"We are able to showcase our defensive capabilities and tailor the C-UAS briefings with a historical background to threats in the region," said Maj. Shawna Rogers, 379th Air Expeditionary Wing senior intelligence officer, in a release.

U.S. Central Command boss USMC Gen. Kenneth F. McKenzie Jr. told lawmakers in April that drones represent the most "persistent and dangerous" threat to troops and countering them is a top priority.

"These small- and medium-sized UAS proliferating across the [area of operations] present a new and complex threat to our forces and those of our partners and allies," McKenzie said. "For the first time since the Korean War, we are operating without complete air superiority."

Staff Sgt. Greg Erwin

Components of the counter-small unmanned aerial systems program are flown during a test demonstration March 9, at Al Udeid Air Base, Qatar.

Tech. Sgt. John Raven

An F-16D Fighting Falcon prepares to drop four Collaborative SDBs during the second Golden Horde test mission near Holloman Air Force Base, N.M., Feb. 19.

Small Diameter Bombs Collaborate in Golden Horde Test

By John A. Tirpak

Six GBU-39 Small Diameter Bombs dropped from two F-16s set up their own network, changed their targets in flight, and synchronized their strikes in a multifaceted final flight test of the current phase of the Golden Horde collaborative weapon technology, said the Air Force Research Laboratory.

Two F-16s from the 96th Test Wing at Eglin Air Force Base, Fla., flying over White Sands Missile Range, N.M., dropped a total of six Boeing-made Small Diameter Bombs—four from one of the fighters and two from the other—in the May 25 test. The munitions established communications with each other and a ground station using the L3Harris Banshee 2 radio network and then reacted to a new high-priority target.

The In-Flight Target Update demonstrated "the ability of Golden Horde weapons to interface with the larger joint all-domain command and control network," AFRL said. This capability is key to developing future "networked, collaborative, and autonomous," or NCA weapons, according to a press release.

The new mission called for two of the weapons to make a synchronized time-on-target attack on a single location, while two other munitions made synchronized attacks on two targets, something that had previously been tested.

The synchronized time-on-target algorithm, supplied by Georgia Tech Research Institute, "was able to flexibly support the new target requirement without any software changes," the AFRL said.

AFRL Commander Maj. Gen. Heather L. Pringle said the test is a technological leap not unlike the advent of laser-guided bombs in the 1960s.

"These technologies are completely changing the way we think about weapon capabilities," she said in a press release.

Golden Horde is one of the Air Force's Vanguard programs—technology demonstrations that will pave the way for new applications of weapons technology and manned/unmanned teaming.

The successful test will lead into "Colosseum," the next phase of Golden Horde development, which will implement "digital engineering, hardware-in-the-loop, and surrogate [unmanned aerial vehicle] testing to rapidly integrate, develop, and test transformational NCA weapon technologies," AFRL stated.

2 Key Defense Studies Focus on Science, Tech, and Diversity

By Amy McCullough

The Defense Department must invest in its science and technology enterprise if it hopes to maintain an advantage over peer adversaries, and two reports due out this summer will outline exactly how it plans to accomplish that, DOD's chief technology officer told House legislators.

The master plan for research, development, test, and evaluation infrastructure is due to Congress by June 30. It will include a summary of science and technology infrastructure across the department and highlight existing and emerging military RDT&E missions and the modernization investments needed for each.

The second report, due Aug. 31, will assess diversity in the department's research and engineering workforce, said Barbara McQuiston, acting undersecretary of defense for research and engineering, during a May 20 House Armed Services cyber, innovative technologies, and information systems subcommittee.

Both reports were mandated by the fiscal 2020 National Defense Authorization Act, which directed the Defense Secretary to work with the services to compile the scopes of work, cost, priority level, schedule, and plan for each project. Congress also sought answers on what policy barriers could be holding back RDT&E plans.

In assessing DOD's research and engineering workforce, Congress wants to understand the proportion of women and minorities currently employed; the effectiveness of existing hiring, recruitment, and retention incentives for women and minorities; and the effectiveness of recruiting and retention programs in DOD labs once those individuals have completed initial DOD-funded "research, programs, grant projects, fellowships, and STEM programs," according to the legislation.

Great power competition, in particularly with China, is driving Congress' and the Pentagon's interest in research and development, covering a range of technologies from energy and microelectronics to hypersonic weapons and digital engineering. One technology of particular interest to all is artificial intelligence (AI), which was the subject of a massive study completed late last year by the National Security Commission on Artificial Intelligence. McQuiston said DOD is still reviewing the recommendations, which include creating programs for developing DOD's own AI specialists, but also enabling those in the private sector to become involved in part-time service, along the lines of the National Guard or Air Force Reserve.

"There is a lot more work that needs to be done, especially in STEM, [and] in science education and in recruitment and diversity of the workforce," said McQuiston.

KMOV.com

(IMAGE FROM TV)—An F-15 in the configuration and markings of a Qatari F-15QA suffered a mishap at MidAmerica St. Louis Airport in Mascoutah, Ill., the morning of May 18.

F-15QA Involved in Mishap Near St. Louis

By John A. Tirpak

Two Active-duty U.S. Air Force pilots ejected from an F-15QA aircraft at MidAmerica airport near St. Louis after the jet departed the runway May 18, the service said. Both pilots received minor injuries.

The cause of the accident is under investigation, but the Air Force has not grounded its own two F-15EX jets, which are based on the F-15QA, nor has it issued a safety grounding on the F-15QA or similar aircraft.

The jet departed the runway upon landing, ending up on an adjacent grass strip. The Air Force did not disclose why the pilots ejected. The mishap occurred just after 7:00 a.m. local time in overcast conditions with some rain.

The F-15QA had recently been accepted by the Air Force and was to be transferred to Qatar under the Foreign Military Sales program. Images of the aircraft taken by local news media showed the aircraft with the canopy and both ejection seats missing. There appeared to be no other damage to the factory-fresh fighter.

Initial reports indicated only one crewmember ejected from the aircraft.

Boeing uses MidAmerica, located in Mascoutah, Ill., for some F-15QA training functions. It builds the F-15 series at its plant adjacent to Lambert Field, St. Louis.

The Air Force recently took delivery of its first two F-15EX aircraft, which flew in the Northern Edge exercise in Alaska, which ended in May. The F-15QA, EX, and SA—for Saudi Arabia—all have a new fly-by-wire control system. The F-15EX is undergoing a streamlined and concurrent developmental/operational test program at Eglin Air Force Base, Fla., made possible by extensive USAF testing of the F-15SA. ✪

SOCOM Selects 5 Armed Overwatch Prototypes

By Brian W. Everstine

U.S. Special Operations Command has awarded a total of $19.2 million to five companies for prototype demonstrations as part of the Armed Overwatch effort to buy a low-cost aircraft to fly surveillance and strikes in austere locations.

According to a May 14 award notice, the aircraft selected to proceed are:

- Leidos Inc.'s Bronco II
- MAG Aerospace's MC-208 Guardian
- Textron Aviation Defense's AT-6E Wolverine
- L-3 Communications Integrated Systems' AT-802U Sky Warden
- Sierra Nevada Corp.'s MC-145B Wily Coyote.

The prototype demonstration will take place at Eglin Air Force Base, Fla., and is expected to be completed by March 2022, the notice states. If the prototype project is successful, a company could be requested to provide a proposal for a follow-on production award.

SOCOM proposed the Armed Overwatch program in the aftermath of the Air Force's light attack experiment and plans for the selection to replace the current U-28 Draco fleet. The command wants to buy about 75 of the aircraft to fly close air support, precision strike, and special operations ISR in austere and permissive environments.

Air Force Special Operations Command boss Lt. Gen. James C. "Jim" Slife said in February that he wants procurement in fiscal 2022. "We can do that at relatively low risk, based on what we've seen from the vendors who have indicated that they intend to bring platforms to demonstrate for us in the coming months," he said at the time.

"I think Congress is appropriately and prudently exercising their oversight role."
—Lt. Col, James "Jim" Slife

Congress in the fiscal 2021 defense policy bill blocked SOCOM from buying aircraft, but allowed the command to move forward for the flying demonstration.

"I think Congress is appropriately and prudently exercising their oversight role," Slife said. "I would view this as a lower-risk enterprise than perhaps some charged with oversight do, but the fact that we see it differently doesn't mean that they're wrong."

SOCOM boss Gen. Richard D. Clarke told the Senate Armed Services Committee in March that armed overwatch is needed because in "many remote areas, intelligence, surveillance, reconnaissance and close air support assets are stretched thin and come at a high cost." ✪

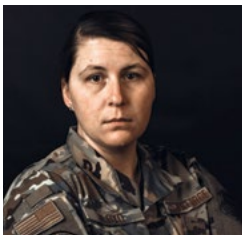
Mike Tsukamoto/staff

Aircraft not to scale. (Top row, left to right): L-3 Communications Integrated Systems' AT-802U Sky Warden; Textron Aviation Defense's AT-6E Wolverine; MAG Aerospace's MC-208 Guardian. (Bottom row, left to right): Leidos Inc.'s Bronco II; Sierra Nevada Corp.'s C-145.

FACES OF THE FORCE

Staff Sgt. Justin Andras/ANG

Senior Airman Jacquiline Graves, an Aircrew Flight Equipment (AFE) journeyman assigned to the 122nd Fighter Wing, was awarded the Air National Guard Outstanding AFE Airman of the Year. Graves completed a 90-day Active Duty Operational Support tour with the Air Force Life Cycle Management Center, spearheading a maternity flight suit project that provides mission capabilities for female aircrew. Graves also was chosen as the 122nd Operations Group Airman of the Year.

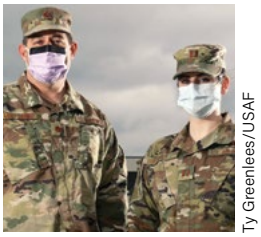


Airman 1st Class Destani Matheny

Technical Sgt. Kelli Floyd is the first enlisted member to be selected for the U.S. Special Operations Command Ghost Program, where she will spend 120 days in SOCOM's executive office for fixed wing aircraft, working on programs such as manned and unmanned aircraft, precision strike, and emerging technologies. Floyd is also Air Combat Command NCO of the year for 2021 and was 2020 20th FW NCO of the year and the 2020 ACC Contracting Innovator of the Year.

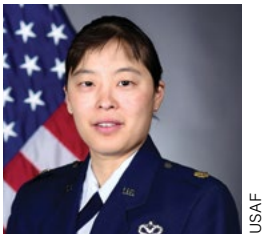
Senior Airman Baylee Hunt

Maj. Sarah Spy, a C-130 Hercules pilot is slotted to become the first female instructor pilot for the Nevada Air National Guard after completing her instructor pilot course this year. Spy has amassed 4,500 flight hours and served on numerous deployments. She joined the Guard in 2002, earned a commercial pilot's license, became a certified flight instructor, and after working in the ANG as a crew chief, earned her commission in 2007.



Ty Greenlees/USAF

Maj. Eric Mozeleski and **Capt. Carly Kerr,** both 88th Medical Group Airmen at Wright-Patterson AFB, Ohio, saved the lives of two individuals involved in a rollover incident on an Ohio interstate. The passenger was ejected from the vehicle with a life-threatening leg injury, which Kerr stabilized using her uniform belt as a tourniquet. They extracted the trapped, injured driver, stabilized both victims, and tended to them until local emergency services personnel arrived.



USAF

USAF **Maj. Monica Pickenpaugh** was named the Federal Engineer of the Year by the National Society of Federal Engineers. Recognized for innovations in the development of drinking water distribution systems and as U.S. Forces Korea's chief of construction, Pickenpaugh's construction projects in the Republic of Korea, worth some $5.7 billion, support the USFK commanders' defense efforts through critical projects.

Airman 1st Class Joao Marcus Costa

Staff Sgt. Journey Collier was named 2020 Military Firefighter of the Year. The Misawa AB, Japan, Airman's accomplishments include streamlining the firefighter certification process, giving virtual school tours to kids amid the COVID-19 pandemic, and leading trainings with her Japanese counterparts. She was accepted into the Professional Officer Course-Early Release Program (POC-ERP), where she will earn a degree and a commission.

Master Sgt. Becky Vanshur / ANG

The **190th Fighter Squadron,** Idaho ANG, won Top Overall Team during the Hawgsmoke 2021 competition, outperforming 12 other units. The three-day event tests maintenance, weapons load crews, and pilots on their execution of skill in a fast-paced environment. "It's surreal. ... It's really a high honor in order to [be a part of] Hawgsmoke," said Lt. Col. Jason Cobb, the 190th's A-10 instructor pilot. The next Hawgsmoke will be held in 2023.

USAF/courtesy

Staff Sgt. Michael Rogers, a pararescueman, received the 2021 Air Force Sergeants Association Pitsenbarger Award for actions in Afghanistan when an accidental discharge by partner forces into a Taliban RPG stockpile set off massive explosions. He saved a communications sergeant and five others who were badly wounded. An injured intelligence sergeant died despite Rogers positioning himself between the exploding stockpile and the injured man.

Tech. Sgt. Marleah Cabano

612th Air Base Squadron Airmen delivered donations to the Children of Love Foundation Orphanage in La Paz, Honduras. With help from the U.S., orphans received clothing, shoes, and towels, as well as toys, soap, toothpaste, and school supplies. Many USAF units at Soto Cano AB sponsor a local orphanage, but Children of Love did not receive help until the 612th stepped up. "It's about being part of the community," said Maj. Duane Reid, 612th ABS director of operations.

Airman 1st Class Luke Kitterman

A **female Airman** will soon begin formal training to become a USAF combat controller. The unnamed Airman, who recently finished the four-week assessment and selection course, is one of four women in the training pipeline vying to break into special warfare operations, a profession that remains dominated by men. She will soon begin combat dive school, parachute training, free-fall, air traffic control class, advanced weapons and demolition skills , and battlefield survival training.

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

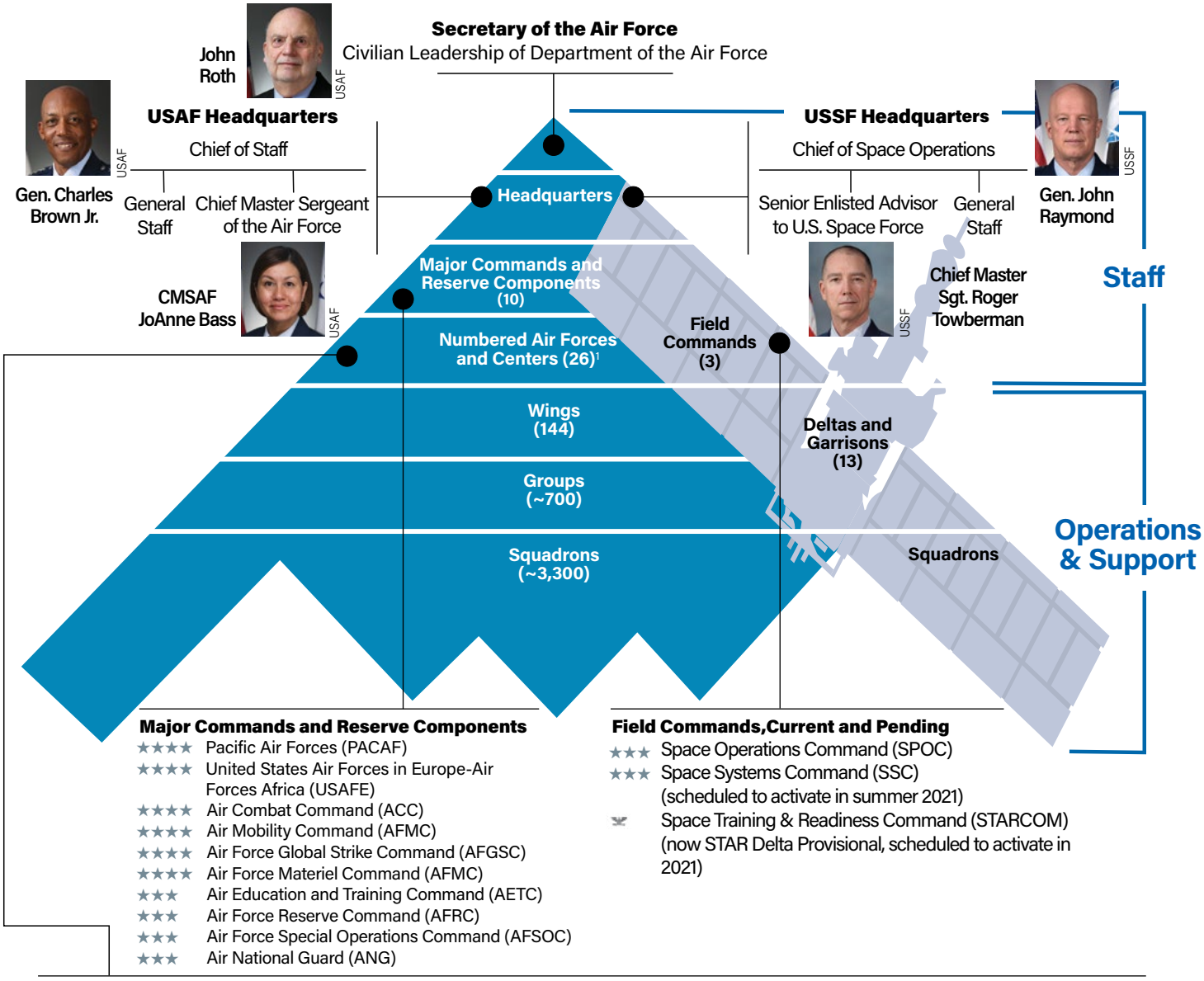
Air Force & Space Force ALMANAC 2021

On the following pages appears a variety of information and statistical material about the U.S. Air Force and U.S. Space Force—their people, organizations, equipment, funding, activities, bases, and more. This Almanac was compiled by Amanda Miller and staff of Air Force Magazine. We especially acknowledge the help of the Secretary of the Air Force Office of Public Affairs, Air Staff agencies, major commands, and reserve components in bringing up to date the comparable data from last year's Almanac—THE EDITORS.

Shutterstock

DEPARTMENT OF THE AIR FORCE

The U.S. Air Force and U.S. Space Force are distinct military services contained within a single Department. The two services can be viewed as parts of the same pyramid, with each echelon of each service falling in parallel under a single Department Secretary at the top.



Major Commands and Reserve Components

- ★★★★ Pacific Air Forces (PACAF)
- ★★★★ United States Air Forces in Europe-Air Forces Africa (USAFE)
- ★★★★ Air Combat Command (ACC)
- ★★★★ Air Mobility Command (AFMC)
- ★★★★ Air Force Global Strike Command (AFGSC)
- ★★★★ Air Force Materiel Command (AFMC)
- ★★★ Air Education and Training Command (AETC)
- ★★★ Air Force Reserve Command (AFRC)
- ★★★ Air Force Special Operations Command (AFSOC)
- ★★★ Air National Guard (ANG)

Field Commands,Current and Pending

- ★★★ Space Operations Command (SPOC)
- ★★★ Space Systems Command (SSC) (scheduled to activate in summer 2021)
- Space Training & Readiness Command (STARCOM) (now STAR Delta Provisional, scheduled to activate in 2021)

Numbered Air Forces

Numbered Air Forces (NAFs) that support Unified Combatant Commands are designated Component Numbered Air Forces (C-NAFs).

C-NAFs

- ★★★ **1st Air Force/AFNORTH**—Supports U.S. Northern Command to ensure air defense of continental United States
- ★★ **3rd Air Force**—Supports U.S. European Command/U.S. Africa Command
- ★★★ **7th Air Force**—Supports U.S. Forces Korea
- ★★ **8th Air Force/Air Forces Strategic**—Supports U.S. Strategic Command and is responsible for all USAF bombers
- ★★ **12th Air Force/AFSOUTH**—Air component of U.S. Southern Command
- ★★★ **U.S. Air Forces Central/AFCENT[3]**—Supports U.S. Central Command

(★) Stars indicate commander's rank.

[1]For a list of NAF-equivalent centers, see AFMC listing on p. 83
[2]312 operational and ~ 3,000 support squadrons
[3]AFCENT is officially a "Named Air Force"
[4]Also supports Unified Combatant Commands

NAFs

- ★★ **2nd Air Force**—Part of AETC, responsible for all USAF non-flying technical training
- ★★ **4th Air Force**—Supports AFRC
- ★★★ **5th Air Force[4]**—Supports PACAF
- ★★ **9th Air Force**—Deployable, operational Joint Task Force
- ★★ **10th Air Force**—Supports Air Force Reserve units nationwide
- ★★★ **11th Air Force**—Provides forces to PACAF
- ★★★ **16th Air Force**—Information warfare operations
- ★★ **18th Air Force[4]**—Operational component of Air Mobility Command
- ★★ **19th Air Force**—Trains aircrews for manned and unmanned aircraft; air battle managers; and weapons directors
- ★★ **20th Air Force**—Responsible for ICBMs and nuclear operations support for Air Force Global Strike Command
- ★★ **22nd Air Force**—Responsible for AFRC C-130 and WC-130 units operated by Air Mobility Command

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DAF PERSONNEL

DAF TOTAL FORCE END STRENGTH

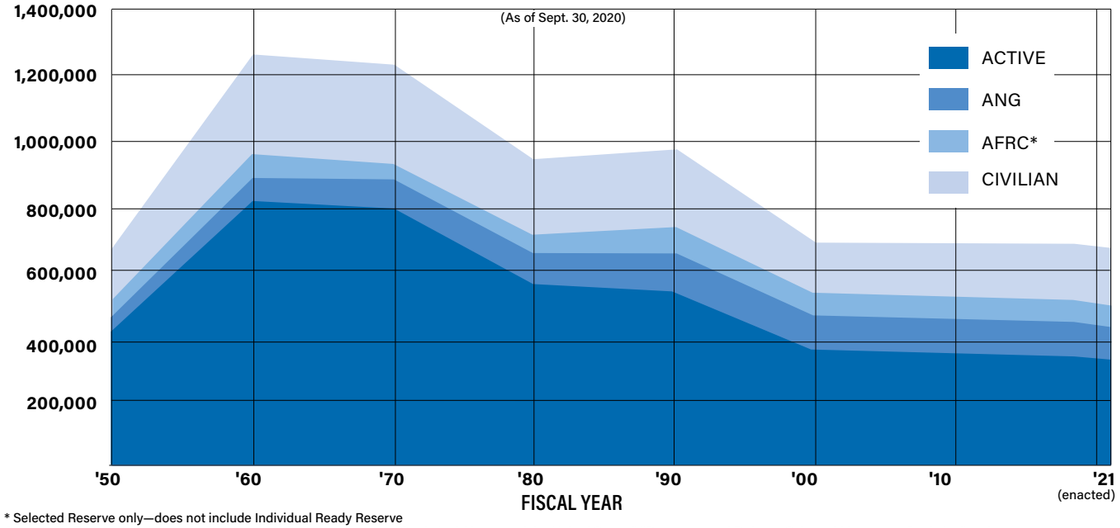
(As of Sept. 30, 2020)

Fiscal Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
USAF Active Duty									**Enacted**	**Requested**
Officers	64,806	62,349	61,004	60,961	61,597	62,640	63,902	64,245	64,936	65,353
Enlisted	261,976	250,104	246,322	252,762	256,983	258,978	263,976	265,369	266,451	267,347
Cadets	3,912	3,879	4,031	4,160	4,207	4,262	4,223	4,176	4,098	4,000
Total USAF Active Duty	**330,694**	**316,332**	**311,357**	**317,883**	**322,787**	**325,880**	**332,101**	**333,790**	**335,485**	**336,700**
USSF Active Duty										
Officers								84	2,742	3,859
Enlisted								1	3,692	4,541
Total USSF Active Duty								**85**	**6,434**	**8,400**
Civilian Personnel										
Direct hire (excluding technicians)	141,496	129,120	129,985	131,965	140,116	135,879	139,536	140,848	147,434*	147,360
ANG technicians	22,568	22,225	23,448	23,044	22,542	21,705	17,502	14,970	11,051	9,942
AFRC technicians	9,277	10,429	8,501	8,384	7,872	7,648	7,714	9,027	9,252*	9,150
Total direct hire	**173,341**	**161,774**	**161,934**	**163,393**	**170,530**	**165,232**	**164,752**	**164,845**	**167,737**	**166,452**
Indirect hire	6,501	4,823	4,090	3,704	4,570	4,202	4,190	3,694	3,975	3,911
Total Civilian Personnel	**179,842**	**166,597**	**166,024**	**167,097**	**175,100**	**169,434**	**168,942**	**168,539**	**171,712**	**170,363**
Air National Guard										
Selected Reserve Officers	14,731	15,024	15,084	14,593	15,257	15,401	15,495	15,990	15,146	15,089
Selected Reserve Enlisted	90,977	91,356	90,644	90,907	90,413	92,068	91,702	91,424	92,954	93,211
Total ANG	**105,708**	**106,380**	**105,728**	**105,500**	**105,670**	**107,469**	**107,197**	**107,414**	**108,100**	**108,300**
Air Force Reserve Command										
Selected Reserve Officers	14,060	13,817	13,937	14,896	13,672	13,716	14,042	14,458	15,108	14,815
Selected Reserve Enlisted	56,853	55,967	54,557	54,304	55,126	54,987	55,347	54,598	55,496	55,485
Total AFRC Selected Reserve	**70,913**	**69,784**	**68,494**	**69,200**	**68,798**	**68,703**	**69,389**	**69,056**	**70,604**	**70,300**
Individual Ready Reserve Officers	11,222	11,222	7,302	7,492	7,492	6,593	7,631	7,631	7,631	7,631
IRR Enlisted	24,271	24,271	29,449	29,359	29,359	21,801	20,683	20,683	20,683	20,683
Total IRR	**35,493**	**35,493**	**36,751**	**36,851**	**36,851**	**28,394**	**28,314**	**28,314**	**28,314**	**28,314**
Total AFRC	**106,406**	**105,277**	**105,245**	**106,051**	**105,649**	**97,097**	**97,370**	**97,370**	**98,918**	**98,614**
Total Ready Reserve	**212,114**	**211,657**	**210,973**	**211,551**	**211,319**	**204,566**	**204,567**	**204,784**	**207,018**	**206,914**

* Based on AFRC data provided April 30, 2021

Sources: For years 2020-2022, the National Defense Budget Estimates for 2022 with select data points provided by the DAF and individual commands.

DAF TOTAL FORCE OVER TIME



* Selected Reserve only—does not include Individual Ready Reserve

Source: Air Force Magazine's USAF Almanac; U.S. Census Bureau; "Statistical Abstract of the United States," "Department of Defense Selected Manpower Statistics," various years.

DAF ACTIVE DUTY BY RANK AND SEX

(As of Sept. 30, 2020)

GRADE		RANK	FEMALE	%	MALE	%	TOTAL	%
CADETS			1,194	28.6	2,982	71.4	4,176	100.0
ENLISTED	E-1	Airman Basic	1,765	21.7	6,373	78.3	8,138	3.06
	E-2	Airman	1,882	23.8	6,014	76.2	7,896	3.0
	E-3	Airman First Class	12,948	24.2	40,543	75.8	53,461	20.2
	E-4	Senior Airman	12,613	21.9	44,954	78.1	57,461	21.7
	E-5	Staff Sergeant	11,500	18.7	50,015	81.3	61,506	23.2
	E-6	Technical Sergeant	7,453	17.6	35,009	82.5	42,462	16.0
	E-7	Master Sergeant	5,432	20.5	21,104	79.5	26,536	10.0
	E-8	Senior Master Sergeant	1,170	22.2	4,107	77.8	5,277	2.0
	E-9	Chief Master Sergeant	476	18.1	2,156	81.9	2,632	1.0
TOTAL			**55,239**	**20.9**	**210,275**	**79.2**	**265,548**	**100.0**
OFFICER	O-1	Second Lieutenant	1,933	26.3	5,423	73.7	7,356	11.5
	O-2	First Lieutenant	1,972	23.4	6,443	76.6	8,415	13.1
	O-3	Captain	5,218	25.1	15,540	74.9	20,758	32.3
	O-4	Major	2,996	20.9	11,313	79.1	14,309	22.3
	O-5	Lieutenant Colonel	1,648	16.8	8,172	83.2	9,820	15.3
	O-6	Colonel	528	16.0	2,764	84.0	3,292	5.1
	O-7	Brigadier General	17	12.6	118	87.4	135	0.2
	O-8	Major General	8	8.6	85	91.4	93	0.1
	O-9	Lieutenant General	3	5.9	48	94.1	51	0.1
	0-10	General	2	12.5	14	87.5	16	0.0
TOTAL			**14,325**	**22.3**	**49,920**	**77.7**	**64,245**	**100.0**
TOTAL ENLISTED AND OFFICER			**69,564**	**21.1**	**260,199**	**78.9**	**329,797**	**100.0**

Sources: Defense Manpower Data Center: Table of Active Duty Females by Rank/Grade and Service, September 2020; Active-Duty Military Personnel by Rank/Grade, September 2020

DAF ACTIVE DUTY AIRMEN MALE/FEMALE, 1950-2020

(As of Sept. 30, 2020)

	1950	1960	1970	1980	1990	2000	2010	2018	2019	2020
Officers										
Female	1,532	3,675	4,667	8,493	13,331	11,819	12,363	13,296	13,932	14,325
Percentage	2.7	2.8	3.6	8.7	13.3	17.1	18.7	21.2	21.8	22.3
Male	55,474	126,014	125,136	89,156	86,714	57,204	53,838	49,344	49,970	49,920
Percentage	97.3	97.2	94.6	91.3	86.7	82.9	81.3	78.8	78.2	77.7
Total Officers	**57,006**	**129,689**	**129,803**	**97,649**	**100,045**	**69,023**	**66,201**	**62,640**	**63,902**	**64,245**
Enlisted										
Female	3,782	5,651	8,987	60,803	60,803	55,011	50,946	51,780	54,205	55,273
Percentage	1.1	0.8	1.4	13.2	14.0	19.2	19.3	20.0	20.5	20.8
Male	350,489	679,412	652,559	399,517	374,385	231,620	212,491	207,198	209,771	210,279
Percentage	98.9	99.2	98.6	86.8	86.0	80.8	80.7	80.0	79.4	79.2
Total Enlisted	**354,271**	**685,063**	**661,546**	**460,320**	**435,188**	**286,631**	**263,437**	**258,978**	**263,976**	**265,552**
Cadets										
Female	0	0	0	504	553	658	966	1,155	1,176	1,194
Percentage	0.0	0.0	0.0	11.4	12.7	15.4	21.2	27.0	27.9	28.6
Male	0	1,949	4,144	3,907	3,817	3,617	3,592	3,110	3,047	2,982
Percentage	0.0	100.0	100.0	88.6	87.3	84.6	78.8	73.0	72.2	71.4
Total	**0**	**1,949**	**4,144**	**4,411**	**4,370**	**4,275**	**4,558**	**4,262**	**4,223**	**4,176**

Sources: Air Force Personnel Center; Defense Manpower Data Center: Table of Active Duty Females by Rank/Grade and Service, September 2020, and Active Duty Military Personnel by Rank/Grade, September 2020

Staff Sgt. Savannah Waters

Capt. Timothy Joubert conducts a preflight check on a U.S. Air Force F-16 during Astral Knight 2021 at Aviano Air Base, Italy, May 13.

DAF ACTIVE DUTY BY COMMAND

(As of Sept. 30, 2020)

MAJOR COMMANDS	
Air Combat Command	80,858
Air Education and Training Command	57,541
Air Force Global Strike Command	28,708
Air Force Materiel Command	17,033
Air Force Special Operations Command	15,660
Air Mobility Command	42,308
Pacific Air Forces	29,952
U.S. Air Forces Europe-AFA	23,081
TOTAL	**295,141**
FIELD OPERATING AGENCIES (FOAS)	
Air Force Agency for Modeling and Simulation	8
Air Force Audit Agency	0
Air Force Cost Analysis Agency	12
Air Force Flight Standards Agency	116
Air Force Historical Research Agency	0
Air Force Inspection Agency	94
Air Force Legal Operations Agency	555
Air Force Manpower Analysis Agency	139
Air Force Medical Readiness Agency	302
Air Force Mortuary Affairs Operations	19
Air Force Office of Special Investigations	120
Air Force Operations Group	34
Air Force Personnel Center	666
Air Force Public Affairs Agency	55
Air Force Review Boards Agency	29
Air Force Safety Center	48
Air National Guard Readiness Center	36
National Air and Space Intelligence Center	148
TOTAL	**2,381**
DIRECT REPORTING UNITS	
Air Force District of Washington	125
Air Force Operational Test and Evaluation Center	298
Air Force Reserve Command	57
U.S. Air Force Academy	201
TOTAL	**681**
OTHER	**31,594**
TOTAL ACTIVE DUTY	**329,797**

*On Dec. 20, 2019, the U.S. Space Force was established, and AFSPC was largely absorbed by the new service.

DAF ACTIVE DUTY END STRENGTH

(As of Sept. 30, 2020)

YEAR	NUMBER	YEAR	NUMBER
1907	3	1963	869,431
1908	13	1964	856,798
1909	27	1965	824,662
1910	11	1966	887,353
1911	23	1967	897,494
1912	51	1968	904,850
1913	114	1969	862,353
1914	122	1970	791,349
1915	208	1971	755,300
1916	311	1972	725,838
1917	1,218	1973	691,182
1918	195,023	1974	643,970
1919	25,603	1975	612,751
1920	9,050	1976	585,416
1921	11,649	1977	570,695
1922	9,642	1978	569,712
1923	9,441	1979	559,455
1924	10,547	1980	557,969
1925	9,670	1981	570,302
1926	9,674	1982	582,845
1927	10,078	1983	592,044
1928	10,549	1984	597,125
1929	12,131	1985	601,515
1930	13,531	1986	608,199
1931	14,780	1987	607,035
1932	15,028	1988	576,446
1933	15,099	1989	570,880
1934	15,861	1990	535,233
1935	16,247	1991	510,432
1936	17,233	1992	470,315
1937	19,147	1993	444,351
1938	21,089	1994	426,327
1939	23,455	1995	400,409
1940	51,165	1996	389,001
1941	152,125	1997	377,385
1942	764,415	1998	367,470
1943	2,197,114	1999	360,590
1944	2,372,292	2000	355,654
1945	2,282,259	2001	353,571
1946	455,515	2002	368,251
1947	305,827	2003	375,062
1948	387,730	2004	376,616
1949	419,347	2005	353,696
1950	411,277	2006	348,953
1951	788,381	2007	333,495
1952	983,261	2008	327,379
1953	977,593	2009	333,408
1954	947,918	2010	334,196
1955	959,946	2011	333,370
1956	909,958	2012	332,918
1957	919,835	2013	330,694
1958	871,156	2014	316,332
1959	840,435	2015	311,357
1960	814,752	2016	317,883
1961	821,151	2017	322,787
1962	884,025	2018	329,880
		2019	332,101
		2020	329,797
		2021	335,485*
		2022	336,700**

From 1907-1946, these Airmen were part of the U.S. Army. See p. 100 on organizational history.

Enacted*
Requested**

ACTIVE DUTY BY REGION

(As of Sept. 30, 2020)

REGIONS	1950	1960	1970	1980	1990	2000	2010	2018	2019	2020
US and Territories	342,437	633,327	565,098	445,886	418,027	291,260	277,123	270,503	276,090	277,818
Europe	24,531	104,899	72,937	76,788	69,296	32,901	30,963	27,085	27,649	27,762
East Asia, Pacific	36,412	50,679	139,666	32,263	33,558	22,030	12,649	20,372	20,698	20,644
Africa, Mideast, S. Asia	1,491	11,160	608	674	376	8,972	891	450	2,076	2,032
Western Hemisphere	6,266	14,106	5,348	2,211	2,356	345	339	2,119	440	436
Other	140	581	7,692	147	11,620	146	12,231	1,138	1,096	1,105
TOTAL*	**411,277**	**814,752**	**791,349**	**557,969**	**535,233**	**355,654**	**334,196**	**321,667**	**328,049**	**329,797**

*Not including cadets, Source: Air Force Personnel Center

ACTIVE DUTY BY BASE, 2011 vs. 2020

(Percentage change Sept. 30, 2011 to Sept. 30, 2020)

Base	2020	2011	# CHANGE	% CHANGE
JB San Antonio-Lackland, Texas	17,155	17,406	-251	-1.4
Ramstein AB, Germany	9,489	9,471	18	0.2
Hurlburt Field, Fla.	9,270	8,314	956	11.5
Nellis AFB, Nev. [1]	7,780	9,900	-2,120	-21.4
JB Langley-Eustis, Va.	7,754	7,986	-232	-2.9
Shaw AFB, S.C.	7,376	5,912	1,464	24.8
Travis AFB, Calif.	6,902	6,571	331	5.0
Kadena AB, Japan	6,648	6,673	-25	0.4
Davis-Monthan AFB, Ariz.	6,511	6,643	-132	2.0
Eglin AFB, Fla.	6,393	5,771	622	10.8
JB Andrews, Md.	5,960	7,603	-1,643	-21.6
Offutt AFB, Neb.	5,878	5,405	473	8.8
Wright-Patterson AFB, Ohio	5,810	5,813	-3	-0.1
Sheppard AFB, Texas	5,787	5,357	430	8.0
Minot AFB, N.D.	5,724	5,323	401	7.5
JB Pearl Harbor-Hickam, Hawaii	5,599	5,030	569	11.3
JB Elmendorf-Richardson, Alaska	5,509	5,608	-99	-1.8
Osan AB, South Korea	5,323	5,308	15	0.3
JB McGuire-Dix-Lakehurst, N.J.	5,319	4,855	464	9.6
Barksdale AFB, La.	5,282	5,814	-532	-9.2
Luke AFB, Ariz.	4,913	3,917	996	25.4
Scott AFB, Ill.	4,878	5,109	-231	-4.5
Moody AFB, Ga.	4,850	4,654	196	4.2
Dyess AFB, Texas	4,780	5,093	-313	-6.1
Tinker AFB, Okla.	4,779	5,876	-1,097	-18.7
Cannon AFB, N.M.	4,674	4,275	399	9.3
Holloman AFB, N.M.	4,604	4,030	574	14.2
Seymour Johnson AFB, N.C.	4,566	4,814	-248	-5.2
Aviano AB, Italy	4,474	4,444	30	0.7
Keesler AFB, Miss.	4,447	5,263	-816	-15.5
RAF Lakenheath, U.K.	4,416	4,636	-220	-4.7
Hill AFB, Utah	4,362	3,864	498	12.9
RAF Mildenhall, U.K.	4,294	4,035	259	6.4
Pentagon, Va.	4,231	4,179	52	1.2
Whiteman AFB, Mo.	4,051	3,786	265	7.0
Spangdahlem AFB, Germany	4,010	4,815	-805	-15.9
Beale AFB, Calif.	3,984	3,937	47	1.2
MacDill AFB, Fla.	3,878	3,649	229	6.3
Goodfellow AFB, Texas	3,820	4,513	-693	-15.4
JB Charleston, S.C.	3,739	3,783	-44	-1.2
Peterson AFB, Fla.	3,623	3,832	-209	-5.5
Little Rock AFB, Ark.	3,621	5,185	-1,564	-30.2
Dover AFB, Del.	3,564	3,525	39	1.1
Robins AFB, Ga.	3,564	3,918	-354	-9.0
Mountain Home AFB, Idaho	3,522	3,553	-31	-0.9
Fairchild AFB, Wash.	3,431	2,861	570	19.9
Fort Meade, Md.	3,416	2,583	833	32.2
Malmstrom AFB, Mont.	3,412	3,129	283	9.0
Ellsworth AFB, S.D.	3,351	3,535	-184	-5.2
JB Lewis-McChord, Wash.	3,335	3,680	-345	-9.4
Yokota AB, Japan	3,279	2,931	348	11.9
Kirtland AFB, N.M.	3,274	3,460	-186	-5.4
F.E. Warren AFB, Wyo.	3,204	3,128	76	2.4
Maxwell AFB, Ala.	3,018	2,915	103	3.5
McConnell AFB, Kan.	2,953	3,023	-70	-2.3
JB San Antonio-Randolph, Texas	2,799	2,938	-139	-4.7
Creech AFB [1]	2,760	n/a	n/a	n/a
Edwards AFB, Calif.	2,697	2,652	45	1.7
Misawa AB, Japan	2,686	2,950	-264	-8.9
Vandenberg AFB, Calif.	2,553	2,809	-256	-9.1
Eielson AFB, Alaska	2,518	1,925	593	30.8
Kunsan AB, South Korea	2,390	2,506	-116	-4.6
Bolling AFB, D.C.	2,374	2,986	-612	-20.5
Pope Field, N.C.	2,340	2,574	-234	-9.1
U.S. Air Force Academy, Colo.	2,290	2,460	-170	-6.9
Andersen AFB, Guam	2,126	2,070	56	2.7
Tyndall AFB, Fla.	1,923	2,748	-825	-30.0
Grand Forks AFB, N.D.	1,892	1,457	435	29.9
Patrick AFB, Fla.	1,851	1,777	74	4.2
Buckley AFB, Colo.	1,721	1,443	278	19.3
Schriever AFB, Colo.	1,663	1,616	47	2.9
MCB Quantico, Va. [2]	1,568	n/a	n/a	n/a
JB San Antonio-Fort Sam Houston, Texas	1,523	1,322	201	15.2
Columbus AFB, Miss.	1,499	1,592	-93	-5.8
Hanscom AFB, Mass.	1,488	1,655	-167	-10.1
Incirlik AB, Turkey	1,474	1,429	45	3.1
Altus AFB, Okla.	1,341	1,381	-40	-2.9
Laughlin AFB, Texas	1,263	1,479	-216	-14.6
Vance AFB, Okla.	1,223	1,209	14	1.2
Los Angeles AFB, Calif.	1,219	1,400	-181	-12.9
USAG Stuttgart, Germany	806	1,265	-459	-36.3
Errors in data	24	2	n/a	n/a
Brooks City-Base, Texas [3]	n/a	28	n/a	n/a
Lajes Field, Portugal [4]	n/a	663	n/a	n/a
Total	**329,797**	**329,029**	**768**	**0.2**

[1] Nellis AFB's personnel included Creech AFB until FY20. [2] Air Force personnel first recorded in 2012.[3] Closed in 2012. [4] Realigned to count personnel with the Ramstein AB host wing in 2015.

DAF ACTIVE DUTY DEMOGRAPHICS: SEX, ETHNICITY, RACE, MARITAL STATUS, EDUCATION

(As of Sept. 30, 2020)

ENLISTED RANKS	E-1	%	E-2	%	E-3	%	E-4	%	E-5	%	E-6	%	E-7	%	E-8	%	E-9	%	ENLISTED TOTAL*	%	ACTIVE DUTY TOTAL*	%
TOTAL	**8,138**	**3.06**	**7,896**	**3.0**	**53,502**	**20.2**	**57,588**	**21.7**	**61,517**	**23.2**	**42,462**	**16.0**	**26,536**	**10.0**	**5,277**	**2.0**	**2,632**	**1.0**	**265,552**		**329,797**	
SEX																						
Female	1,765	21.7	1,882	23.8	12,634	21.9	11,502	18.7	7,453	17.6	5,432	20.5	1,170	22.2	476	18.1	55,273	20.8	55,273	20.8	69,598	21.1
Male	6,373	78.3	6,014	24.2	44,954	78.1	50,015	81.3	35,009	82.5	21,104	79.5	4,107	77.8	2,156	81.9	210,279	79.2	210,279	79.2	260,199	78.9
ETHNICITY																			**265,552**		**329,797**	
Declined to Respond	18	0.2	33	0.4	115	0.2	398	0.7	1,032	1.7	1,030	2.4	819	3.1	139	2.6	53	2.0	3,637	1.4	14,057	4.3
Hispanic or Latino	1,616	19.9	1,811	22.9	10,936	20.4	11,026	19.1	10,619	17.3	6,185	14.6	3,315	12.5	605	11.5	214	8.1	46,327	17.4	51,267	15.5
Not Hispanic or Latino	6,504	79.9	6,052	76.6	42,451	79.3	46,164	80.2	49,866	81.1	35,247	83.0	22,402	84.4	4,533	85.9	2,365	89.9	215,584	81.2	264,469	80.2
RACE																			**265,548**		**329,793**	
American Indian or Alaska Native	81	1.0	76	1.0	467	0.9	478	0.8	431	0.7	304	0.7	193	0.7	23	0.4	15	0.6	2,068	0.8	2,383	0.7
Asian	299	3.7	326	4.1	2,557	4.8	2,592	4.5	2,430	4.0	1,402	3.3	831	3.1	106	2.0	39	1.5	10,582	4.0	14,053	4.3
Black or African American	1,384	17.0	1,431	18.1	9,912	18.5	10,707	18.6	9,896	16.1	6,243	14.7	4,074	15.4	947	17.9	439	16.7	45,033	17.0	49,058	14.9
Declined to Respond	22	0.3	54	0.7	230	0.4	765	1.3	1,675	2.7	2,099	4.9	1,933	7.3	472	8.9	200	7.6	7,450	2.8	11,520	3.5
Identified More Than One Race	420	5.2	393	5.0	2,798	5.2	3,047	5.3	3,221	5.2	1,823	4.3	877	3.3	151	2.9	47	1.8	12,777	4.8	14,845	4.5
Native Hawaiian or Other Pacific Islander	111	1.4	112	1.4	744	1.4	735	1.3	747	1.2	692	1.6	407	1.5	66	1.3	18	0.7	3,632	1.4	3,968	1.2
White	5,821	71.5	5,504	69.7	36,794	68.8	39,264	68.2	43,117	70.1	29,899	70.4	18,221	68.7	3,512	66.6	1,874	71.2	184,006	69.3	233,966	70.9
MARITAL STATUS																			**265,548**		**329,793**	
Divorced	50	0.60	37	0.5	576	1.1	2,562	4.4	5,352	8.7	4,645	10.9	2,884	10.9	521	9.9	226	8.6	16,853	6.3	19,484	5.9
Married	796	9.80	1,049	13.3	13,274	24.8	21,918	38.1	35,313	57.4	32,119	75.6	21,948	82.7	4,535	85.9	2,341	88.9	133,293	50.2	177,317	53.8
Single	7,291	89.6	6,810	86.2	39,639	74.1	33,076	57.4	20,819	33.8	5,650	13.3	1,657	6.2	213	4.0	62	2.4	115,217	43.4	132,747	40.3
Other***	1	**	0	0.0	13	**	32	0.1	33	0.1	48	0.1	47	0.2	8	0.2	3	0.1	185	0.1	245	0.1
HIGHEST EDUCATIONAL ACHIEVEMENT																			**265,548**		**329,793**	
No High School Diploma or GED	4	**	5	0.1	25	**	6	**	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	40	**	40	**
High School Diploma/GED	5,563	68.4	1,143	14.5	3,550	6.6	230	0.4	15	**	3	**	2	**	0	0.0	0	0.0	10,506	4.0	10,506	3.2
Some College	1,516	18.6	6,507	82.4	47,142	88.1	51,824	90.0	38,353	62.3	12,243	28.8	2,014	7.6	0	0.0	0	0.0	159,599	60.1	159,599	48.4
Associate Degree	25	0.3	5	0.1	336	6.3	3,441	6.0	18,401	29.9	22,419	52.8	14,650	55.2	1,715	32.5	515	19.6	61,507	23.2	61,507	18.7
Bachelor's Degree	9	0.1	4	0.1	576	1.1	1,837	3.2	4,263	6.9	6,811	16.0	7,802	29.4	2,376	45.0	1,210	46.0	24,888	9.4	51,615	15.7
Master's Degree	0	0.0	1	**	33	0.1	122	0.2	366	0.6	899	2.1	1,986	7.5	1,162	22.0	896	34.0	5,465	2.1	32,057	9.7
Ph.D. or Professional Degree	0	0.0	0	0.0	0	0.0	12	**	5	**	9	**	21	0.1	13	0.2	8	0.3	68	**	7,691	2.3
Unknown	1,021	12.5	231	2.9	1,840	3.4	116	0.2	114	0.2	78	0.2	61	0.2	11	0.2	3	0.1	3,475	1.3	6,778	2.1
																			265,548		**329,793**	

OFFICER RANKS	O-1	%	O-2	%	O-3	%	O-4	%	O-5	%	O-6	%	O-7	%	O-8	%	O-9	%	O-10	%	OFFICER TOTAL	%
TOTAL	**7,356**	**11.5**	**8,415**	**13.1**	**20,758**	**32.3**	**14,309**	**22.3**	**9,820**	**15.3**	**3,292**	**5.1**	**135**	**0.2**	**93**	**0.1**	**51**	**0.1**	**16**	**0.0**	**64,245**	
SEX																						
Female	1,933	26.3	1,972	23.4	5,218	25.1	2,996	20.9	1,648	8,172	528	16.0	17	12.6	8	8.6	3	5.9	2	12.5	14,325	22.30
Male	5,423	73.7	6,443	76.6	15,540	74.9	11,313	79.1	16.78	83.2	2,764	84.0	118	87.4	85	91.4	48	94.1	14	87.5	49,920	77.70
ETHNICITY																						
Declined to Respond	1,909	30.0	1,784	21.2	2,418	11.6	2,996	20.9	1,211	12.3	99	3.0	2	1.5	1	1.1	0	0.0	0	0.0	10,420	16.2
Hispanic or Latino	721	9.8	815	9.7	1,742	8.4	933	6.5	565	5.8	161	4.9	1	0.7	2	2.2	0	0.0	0	0.0	4,940	7.7
Not Hispanic or Latino	4,726	64.2	5,816	69.1	16,598	80.0	10,380	72.5	8,044	81.9	3,032	92.1	132	97.8	90	96.8	51	100.0	16	100.0	48,885	76.1
RACE																						
American Indian or Alaska Native	40	0.5	28	0.3	108	0.5	81	0.6	44	0.4	13	0.4	1	0.7	0	0.0	0	0.0	0	0	315	0.5
Asian	475	6.5	510	6.1	1,259	6.1	757	5.3	373	3.8	95	2.9	2	1.5	0	0.0	0	0.0	0	0.0	3,471	5.4
Black or African American	478	6.5	573	6.8	1,353	6.5	849	5.9	546	5.6	214	6.5	5	3.7	3	3.2	3	5.9	1	6.3	4,025	6.3
Declined to Respond	503	6.8	465	5.5	1,161	5.6	1,147	8.0	653	6.6	136	4.1	3	2.2	2	2.2	0	0.0	0	0.0	4,070	6.3
Identified More Than One Race	379	5.2	380	4.5	750	3.6	327	2.3	184	1.9	46	1.4	2	1.5	0	0.0	0	0.0	0	0.0	2,068	3.2
Native Hawaiian or Other Pacific Islander	51	0.7	44	0.5	117	0.6	80	0.6	36	0.4	7	0.2	0	0.0	0	0.0	1	2.0	0	0.0	336	0.5
White	5,430	73.8	6,415	76.2	16,010	77.1	11,068	77.3	7,984	81.3	2,781	84.5	122	90.4	88	94.6	47	92.2	15	93.8	49,960	77.8
MARITAL STATUS																						
Divorced	160	2.2	224	2.7	856	4.1	769	5.4	463	4.7	148	4.5	5	3.7	2	2.2	4	7.8	0	0.0	2,631	4.1
Married	2,438	33.1	3,963	47.1	13,548	65.3	11,896	83.1	8,870	90.3	3,031	92.1	128	94.8	89	95.7	46	90.2	15	93.8	44,024	68.5
Single	4,756	64.7	4,226	50.2	6,339	30.5	1,630	11.4	469	4.8	104	3.2	2	1.5	2	2.2	1	2.0	1	6.3	17,530	27.3
Other***	2	**	2	**	15	0.1	14	0.1	18	0.2	9	0.3	0	0.0	0	0.0	0	0.0	0	0.0	60	0.1
HIGHEST EDUCATIONAL ACHIEVEMENT																						
Bachelor's Degree	5,372	73.0	6,921	82.2	11,396	54.9	2,865	20.0	171	1.7	1	**	1	0.7	0	0.0	0	0.0	0	0.0	26,727	41.6
Master's Degree	269	3.7	912	10.8	5,800	27.9	8,966	62.7	7,891	80.4	2,482	75.4	123	91.1	84	90.3	49	96.1	16	100.0	26,592	41.4
Ph.D. or Professional Degree	11	0.1	20	0.2	2,660	12.8	2,376	16.6	1,728	17.6	806	24.5	11	8.1	9	9.7	2	3.9	0	0.0	7,623	11.9
Unknown	1,704	23.2	562	6.7	902	4.3	102	0.7	30	0.3	3	0.1	0	0.0	0	0.0	0	0	0	0.0	3,303	5.1

Source: Air Force Personnel Center data request

*The ranks of four enlisted members were unaccounted for in some source data because of errors in a database query.
**Less than 0.1 percent.
***Includes annulled, legally separated, widowed, interlocutory decree, and unknown.

AIR FORCE RESERVE DEMOGRAPHICS: SEX, ETHNICITY, RACE, MARITAL STATUS, EDUCATION

(As of Sept. 30, 2020)

ENLISTED RANKS	E-1	%	E-2	%	E-3	%	E-4	%	E-5	%	E-6	%	E-7	%	E-8	%	E-9	%	TOTAL	%
TOTAL	946	1.7	762	1.4	3,772	6.9	12,211	22.4	10,952	20.1	13,882	25.4	8,142	14.9	2,900	5.3	1,031	1.9	54,598	
SEX																				
Female	409	43.2	336	44.1	1,408	37.3	3,789	31.0	2,829	25.8	3,349	24.1	2,114	26.0	794	27.4	225	21.8	15,253	27.9
Male	537	56.8	426	55.9	2,364	62.7	8,422	69.0	8,123	74.2	10,533	75.9	6,028	74.0	2,106	72.6	806	78.2	39,345	72.1
ETHNICITY																				
Declined to Respond	895	94.6	661	86.7	3,294	87.3	7,594	62.2	3,877	35.4	2,916	21.0	6,109	75.0	170	5.9	42	4.1	25,558	46.8
Hispanic or Latino	16	1.7	31	4.1	157	4.2	1,335	10.9	1,692	15.4	2,129	15.3	1,084	13.3	340	11.7	89	8.6	6,873	12.6
Not Hispanic or Latino	35	3.7	70	9.2	321	8.5	3,282	26.9	5,383	49.2	8,837	63.7	949	11.7	2,390	82.4	900	87.3	22,167	40.6
RACE																				
American Indian or Alaska Native	8	0.8	6	0.8	30	0.8	95	0.8	83	0.8	105	0.8	51	0.6	28	1.0	6	0.6	412	0.8
Asian	46	4.9	40	5.2	249	6.6	715	5.9	494	4.5	514	3.7	211	2.6	63	2.2	18	1.7	2,350	4.3
Black or African American	333	35.2	246	32.3	1,088	28.8	3,120	25.6	2,203	20.1	2,309	16.6	1,112	13.7	353	12.2	46	4.5	10,810	19.8
Declined to Respond or Identification Pending	1	0.1	6	0.8	12	0.3	210	1.7	343	3.1	693	5.0	503	6.2	178	6.1	50	4.8	1,996	3.7
Identified More Than One Race	40	4.2	37	4.9	163	4.3	512	4.2	464	4.2	485	3.5	179	2.2	39	1.3	81	7.9	2,000	3.7
Native Hawaiian or Other Pacific Islander	19	2.0	14	1.8	49	1.3	201	1.6	143	1.3	212	1.5	105	1.3	23	0.8	6	0.6	772	1.4
White	499	52.7	413	54.2	2,181	57.8	7,358	60.3	7,222	65.9	9,564	68.9	5,981	73.5	2,216	76.4	824	79.9	36,258	66.4
MARITAL STATUS																				
Divorced	13	1.4	14	1.8	86	2.3	583	4.8	1,034	9.4	1,780	12.8	1,169	14.4	415	14.3	131	12.7	5,225	9.6
Married	93	9.8	78	10.2	630	16.7	3,776	30.9	5,503	50.2	8,730	62.9	5,944	73.0	2,246	77.4	836	81.1	27,836	51.0
Single	840	88.8	670	87.9	3,055	81.0	7,847	64.3	4,406	40.2	3,341	24.1	1,011	12.4	230	7.9	59	5.7	21,459	39.3
Other*	0	0.0	0	0.0	1	**	5	**	9	**	31	0.2	18	0.2	9	0.3	5	0.5	78	0.1
HIGHEST EDUCATIONAL ACHIEVEMENT* **																				
No High School Diploma or GED	6	0.6	9	1.2	22	0.6	55	0.5	49	0.4	53	0.4	16	0.2	0	0.0	0	0.0	210	0.4
High School Diploma/GED	721	76.2	221	29.0	1,684	44.6	674	5.5	365	3.3	74	0.5	3	**	0	0.0	0	0.0	3,742	6.9
Some College	210	22.2	527	69.2	1,940	51.4	10,055	82.3	6,534	59.7	6,737	48.5	2,362	29.0	110	3.8	29	2.8	28,504	52.2
Associate Degree	1	0.1	1	0.1	26	0.7	588	4.8	2,581	23.6	4,522	32.6	3,267	40.1	1,390	47.9	420	40.7	12,796	23.4
Bachelor's Degree	3	0.3	0	0.0	61	1.6	735	6.0	1,225	11.2	2,013	14.5	1,851	22.7	929	32.0	354	34.3	7,171	13.1
Master's Degree	0	0.0	0	0.0	9	0.2	85	0.7	172	1.6	454	3.3	612	7.5	454	15.7	220	21.3	2,006	3.7
Ph.D. or Professional Degree	0	0.0	0	0.0	2	0.1	6	**	5	**	11	0.1	25	0.3	14	0.5	8	0.8	71	0.1
Unknown	5	0.5	4	0.5	28	0.7	13	0.1	21	0.2	18	0.1	6	0.1	3	0.1	0	0.0	98	0.2

OFFICER RANKS	O-1	%	O-2	%	O-3	%	O-4	%	O-5	%	O-6	%	O-7	%	O-8	%	TOTAL	%	AFRC TOTAL	%
TOTAL	576		602		2,886		5,021		4,272		1,021		53		27		14,458		69,056	
SEX																				
Female	154	26.7	205	34.1	916	31.7	1,274	25.4	1,050	24.6	260	25.5	16	30.2	5	18.5	3,880	26.8	19,133	27.7
Male	422	73.3	397	65.9	1,970	68.3	3,747	74.6	3,222	75.4	761	74.5	37	69.8	22	81.5	10,578	73.2	49,923	72.3
ETHNICITY																				
Declined to Respond	284	49.3	275	45.7	843	29.2	1,093	21.8	306	7.2	37	3.6	1	1.9	0	0.0	2,839	19.6	23,237	33.6
Hispanic or Latino	45	7.8	46	7.6	204	7.1	324	6.5	266	6.2	53	5.2	1	1.9	0	0.0	939	6.5	7,812	11.3
Not Hispanic or Latino	247	42.9	281	46.7	1,839	63.7	3,604	71.8	3,700	86.6	931	91.2	51	96.2	27	100.0	10,680	73.9	38,007	55.0
RACE																				
American Indian or Alaska Native	4	0.7	0	0.0	11	0.4	37	0.7	16	0.4	5	0.5	0	0.0	0	0.0	73	0.5	485	0.7
Asian	24	4.2	31	5.1	171	5.9	214	4.3	163	3.8	33	3.2	0	0.0	0	0.0	636	4.4	2,986	4.3
Black or African American	47	8.2	62	10.3	265	9.2	273	5.4	230	5.4	46	4.5	2	3.8	0	0.0	925	6.4	11,735	17.0
Declined to Respond or Identification Pending	16	2.8	15	2.5	128	4.4	337	6.7	240	5.6	46	4.5	1	1.9	0	0.0	783	5.4	2,779	4.0
Identified More Than One Race*	21	3.6	23	3.8	83	2.9	104	2.1	65	1.5	9	0.9	50	94.3	1	3.7	356	2.5	2,356	3.4
Native Hawaiian or Other Pacific Islander	3	0.5	6	1.0	23	0.8	25	0.5	20	0.5	5	0.5	0	0.0	0	0.0	82	0.6	854	1.2
White	461	80.0	465	77.2	2,205	76.4	4,031	80.3	3,538	82.8	877	85.9	0	0.0	26	96.3	11,603	80.3	47,861	69.3
MARITAL STATUS																				
Divorced	40	6.9	37	6.1	221	7.7	400	8.0	351	8.2	81	7.9	3	0.6	2	7.4	1,135	7.9	6,360	9.2
Married	287	49.8	356	59.1	1,961	67.9	4,022	80.1	3,625	84.9	892	87.4	48	90.6	25	92.6	11,216	77.6	39,052	56.6
Single	249	43.2	207	34.4	701	24.3	593	13.9	280	6.6	45	4.4	1	1.9	0	0.0	2,076	14.4	23,535	34.1
Other*	0	0.0	2	0.3	3	0.1	6	0.1	16	0.4	3	0.3	1	1.9	0	0.0	31	0.2	109	0.2
HIGHEST EDUCATIONAL ACHIEVEMENT* **																				
No High School Diploma or GED	2	0.3	0	0.0	0	0.0	0	0.0	1	**	0	0.0	0	0.0	0	0.0	3	**	213	0.3
High School Diploma/GED	11	1.9	10	1.7	4	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	0.2	3,767	5.5
Some College	16	2.8	20	3.3	14	0.5	5	0.1	0	0.0	0	0.0	0	0.0	0	0.0	55	0.4	28,559	41.4
Associate Degree	24	4.2	16	2.7	6	0.1	2	**	5	0.1	0	0.0	0	0.0	0	0.0	53	0.4	12,849	18.6
Bachelor's Degree	389	67.5	330	54.8	1,546	53.6	1,427	28.4	759	17.8	22	2.2	0	0.0	0	0.0	4,473	30.9	11,644	16.9
Master's Degree	69	12.0	95	15.8	868	30.1	2,836	56.5	2,770	64.8	758	74.2	46	86.8	23	85.2	7,465	51.6	9,471	13.7
Ph.D. or Professional Degree	1	0.2	30	5.0	262	9.1	640	12.7	711	16.6	241	23.6	7	13.2	4	14.8	1,896	13.1	1,967	2.8
Unknown	64	11.1	101	16.8	186	6.4	111	2.2	26	0.6	0	0.0	0	0.0	0	0.0	488	3.4	586	0.8

Source: AFRC data request.

*Includes annulled, legally separated, widowed, interlocutory decree, and unknown.

ANG DEMOGRAPHICS: SEX, ETHNICITY, RACE, MARITAL STATUS, EDUCATION

(As of Sept. 30, 2020)

ENLISTED RANKS	E-1	%	E-2	%	E-3	%	E-4	%	E-5	%	E-6	%	E-7	%	E-8	%	E-9	%	ENLISTED TOTAL	%
TOTAL	**2,149**		**1,197**		**12,612**		**13,368**		**19,922**		**20,970**		**14,501**		**4,628**		**2,077**		**91,424**	
SEX																				
Female	835	38.9	504	42.1	3,538	28.1	3,147	23.5	3,943	19.8	4,049	19.3	2,885	19.9	924	20.0	309	14.9	20,134	22.0
Male	1,314	61.1	693	57.9	9,074	71.9	10,221	76.5	15,979	80.2	16,921	80.7	11,616	80.1	3,704	80.0	1,768	85.1	71,290	78.0
Ethnicity																				
Declined to Respond	4	0.2	4	0.3	45	0.4	282	2.1	754	3.8	945	4.5	533	3.7	91	2.0	27	1.3	2,685	2.9
Hispanic or Latino	328	15.3	184	15.4	1,853	14.7	1,908	14.3	2,723	13.7	2,345	11.2	1,227	8.5	352	7.6	133	6.4	11,053	12.1
Not Hispanic or Latino	1,817	84.6	1,009	84.3	10,714	85.0	11,178	83.6	16,445	82.5	17,680	84.3	12,741	87.9	4,185	90.4	1,917	92.3	77,686	85.0
RACE																				
American Indian or Alaska Native	16	0.7	11	0.9	76	0.6	96	0.7	137	0.7	133	0.6	103	0.7	32	0.7	12	0.6	616	0.7
Asian	80	3.7	38	3.2	502	4.0	571	4.3	725	3.6	624	3.0	362	2.5	86	1.9	37	1.8	3,025	3.3
Black or African American	314	14.6	209	17.5	1,506	11.9	1,618	12.1	2,182	11.0	1,830	8.7	1,070	7.4	270	5.8	126	6.1	9,125	10.0
Declined to Respond	0	0.0	2	0.2	16	0.1	115	0.9	370	1.9	669	3.2	568	3.9	171	3.7	60	2.9	1,971	2.2
Identified More Than One Race	91	4.2	55	4.6	480	3.8	502	3.8	635	3.2	562	2.7	253	1.7	70	1.5	21	1.0	2,669	2.9
Native Hawaiian or Other Pacific Islander	31	1.4	17	1.4	148	1.2	154	1.2	246	1.2	264	1.3	121	0.8	35	0.8	11	0.5	1,027	1.1
White	1,617	75.2	865	72.3	9,884	78.4	10,312	77.1	15,627	78.4	16,888	80.5	12,024	82.9	3,964	85.7	1,810	87.1	72,991	79.8
MARITAL STATUS																				
Divorced	16	0.7	6	0.5	184	1.5	530	4.0	1,537	7.7	2,225	10.6	1,798	12.4	534	11.5	223	10.7	7,053	7.7
Married	90	4.2	112	9.4	1,850	14.7	4,064	30.4	10,150	50.9	14,197	67.7	11,281	77.8	3,840	83.0	1,769	85.2	47,353	51.8
Single	2,043	95.1	1,079	90.1	10,574	83.8	8,766	65.6	8,217	41.2	4,506	21.5	1,386	9.6	232	5.0	78	3.8	36,881	40.3
Other*	0	0.0	0	0.0	4	**	8	0.1	18	0.1	42	0.2	36	0.2	22	0.5	7	0.3	137	0.1
HIGHEST EDUCATIONAL ACHIEVEMENT* **																				
High School Diploma/GED	1,531	66.6	209	18.8	3,592	28.5	940	7.5	737	3.7	166	0.8	35	0.2	0	0.0	0	0.0	7,210	7.9
Some College	358	15.6	892	80.1	7,711	61.1	10,304	82.6	13,697	67.9	11,462	55.4	5,647	37.3	274	5.9	159	7.6	50,486	55.3
Associate Degree	0	0.0	2	0.2	195	1.5	578	4.6	3,820	19.0	6,267	30.3	5,942	39.3	2,622	56.1	1,032	49.5	20,452	22.4
Bachelor's Degree	2	0.1	1	0.1	481	3.8	507	4.1	1,547	7.7	2,322	11.2	2,763	18.3	1,308	28.0	619	29.7	9,950	10.5
Master's Degree	0	0.0	1	0.1	48	0.4	54	0.4	233	1.2	433	2.1	721	4.8	448	9.6	262	12.6	2,200	2.4
Ph.D. or Professional Degree	1	**	0	0.0	4	**	4	**	13	0.1	20	0.1	26	0.2	20	0.4	13	0.6	101	0.1
Unknown/Other	406	17.7	8	0.7	593	4.7	83	0.7	123	0.6	32	0.2	5	**	0	0.0	0	0.0	1,249	1.4

OFFICER RANKS	O-1	%	O-2	%	O-3	%	O-4	%	O-5	%	O-6	%	O-7	%	O-8	%	O-9	%	OFFICER TOTAL	%	ANG TOTAL	%
TOTAL	**1,265**		**1,233**		**3,672**		**4,280**		**4,343**		**1,009**		**140**		**44**		**4**		**15,990**		**107,414**	
SEX																						
Female	306	24.2	294	23.8	859	23.4	799	18.7	734	17	141	14.0	17	12.1	3	6.8	0	0.0	3,153	19.7	23,287	21.70
Male	959	75.8	939	76.2	2,813	76.6	3,481	81.3	3,609	83.1	868	86.0	123	87.9	41	93.2	4	100.0	12,837	80.3	84,127	78.30
ETHNICITY																						
Declined to Respond	47	3.7	50	4.1	192	5.2	494	11.5	222	5.1	14	1.4	1	0.7	0	0.0	0	0.0	1,020	6.4	3,705	3.4
Hispanic or Latino	81	6.4	130	10.5	263	7.2	223	5.2	221	5.1	53	5.3	7	5.0	0	0.0	1	25.0	979	6.1	12,032	11.2
Not Hispanic or Latino	1,137	89.9	1,053	85.4	3,217	87.6	3,563	83.2	3,900	89.8	942	93.4	132	94.3	44	100.0	3	75.0	13,991	87.5	91,677	85.3
RACE																						
American Indian or Alaska Native	7	0.6	3	0.2	18	0.5	19	0.4	23	0.5	5	0.5	1	0.7	0	0.0	0	0.0	76	0.5	692	0.6
Asian	43	3.4	43	3.5	132	3.6	145	3.4	122	2.8	17	1.7	3	2.1	0	0.0	0	0.0	505	3.2	3,530	3.3
Black or African American	77	6.1	90	7.3	196	5.3	175	4.1	154	3.5	33	3.3	6	4.3	2	4.5	0	0.0	733	4.6	9,858	9.2
Declined to Respond	19	1.5	26	2.1	117	3.2	165	3.9	190	4.4	19	1.9	1	0.7	0	0.0	0	0.0	537	3.4	2,508	2.3
Identified More Than One Race	32	2.5	40	3.2	83	2.3	71	1.7	46	1.1	5	0.5	0	0.0	0	0.0	0	0.0	277	1.7	2,946	2.7
Native Hawaiian or Other Pacific Islander	9	0.7	15	1.2	21	0.6	31	0.7	24	0.6	3	0.3	0	0.0	0	0.0	0	0.0	103	0.6	1,130	1.1
White	1,078	85.2	1,016	82.4	3,105	84.6	3,674	85.8	3,784	87.1	927	91.9	129	92.1	42	95.4	4	100.0	13,759	86	86,750	80.8
MARITAL STATUS																						
Divorced	87	6.9	69	6.0	281	7.7	331	7.7	372	8.6	66	6.5	10	7.1	2	4.5	0	0.0	1,218	7.6	8,271	7.7
Married	848	67.0	751	60.9	2,755	75.0	3,603	84.2	3,725	85.8	908	90.0	129	92.1	41	93.2	4	100.0	12,764	79.8	60,117	56.0
Single	328	25.9	413	33.5	630	17.2	340	7.9	236	5.4	30	3.0	1	0.7	1	2.3	0	0.0	1,979	12.4	38,860	36.2
Other*	2	0.2	0	0.0	6	0.2	6	0.1	10	0.2	5	0.5	0	0.0	0	0.0	0	0.0	29	0.2	166	0.2
HIGHEST EDUCATIONAL ACHIEVEMENT* **																						
High School Diploma/GED	22	1.6	14	1.0	4	0.1	1	**	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	41	0.2	7,251	6.7
Some College	141	10.5	55	4.1	25	0.7	7	0.2	7	0.2	2	0.2	1	0.7	0	0.0	0	0.0	238	1.5	50,486	46.9
Associate Degree	144	10.8	58	4.3	14	0.4	3	0.1	1	**	0	0.0	0	0.0	0	0.0	0	0.0	220	1.4	20,672	19.2
Bachelor's Degree	807	60.3	907	67.6	2,465	67.1	1,858	43.5	1,450	33.3	232	21.5	33	23.2	8	17.8	0	0.0	7,760	47.8	17,710	16.5
Master's Degree	152	11.4	213	15.9	807	22.0	1,716	40.2	1,965	45.1	482	44.8	67	47.2	22	48.9	0	0.0	5,424	33.4	7,624	7.1
Ph.D. or Professional Degree	11	0.8	28	2.1	146	4	420	9.9	669	15.4	224	20.8	23	16.2	3	6.7	0	0	1,524	9.4	1,625	1.5
Unknown/Other	61	4.6	66	4.9	212	5.8	262	6.1	264	6.1	137	13.2	18	12.7	12	26.66	4	**	1,036	6.4	2,285	2.1

*Includes annulled, legally separated, widowed, interlocutory decree, and unknown.
**Less than 0.1.
***Provided separately as of June 10, 2021. Totals differ from fiscal 2020 end strength by 175 enlisted personnel and 253 officers.
Source: Air National Guard data request

TOTAL FORCE AIRMEN AND GUARDIANS BY AIR FORCE SPECIALTY CODE (AFSC)

(As of Sept. 30, 2020)

ENLISTED

AFSC		TOTAL
1A0	In-Flight Refueling Spc	1,795
1A1	Flight Eng	1,333
1A2	Aircraft Ldm	4,422
1A3	Airborne Mission Sys Spc	1,990
1A6	Flight Attendant	328
1A8	Airborne ISR	2,399
1A9	Spc Mission Aviator	1,352
1BO	Cyber Warfare Operations	9
1B4	CW Ops	1,738
1C0	Aviation Rsc Mgmt	3,071
1C1	Air Traffic Control	3,203
1C3	C2 Ops	2,862
1C5	C2 Battle Mgmt Ops	2,237
1C6	Space Sys Ops	1,669
1C7	Airfield Mgmt	1,166
1C8	Radar, Airfield, and Weather Sys	1,941
1N0	Intelligence	5,980
1N1	Geospatial Intelligence	3,734
1N2	SIGINT	2,337
1N3	Cryptologic Language Analyst	3,462
1N4	Fusion Analyst	4,486
1N7	HUMINT Spc	134
1N8	Targeting Analyst	666
1P0	Aircrew Flight Equip	4,065
1S0	Safety	759
1T0	SERE Specialist	614
1U0	Sensor Ops	2,254
1U1	RPA pilot	79
1W0	Weather	3,012
1Z1	Pararescue	976
1Z2	Combat Control	676
1Z3	TACP	2,040
1Z4	Special Recon	103
2A0	Avionics	1,716
2A2	SOF/PR Integrated Comm/Nav/Mission Sys	1,835
2A3	Fighter/RPA Maint	20,185
2A5	Airlift/Special Mission Aircraft Maint	21,425
2A6	Aircraft Sys	28,100
2A7	Aircraft Fabrication	8,985
2A8	Mobility AF Integrated Comms/Nav/Mission Sys	4,641
2A9	Bomber/Spc Integrated Comms/Nav/Mission Sys	2,583
2F0	Fuels	4,684
2G0	Logistics Plans	1,569
2M0	Missile and Space Sys Maint	1,766
2P0	Precision Measurement Equipment Lab	770
2R0	Maint Mgmt	1,197
2R1	Maint Mgmt Prod	1,285
2S0	Materiel Mgmt	10,108
2T0	Traffic Mgmt	2,717
2T1	Ground Trans	3,210
2T2	Air Trans	10,993
2T3	Vehicle Mgmt	5,216
2W0	Munitions Sys	9,685
2W1	Aircraft Armament Sys	9,988
2W2	Nuclear Weapons	758
3D0	Cyberspace Ops	10,913
3D1	Client Sys	20,230
3E0	Facility Sys	4,986
3E1	HVAC, Refrigeration	2,453
3E2	Heavy Repair	3,200
3E3	Structural	2,699
3E4	Infrastructure Sys	2,878
3E5	Engineering	1,574
3E6	Ops Mgmt	1,189
3E7	Fire Protection	5,669
3E8	Explosive Ordnance Disposal	1,882
3E9	Emergency Mgmt	1,711
3F0	Personnel	9,909
3F1	Services	7,429
3F2	Education and Training	2,579
3F3	Manpower	510
3F4	Equal Opportunity	406
3F5	Administration	6,173
3H0	Historian	19
3N0	Public Affairs	1,863
3N1	Regional Band	542
3N2	Premier Band - The USAF Band	165
3N3	USAF Academy Band	16
3P0	Security Forces	38,409
4A0	Health Services Mgmt	4,256
4A1	Medical Materiel	1,490
4A2	Biomedical Equip	698
4B0	Bioenvironmental Eng	1,245
4C0	Mental Health Svc	1,002
4D0	Diet Therapy	236
4E0	Public Health	1,479
4H0	Cardiopulmonary Lab	466
4J0	Physical Medicine	308
4M0	Aerospace and Ops Physiology	262
4N0	Aerospace Medical Svc	11,647
4N1	Surgical Svc	665
4P0	Pharmacy	795
4R0	Diagnostic Imaging	872
4T0	Medical Lab	1,331
4V0	Ophthalmic	387
4Y0	Dental	2,865
5J0	Paralegal	1,346
5R0	Religious Affairs	886
6C0	Contracting	1,708
6F0	Financial Mgmt and Comptroller	3,430
7S0	Special Investigations	1,206
8A1	Career Assistance Advisor	275
8A2	Enlisted Aide	64
8A3	Protocol	64
8B0	Military Training Instructor	735
8B1	Military Training Leader	426
8B2	Academy Military Training NCO	118
8C0	Amn and Family Readiness Center NCO	224
8D1	Language and Culture Advisor	1
8F0	First Sergeant	2,497
8G0	USAF Honor Guard	285
8G1	USAF Installation Honor Guard Prgm Mgr	74
8H0	Amn Dorm Leader	296
8I0	Supt, IG	262
8I1	Inspections Coordinator	232
8I2	Supt, Complaints and Resolutions	6
8K0	Software Development Specialist	1
8L1	Enlisted Air Advisor-Basic	1
8L7	Enl Combat Aviation Advisor (SOF)	35
8P0	Courier	70
8P1	Defense Attache	145
8R0	Enlisted Accessions Recruiter	1,727
8R2	Second-Tier Recruiter	914
8R3	Third-Tier Recruiter	509
8S0	Missile Facility Mgr	182
8T0	PME Instructor	640
8T1	Enl PME Instructional Sys Designer	17
8U0	Unit Deployment Mgr	248
9A0	Enl Amn, Disqualified for Reasons Beyond Ctrl	151
9A1	Enl Amn, Disqualified for Reasons Within Ctrl	102
9A2	Enl Airman Awaiting Discharge, Separation, or Ret for Reasons Within Ctrl	44
9A3	Enl Awaiting Dis, Sep, or Ret for Reasons Beyond Ctrl	24
9A5	Enl Amn Temp Ineligible for Retraining, Disqualified for Reasons Beyond Ctrl	28
9C0	Chief Master Sergeant of the Air Force	2
9D1	Key Developmental Senior Enlisted Positions	32
9E0	Command Chief Master Sergeant	392
9E1	Command Chief Executive Assistant	16
9E2	Individual Mobilization Augmentee to CCMS	11
9G1	Group Supt	776
9H0	Academic Faculty Inst	1
9J0	Prisoner	12
9L0	Interpreter/Translator	70
9L1	Enl Engagement Mgr/Int'l Affairs	1
9M4	Chief, Medical Enl Force	13
9N0	SECAF Enl Legislative Fellows	1
9Q0	Reserve Force Generation and Oversight NCO	9
9S0	Chief Master Sergeant of the Space Force	1
9S1	Scientific Applications Spc	548
9T0	Basic Enl Amn	11,385
9T1	Officer Trainee	272
9T2	Pre-Cadet Assigned	440
9T4	AF Institute of Tech or Ed With Industry Enl Students	1
9T5	Basic Special Warfare Enlisted Airman	124
	Unknown/other	275

OFFICER

AFSC		TOTAL
10C	Ops Cmdr	623
11B	Bomber Pilot	615
11E	Experimental Test Pilot	154
11F	Fighter Pilot	3,740
11G	Generalist Pilot	435
11H	Helicopter Pilot	886
11K	Trainer Pilot	1,627
11M	Mobility Pilot	7,760
11R	Recon/Surveillance/EW Pilot	941
11S	Spc Ops Pilot	1,543
11U	RPA Pilot	329
12B	Bomber Combat Systems Officer (CSO)	657
12E	Experimental Test CSO	24
12F	Fighter CSO	421
12G	Generalist CSO	128
12H	Rescue CSO	96
12K	Trainer CSO	139
12M	Mobiity CSO	517
12R	Recon/Surveillance/EW CSO	873
12S	Spc Ops CSO	633
12U	RPA	67
13A	Astronaut	5
13B	Air Battle Mgr	1,773
13C	Spc Tactics	1
13L	Air Liaison Officer	2
13M	Airfield Ops	313
13N	Nuclear and Missile Ops	1,120
13O	Multi-Domain Warfare Officer	14
13S	Space Ops	2,035
14F	Info Ops	120
14N	Intelligence	5,374
15A	Operations Research Analyst	418
15W	Weather and Environmental Svcs	514
16F	Foreign Affair Officer	390
16G	AF Ops Staff Officer	731
16K	Software Development Officer	4
16P	Political-Military Affairs Strategist	318
16R	Planning and Programming	722
17C	Cyberspace Warfare Ops Cmdr	23
17D	Warfighter Comms Ops	3,154
17S	Cyberspace Effects Ops	1,061
18A	Attack RPA Pilot	1,478
18E	Experimental Test RPA Pilot	9
18G	Generalist RPA Pilot	103
18R	Recon RPA Pilot	329
18S	Special Ops RPA Pilot	292
19Z	Special Warfare	723
20C	Logistics Cmdr	371
21A	Aircraft Maint	2,082
21M	Munitions and Missile Maint	301
21R	Logistics Readiness	2,236
30C	Support Cmdr	521
31P	Security Forces	947
32E	Civil Eng	1,893
35B	Band	23
35P	Public Affairs	635
38F	Force Support Officer	2,323
40C	Medical Cmdr	228
41A	Health Services Admin	1,818
42B	Physical Therapist	187
42E	Optometrist	281
42F	Podiatric Surgeon	16
42G	Physician Asst	752
42N	Audiology/Speech Pathologist	32
42P	Clinical Psychologist	294
42S	Clinical Social Worker	289
42T	Occupational Therapist	19
43A	Aerospace and Operational Physiologist	88
43B	Biomedical Scientist	118
43D	Dietitian	36
43E	Bioenvironmental Eng	400
43H	Public Health Officer	284
43P	Pharmacist	301
43T	Biomedical Lab	151
44A	Chief, Hospital/Clinic Svcs	75
44B	Preventive Medicine	21
44D	Pathologist	76
44E	ER Services Physician	310
44F	Family Physician	583
44G	General Practice Physician	112
44J	Clinical Geneticist	2
44K	Pediatrician	357
44M	Internist	497
44N	Neurologist	36
44O	Physician	35
44P	Psychiatrist	157
44R	Diagnostic Radiologist	145
44S	Dermatologist	40
44T	Radiotherapist	7
44U	Occupational Medicine	15
44Y	Critical Care Medicine	56
44Z	Allergist	23
45A	Anesthesiologist	166
45B	Orthopedic Surgeon	117
45E	Ophthalmologist	50
45G	Obstetrician and Gynecologist	155
45N	Otorhinolaryngologist	53
45S	Surgeon	301
45U	Urologist	28
46A	Nursing Admin	194
46F	Flight Nurse	982
46N	Clinical Nurse	3,251
46P	Mental Health Nurse	79
46S	Operating Room Nurse	222
46Y	Adv Practice RN	669
47B	Orthodontist	38
47D	Oral and Maxillofacial Pathologist	5
47E	Endodontist	33
47G	Dentist	979
47H	Periodontist	46
47K	Pediatric Dentist	14
47P	Prosthodontist	55
47S	Oral and Maxillofacial Surgeon	74
48A	Aerospace Medicine Physician Spc	141
48G	General Med Officer, Flight Surgeon	230
48R	Residency Trained Flight Surgeon	857
48V	Pilot-Physician	3
51J	Judge Advocate	2,311
52R	Chaplain	1,165
60C	Sr Materiel Leader-Upper Echelon	19
61C	Chemist/Nuclear Chemist	71
61D	Physicist/Nuclear Eng	177
62E	Development Eng	2,295
62S	Materiel Leader	9
63A	Acquisition Mgr	2,768
63G	Sr Materiel Leader-Lower Echelon	88
63S	Materiel Leader	156
64P	Contracting	846
65F	Financial Mgmt	774
65W	Cost Analysis	69
71S	Spc Investigations	446
80C	Cmdr, Cadet Squadron, USAF Academy	52
81C	Instructor, Officer Training School	102
81D	ROTC Detachent Commander and Professor of Aerospace Studies	111
81L	Education and Training Leader	5
81T	Instructor	900
82A	Academic Program Mgr	77
83R	Recruiting Svc	156
84H	Historian	12
85G	USAF Honor Guard	4
86M	Ops Mgmt	254
86P	C2	89
87G	Wing IG	247
87I	Director, Wing Inspections	138
87Q	Director, Complaints Resolution	119
88A	Aide-de-camp	41
88B	Protocol Officer	2
88C	Sexual Assault Response Coordinator	5
88E	Officer Air Advisor-Advanced	1
89G	Officer Combat Aviation Advisor	36
90G	General Officer	599
91C	Cmdr	210
91W	Wing Cmdr	485
92J	Non-Designated Lawyer	8
92M	Health Prof Scholarship Prgm Med Student	286
92P	Physician Assistant Student	16
92R	Chaplain Candidate	1
92S	Student Officer Authorization	1,959
92T	Pilot Trainee	3,387
93P	Patient	12
95A	Non-extended Active Duty USAFR Academy Liaison Officer or CAP Reserve Asst Prgm Officer	17
96B	Disq Officer, Reasons Within Control	2
96D	Officer N/A for Use in Awarded AFSC for Cause	15
97E	Executive Officer	780
99G	Gold Bar Diversity Recruiter	12
	Unknown/other	2,713
	Total	**506,267**

DOD PERSONNEL

DOD TOTAL FORCE END STRENGTH

(In thousands, as of Sept. 30, 2020)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Active-Duty Military									Enacted	Requested
USAF	331	316	311	317	323	326	328	330	329	328
Army	532	508	491	475	476	476	484	481	486	485
Marine Corps	196	188	184	184	185	186	186	181	181	179
Navy	324	326	328	325	324	330	337	342	348	346
USSF								*	6	8
Full-time Guard and Reserve	77	77	76	76	75	79	83	N/A	N/A	N/A
Total	**1,460**	**1,415**	**1,390**	**1,378**	**1,382**	**1,397**	**1,422**	**N/A**	**N/A**	**N/A**
Guard and Reserve (Selected Reserve)										
Air National Guard	106	106	106	106	106	107	107	107	108	108
AFRC	71	70	68	69	69	69	69	69	71	70
Army National Guard	358	354	350	342	344	335	336	336	337	336
Army Reserve	198	195	199	198	194	189	191	189	190	190
Marine Corps Reserve	40	39	39	38	39	38	38	36	36	37
Navy Reserve	62	59	57	58	58	59	60	59	59	59
Total	**835**	**824**	**819**	**812**	**810**	**797**	**801**	**796**	**801**	**800**
Appropriated-fund Civilian (Full-time Equivalents)										
DAF	180	167	166	167	167	170	172	170	173	176
Army	256	207	206	195	191	189	190	251	185	187
Navy/Marine Corps	208	193	199	204	206	209	218	220	210	211
Defense Agencies	129	189	187	189	191	193	216	114	210	212
Total	**773**	**756**	**758**	**755**	**756**	**761**	**796**	**755**	**778**	**786**

Sources: Defense Manpower Data Center, Number of Military and DoD Appropriated Fund (APF) Civilian Personnel Permanently Assigned; National Defense Budget Estimates for 2021 and 2022. *85 military personnel had transferred into the USSF as of Sept. 30, 2020. Totals may not add precisely due to rounding.

DOD MILITARY DEMOGRAPHICS BY SERVICE

(As of Sept. 2019)

	DOD*	%	DAF	%	Army	%	Marine Corps	%	Navy	%
HIGHEST EDUCATIONAL ACHIEVEMENT										
No High School Diploma or GED	27,106	1.3	45	0.0	699	0.2	38	0.0	833	0.3
High School Diploma/GED or Some College	1,400,410	65.8	169,725	51.8	331,606	69.1	158,325	85.1	230,055	69.2
Associate Degree	176,887	8.3	63,451	19.4	27,695	5.8	3,974	2.1	22,616	6.8
Bachelor's Degree	318,447	15.0	50,200	15.3	77,045	16.1	18,050	9.7	41,103	12.4
Advanced Degree	175,358	8.2	40,130	12.2	41,316	8.6	4,635	2.5	22,996	6.9
Unknown	29,317	1.4	4,327	1.3	1,424	0.3	987	0.5	14,925	4.5
ETHNICITY										
Hispanic or Latino	329,453	15.5	49,229	15.0	77,440	16.1	41,956	22.6	52,929	15.9
Not Hispanic or Latino	1,798,072	84.5	278,649	85.0	402,345	83.9	144,053	77.4	279,599	84.1
MARITAL STATUS										
Divorced	114,732	5.4	19,277	5.9	24,019	5.0	5,546	3.0	14,147	4.3
Married	1,020,572	48.0	176,682	53.9	253,262	52.8	75,157	40.4	166,708	50.1
Never Married	988,964	46.5	131,692	40.2	201,950	42.1	105,219	56.6	150,556	45.3
Other**	3,257	0.2	227	0.1	554	0.1	87	0.1	1,117	0.3
RACE										
American Indian or Alaska Native	20,722	1.0	2,306	0.7	3,574	0.7	1,953	1.1	6,794	2.0
Asian	97,320	4.6	13,464	4.1	23,859	5.0	5,780	3.1	19,007	5.7
Black or African American	358,742	16.9	48,257	14.7	102,746	21.4	19,389	10.4	57,344	17.2
Native Hawaiian or Other Pacific Islander	21,065	1.0	3,867	1.2	5,589	1.2	2,015	1.1	3,848	1.2
White	1,501,942	70.6	233,904	71.3	324,351	67.6	148,657	79.9	205,524	61.8
Multi-racial***	53,605	2.5	14,207	4.3	n/a	n/a	2,267	1.2	23,122	7.0
Other/Unknown	74,129	3.5	11,873	3.6	19,666	4.1	5,948	3.2	16,889	5.1
SEX										
Female	390,071	18.3	68,137	20.8	73,365	15.3	16,621	8.9	66,637	20.0
Male	1,737,454	81.7	259,741	79.2	406,420	84.7	169,388	91.1	265,891	80.0

*DOD numbers combine both Active and reserve; the others are Active-duty only. **Includes annulled, widowed, and unknown.***Army and Army Reserve do not report "Multiracial."

DOD ACTIVE DUTY BY ENLISTED/OFFICER AND SEX

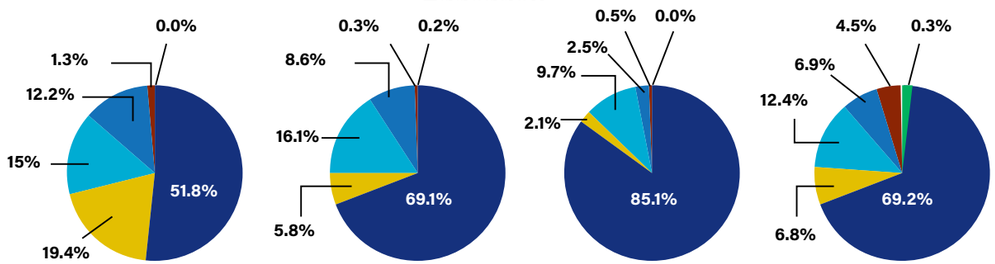
(As of Sept. 30, 2020)

	DOD	%	DAF	%	ARMY	%	MARINE CORPS	%	NAVY	%
CADET/MIDSHIPMAN	**13,190**	**1.0**	**4,176**	**1.3**	**4,490**	**0.9**	**0**	**0.0**	**4,524**	**1.3**
Female	3,549	26.9	1,194	28.6	1,070	23.8	0	0.0	1,285	28.4
Male	9,641	73.1	2,982	71.4	3,420	76.2	0	0.0	3,239	71.6
ENLISTED	**1,099,125**	**81.6**	**265,369**	**79.5**	**387,911**	**79.9**	**159,508**	**88.2**	**286,337**	**82.6**
Female	185,687	16.9	55,239	20.8	57,594	14.9	14,301	9.0	58,553	20.5
Male	913,438	83.1	210,130	79.2	330,317	85.2	145,207	91.0	227,784	79.6
OFFICER	**234,336**	**17.4**	**64,245**	**19.3**	**92,982**	**19.2**	**21,450**	**11.9**	**55,659**	**16.1**
Female	44,199	18.9	14,325	22.3	16,951	18.2	1,847	8.6	11,076	19.9
Male	190,137	81.1	49,920	77.7	76,031	81.8	19,603	91.4	44,583	80.1
TOTAL ACTIVE DUTY	**1,346,651**		**333,790**		**485,383**		**180,958**		**346,520**	

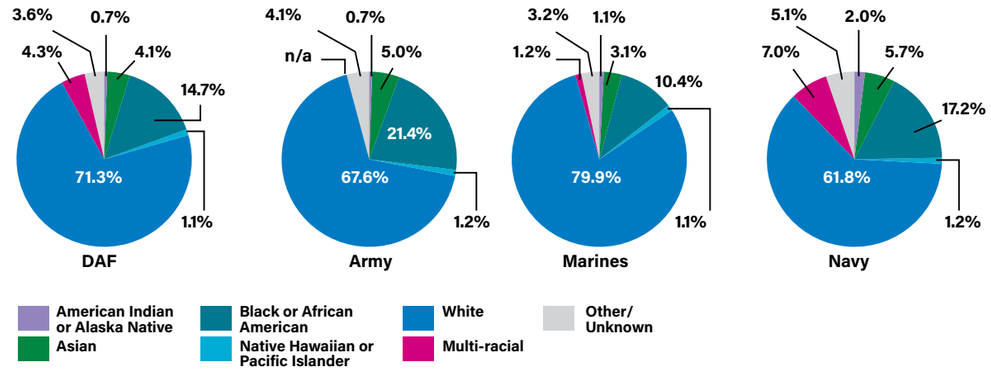
Sources: Defense Manpower Data Center, Active Duty Military Personnel by Rank/Grade and Service; and Table of Active Duty Females by Rank/Grade and Service

DOD Military Demographics by Service

Education



Race



PAY & ALLOWANCES

MONTHLY MILITARY BASIC PAY

(Effective Jan. 1, 2021)

	PAY GRADE	YEARS OF SERVICE < 2	2	3	4	6	8	10	12	14	16	18	20	22	24	26
COMMISSIONED OFFICERS	O-10												16,608	16,608	16,608	16,608
	O-9												16,013	16,244	16,577	16,608
	O-8	11,330	11,701	11,948	12,016	12,323	12,837	12,956	13,444	13,584	14,004	14,612	15,172	15,546	15,546	15,546
	O-7	9,414	9,851	10,054	10,215	10,506	10,794	11,127	11,458	11,791	12,837	13,719	13,719	13,719	13,719	13,789
	O-6	7,139	7,843	8,358	8,358	8,390	8,749	8,797	8,797	9,297	10,181	10,699	11,218	11,513	11,812	12,390
	O-5	5,951	6,704	7,168	7,256	7,546	7,718	8,099	8,380	8,741	9,293	9,556	9,816	10,111	10,111	10,111
	O-4	5,135	5,944	6,341	6,429	6,797	7,192	7,684	8,067	8,333	8,486	8,574	8,574	8,574	8,574	8,574
	O-3	4,515	5,118	5,523	6,023	6,312	6,628	6,833	7,169	7,345	7,345	7,345	7,345	7,345	7,345	7,345
	O-2	3,901	4,443	5,117	5,290	5,399	5,399	5,399	5,399	5,399	5,399	5,399	5,399	5,399	5,399	5,399
	O-1	3,386	3,524	4,261	4,261	4,261	4,261	4,261	4,261	4,261	4,261	4,261	4,261	4,261	4,261	4,261
	O-3E				6,023	6,312	6,628	6,833	7,169	7,454	7,617	7,839	7,839	7,839	7,839	7,839
	O-2E				5,290	5,399	5,570	5,861	6,085	6,252	6,252	6,252	6,252	6,252	6,252	6,252
	O-1E				4,261	4,550	4,718	4,890	5,058	5,290	5,290	5,290	5,290	5,290	5,290	5,290
ENLISTED MEMBERS	E-9[1]							5,637	5,765	5,926	6,115	6,307	6,612	6,872	7,143	7,560
	E-8						4,615	4,819	4,945	5,096	5,261	5,556	5,706	5,962	6,104	6,452
	E-7	3,208	3,501	3,635	3,812	3,951	4,190	4,324	4,562	4,760	4,895	5,039	5,095	5,282	5,383	5,765
	E-6	2,774	3,053	3,188	3,319	3,455	3,763	3,883	4,115	4,185	4,237	4,297	4,297	4,297	4,297	4,297
	E-5	2,542	2,713	2,844	2,978	3,187	3,406	3,585	3,607	3,607	3,607	3,607	3,607	3,607	3,607	3,607
	E-4	2,330	2,450	2,582	2,714	2,829	2,829	2,829	2,829	2,829	2,829	2,829	2,829	2,829	2,829	2,829
	E-3	2,104	2,236	2,372	2,372	2,372	2,372	2,372	2,372	2,372	2,372	2,372	2,372	2,372	2,372	2,372
	E-2	2,001	2,001	2,001	2,001	2,001	2,001	2,001	2,001	2,001	2,001	2,001	2,001	2,001	2,001	2,001
	E-1	1,650	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785

Amounts have been rounded to the nearest dollar. Basic pay for pay grades O-7 through O-10 is limited to $16,608.30. Grades O-1E to O-3E are commissioned officers with more than four years of Active-duty service as an enlisted member. Basic pay for the Chief Master Sergeants of the USAF and USSF is $9,109.50.
Source: militarypay.defense.gov

ANNUAL PAY FOR FEDERAL CIVILIANS

(Effective Jan. 1, 2021)

GENERAL SCHEDULE										
Grade	**Step 1**	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**Step 7**	**Step 8**	**Step 9**	**Step 10**
GS-1	$19,738	$20,400	$21,056	$21,709	$22,365	$22,749	$23,398	$24,052	$24,078	$24,690
GS-2	22,194	22,722	23,457	24,078	24,349	25,065	25,781	26,497	27,213	27,929
GS-3	24,216	25,023	25,830	26,637	27,444	28,251	29,058	29,865	30,672	31,479
GS-4	27,184	28,090	28,996	29,902	30,808	31,714	32,620	33,526	34,432	35,338
GS-5	30,414	31,428	32,442	33,456	34,470	35,484	36,498	37,512	38,526	39,540
GS-6	33,903	35,033	36,163	37,293	38,423	39,553	40,683	41,813	42,943	44,073
GS-7	37,674	38,930	40,186	41,442	42,698	43,954	45,210	46,466	47,722	48,978
GS-8	41,723	43,114	44,505	45,896	47,287	48,678	50,069	51,460	52,851	54,242
GS-9	46,083	47,619	49,155	50,691	52,227	53,763	55,299	56,835	58,371	59,907
GS-10	50,748	52,440	54,132	55,824	57,516	59,208	60,900	62,592	64,284	65,976
GS-11	55,756	57,615	59,474	61,333	63,192	65,051	66,910	68,769	70,628	72,487
GS-12	66,829	69,057	71,285	73,513	75,741	77,969	80,197	82,425	84,653	86,881
GS-13	79,468	82,117	84,766	87,415	90,064	92,713	95,362	98,011	100,660	103,309
GS-14	93,907	97,037	100,167	103,297	106,427	109,557	112,687	115,817	118,947	122,077
GS-15	110,460	114,142	117,824	121,506	125,188	128,870	132,552	136,234	139,916	143,598

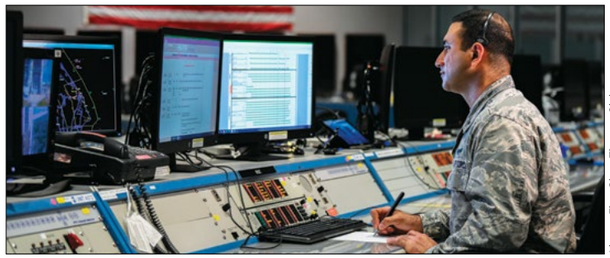
Does not include locality pay assigned by geographic area, such as 19.18% for Dayton, Ohio, and 30.48% for Washington, D.C. Source: Office of Personnel Management

SENIOR EXECUTIVE SERVICE PAY

(Effective Jan. 1, 2021)

SES Pay System Structure	Minimum	Maximum
Certified SES performance appraisal system	$132,552	$199,300
Noncertified SES performance appraisal system	$132,552	$183,300

The pay scale does not include locality pay.
Source: Office of Personnel Management



Airman First Class Thomas Sjoberg

1st Lt. Ahmed Said, a range squadron range operations commander, at Cape Canaveral Space Force Station, Fla., Feb. 22.

SAMPLE HOUSING ALLOWANCES

(Effective Jan. 1, 2021)

	NO DEPENDENTS	DEPENDENTS
JB San Antonio		
O-7 to O-10	$1,806	$2,040
O-6	1,803	2,028
O-5	1,800	2,013
O-4	1,794	1,920
O-3	1,785	1,818
O-2	1,728	1,785
O-1	1,542	1,770
E-9	1,779	1,830
E-8	1,683	1,794
E-7	1,659	1,803
E-6	1,548	1,788
E-5	1,434	1,761
E-4 to E-1	1,239	1,653
Eglin AFB (Niceville-Valparalso, Fla.)		
O-7 to O-10	$2,085	$2,406
O-6	2,049	2,388
O-5	1,947	2,370
O-4	1,881	2,244
O-3	1,731	2,064
O-2	1,662	1,773
O-1	1,623	1,683
E-9	1,716	2,118
E-8	1,692	1,995
E-7	1,653	1,878
E-6	1,626	1,776
E-5	1,533	1,665
E-4 to E-1	1,371	1,647
Travis AFB (Fairfield, Calif.)		
O-7 to O-10	$2,781	$3,123
O-6	2,766	3,102
O-5	2,763	3,075
O-4	2,757	2,940
O-3	2,748	2,778
O-2	2,664	2,745
O-1	2,337	2,736
E-9	2,742	2,802
E-8	2,736	2,772
E-7	2,541	2,763
E-6	2,355	2,748
E-5	2,265	2,727
E-4 to E-1	2,142	2,532
JB Langley-Eustis (Hampton, Va.)		
O-7 to O-10	$2,781	$3,123
O-6	1,656	2,208
O-5	1,644	2,193
O-4	1,560	1,938
O-3	1,545	1,596
O-2	1,506	1,563
O-1	1,425	1,530
E-9	1,539	1,683
E-8	1,533	1,590
E-7	1,473	1,581
E-6	1,428	1,566
E-5	1,335	1,518
E-4 to E-1	1,170	1,473
Kirtland AFB (Albuquerque, N.M.)		
O-7 to O-10	$1,590	$1,893
O-6	1,587	1,884
O-5	1,584	1,869
O-4	1,578	1,746
O-3	1,569	1,602
O-2	1,518	1,569
O-1	1,359	1,554
E-9	1,563	1,623
E-8	1,557	1,596
E-7	1,458	1,587
E-6	1,362	1,572
E-5	1,269	1,545
E-4 to E-1	1,104	1,455

Monthly rates for assigned duty at the most populous DAF bases, by total force, in each of the five states with the most active-duty members. Sources: Analysis of data from the Defense Travel Management Office and the Defense Manpower Data Center.

SUBSISTENCE ALLOWANCE

(Effective Jan. 1, 2021)

Officers	Enlisted Members
$266.18/month	$386.50/month

HAZARDOUS DUTY INCENTIVE PAY

(Effective since Jan. 1, 2017)

Pay Grade	Monthly Rate
O-10	$150
O-9	150
O-8	150
O-7	150
O-6	250
O-5	250
O-4	250

Pay Grade	Monthly Rate
O-3	175
O-2	150
O-1	150
E-9	240
E-8	240
E-7	240
E-6	215

Pay Grade	Monthly Rate
E-5	190
E-4	165
E-3	150
E-2	150
E-1	150

Source: militarypay.defense.gov

All Pay Grades	Monthly Rate
Flying aircrew	$250
HALO parachute jumper	225
All Other Eligible	150

Amounts have been rounded to the nearest dollar.

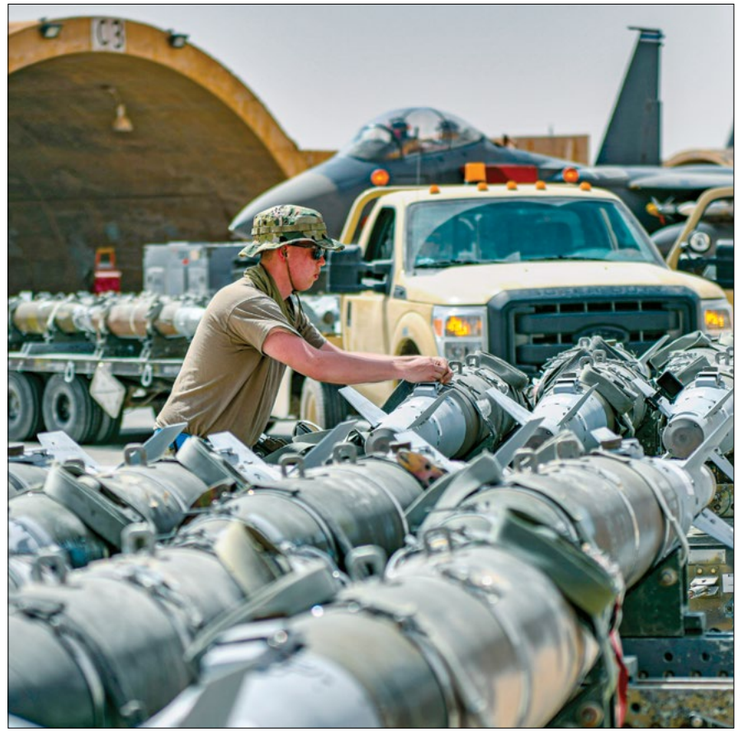
AVIATION INCENTIVE PAY

(Effective since Oct. 1, 2017)

Monthly Rate	Years of Service as an Aviation Officer
$150	Two or fewer
250	More than two
700	More than six
1,000	More than 10
700	More than 22
450	More than 24

Monthly Rate	Years of Service as an Enlisted Flyer
$225	Four or fewer
350	More than four
500	More than eight
600	More than 14

Source: Defense Finance and Accounting Service



Tech. Sgt. Paul Duquette

Airmen prepare munitions at an undisclosed location in southwest Asia.

RANK INSIGNIA OF THE ARMED FORCES

Air Force & Space Force

Officer

O-1	Second Lieutenant	O-6	Colonel
O-2	First Lieutenant	O-7	Brigadier General
O-3	Captain	O-8	Major General
O-4	Major	O-9	Lieutenant General
O-5	Lieutenant Colonel	O-10	General

Enlisted

E-1	Airman Basic No insignia	E-5	Staff Sergeant	E-9	Chief Master Sergeant
E-2	Airman	E-6	Technical Sergeant		First Sergeant
E-3	Airman First Class	E-7	Master Sergeant		First Sergeant
E-4	Senior Airman	E-8	Senior Master Sergeant		First Sergeant

Command Chief Master Sergeant

The star device shown here denotes an E-9 who serves in a 9E000 position as a command's senior enlisted adviser.

Chief Master Sergeant of the Air Force

Senior Enlisted Advisor of the U.S. Space Force

Army

O-1	2nd Lieutenant	W-1	Warrant Officer 1	E-1	Private
O-2	1st Lieutenant	W-2	Warrant Officer 2	E-2	Private E-2
O-3	Captain	W-3	Warrant Officer 3	E-3	Private First Class
O-4	Major	W-4	Warrant Officer 4	E-4	Corporal / Specialist
O-5	Lieutenant Colonel	W-5	Warrant Officer 5	E-5	Sergeant
O-6	Colonel			E-6	Staff Sergeant
O-7	Brigadier General			E-7	Sergeant First Class
O-8	Major General			E-8	Master Sergeant / First Sergeant
O-9	Lieutenant General			E-9	Sergeant Major / Command Sergeant Major
O-10	General General of the Army (Reserved for wartime only)				Sergeant Major of the Army

Navy & Coast Guard

O-1	Ensign	W-1	USN Warrant Officer 1	E-1	Seaman Recruit
O-2	Lieutenant Junior Grade	W-2	USN Chief Warrant Officer 2	E-2	Seaman Apprentice
O-3	Lieutenant	W-3	USN Chief Warrant Officer 3	E-3	Seaman
O-4	Lieutenant Commander	W-4	USN Chief Warrant Officer 4	E-4	Petty Officer Third Class
O-5	Commander	W-5	USN Chief Warrant Officer 5	E-5	Petty Officer Second Class
O-6	Captain			E-6	Petty Officer First Class
O-7	Rear Admiral Lower Half			E-7	Chief Petty Officer
O-8	Rear Admiral Upper Half			E-8	Senior Chief Petty Officer
O-9	Vice Admiral			E-9	Master Chief Petty Officer / Fleet/ Command Master Chief Petty Officer
O-10	Admiral Fleet Admiral (Reserved for wartime only)				Master Chief Petty Officer of the Navy and Coast Guard

Marine Corps

O-1	2nd Lieutenant	W-1	Warrant Officer 1	E-1	Private
O-2	1st Lieutenant	W-2	Chief Warrant Officer 2	E-2	Private First Class
O-3	Captain	W-3	Chief Warrant Officer 3	E-3	Lance Corporal
O-4	Major	W-4	Chief Warrant Officer 4	E-4	Corporal
O-5	Lieutenant Colonel	W-5	Chief Warrant Officer 5	E-5	Sergeant
O-6	Colonel			E-6	Staff Sergeant
O-7	Brigadier General			E-7	Gunnery sergeant
O-8	Major General			E-8	Master Sergeant / First Sergeant
O-9	Lieutenant General			E-9	Master Gunnery Sergeant / Sergeant Major
O-10	General				Sergeant Major of the Marine Corps

AWARDS AND DECORATIONS

Shown in order of precedence.


Medal of Honor (AF)


Air Force Cross


Defense Distinguished Service Medal


Distinguished Service Medal (AF)


Silver Star


Defense Superior Service Medal


Legion of Merit


Distinguished Flying Cross


Airman's Medal


Bronze Star Medal


Purple Heart


Defense Meritorious Service Medal


Meritorious Service Medal (AF)


Air Medal


Aerial Achievement Medal


Joint Service Commendation Medal


Air Force Commendation Medal


Joint Service Achievement Medal


Air Force Achievement Medal


Air Force Combat Action Medal


Presidential Unit Citation (AF)


Joint Meritorious Unit Award


Gallant Unit Citation


Air Force Meritorious Unit Award


Air Force Outstanding Unit Award


Air Force Organizational Excellence Award


Prisoner of War Medal


Combat Readiness Medal


Air Force Good Conduct Medal


Good Conduct Medal


Air Reserve Forces Meritorious Service Medal


Outstanding Airman of the Year Ribbon


Air Force Recognition Ribbon


American Defense Service Medal


American Campaign Medal


Asiatic-Pacific Campaign Medal


European-African-Middle Eastern Campaign Medal


World War II Victory Medal


Army of Occupation Medal


Medal for Humane Action

National Defense Service Medal

Korean Service Medal

Antarctica Service Medal

Armed Forces Expeditionary Medal

Vietnam Service Medal

Southwest Asia Service Medal

Kosovo Campaign Medal

Afghanistan Campaign Medal

Iraq Campaign Medal

Inherent Resolve Campaign Medal

Global War on Terrorism Expeditionary Medal

Global War on Terrorism Service Medal

Korean Defense Service Medal

Armed Forces Service Medal

Humanitarian Service Medal

Military Outstanding Volunteer Service Medal

Air & Space Campaign Medal

Nuclear Deterrence Operations Service Medal

Air Force Overseas Ribbon-Short

Air Force Overseas Ribbon-Long

Air Force Expeditionary Service Ribbon

Air Force Longevity Service Award Ribbon

Air Force Special Duty Ribbon

USAF Basic Military Training Instructor Ribbon

Air Force Recruiter Ribbon

Armed Forces Reserve Medal

USAF NCO PME Graduate Ribbon

USAF Basic Military Training Honor Graduate Ribbon

Small Arms Expert Marksmanship Ribbon

Air Force Training Ribbon

Continued from previous page

Philippine Defense Ribbon

Philippine Liberation Ribbon

Philippine Independence Ribbon

Philippine Presidential Unit Citation

ROK Presidential Unit Citation

RVN Gallantry Cross with Palm

United Nations Service Medal

United Nations Medal

NATO Meritorious Service Medal

NATO Medal for Yugoslavia

NATO Medal for Kosovo

Article 5 NATO Medal-Eagle Assist

Article 5 NATO Medal-Active Endeavor

Non-Article 5 NATO Medal-Balkans

Non-Article 5 NATO Medal-ISAF*

Republic of Vietnam Campaign Medal

Kuwait Liberation Medal, Kingdom of Saudi Arabia

Kuwait Liberation Medal, Government of Kuwait

Republic of Korea Korean War Service Medal

*International Security Assistance Force

Devices

Bronze Star

For number of campaigns or operations, multiple qualifications, or an additional award of an authorized ribbon.

Silver Star

One silver star is worn in lieu of five bronze service stars.

Silver and Bronze Stars

When worn together on a single ribbon, silver stars are worn to wearer's right of a bronze star.

Bronze Oak Leaf Cluster

For second and subsequent awards.

Silver Oak Leaf Cluster

For sixth, 11th, etc., entitlements or in lieu of five bronze OLCs.

Silver and Bronze OLCs

Silver OLCs are worn to the wearer's right of the bronze OLCs on the same ribbon.

Valor Device

Denotes heroism above what is normally expected while engaged in direct combat with an enemy of the U.S., or an opposing foreign or armed force, with exposure to enemy hostilities and personal risk; not an additional award; only one per ribbon; worn to the wearer's right of OLCs on the same ribbon.

Arrowhead Device

Shows participation in assigned tactical combat parachute, glider, or amphibious assault landing; worn on campaign medals, Korean Service Medal, and Armed Forces and GWOT Expeditionary medals.

Combat Device

Denotes meritorious service or achievement performed under combat conditions.

Remote Device

Denotes hands-on employment of a weapons system, performed remotely without personal physical combat risk that had a direct and immediate effects on the outcome of an engagement or specific effects on a target.

Hourglass Device

Issued for the Armed Forces Reserve Medal in bronze for 10 years of service, silver for 20, and gold for 30.

Arctic Device

Worn on Air Force Overseas Ribbon-Short for service north of Arctic Circle; one per ribbon; worn to the wearer's right of OLCs.

Mobility Device

Worn with the Armed Forces Reserve Medal to denote Active Duty status for at least one day during a contingency; here with number of mobilizations.

Nuclear Device

Worn on the Nuclear Deterrence Operations Service Medal to indicate direct support.

Wintered Over Device

Worn on Antarctica Service Medal to denote staying on the Antarctic continent over the winter—bronze for one; gold, two; silver, three.

Plane Device

Worn on Army of Occupation Medal for 90 consecutive days in direct support of the Berlin Airlift, June 26, 1948, to Sept. 30, 1949.

USAF Specialty Berets

Airmen in seven USAF specialties are authorized to wear a colored beret along with the insignia of that particular field.

Combat Controller/ Special Tactics Officer

Pararescue/Combat Rescue Officer

Security Forces

Survival, Evasion, Resistance, and Escape

Tactical Air Command and Control

(Tactical Air Control Party crest)

Air Liaison Officer

(TACP flash and rank)

Weather Parachutist

2020 USAF & USSF ALMANAC

SPENDING

An LC-130 Skibird assigned to the 109th Airlift Wing sits on the ice runway at Raven Camp in Kangerlussuaq, Greenland, May 11. Raven Camp is used to train members on landing on ice runways, polar airdrops, and operating in the snow and ice conditions.

Courtesy

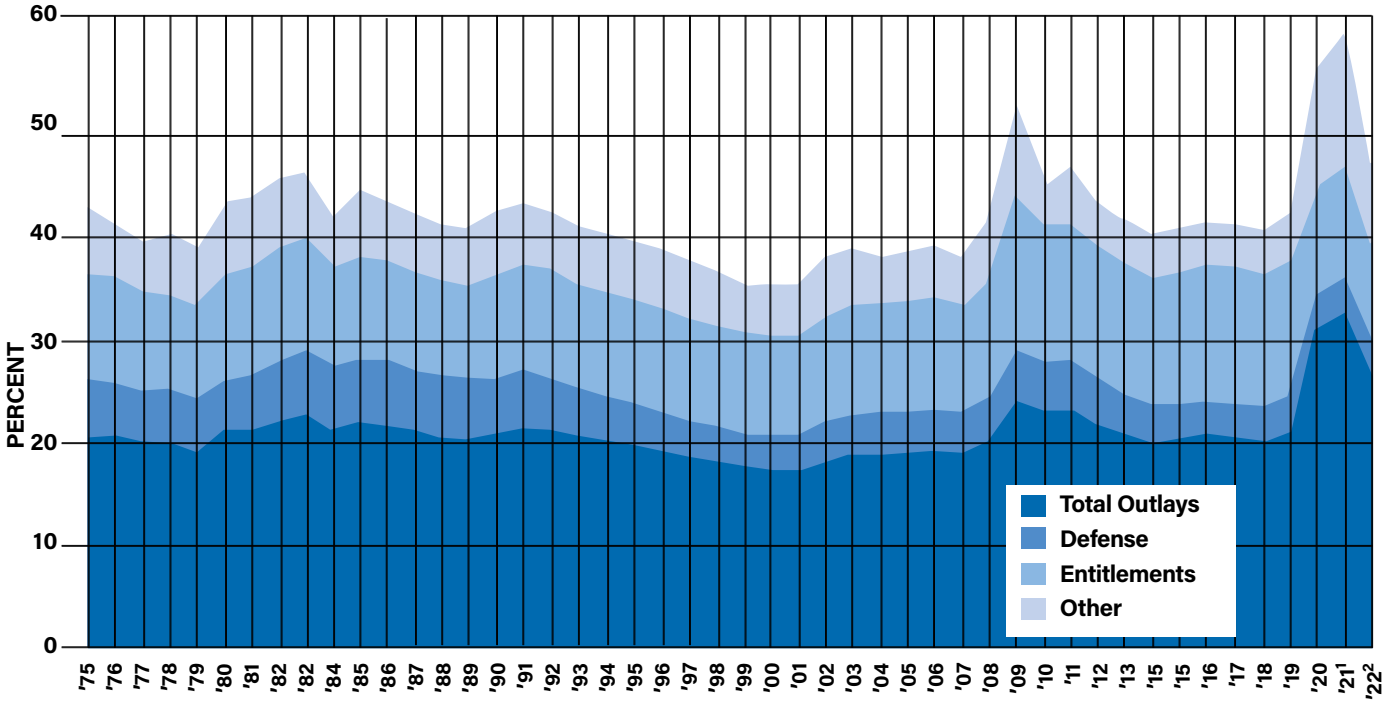
Each year, the President submits a budget request to Congress. Congress can add to or subtract from that request, and does, on an item by item basis. After debate, which takes months, Congress must pass both an Authorization bill that directs the President's spending and an Appropriation bill to fund those programs. The Defense Department Budget rolls up the total spending by each military department—the Departments of the Air Force (which also includes the Space Force), the Navy (which also includes the Marine Corps), and the Army. Budget figures sometimes disagree, either because of rounding or because of different approaches to financial reporting. Variations appearing among the tables on the following pages are due to one or the other factor.

FEDERAL BUDGET SPENDING AS PERCENTAGE OF GROSS DOMESTIC PRODUCT (GDP)

	TOTAL OUTLAYS %	DEFICIT SURPLUS %	ENTITLEMENTS %	DEFENSE %
1974	18.2	-0.4	8.5	5.4
1975	20.7	-3.3	10.3	5.5
1976	20.8	-4.1	10.3	5.0
1977	20.2	-2.7	9.7	4.8
1978	20.2	-2.6	9.7	4.6
1979	19.6	-1.6	9.3	4.6
1980	21.2	-2.6	10.1	4.8
1981	21.6	-2.5	10.5	5.0
1982	22.5	-3.9	10.9	5.6
1983	22.9	-5.9	11.3	5.9
1984	21.6	-4.7	10.0	5.8
1985	22.2	-5.0	10.2	5.9
1986	21.9	-4.9	9.9	6.0
1987	21.1	-3.1	9.7	5.9
1988	20.7	-3.0	9.6	5.7
1989	20.6	-2.7	9.5	5.5
1990	21.2	-3.7	10.3	5.1
1991	21.7	-4.4	10.4	5.2
1992	21.5	-4.5	10.7	4.7
1993	20.8	-3.8	10.5	4.3
1994	20.4	-2.8	10.5	3.9
1995	20.0	-2.2	10.4	3.6
1996	19.6	-1.4	10.4	3.3
1997	18.9	-0.3	10.2	3.2
1998	18.5	0.8	10.2	3.0
1999	18.0	1.3	9.9	2.9
2000	17.7	2.3	9.8	2.9
2001	17.7	1.2	10.0	2.9
2002	18.6	-1.5	10.6	3.2
2003	19.1	-3.3	11.0	3.6
2004	19.1	-3.4	10.8	3.8
2005	19.3	-2.5	10.8	3.8
2006	19.5	-1.8	10.9	3.8
2007	19.1	-1.1	10.7	3.8
2008	20.2	-3.1	11.4	4.2
2009	24.4	-9.8	15.1	4.6
2010	23.3	-8.7	13.5	4.6
2011	23.4	-8.4	13.7	4.5
2012	22.0	-6.7	13.3	4.2
2013	20.8	-4.1	12.8	3.8
2014	20.2	-2.8	12.6	3.4
2015	20.4	-2.4	13.3	3.2
2016	20.8	-3.2	13.6	3.2
2017	20.6	-3.5	13.5	3.1
2018	20.2	-3.8	12.9	3.1
2019	21.0	-4.6	13.4	3.2
2020	31.2	-14.9	11.0	3.4
2021*	32.9	-16.7	10.7	3.3
2022**	25.6	-7.8	10.8	3.2

*The estimated deficit for 2021 is based on partial year actual data and generally incorporates actuals through March.
**Requested budget authority

FEDERAL BUDGET SPENDING AS A PERCENTAGE OF GDP



Based on 1—enacted and 2—requested amounts. Sources: Budget of the U.S. Government, Fiscal Year 2022; White House Office of Management and Budget's Historical Tables

DOD BUDGET AUTHORITY

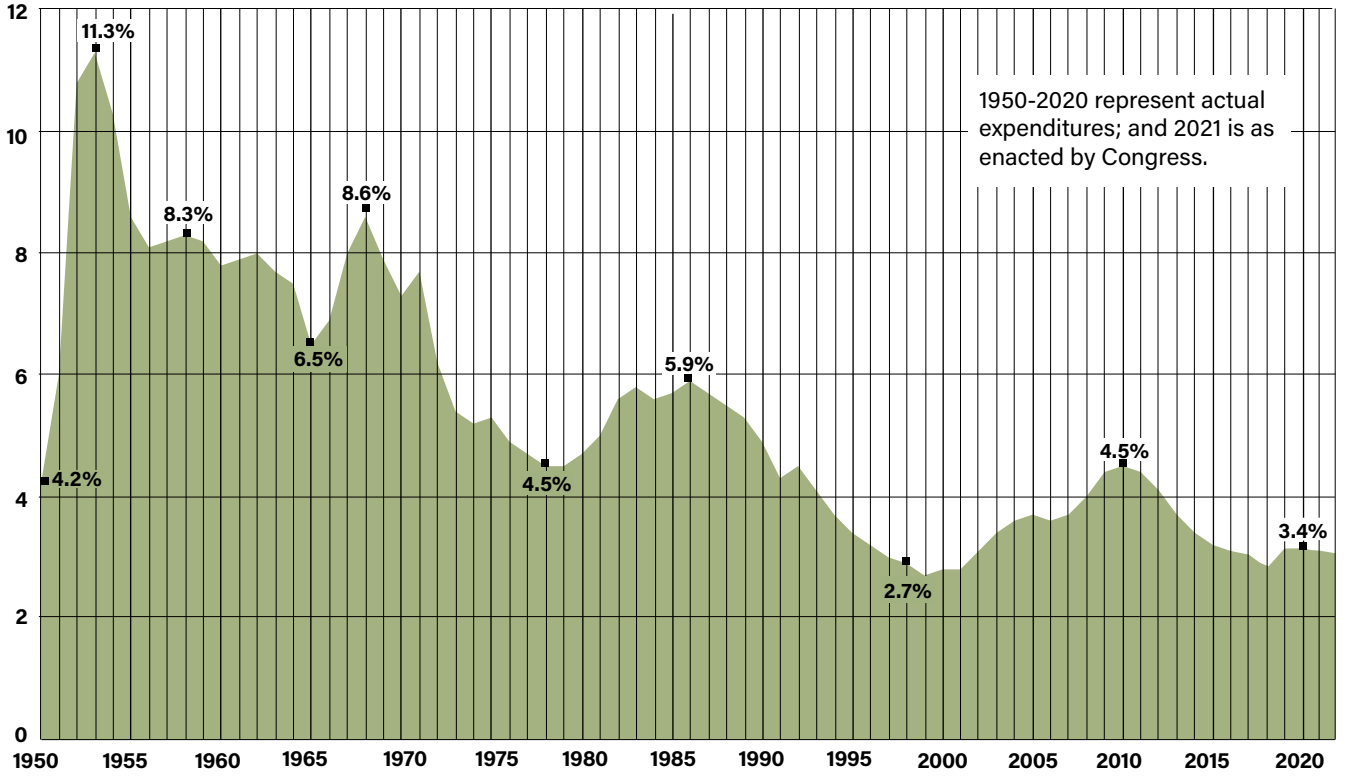
($ billions)

	2016	2017	2018	2019	2020	2021	2022*
Base Budget (discretionary)	$521.4	$523.5	$600	$616	$633	$635	$715
With War Costs and Supplements (discretionary and mandatory)	$595.7	$626.2	$671	$688	$723	$704	$715

*Includes $42.1 billion for Direct War and Enduring Operations costs in the base request. Source: Budget of the U.S. Government, Fiscal Year 2022.

DOD SPENDING AS PERCENTAGE OF GDP

Percent by Fiscal Year



Sources: Budget of the U.S. Government, Fiscal Year 2022

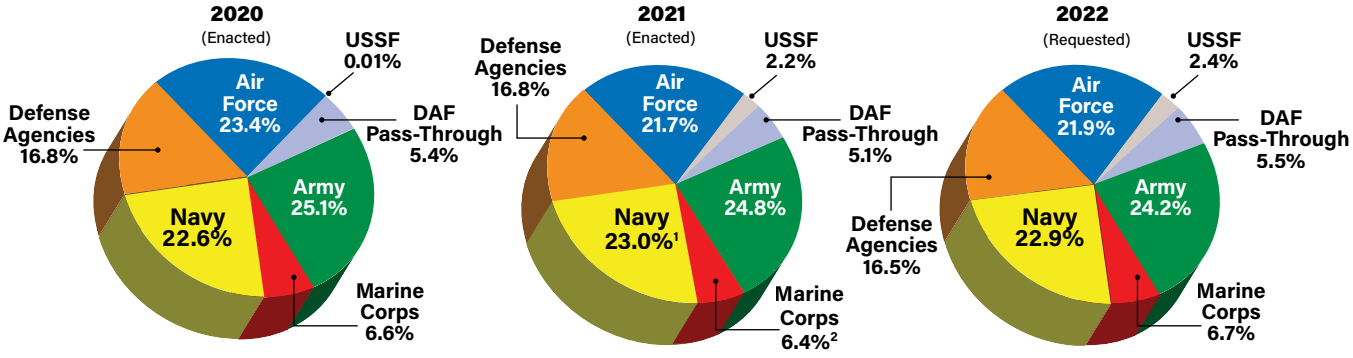
DOD BUDGET BY SERVICE, INCLUDING PASS-THROUGH

($ billions)

	Enacted*		Enacted		Requested	
	2020	%	2021	%	2022	%
Department of the Air Force	**$207,169**		**$204,001**		**$212,764**	
USAF	$168,082	23.4	$152,818	21.7	$156,278	21.9
USSF	$40	**	$15,420	2.2	$17,438	2.4
Pass-Through	$39,047	5.4	$35,763	5.1	$39,048	5.5
Army	$180,090	25.1	$174,265	24.8	$172,734	24.2
Navy	$162,560	22.6	$162,142		$163,866	22.9
Marine Corps	$47,465	6.6	$44,937		$47,855	6.7
Defense Agencies	$120,539	16.8	$118,377	16.8	$117,780	16.5
TOTAL	**$717,823**		**$703,723**		**$715,000**	

* Estimated based on DOD's $207,079,000 request for the full Department of the Navy.
**Totals may not add up due to rounding.
Source: Defense Budget Overview, United States Department of Defense Fiscal Year 2022 Budget Request

DOD BUDGET SHARES: 2020 vs. 2021 vs. 2022



1—Estimated based on DOD's $207,079,000 request for the full Department of the Navy. .
2—Totals may not add up due to rounding
Sources: Defense Budget Overview; United States Department of Defense Fiscal Year 2022 Budget Request

DOD BUDGET BY SPENDING CATEGORY

(Base budget not including war funding; current $ billions)

						Enacted*	Enacted	Requested
	2015	2016	2017	2018	2019	2020	2021	2022
Military Personnel	$139.00	$138.30	$139.00	$136.00	$144.70	$150.20	$162.3	$167.3
O&M	$248.20	$247.80	$258.10	199.70	$231.40	$234.90	$283,395	$290,361
Procurement	$104.00	$119.90	$126.00	$107.10	$133.80	$131.70	$141,672	$133,640
RDT&E	$64.10	$70.60	$74.80	$71.80	$94.10	$103.50	$106,447	$111,964
Military Construction	$6.40	$7.60	$7.60	$6.40	$8.80	$9.90	$7,144	$8,423
Family Housing	$1.30	$1.50	$1.40	$1.20	$1.60	$1.50	$1,401	$1,424
Revolving Funds	$2.30	$2.30	$2.30	$1.50	$1.90	$1.60	$1,394	$1,902
Total	**$565.40**	**$588.00**	**$609.20**	**$523.70**	**$616.40**	**$633.30**	**$703,723**	**$715,000**

Base budget, not including overseas contingency operations, a.k.a. war funding, in fiscal years 2015-2021. OCO is not listed separately in the fiscal 2022 request; instead, the base request includes $42.1 billion for Direct War and Enduring Operations costs. *Actual figures for fiscal 2020 had not been published by the Defense comptroller by press time.
Source: Defense Budget Overview, United States Department of Defense Fiscal Year 2022 Budget Request

DOD BUDGET SHARES BY MILITARY DEPARTMENT

								Enacted*	Enacted	Requested
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
DAF**	$146,263	$152,392	$153,567	$164,009	$171,457	$190,359	$196,066	$207,169	$204,001	$212,764
%	25.0	26.2	27.2	27.9	28.1	28.3	28.3	28.9	29.0	29.8
Army	$176,535	$162,246	$150,887	$151,296	$159,018	$178,260	$181,166	$180,090	$174,265	$172,734
%	30.2	27.9	26.7	25.7	26.1	26.5	26.1	25.1	24.8	24.2
Navy/Marine Corps	$163,140	$164,397	$160,512	$170,325	$174,058	$190,489	$197,778	$210,025	$207,079	$211,721
%	27.9	28.29	28.39	28.97	28.57	28.31	28.54	29.26	29.4	29.6
Defense Agencies	$99,455	$102,153	$100,437	$102,348	$104,754	$113,853	$117,991	$120,539	$118,377	$117,780
%	16.9	17.6	17.8	17.4	17.2	16.9	17.0	16.8	16.8	16.5
Total	**$585,393**	**$581,188**	**$565,403**	**$587,978**	**$609,287**	**$672,960**	**$693,001**	**$717,823**	**$703,723**	**$715,000**

*Actual figures for fiscal 2020 had not been published by the Defense comptroller by press time.
**Includes Pass-Through
Source: Defense Budget Overview, United States Department of Defense Fiscal Year 2022 Budget Request;
with historical amounts from the National Defense Budget Estimates for FY21

DAF BUDGET BY SPENDING CATEGORY

($ millions; excludes war funding)

CURRENT DOLLARS	2013	2014	2015	2016	2017	2018	2019	Enacted* 2020	Enacted 2021	Requested 2022
Military Personnel	$34,704	$35,103	$33,617	$34,026	$34,570	$34,697	$37,413	$39,223	$42,595	$44,556
O&M	$42,550	$43,196	$44,596	$44,442	$45,920	$50,189	$51,242	$53,126	$64,359	$67,545
Procurement	$30,341	$31,259	$33,914	$40,939	$38,102	$41,736	$43,177	$44,061	$67,545	$47,211
RDT&E	$22,766	$23,655	$23,568	$24,458	$27,339	$28,954	$40,551	$45,304	$46,649	$50,451
Military Construction	$482	$1,291	$1,045	$1,654	$1,989	$2,181	$1,951	$2,404	$1,315	$2,483
Family Housing	$520	$465	$328	$492	$336	$336	$396	$430	$434	$441
Revolving & Management	$45	$150	$67	$63	$64	$67	$78	$92	$96	$77
Total	**$131,408**	**$135,120**	**$137,134**	**$146,075**	**$148,320**	**$158,160**	**$174,807**	**$184,639**	**$204,001**	**$212,764**

PERCENTAGE CHANGE	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Military Personnel	-0.03	-0.30	-4.30	1.20	1.60	0.40	7.80	4.80	8.60	4.60
O&M	-10.70	0.00	3.10	-0.40	3.30	9.30	2.10	3.68	21.10	4.60
Procurement	-16.90	1.50	8.40	20.70	-6.90	9.50	3.50	2.05	53.30	-30.10
RDT&E	-14.00	2.40	-0.50	3.80	11.80	5.90	40.10	11.70	3.00	8.20
Military Construction	-67.60	163.90	-19.10	58.30	20.30	9.70	-10.60	23.20	-45.30	88.80
Family Housing	4.70	-11.90	-29.50	50.00	-31.70	0.00	17.90	8.60	0.90	1.60
Revolving & Management	-31.70	228.50	-55.40	-6.00	1.60	4.70	16.40	18.00	4.30	-19.80
Total	**-11.40**	**1.30**	**1.40**	**6.50**	**1.50**	**15.80**	**1.80**	**5.60**	**10.50**	**4.30**

*Actual figures for fiscal 2020 had not been published by the Defense comptroller by press time.
Source: Defense Budget Overview, United States Department of Defense Fiscal Year 2022 Budget Request

DAF SPENDING VS. PASS-THROUGH

(Total Obligation Authority; $ in billions)

	2012	2013	2014	2015	2016	2017	2018	2019	Enacted* 2020	Enacted 2021	Requested 2022
DAF	$128.90	$116.40	$120.80	$120.80	$129.80	$136.60	$151.50	$156.80	$168.10	$168.20	$173.70
DAF Pass-Through	$33.1	$29.8	$31.3	$31.7	$33.1	$34.3	$37.2	$37.8	$39.0	$37.3	$39.0
Total	**$162.0**	**$146.2**	**$152.1**	**$152.5**	**$162.9**	**$170.9**	**$188.7**	**$194.6**	**$207.1**	**$205.5**	**$212.8**
Pass-Through %	**20.4%**	**20.4%**	**20.6%**	**20.8%**	**20.3%**	**20.1%**	**19.7%**	**19.4%**	**18.8%**	**18.2%**	**18.3%**

*Actual figures for fiscal 2020 were not available by press time.
Source: Defense Budget Overview, United States Department of Defense Fiscal Year 2022 Budget Request; with historical amounts from Secretary of the Air Force Public Affairs.

MAJOR USAF PROGRAMS

(For Major Space Force Programs, see p. 79)

		RDT&E (Current $ millions)					PROCUREMENT (Current $ millions)				
	PROGRAM	2019	2020	2021 request	2021 enacted	2022 request	2019	2020	2021 request	2021 enacted	2022 request
BOMBER	B-1B	58.2	1	15.8	15.7	29.1	39.7	18.9	21.8	21.8	30.5
	B-2A	591.1	593.4	187.4	181.0	144.0	60.3	9.5	31.5	30.8	29.9
	B-21	2,189.9	2,982.5	2,848.4	2,843.2	2,872.6	CLASS	CLASS	CLASS	108	108.0
	B-52	290.1	323.6	520	482.7	715.8	117.2	47.9	53.9	27.3	74.96
	B-52 CERP	59.7	175.4	299.4	273.0	484.1					
FIGHTER/ATTACK	A-10	25.5	31.9	24.5	24,490	39,224	168.1	125.8	135.8	135,793	83,621
	F-15C/D/E	196.1	684.2	298.9	288,381	239,616	440.9	474.1	349.3	203,910	234,430
	EPAWSS	133.4	47.3	170.7	170,368	112,012	214.9	125.4	31.9	N/A	149,797
	F-15EX	0	0	159.8	159,470	118,126	0	621.1	1,403.3	1,233,647	1,186,903
	F-16	182.2	193.1	223.4	202,498	224,573	303.4	281.5	615.8	622,593	613,166
	F-22	563.6	546.3	665.1	663,825	647,296	321.5	323.6	387.9	357,586	424,722
	F-35	490.3	99.4	132.3	114,621	69,365	5,267.1	6,059.6	5,177.8	5,606,799	4,167,604
	NGAD	413.9	905.1	1,044.1	902,440	1,524,667	-	-	-	-	-
	F-35 Blk 4 C2D2	-	642.4	785.3	695,869	985,404	-	14	41		
	F-35 Mods						237.3	329.6	322.2	295,832	304,135
HELO	HH-60G/U	0	0	0	0	0	92.0	26.7	44.538	-	0
	HH-60W	446.0	247.0	63.169	63.054	66.355	850.535	973.473	1,147,473	1,083,909	792,221
	UH1 Replacement	258.0	171.0	44.464	41.388	16.132	12.0	3.8	194.016	194.016	0
ICBM	Minuteman III Squadrons	185.6	104.2	116.6	89.3	113.6	N/A	N/A	N/A	N/A	N/A
	Ground-Based Strategic Deterrent	401.2	557.5	1,524.80	1,447.10	2,553.50	N/A	N/A	N/A	N/A	10.895
	MMIII Fuze Modernization	124.5	161.2	167.1	156.7	129.7	13.9	19.5	46.9	43.5	100.77
	Minuteman III Modifications	N/A	N/A	N/A	N/A	N/A	100.3	59.7	85.3	81.1	88.6
ISR/BM/C3	Air and Space Operations	98.9	114.8	51.2	51.1	3.0	38.6	33.2	25.0	15.38	2.2
	DCGS	52.4	25.0	14.20	14.10	24.57	398.0	116.1	140.2	140.2	261.07
	CRC	6.2	8.1	16.0	16.01	9.88	7.3	0	13.4	N/A	N/A
	E-3	108.8	68.0	138.3	N/A	N/A	48.4	112.1	172.1	118.07	109.86
	E-3 Block 40/45	N/A	N/A	N/A	N/A	N/A	69.3	32.8	53.3	53.3	30.2
	E-8	N/A	N/A	N/A	N/A	N/A	37.8	48.8	11	22.04	16.3
	ABMS	0	143.6	302.3	158.5	204	N/A	N/A	N/A	N/A	N/A
	E-4B	55.7	60.2	3.5	3.46	26.3	67.9	58.5	58.8	44.1	19.08
	Compass Call	43.5	31.9	15.9	15.8	91.3	172.3	110.8	206.2	159.9	0
	MQ-9	105.1	127.3	162.1	106.89	85.1	401.6	376.4	171.9	343.6	3.29
	RQ-4	221.7	191.7	134.6	163.3	83.1	123.7	1.7	40.5	N/A	N/A
	RC-135	64.8	45.2	59.8	-	-	394.5	227.7	191.3	191.3	207.6
	U-2 Mods	87.6	36.4	18.7	36.6	17.1	67.4	58.6	120.2	120.22	126.8
MOBILITY	C-5	25.1	10.2	32,59	30,560	17,507	68	57.937	62,108	50,279	25,431
	C-17	48.3	25.1	9,991	9.935	16,360	77	60.244	66,798	44,798	59,570
	C-32	7.9	9.9	9,9	9.9		4.5	11.5	2,947	2.947	1,949
	C-130J	15.4	8.6	10,674.00	10.656	14,112.00	674.10	742.16	37,131	797,131	128,896
	KC-10 (ATCA)	6.6	0.2	0	0		11	2	2,108	117	1,902
	KC-135	2.692	0	4,591	4.583	3,564	91.4	113.351	88,25	88.25	-
	KC-46	80.2	52,623	0.00	0	1.00	2,290.90	2,139.71	2,850.15	2,665,299.00	2,380,315
	PAR	657.9	757.9	800,889	799,429	680,665	0	0	0	0	0
	VC-25A	0	0	0	0	0	27.2	48.6	1,983	1,983	96
MUNITION	AIM-9	29	10.3	19.4	19.4	33	118.3	155.3	164.8	164.8	107.6
	AIM-120	50.7	55.4	51.8	51.7	51.3	307.5	311.7	453.2		214
	JASSM	40.9	78.5	70.8	70.7	117.3	602.8	483.4	505.9	500	710.6
	SDB1	N/A	N/A	N/A	N/A	-	209.3	273.3	95.8	95.8	82.8
	SDB2	75.5	45.2	17.3	20.8	27.1	100.9	183.3	273.3	210	294.6
	JDAM	0	0	7.9	6.8	-	922.7	1034.2	444.7	459.7	124.1
	SiAW	14.5	162.8	160.4	150.4	166.6	-	-	-	-	-
	AGM-65	-	0.3	0.3	N/A	-	-	-	-	0.3	-
	LRASM	-	-	N/A	N/A	N/A	54.4	0	19.8	19.8	-
	AGM-114 Hellfire	-	-	-	-	-	205.8	299.6	183.6	183.5	103.7
	ARRW	-	-	-	-	N/A	-	-	-	-	160.9
	LRSO	-	-	-	384.7	609	-	-	-	-	-
SOF	CV-22B	38.8	17.9	18,419	18,385	17,189	92.9	82.6	-	206,220	0
	HC-130/MC-130	16.2	17.2	24,705	19,491	46,796	-	41,820	-	76,573	150,263
	MC-130J	-	-	-	-	-	717,879	850,637	362,807	355,107	220,049
TRAINERS	T-6	1.7	1.2	1.8	1.8	0.2	53.2	11.8	26.8	23.9	8.7
	T-7A	236.8	340.4	248.7	248.2	188.9	-	-	-	-	10.4
	T-38	8.5	0.6	6.1	8.9	4.5	70.6	37.3	36.8	40.8	49.9
	T-1	N/A	N/A	N/A	N/A	N/A	21.8	26.8	4.5	3.9	3.9

EQUIPMENT

2021 USAF & USSF ALMANAC

AIRCRAFT TOTAL ACTIVE INVENTORY (TAI)

(As of Sept. 30, 2020)

	ACTIVE	ANG	AFRC	TOTAL FORCE	AVG. AGE
Bomber					
B-1B Lancer	62	0	0	62	94.05
B-2A Spirit	20	0	0	20	25.35
B-52H Stratofortress	58	0	18	76	58.80
Total	**140**	**0**	**18**	**158**	**59.40**
Fighter/Attack					
A-10C Thunderbolt II	141	85	55	281	39.43
F-15C Eagle	88	123	0	211	35.92
F-15D Eagle	9	14	0	23	35.55
F-15E Strike Eagle	218	0	0	218	28.43
F-16C Fighting Falcon	441	288	52	781	30.09
F-16D Fighting Falcon	108	45	2	155	30.91
F-22A Raptor	166	20	0	186	14.19
F-35A Lightning II	220	19	0	239	4.44
Total	**1.391**	**594**	**109**	**2,094**	**27.37**
Special Operations Forces					
AC-130J Ghostrider	20	0	0	20	3.48
AC-130U Spooky	7	0	0	7	32.2
AC-130W Stinger II	10	0	0	10	31.19
CV-22B Osprey	50	0	0	50	10.44
MC-130H Combat Talon II	16	0	0	16	31.87
MC-130J Commando II	51	0	0	51	5.47
Total	**154**	**0**	**0**	**154**	**19.11**
ISR/BM/C3					
E-3B Sentry (AWACS)	11	0	0	11	42.45
E-3C Sentry (AWACS)	1	0	0	1	38.0
E-3G Sentry (AWACS)	23	0	0	23	40.37
E-4B NAOC	4	0	0	4	46.38
E-8C JSTARS	0	16	0	16	19.8
TE-8A JSTARS (trainer)	0	1	0	1	29.7
E-9A	2	0	0	2	28
E-11A BACN	3	0	0	3	8.73
EC-130H Compass Call	11	0	0	11	46.09
EC-130J Commando Solo	0	7	0	7	20.27
MQ-1B Predator	5	0	0	5	14.7
MQ-9A Reaper	265	24	0	289	6.11
NC-135W (test bed)	1	0	0	1	58.5
OC-135B Open Skies	2	0	0	2	58.4
RC-26B Condor	0	11	0	11	26.4
RC-135S Cobra Ball	3	0	0	3	58.47
RC-135U Combat Sent	2	0	0	2	55.65
RC-135V Rivet Joint	8	0	0	8	55.94
RC-135W Rivet Joint	12	0	0	12	57.08
RQ-4B Global Hawk	33	0	0	33	10.36
TC-135W (trainer)	3	0	0	3	58.3
TU-2S Dragon Lady (trainer)	4	0	0	4	35.92
U-2S Dragon Lady	27	0	0	27	37.85
WC-130J Hercules	0	0	10	10	19.45
WC-135C Constant Phoenix	1	0	0	1	56.4
WC-135W Constant Phoenix	1	0	0	1	58.4
Total	**422**	**59**	**10**	**491**	**37.99**

	ACTIVE	ANG	AFRC	TOTAL FORCE	AVG. AGE
Tanker					
HC-130J Combat King II	19	12	0	31	5.58
HC-130N King	0	1	0	1	24.5
KC-10A Extender	56	0	0	56	35.14
KC-46A	27	12	6	45	0.6
KC-135R Stratotanker	157	115	67	339	57.25
KC-135T Stratotanker	30	24	0	54	60.59
Total	**289**	**164**	**73**	**526**	**30.61**
Transport					
C-5M Super Galaxy	36	0	16	52	33.32
C-12C Huron	16	0	0	16	44.17
C-12D Huron	6	0	0	6	36.43
C-12F Huron	3	0	0	3	35.25
C-12J Huron	4	0	0	4	32.72
C-17A Globemaster III	146	50	26	222	18.04
C-20H	1	0	0	1	26
C-21A Learjet	19	0	0	19	35.50
C-32A Air Force Two	4	0	0	4	22
C-32B Air Force Two	0	2	0	2	17.24
C-37A Gulfstream V	10	0	0	10	19.47
C-37B Gulfstream V	5	0	0	5	6.78
C-40A	4	0	0	4	16.65
C-40C Clipper	0	3	4	7	14.76
C-130H Hercules	2	123	42	167	30.94
C-130J Super Hercules	106	18	10	134	11.42
LC-130H Hercules	2	123	42	167	30.94
VC-25A Air Force One	2	0	0	2	29.95
Total	**366**	**319**	**140**	**825**	**25.64**
Helicopter					
HH-60G Pave Hawk	65	23	16	104	28.25
HH-60U Pave Hawk	3	0	0	3	9.37
TH-1H Iroquois (trainer)	28	0	0	28	39.53
UH-1N Iroquois	63	0	0	63	48.59
Total	**159**	**23**	**16**	**198**	**31.43**
Trainer					
T-1A Jayhawk	178	0	0	178	25.91
T-6A Texan II	442	0	0	442	14.98
T-38A Talon	53	0	0	53	54
(A)T-38B Talon	6	0	0	6	57.12
T-38C Talon	443	0	0	443	54.30
T-41D Mescalero	4	0	0	4	51.1
T-51A Cessna	3	0	0	3	15.2
T-53A Kadet II	24	0	0	24	8.66
UV-18B Twin Otter	3	0	0	3	36.53
Gliders	23	0	0	23	10.4
Total	**1,179**	**0**	**0**	**1,179**	**32.81**
GRAND TOTAL	**4,100**	**1,159**	**366**	**5,625**	**33.04**

Total active inventory (TAI): aircraft assigned to operating forces for mission, training, test, or maintenance. Includes primary, backup, and attrition reserve aircraft. For other aircraft acronyms, see Gallery of Weapons.

ICBMs IN SERVICE OVER TIME

(As of Sept. 30, 2020)

TYPE OF SYSTEM	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Minuteman III	450	450	450	450	450	450	406	400	400	400
Total ICBMs	**450**	**450**	**450**	**450**	**450**	**450**	**406**	**400**	**400**	**400**

AVERAGE PILOT TRAINING HOURS PER MONTH BY AIRCRAFT TYPE FY17-FY20

AIRCRAFT Type	COMPONENT	FY17	FY18	FY19	FY20
ALL MDS	Active Duty	10.9	10.7	6.8	10.9
	ANG	9.9	9.3	5.3	9
	AFRC	8.8	8	4.2	7.2
AIRLIFT	Active Duty	13.1	12.7	8	12.2
	ANG	9.8	9.8	5.8	10.3
	AFRC	9	10.7	5.2	8.3
BACN	Active Duty	25	26	21.6	23.4
	ANG	N/A	N/A	N/A	N/A
	AFRC	N/A	N/A	N/A	N/A
BOMBER	Active Duty	7.9	6.1	4	7.2
	ANG	5	4.2	1.6	2.2
	AFRC	4.8	3.5	2.9	4.7
FIGHTER	Active Duty	8.5	8.2	5.7	8.1
	ANG	8.4	7.1	4.2	6.4
	AFRC	6.8	5.2	3.9	5.5
FIX WING	Active Duty	8.5	9	5.7	8.7
	ANG	7.8	6.8	5.8	10.8
	AFRC	N/A	N/A	N/A	4.8
RECON	Active Duty	7.9	7.8	4.7	7
	ANG	11.1	8	5.7	9
	AFRC	5.7	5.7	2.7	5.3
RESCUE	Active Duty	N/A	N/A	N/A	N/A
	ANG	7	1.6	N/A	N/A
	AFRC	N/A	N/A	N/A	N/A
ROTARY	Active Duty	6.7	6.8	4.5	6.9
	ANG	6.4	5.8	3.9	7.9
	AFRC	6.8	8.5	3.4	4.9
SPEC OPS	Active Duty	12.2	11.1	6.6	13
	ANG	7.3	6.9	3.7	5.8
	AFRC	9.3	5	3	5.2
TANKER	Active Duty	15.9	13.6	8	12.1
	ANG	12.1	12.4	7.5	10.4
	AFRC	11.1	10	5.7	8.3
TRAINER	Active Duty	8.4	10.2	6.8	9.6
	ANG	1.2	7.9	1.7	0.9
	AFRC	8.8	1.2	2.2	2.9

NOTE: These reflect Flying Hours only and do not include Simulator Hours

TOTAL NUMBER OF ACTIVE DUTY AIRCRAFT IN SERVICE OVER TIME

(As of Sept. 30, 2020)

ACTIVE	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bomber	144	144	141	141	140	140	139	139	140	140
Fighter/Attack	1,287	1,289	1,287	1,273	1,312	1,282	1,297	1,332	1,370	1,391
Special Ops Forces	105	117	122	124	144	132	138	135	144	154
ISR/BM/C3	381	413	394	444	437	434	441	432	428	422
Tanker	247	246	243	244	239	236	234	215	238	289
Transport	429	425	413	410	381	384	363	356	361	366
Helicopter	151	170	138	137	157	160	131	154	159	159
Trainer	1,190	1,213	1,189	1,195	1,187	1,194	1,211	1,181	1,180	1,179
Total Active Duty	**3,934**	**4,017**	**3,927**	**3,968**	**3,997**	**3,962**	**3,954**	**3,944**	**4,015**	**4,100**
ANG										
Bomber	0	0	0	0	0	0	0	0	0	0
Fighter/Attack	639	635	630	585	611	577	575	575	577	594
Special Ops Forces	4	4	4	4	4	4	4	1	0	0
ISR/BM/C3	80	87	86	88	91	89	93	78	59	59
Tanker	189	189	187	185	184	181	181	185	181	164
Transport	242	232	223	207	207	212	210	208	208	319
Helicopter	17	17	17	17	17	17	17	17	23	23
Total ANG	**1,171**	**1,164**	**1,147**	**1,086**	**1,114**	**1,080**	**1.080**	**1,064**	**1,048**	**1,159**
AFRC										
Bomber	18	18	18	18	18	18	18	18	18	18
Fighter/Attack	100	101	95	104	111	111	109	109	109	109
Special Ops Forces	10	5	4	0	0	0	0	0	00	0
ISR/BM/C3	12	11	11	10	10	10	10	10	10	10
Tanker	72	72	71	68	68	72	72	72	74	73
Transport	152	148	147	145	139	101	91	96	98	140
Helicopter	15	15	15	15	15	15	15	15	15	16
Total AFRC	**379**	**370**	**361**	**360**	**361**	**327**	**315**	**320**	**324**	**366**
TOTAL FORCE	**5,484**	**5,551**	**5,435**	**5,414**	**5,472**	**5,369**	**5,349**	**5,328**	**5,387**	**5,625**

2020 AIRCRAFT MISSION CAPABLE RATES

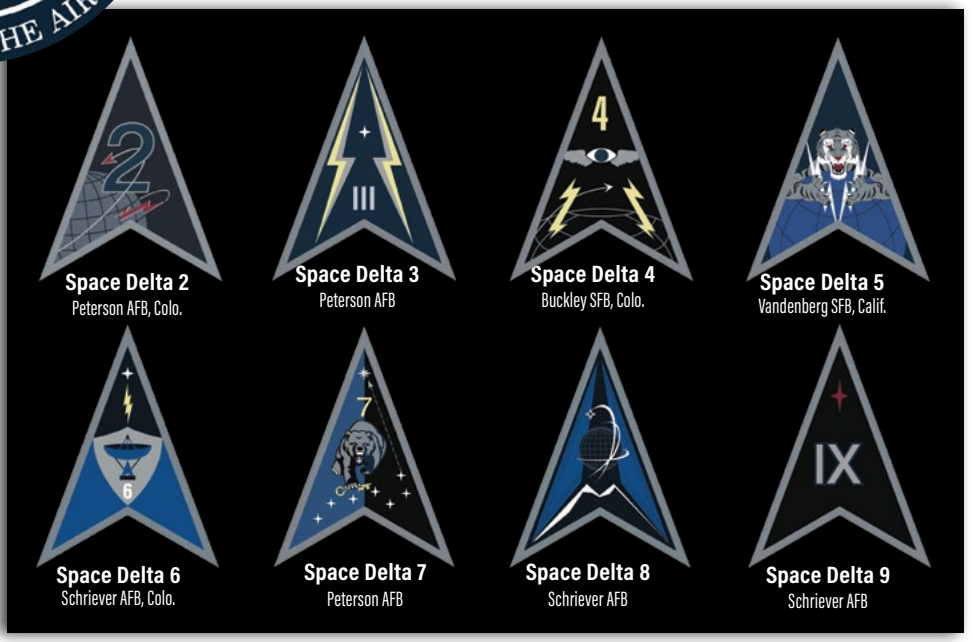
(As of Nov. 17, 2020)

MDS	FY20 12-HOUR FIX %	FY20 BREAKS %	FY20 MC %
A-10C	68.45	11.26	72.04
AC-130J	67.05	5.78	82.03
AC-130U	72.00	16.67	88.34
AC-130W	58.70	16.39	80.45
AT-38B	64.91	5.12	88.11
B-1B	21.15	26.71	52.78
B-2A	58.30	28.19	62.41
B-52H	29.94	45.54	60.51
C-5M	39.41	9.26	60.53
C-12C	0.00	0.00	99.27
C-12D	0.00	0.00	100.00
C-12F	0.00	0.00	85.69
C-12J	0.00	0.00	100.00
C-17A	59.18	2.76	82.30
C-21A	0.00	0.00	100.00
C-32A	0.00	1.41	88.61
C-37A	0.00	0.14	93.69
C-37B	42.86	0.75	90.40
C-40B	50.00	0.32	87.68
C-40C	61.54	1.26	92.11
C-130H	39.31	5.83	70.02
C-130J	58.25	3.32	78.76
CV-22B	40.22	35.27	54.21
E-3B	51.65	38.00	65.83
E-3C	75.00	50.00	76.77
E-3G	48.95	37.04	70.73
E-4B	20.00	3.81	58.65
E-8C	50.37	29.41	66.49
EC-130H	61.25	29.34	66.90
EC-130J	13.33	7.01	52.46
EQ-4B	60.00	9.52	82.05
F-15C	64.40	14.32	71.93
F-15D	67.25	8.92	70.52
F-15E	61.96	15.85	69.21
F-16C	59.21	9.74	73.90
F-16D	59.97	9.89	72.11
F-22A	59.47	9.28	51.98
F-35A	N/A	N/A	76.07
HC-130J	53.44	9.31	79.74
HC-130N	0.00	20.00	74.18
HH-60G	58.59	12.50	68.99
KC-10A	53.80	5.95	80.62
KC-46A	45.10	2.71	66.53
KC-135R	52.13	11.41	72.87
KC-135T	56.47	12.20	73.11
LC-130H	28.67	19.66	45.72
MC-12W	0.00	0.00	100.00
MC-130H	47.37	17.89	73.60
MC-130J	52.20	10.54	75.87
MQ-9A	60.20	3.49	90.77
OC-135B	35.29	121.43	86.57
RC-135S	50.00	16.33	87.61
RC-135U	61.11	13.33	86.49
RC-135V	50.00	19.64	77.97
RC-135W	48.95	17.15	81.03
RQ-4B	47.83	13.52	73.61
T-1A	64.63	10.54	68.43
T-6A	68.95	5.29	73.57
T-38A	69.85	6.78	71.29
T-38C	56.27	7.38	65.44
TC-130H	71.79	36.79	73.81
TC-135W	40.74	21.26	80.79
TE-8A	57.14	10.00	63.88
TH-1H	54.13	6.93	75.44
TU-2S	63.93	16.05	78.73
U-2S	60.38	13.64	73.37
UH-1N	48.86	6.46	82.14
VC-25A	0.00	0.00	91.29
WC-130J	32.31	13.13	62.69
WC-135C	16.67	25.53	85.33
WC-135W	50.00	28.57	70.32
TOTAL	**58.46**	**8.29**	**72.74**

***Data is from LIMS-EV Weapon Systems View pulled Nov. 17, 2020.**

U.S. SPACE FORCE

The U.S. Space Force was created on Dec. 20, 2019. The Space Force exists as a separate military service within the Department of the Air Force, with its own service chief. The Chief of Space Operations is a member of the Joint Chiefs of Staff.



Missions and Functions. The 2020 National Defense Authorization Act assigned these duties to the Space Force:

(1) Protect the interests of the United States in space.

(2) Deter aggression in, from, and to space.

(3) Conduct space operations.

People. The Space Force includes a combination of uniformed military and civilian personnel. As of spring 2021, some 6,000 members had transferred from the Air Force, and members of the other services are also now eligible to transition to become Guardians. Most large Space Force commands, however, will continue to be manned by both Guardians and Airmen, as the Space Force will rely on Air Force members to perform most support functions, such as lawyers, doctors, civil engineers, logisticians, chaplains, and financial managers.

In time, the Space Force is expected to comprise 15,000 to 16,000 Active duty members, plus Reservists, Guardsmen, and civilian personnel.

U.S. Space Force Budget Summary

Funding	2021 (Enacted) ($ millions)	2022 (Requested) ($ millions)
Operations & Maintenance	2,569	3,406
Research Development Test & Evaluation	10,540	11,265
Procurement	2,311	2,767
Total	**15,420**	**17,438**
Military Construction	**2021 (Enacted) ($ millions)**	**2022 (Requested) ($ millions)**
Facilities and Housing	**9,979**	**12,764**
Authorized Manpower	**2021 (Enacted)**	**2022 (Requested)**
Military	6,434	8,400
Civilian	3,545	4,364
Total Force Personal	**9,979**	**12,764**
Major USSF Procurement Quantities	**2021 (Enacted)**	**2022 (Requested)**
Natonal Security Space Launches	3	5
GPS-III and Follow-On	2	2

Office of the Chief of Space Operations. The Chief of Space Operations leads the Space Force, responsible for defining space doctrine, organizing space forces, and manning, training, and equipping those forces. To sustain the Space Force over time, the headquarters leads strategy, planning, research and development, and sets the operational requirements to ensure joint warfighter capabilities are fielded and available as needed. Space Space Systems Command will manage acquisition.

Recruiting, Accession, and Initial Training. The Air Force handles recruiting and most day-to-day personnel matters. The planned Space Training and Readiness Command is not yet formally established. Air Force Officer Training School, Reserve Officer Training Corps, and the Air Force Academy are the sources for new officers and the Air Force Basic Military Training (BMT) structure trains new enlisted members.

USAF

Gen. John W. "Jay" Raymond, Chief of Space Operations

Headquarters: Pentagon, Va.
Date of current designation: Dec. 20, 2019

Secretary of the Air Force

Chief of Space Operations & Senior Enlisted Adviser (E-9)

Vice Chief of Space Operations

Director of Staff

Support
- Staff Action Group
- Protocol
- Resources
- IT & Admin
- Total Force Integration

USAF

Chief Master Sgt. Roger A. Towberman, Senior Enlisted Leader

USSF PERSONNEL

Active Duty as of Dec. 20, 2020	
Active duty entering via transfers and accessions:	2,253*
Selects**:	6,111

*As of Dec. 20, 2020
**Does not guarantee transfer

CAREER FIELDS

Space Force began accepting transfers Sept. 1, 2020, in the following career fields:

Enlisted	
1C6	Space Systems Operations
1NX	Space Intelligence
3D0	Cyber Operations Officer

Officer	
13S	Space Operations
14N	Space Intelligence
17D	Cyber Operations
17X	Cyber Warfare
63A	Acquisitions
62E	Acquisitions Engineer

FIELD COMMANDS

Space Operations Command

Headquarters: Peterson AFB, Colo.
Date of activation: Oct. 21, 2020
Commander: Lt. Gen. Stephen N. Whiting

MAJOR UNITS	LOCATION	MISSION
Space Delta 2	Peterson AFB, Colo.	Space domain space awareness
Space Delta 3	Peterson AFB, Colo.	Electronic warfare
Space Delta 4	Buckley SFB, Colo.	Missile warning
Space Delta 5	Vandenberg SFB, Calif.	Operational level command and control
Space Delta 6	Schriever AFB, Colo.	Satellite control network, defensive
Space Delta 7	Peterson AFB, Colo.	ISR
Space Delta 8	Schriever AFB,Colo.	Satcoms, position, navigation, timing
Space Delta 9	Schriever AFB, Colo.	Defensive ops, Space domain awareness
Buckley Garrison	Buckley SFB, Colo.	Mission support

Space Systems Command

Headquarters when activated: Los Angeles AFB, Calif.
Anticipated activation: Summer 2021
Commander: [TBD]

MAJOR UNITS*	LOCATION	MISSION
Four Corps: Atlas/Development/Production/Enterprise	Los Angeles AFB, Calif.	Acquisition
Space Development Agency**	Pentagon	Acquisition
Space Launch Delta 30	Vandenberg SFB, Calif.	Space launch, ICBM test, launch range operations
Space Launch Delta 45	Patrick SFB, Fla.	Space launch, launch range operations
Space Rapid Capabilities Office	Kirtland AFB, N.M.	Acquisition

Space Training and Readiness Command

Headquarters when activated: TBD
Anticipated activation: 2021
Commander: [TBD]

MAJOR UNITS*	LOCATION	MISSION
25th Space Range Squadron	Schriever AFB, Colo.	Operates the space test and training range
527th Space Aggressor Squadron	Schriever AFB, Colo.	Simulates adversary threats for training
705th Combat Training Squadron Operating Location Alpha	Schriever AFB, Colo.	Virtual exercises
National Security Space Institute	Peterson AFB, Colo.	Space education and training
USAF Warfare Center, Detachment 1	Schriever AFB, Colo.	Operational test and evaluation, tactics development, and training

*Partial list as known at press time
**Transfers from the Office of the Secretary of Defense to USSF before fiscal 2023.

USSF HISTORICAL LINEAGE

The U.S. Space Force traces its roots to the beginning of the Cold War, with the first Air Force space programs starting in 1945. USAF's Western Development Division, under Gen. Bernard A. Schriever, was established in 1954 as the first dedicated space organization within the U.S. Armed Forces. Military space forces were organized under several different Air Force major commands until they were unified when Air Force Space Command was established in September 1982. In December 2019, AFSPC became the cornerstone for the U.S. Space Force as a separate military branch. Below, we trace space organizational lineage within the Department of the Air Force. Because the space mission was—and to some extent still is—spread across several commands, offices, organizations, divisions, and services, some entries are concurrent and non-USAF organizations are not listed. This Space Force history is not intended to be all-inclusive.

WESTERN DEVELOPMENT DIVISION		
Gen. Bernard A. Schriever	July 1, 1953	May 31, 1957

AIR FORCE BALLISTIC MISSILE DIVISION		
Gen. Bernard A. Schriever	June 1, 1957	April 24, 1959
Maj. Gen. Osmond J. Ritland	April 25, 1959	March 31, 1961

SPACE AND MISSILE SYSTEMS ORGANIZATION		
Lt. Gen. John W. O'Neill	July 1, 1967	Aug. 31, 1969
Lt. Gen. Samuel C. Phillips	Sept. 1, 1969	Aug. 24, 1972
Lt. Gen. Kenneth W. Schultz	Aug. 25, 1972	Aug. 28, 1975
Lt. Gen. Thomas W. Morgan	Aug. 29, 1975	April 28, 1978
Lt. Gen. Richard C. Henry	April 29, 1978	Sept. 30, 1979

SPACE DIVISION		
Lt. Gen. Richard C. Henry	Oct. 1, 1979	May 1, 1983
Lt. Gen. Forrest S. McCartney	May 1, 1983	Sept. 30, 1986
Lt. Gen. Aloysius G. Casey	Oct. 9, 1986	June 23, 1988
Lt. Gen. Donald L. Cromer	June 24, 1988	March 14, 1989

BALLISTIC MISSILE OFFICE		
Maj. Gen. John W. Hepfer	Oct. 1, 1979	Oct. 31, 1980
Maj. Gen. Forrest S. McCartney	Oct. 31, 1980	May 19, 1982
Maj. Gen. Aloysius G. Casey	May 19, 1982	Sept. 30, 1986
Maj. Gen. Edward P. Berry Jr.	Sept. 30, 1986	March 14, 1989

SPACE SYSTEMS DIVISION (SSD) AND BALLISTICS SYSTEM DIVISION (BSD)		
Lt. Gen. Donald L. Cromer (SSD)	March 15, 1989	May 31, 1991
Lt. Gen. Edward P. Barry Jr. (SSD)	July 8, 1991	June 30, 1992
Lt. Gen. Edward P. Barry Jr. (BSD)	March 15, 1989	May 30, 1989
Brig. Gen. Ralph G. Tourino (BSD)	May 30, 1989	May 4, 1990

SPACE AND MISSILE SYSTEMS CENTER		
Lt. Gen. Edward P. Barry Jr.	July 1, 1992	Nov. 16, 1994
Lt. Gen. Lester L. Lyles	Nov. 16, 1994	Aug. 18, 1996

SPACE SYSTEMS DIVISION (SSD) AND BALLISTIC SYSTEMS DIVISION (BSD)		
Maj. Gen. Osmond J. Ritland (SSD)	April 1, 1961	May 13, 1962
Lt. Gen. Howell M. Estes Jr. (SSD)	May 14, 1962	Oct. 2, 1962
Maj. Gen. Ben I. Funk (SSD)	Oct. 3, 1962	Aug. 31, 1966
Maj. Gen. Paul T. Cooper (SSD)	Sept. 1, 1966	June 30, 1967
Maj. Gen. Thomas P. Gerrity (BSD)	April 1, 1961	June 30, 1962
Lt. Gen. W. Austin Davis (BSD)	July 1, 1962	July 18, 1964
Maj. Gen. Harry Sands Jr. (BSD)	July 20, 1966	June 30, 1967
Maj. Gen. John L. McCoy (BSD)	July 20, 1966	June 30, 1969

SPACE AND MISSILE SYSTEMS CENTER		
Lt. Gen. Roger G. DeKok	Aug. 18, 1996	Aug. 12, 1998
Lt. Gen. Eugene L. Tattini	Aug. 13, 1998	May 25, 2001
Lt. Gen. Brian A. Arnold	May 25, 2001	May 20, 2005
Lt. Gen. Michael A. Hamel	May 20, 2005	May 16, 2008
Lt. Gen. John T. Sheridan	May 16, 2008	June 3, 2011
Lt. Gen. Ellen M. Pawlikowski	June 3, 2011	June 19, 2014
Lt. Gen. Samuel A. Greaves	Jun 19, 2014	March 22, 2017
Lt. Gen. John F. Thompson	March 22, 2017	

AIR FORCE SPACE COMMAND		
Gen. James V. Hartinger	Sept. 1, 1982	July 30, 1984
Gen. Robert T. Herres	July 30, 1984	Oct. 1, 1986
Maj. Gen. Maurice C. Padden	Oct. 1, 1986	Oct. 29, 1987
Lt. Gen. Donald J. Kutyna	Oct. 29, 1987	March 29, 1990
Lt. Gen. Thomas S. Moorman Jr.	March 29, 1990	March 23, 1992
Gen. Donald J. Kutyna	March 23, 1992	June 30, 1992
Gen. Charles A. Horner	June 30, 1992	Sept. 13, 1994
Gen. Joseph W. Ashy	Sept. 13, 1994	Aug. 26, 1996
Gen. Howell M. Estes III	Aug. 26, 1996	Aug. 14, 1998
Gen. Richard B. Myers	Aug. 14, 1998	Feb. 22, 2000
Gen. Ralph E. Eberhart	Feb. 22, 2000	April 19, 2002
Gen. Lance W. Lord	April 19, 2002	April 1, 2006
Lt. Gen. Frank G. Klotz (acting)	April 1, 2006	June 26, 2006
Gen. Kevin P. Chilton	June 26, 2006	Oct. 3, 2007
Lt. Gen. Michael A. Hamel (acting)	Oct. 3, 2007	Oct. 12, 2007
Gen. C. Robert Kehler	Oct. 12, 2007	Jan. 5, 2011
Gen. William L. Shelton	Jan. 5, 2011	Aug. 15, 2014
Gen. John E. Hyten	Aug. 15, 2014	Oct. 25, 2016
Gen. John W. Raymond	Oct. 25, 2016	Jan. 14, 2020

U.S. SPACE FORCE		
Gen. John W. Raymond	Jan. 14, 2020	

USAF

Gen. Bernard A. Schriever was the chief architect of the U.S. Air Force's early ballistic missile and space programs and is known as the "Father of Air Force space and missiles." He led Western Development Division, the first dedicated space organization in the U.S. armed services.

SATELLITES IN SERVICE OVER TIME

(As of Sept. 30, 2020)

TYPE OF SYSTEM	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
AEHF	1	2	2	3	3	3	3	4	5	5
ATRR	0	1	1	0	0	0	1	1	1	1
DMSP	6	4	4	6	6	6	5	5	4	4
DSCS	8	8	8	7	6	6	6	6	6	6
GPS	34	30	31	38	41	37	35	31	29	31
GSSAP	0	0	0	2	2	4	4	4	4	4
Milstar	5	5	5	5	5	5	5	5	5	4
ORS-5									1	1
SBIRS	1	1	2	2	2	2	3	7	6	6
SBSS	1	1	1	1	1	1	1	2	1	1
WGS		3	3	4	6	7	7	9	10	10
Total Satellites	**59**	**55**	**58**	**70**	**73**	**71**	**72**	**77**	**72**	**73+**

AEHF: Advanced Extremely High Frequency; **ATRR:** Advanced Technology Risk Reduction; **DMSP:** Defense Meteorological Satellite Prg.; **DSCS:** Defense Satellite Communications System; **GPS:** Global Positioning System; **GSSAP:** Geosynchronous Space Situational Awareness Prg.; **ORS-5:** Operationally Responsive Space-5; **SBIRS:** Space Based Infrared System; **SBSS:** Space Based Surveillance System; **WGS:** Wideband Global SATCOM.

Source: TAI as of Sept. 30, 2020

MAJOR USSF PROGRAMS

	RDT&E (Current $ millions)					PROCUREMENT (Current $ millions)				
PROGRAM	2019	2020	2021 request	2021 enacted	2022 request	2019	2020	2021	2021	2022
AEHF	144.8	117.3	138.3	90	28.2	29.8	21.9	14.8	7.8	0
Counterspace Systems	20.2	27	54.70	57.2	38.1	1.1	5.7	65.5	49.16	64.8
NSSL	443	432	561	551	221.5	954.6	1,237.6	1043.2	996.4	1,337.3
Next-Gen OPIR	643.1	1,470.30	2,318.9	2,318.9	2,451.25	N/A	N/A	N/A	N/A	N/A
Space Fence	19.4	0	N/A	N/A	N/A	46.4	57.8	11.3	11.3	0
Weather System Follow-On	138.1	207.9	2.5	2.5	1.44	N/A	N/A	N/A	N/A	N/A
Protected Tactical Service	29.6	163.7	205.2	200.2	243.3	N/A	N/A	N/A	N/A	N/A
Protected Tactical Enterprise Service	46.4	105	114.4	109.4	100.3	N/A	N/A	N/A	N/A	N/A
Space Test Program	25.6	26.1	26.5	26.5	20.9	N/A	N/A	N/A	N/A	N/A
Space C2	70.4	75.8	149.7	149.7	154.5	N/A	N/A	N/A	N/A	N/A
Polar MILSATCOM	26.4	412.4	190.2	190.2	127.9	N/A	N/A	N/A	N/A	N/A
Wideband Global SATCOM	4	1.9	0	N/A	N/A	12.1	0	0	N/A	N/A
GPS III Space Segment	141.4	42.4	10.8	10.8	7.2	69.4	31.5	20.1	20.1	84.45
GPS III Follow-On Satellites	426.9	447.9	263.5	285.5	264.3	0	394.6	627.8	597.8	601.4
GPS III Operational Control Segment	491.6	445.3	482	482	413.8	N/A	N/A	N/A	N/A	

USAF MAJOR COMMANDS AND AIR NATIONAL GUARD

The Air Force has nine major commands and two Air Reserve Components. (Air Force Reserve Command is both a majcom and an ARC.) In late 2019, Air Force Space Command was redesignated U.S. Space Force, a separate military branch under the Department of the Air Force.

As significant subdivisions of the Air Force, major commands conduct a considerable part of the service's mission and are directly subordinate to Headquarters USAF.

Majcoms are organized on a functional basis in the U.S. and on a geographic basis overseas. In addition to accomplishing designated portions of USAF's worldwide activities, they organize, administer, equip, and train their subordinate elements.

The majcom sits atop a skip-echelon staffing structure, which means every other organizational level (i.e., majcom, wing, and squadron) will have a full range of staff functions. The other organizations (NAF, group, and flight) are tactical, mission-centered echelons. These tactical echelons are designed to increase operational effectiveness without the burden of additional staff functions.

AFGSC

Air Force Global Strike Command

Headquarters: Barksdale AFB, La.
Date of current designation: Aug. 7, 2009
Commander: Gen. Timothy M. Ray

Primary Mission

Organize, train, equip, maintain, and provide ICBM forces and long-range bomber forces to combatant commanders; provide installation mission support.

AFGSC Structure

COMMANDER

8th Air Force
Barksdale AFB, La.
Commander:**

20th Air Force
F. E. Warren AFB, Wyo.
Commander: **

AFGSC AIRCRAFT BY TYPE	
B-1B	60
B-2A	19
B-52H	56
E-4B	4
T-38A	14
UH-1N	25

PERSONNEL	
Active Duty	**28,708**

EQUIPMENT (TOTAL AIRCRAFT INVENTORY)	
Bomber	135
Helicopter	25
ICBM	400
ISR/BM/C3	4
Trainer	14

Source: U.S. Air Force Total Aircraft Inventory (TAI) as of Sept. 30, 2020

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
2nd Bomb Wing (BW)	Barksdale AFB, La.	B-52H
5th BW	Minot AFB, N.D.	B-52H
7th BW	Dyess AFB, Texas	B-1B
28th BW	Ellsworth AFB, S.D.	B-1B
90th Missile Wing (MW)	F. E. Warren AFB, Wyo.	Minuteman III, UH-1N
91st MW	Minot AFB, N.D.	Minuteman III, UH-1N
341st MW	Malmstrom AFB, Mont.	Minuteman III, UH-1N
377th Air Base Wing	Kirtland AFB, N.M.	Nuclear operations, expeditionary force training, base support
509th BW	Whiteman AFB, Mo.	B-2A, T-38C
576th Flight Test Squadron	Vandenberg SFB, Calif.	Minuteman III
595th Command and Control Group	Offutt AFB, Neb.	Command and control, E-4B

ACC

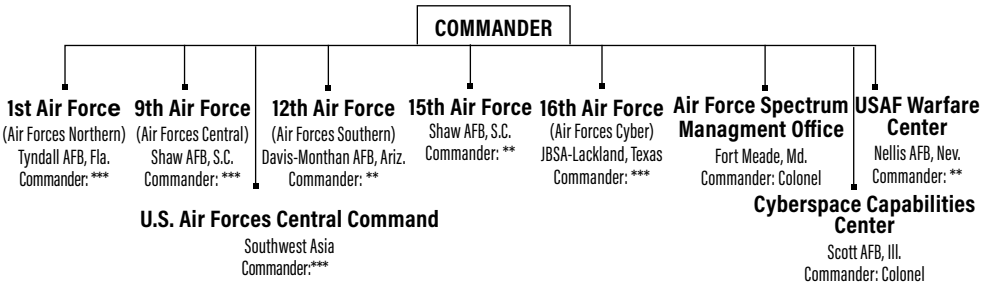
Air Combat Command

Headquarters: JB Langley-Eustis, Va.
Date of current designation: June 1, 1992
Commander: Gen. Mark D. Kelly

Primary Mission

Primary force provider of combat air power—fighter, conventional bomber, reconnaissance, battle management, and electronic combat aircraft—to combatant commands. Provide command, control, communications, and intelligence (C3I) systems. Conduct global information operations.

ACC Structure



PERSONNEL	
Active Duty	**80,858**

EQUIPMENT (TAI)	
Fighter/Attack	694
Helicopter	39
ISR/BM/C3	352
Trainer	49

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
1st Fighter Wing (FW)	JB Langley-Eustis, Va.	F-22, T-38A
4th FW	Seymour Johnson AFB, N.C.	F-15E
9th Reconnaissance Wing	Beale AFB, Calif.	RQ-4, T-38A, U-2
20th FW	Shaw AFB, S.C.	F-16CM
23rd Wing	Moody AFB, Ga.	A-10C, HC-130J, HH-60G
53rd Wing	Eglin AFB, Fla.	A-10C, BQM-167A, E-9A, F-15C/D/E, F-16C/D, F-22A, F-35A, HC-130J, HH-60G, MQ-9, QF-4, QF-16, RQ-4, U-2
55th Wing	Offutt AFB, Neb.	EC-130H, OC-135B, RC-135S/U/V/W, TC-135S/W, WC-135
57th Wing	Nellis AFB, Nev.	A-10C, EC-130, F-15, F-15E, F-16, F-22A, F-35A, HH-60G (23rd Wing), MQ-9
67th Cyberspace Wing	JBSA-Lackland, Texas	Cyberspace operations
70th ISR Wing (ISRW)	Fort Meade, Md.	Cryptologic operations
93rd Air Ground Operations Wing	Moody AFB, Ga.	Battlefield Airmen operations, support
99th Air Base Wing (ABW)	Nellis AFB, Nev.	Base spt.
319th Reconnaissance Wing	Grand Forks AFB, N.D.	Base spt.
325th FW	Tyndall AFB, Fla.	F-22A
355th Wing	Davis-Monthan AFB, Ariz.	A-10, EC-130H, (55th Wing), F-16CG, HC-130J, HH-60G (23rd Wing)
363rd ISRW	JB Langley-Eustis, Va.	Multi-intelligence analysis, targeting
366th FW	Mountain Home AFB, Idaho	F-15E
388th FW	Hill AFB, Utah	F-16C/D, F-35A
432nd Wing	Creech AFB, Nev.	MQ-1, MQ-9, RQ-170
480th ISRW	JB Langley-Eustis, Va.	DCGS, cyber ISR, CFACC support, signals intelligence integration
461st Air Control Wing (ACW)	Robins AFB, Ga.	E-8C (AA)
505th Command and Control Wing	Hurlburt Field, Fla.	Command and control operational-level tactics, testing, training
552nd ACW	Tinker AFB, Okla.	E-3B/C/G
557th Weather Wing	Offutt AFB, Neb.	Weather information
601st Air Operations Center	Tyndall AFB, Fla.	Plan and direct air operations
616th Operations Center	JBSA-Lackland, Texas	Plan and direct cyber operations
633rd ABW	JB Langley-Eustis, Va.	Joint base facilities support
688th Cyberspace Wing	JBSA-Lackland, Texas	Information operations, engineering installations
AF Rescue Coordination Center	Tyndall AFB, Fla.	National search and rescue coordination
AF Technical Applications Center	Patrick SFB, Fla.	Nuclear treaty monitoring, nuclear event detection

ACC AIRCRAFT BY TYPE					
A-10	116	F-15E	158	OC-135B	2
AT-38	6	F-16C	149	RC-135S	3
E-3B	8	F-16D	19	RC-135U	2
E-3G	23	F-22A	115	RC-135V	8
E-9A	2	F-35A	116	RC-135W	9
E-11	3	HC-130J	16	RQ-4B	31
EC-130	11	HH-60G	39	T-38A	39
F-15C	18	MQ-1	5	TC-135W	3
F-15D	3	MQ-9	198	TU-2S	4
				U-2S	27

Source: U.S. Air Force Total Aircraft Inventory (TAI) as of Sept. 30, 2020

AETC

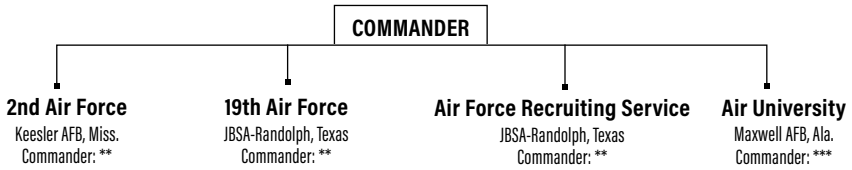
Air Education and Training Command

Headquarters: JBSA-Randolph, Texas
Date of current designation: July 1, 1993
Commander: Lt. Gen. Marshall B. "Brad" Webb

Primary Mission

Recruit, train, and educate airmen through basic military training, initial and advanced technical training, and professional military education.

AETC Structure



PERSONNEL	
Active Duty	**57,541**

EQUIPMENT (TAI)	
Fighter/Attack	236
Helicopter	22
Tanker	18
Trainer	1,130
Transport	50

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
12th Flying Training Wing (FTW)	JBSA-Randolph, Texas	T-1A, T-6A, T-38C (CSO at NAS Pensacola, Fla.)
14th FTW	Columbus AFB, Miss.	T-1A, T-6A, T-38C (A-29 at Moody AFB, Ga.)
17th Training Wing (TRW)	Goodfellow AFB, Texas	Technical training
33rd Fighter Wing (FW)	Eglin AFB, Fla.	F-35
37th TRW	JBSA-Lackland, Texas	Basic military and technical training
42nd Air Base Wing (ABW)	Maxwell AFB, Ala.	Base support
47th FTW	Laughlin AFB, Texas	T-1A, T-6A, T-38C
49th Wing	Holloman AFB, N.M.	MQ-1, MQ-9, QF-16
56th FW	Luke AFB, Ariz.	F-16, F-35
58th Special Operations Wing	Kirtland AFB, N.M.	CV-22, HC-130J/P/N, HH-60G, MC-130H/J/P, UH-1N, TH-1H
59th Medical Wing	JBSA-Lackland, Texas	Wilford Hall Ambulatory Surgical Cntr.
71st FTW	Vance AFB, Okla.	T-1A, T-6A, T-38C
80th FTW	Sheppard AFB, Texas	T-6A, T-38C
81st TRW	Keesler AFB, Miss.	Technical training
82nd TRW	Sheppard AFB, Texas	Technical training
97th Air Mobility Wing	Altus AFB, Okla.	C-17, KC-135R, KC-46
314th Air Mobility Wing	Little Rock AFB, Ark.	C-130J
502nd ABW	JBSA-Fort Sam Houston, Texas	JBSA facilities support
AF Profession of Arms Center of Excellence	JBSA-Randolph, Texas	Professional training
AF Institute of Technology	Wright-Patterson AFB, Ohio	Postgraduate education
Carl A. Spaatz Center for Officer Education	Maxwell AFB, Ala.	Officer professional military education (PME)
Curtis E. LeMay Center for Doctrine Dev. & Education	Maxwell AFB, Ala.	Air Force doctrine development
Ira C. Eaker Center for Leadership Dev.	Maxwell AFB, Ala.	Professional and technical continuing education
Jeanne M. Holm Center for Officer Accessions and Citizen Development	Maxwell AFB, Ala.	Officer training, ROTC and JROTC oversight
Muir S. Fairchild Research Information Cntr.	Maxwell AFB, Ala.	Information resources
Thomas N. Barnes Center for Enlisted Education	Maxwell AFB, Ala.	Enlisted PME

AETC AIRCRAFT BY TYPE

C-130J	14	KC-135R	17	T-53A	24
C-17A	17	KC-135T	1	TG-15A	2
CV-22B	8	MC-130J	5	TG-15B	3
F-16C	83	T-1A	178	TG-16A	19
F-16D	51	T-6A	442	TH-1H	28
F-35A	102	T-38C	427	UH-1N	10
HC-130J	3	T-41D	4	UV-18B	3
HH-60G	12	T-51A	3		

Source: U.S. Air Force Total Aircraft Inventory (TAI) as of Sept. 30, 2020

AFMC

Primary Mission

Research, develop, procure, test, and sustain USAF weapon systems.

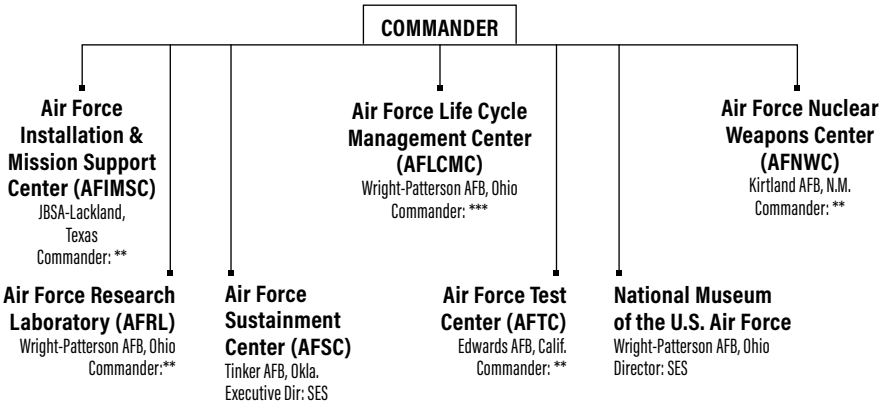
PERSONNEL	
Active Duty	**17,033**
EQUIPMENT (TAI)	
Bomber	5
Fighter/Attack	49
Helicopter	5
ISR/BM/C3	19
Tanker	1
Trainer	16
Transport	30

Source: U.S. Air Force Total Aircraft Inventory (TAI) as of Sept. 30, 2020

Air Force Materiel Command

Headquarters: Wright-Patterson AFB, Ohio
Date of current designation: July 1, 1992
Commander: Gen. Arnold W. Bunch Jr.

AFMC Structure



	MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
AFIMSC	AF Civil Engineer Center	JBSA-Lackland, Texas	Installation support (civil engineering)
	AF Financial Management Center of Expertise	Buckley SFB, Colo.	Installation support (financial analysis)
	AF Financial Services Center	Ellsworth AFB, S.D.	Installation support (payment processing)
	AF Installation Contracting Center	Wright-Patterson AFB, Ohio	Enterprise contracting support
	AF Security Forces Center	JBSA-Lackland, Texas	Installation support (security forces programs)
	AF Services Center	JBSA-Lackland, Texas	Installation support (lodging, recreation)
AFLCMC	AF Prg. Exec. Officer–Agile Combat Support	Wright-Patterson AFB, Ohio	Sys. acquisition
	AFPEO–Armament	Eglin AFB, Fla.	Sys. acquisition
	AFPEO–Battle Management	Hanscom AFB, Mass.	Sys. acquisition
	AFPEO–Business and Enterprise Sys.	Maxwell AFB-Gunter Annex, Ala.	Sys. acquisition
	AFPEO–C3I and Networks	Hanscom AFB, Mass.	Sys. acquisition
	AFPEO–Fighters and Bombers	Wright-Patterson AFB, Ohio	Sys. acquisition
	AFPEO–ISR and Special Operations Forces	Wright-Patterson AFB, Ohio	Sys. acquisition
	AFPEO–Mobility	Wright-Patterson AFB, Ohio	Sys. acquisition
	AFPEO-Presidential Aircraft Recapitalization	Wright-Patterson AFB, Ohio	Sys. acquisition
	AFPEO–Tanker	Wright-Patterson AFB, Ohio	Sys. acquisition
	88th Air Base Wing (ABW)	Wright-Patterson AFB, Ohio	Base spt.
AFNWC	AFPEO–Nuclear Command, Control, and Communications	Hanscom AFB, Mass.	Sys. acquisition
	AFPEO–Strategic Sys.	Kirtland AFB, N.M.	Sys. acquisition
AFRL	Aerospace Sys.	Wright-Patterson AFB, Ohio	Research and development (R&D)
	AF Office of Scientific Research	Arlington, Va.	Research
	AF Strategic Development Planning and Experimentation Office	Wright-Patterson AFB, Ohio	R&D
	Directed Energy	Kirtland AFB, N.M.	R&D
	Information	Rome, N.Y.	R&D
	Materials and Manufacturing	Wright-Patterson AFB, Ohio	R&D
	Munitions	Eglin AFB, Fla.	R&D
	Sensors	Wright-Patterson AFB, Ohio	R&D
	Space Vehicles	Kirtland AFB, N.M.	R&D
	711th Human Performance Wing	Wright-Patterson AFB, Ohio	Airman performance R&E
AFSC	Ogden Air Logistics Complex (ALC)	Hill AFB, Utah	Weapons sustainment
	Oklahoma City ALC	Tinker AFB, Okla.	Weapons sustainment
	Warner Robins ALC	Robins AFB, Ga.	Weapons sustainment
	72nd ABW	Tinker AFB, Okla.	Base support
	75th ABW	Hill AFB, Utah	Base and Utah Test and Training Range support
	78th ABW	Robins AFB, Ga.	Base support
	448th Supply Chain Management Wing	Tinker AFB, Okla.	Depot line repairables and consumables
	635th Supply Chain Operations Wing	Scott AFB, Ill.	Global sustainment support
AFTC	Arnold Engineering Development Complex	Arnold AFB, Tenn.	Flight, space, and missile ground testing
	96th Test Wing (TW)	Eglin AFB, Fla.	Aircraft/system testing, base & range support
	412th TW	Edwards AFB, Calif.	Aircraft/system testing, base & range support
	U.S. Air Force Test Pilot School	Edwards AFB, Calif.	Pilot, navigator & engineer training for flight tests

AFMC AIRCRAFT BY TYPE	
A-10C	1
B-1B	2
B-2A	1
B-52H	2
C-12C	16
C-12D	6
C-12F	1
C-12J	1
C-40B	6
F-15C	2
F-15E	5
F-16C	13
F-16D	22
F-22A	4
F-35A	2
HH-60U	3
KC-135R	1
MQ-9A	16
NC-135W	1
RQ-4B	2
T-38C	16
UH-1N	2

AFRC

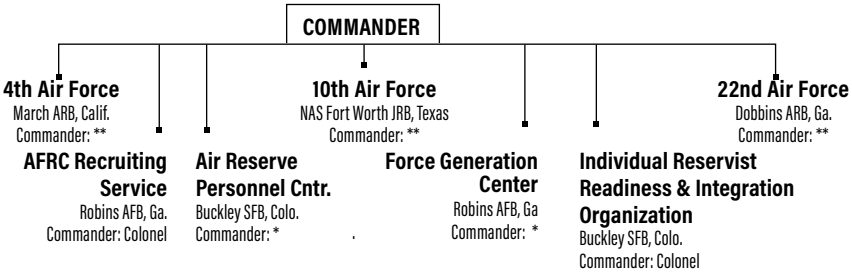
Air Force Reserve Command

Headquarters: Robins AFB, Ga.
Date of current designation: Feb. 17, 1997
Commander: Lt. Gen. Richard W. Scobee

Primary Mission

Provide strike, air mobility, special operations forces, rescue, aeromedical evacuation, aerial firefighting and spraying, weather reconnaissance, cyberspace operations, ISR, space, flying training, and other capabilities to support the Active-duty force and assist with domestic and foreign disaster relief.

AFRC Structure



PERSONNEL	
Selected Reserve	**65,508**

AFRC AIRCRAFT BY TYPE			
A-10	55	C-5M	16
B-52H	18	F-16C	52
C-130H	42	F-16D	2
C-130J	10	HH-60G	16
C-17A	26	KC-135R	67
C-40	4	WC-130J	10

EQUIPMENT (TAI)	
Bomber	18
Fighter/Attack	109
Helicopter	16
ISR/BM/C3	10
Tanker	67
Transport	98

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
94th Airlift Wing (AW)	Dobbins ARB, Ga.	C-130H
301st Fighter Wing (FW)	NAS JRB Fort Worth, Texas	F-16 (Texas)
302nd AW	Peterson AFB, Colo.	C-130H (including Modular Airborne Firefighting System)
307th Bomb Wing	Barksdale AFB, La.	B-52H
310th Space Wing	Schriever AFB, Colo.	Space control and operations and warning, information operations
315th AW (classic associate)	JB Charleston, S.C.	C-17
349th Air Mobility Wing (classic associate)	Travis AFB, Calif.	C-5, C-17, KC-10
403rd Wing	Keesler AFB, Miss.	C-130J, WC-130J
419th FW (classic associate)	Hill AFB, Utah	F-35A
433rd AW	JBSA-Lackland, Texas	C-5M, formal training unit
434th Air Refueling Wing (ARW)	Grissom ARB, Ind.	KC-135R
439th AW	Westover ARB, Mass.	C-5M
442nd FW	Whiteman AFB, Mo.	A-10C
445th AW	Wright-Patterson AFB, Ohio	C-17
446th AW (classic associate)	JB Lewis-McChord, Wash.	C-17
452nd AMW	March ARB, Calif.	C-17, KC-135R
459th ARW	JB Andrews, Md.	KC-135R
482nd FW	Homestead ARB, Fla.	F-16C
507th ARW	Tinker AFB, Okla.	KC-135R
512th AW (classic associate)	Dover AFB, Del.	C-5M, C-17
514th AMW (classic associate)	JB McGuire-Dix-Lakehurst, N.J.	C-17, KC-10
655th ISR Wing	Wright-Patterson AFB, Ohio	Intelligence
908th AW	Maxwell AFB, Ala.	C-130H
910th AW	Youngstown ARS, Ohio	C-130H
911th AW	Pittsburgh ARS, Pa.	Converting from C-130 to C-17
914th ARW	Niagara Falls ARS, N.Y.	KC-135R
916th ARW	Seymour Johnson AFB, N.C.	KC-135R, KC-46A
919th Special Operations Wing (classic associate)	Duke Field, Fla.	AC-130U, C-145A, C-146, C-208 MC-130H, MQ-9, PC-12, U-28
920th Rescue Wing	Patrick SFB, Fla.	HC-130K/J, HH-60G
926th Wing (classic associate)	Nellis AFB, Nev.	F-15C, F-15E, F-16, F-22A, F-35A, MQ-9 (Creech AFB, Nev.), RQ-4 (Beale AFB, Calif.)
927th ARW (classic associate)	MacDill AFB, Fla.	KC-135R
931st ARW (classic associate)	McConnell AFB, Kan.	KC-1355R, KC-46A
932nd AW	Scott AFB, Ill.	C-40C
934th AW	Minneapolis-St. Paul ARS, Minn.	C-130H
940th ARW	Beale AFB, Calif.	KC-135R
944th FW (classic and active associate)	Luke AFB, Ariz.	A-10 (active associate-Davis Monthan AFB, Ariz.) F-15E (Seymour Johnson A FB, N.C.), F-16 (Luke AFB and Holloman AFB, Ariz.), F-35A (Luke AFB and Eglin AFB, Fla.)
960th Cyberspace Wing	JBSA-Lackland, Texas	Cyberspace operations

Classic associate: Active-duty unit owns aircraft.

Source: TAI as of Sept. 30, 2020

AFSOC

Air Force Special Operations Command

Headquarters: Hurlburt Field, Fla.
Date of current designation: May 22, 1990
Commander: Lt. Gen. James C. "Jim" Slife

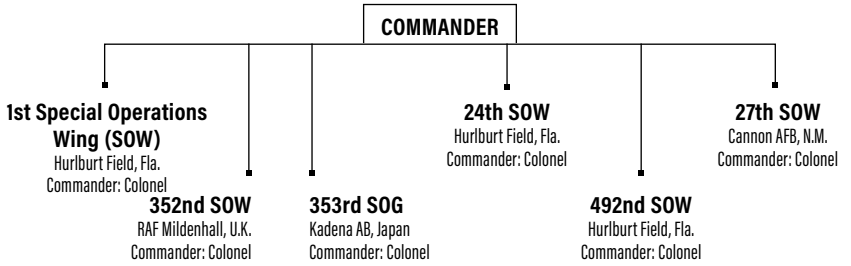
Primary Mission

Organize, train, equip, maintain, and provide special operations air power forces to combatant commanders.

AFSOC AIRCRAFT BY TYPE	
AC-130J	20
AC-130U	7
AC-130W	10
C-130H	2
CV-22B	42
MC-130H	16
MC-130J	46
MQ-9A	51

Source: U.S. Air Force Total Aircraft Inventory (TAI) as of Sept. 30, 2020

AFSOC Structure



PERSONNEL	
Active Duty	**15,660**

EQUIPMENT (TAI)	
ISR/BM/C3	51
Special Operations Forces	141
Transport	2

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
1st Special Operations Group (SOG)	Hurlburt Field, Fla.	AC-130J/U, CV-22, MC-130H, MQ-9, U-28A
27th SOG	Cannon AFB, N.M.	AC-130W, C-146A*, CV-22B, MC-130J, MQ-9, U-28A
551st SOS	Cannon AFB, N.M.	AC-130H/W, CV-22, MC-130J, MQ-9
720th Special Tactics Group (STG)	Hurlburt Field, Fla.	Special tactics operations
724th STG	Pope Field, N.C.	Special tactics operations
752nd SOG	RAF Mildenhall, U.K.	CV-22, MC-130J

*Owned by U.S. Special Operations Command

Staff Sgt. Brandon Nelson/USA

Special Tactics Controllers from the 321st Special Tactics Squad conduct day and night iterations of fast rope and repelling out the back of a CV-22 from the 7th Special Operations Squadron on April 12 and April 15, 2021. These skills are critical to maintaining mission readiness and maintain the ability to meet today's SOF challenges in a real world environment.

AMC

Air Mobility Command

Headquarters: Scott AFB, Ill.
Date of current designation: June 1, 1992
Commander: Gen. Jacqueline D. Van Ovost

Primary Mission

Organize, train, equip, maintain, and provide air mobility forces to sustain worldwide air power operations.

AMC Structure

COMMANDER

18th Air Force
(Air Forces Transportation)
Scott AFB, Ill.
Commander: **

U.S. Air Force Expeditionary Cntr.
JB McGuire-Dix-Lakehurst, N.J.
Commander: **

PERSONNEL	
Active Duty	**42,308**

EQUIPMENT (TAI)	
Tanker	194
Transport	254

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
6th Air Refueling Wing (ARW)	MacDill AFB, Fla.	C-37, KC-135R
19th Airlift Wing (AW)	Little Rock AFB, Ark.	C-130H/J
22nd ARW	McConnell AFB, Kan.	KC-135R
60th Air Mobility Wing (AMW)	Travis AFB, Calif.	C-5, C-17, KC-10
62nd AW	JB Lewis-McChord, Wash.	C-17
87th Air Base Wing (ABW)	JB McGuire-Dix-Lakehurst, N.J.	Joint base facilities support
89th AW	JB Andrews, Md.	C-20B, C-32A, C-37A/B, C-40B, VC-25A
92nd ARW	Fairchild AFB, Wash.	KC-135R
305th AMW	JB McGuire-Dix-Lakehurst, N.J.	C-17, KC-10
317th AW	Dyess AFB, Texas	C-130J
375th AMW	Scott AFB, Ill.	C-21, C-40 (AA), KC-135R (AA), NC-21
436th AW	Dover AFB, Del.	C-5, C-17
437th AW	JB Charleston, S.C.	C-17A
515th Air Mobility Operations Wing (AMOW)	JB Pearl Harbor-Hickam, Hawaii	Contingency airfield operations
521st AMOW	Ramstein AB, Germany	Contingency airfield operations
618th Air Operations Center	Scott AFB, Ill.	Tanker Airlift Control Center operations
621st Contingency Response Wing	JB McGuire-Dix-Lakehurst, N.J.	Rapidly deployable bare-base operations
628th ABW	JB Charleston, S.C.	Joint base facilities support

AMC AIRCRAFT BY TYPE	
C-130J	64
C-17A	120
C-21A	14
C-32A	4
C-37A	5
C-37B	5
C-40A	4
C-5M	36
KC-10A	56
KC-135R	115
KC-135T	23
VC-25A	2

Source: U.S. Air Force Total Aircraft Inventory (TAI) as of Sept. 30, 2020

Airman 1st Class Stephani Barge

The sun sets over a C-17 Globemaster III aircraft on the flight line at Dover Air Force Base, Del., March 30. The 436th Airlift Wing owns, maintains and operates C-5M Super Galaxy and C-17 Globemaster III aircraft with a mission to provide rapid global airlift, combat ready Airmen, and installation support.

PACAF

Pacific Air Forces

Headquarters: JB Pearl Harbor-Hickam, Hawaii
Date of current designation: July 1, 1957
Commander: Gen. Kenneth S. Wilsbach

Primary Mission

Provide U.S. Pacific Command integrated expeditionary Air Force capabilities, including strike, air mobility, and rescue forces.

PACAF Structure

COMMANDER

- **5th Air Force** — Yokota AB, Japan — Commander: ***
- **7th Air Force** — Osan AB, South Korea — Commander: ***
- **11th Air Force** — JB Elmendorf-Richardson, Alaska — Commander: ***

PERSONNEL	
Active Duty	**29,952**

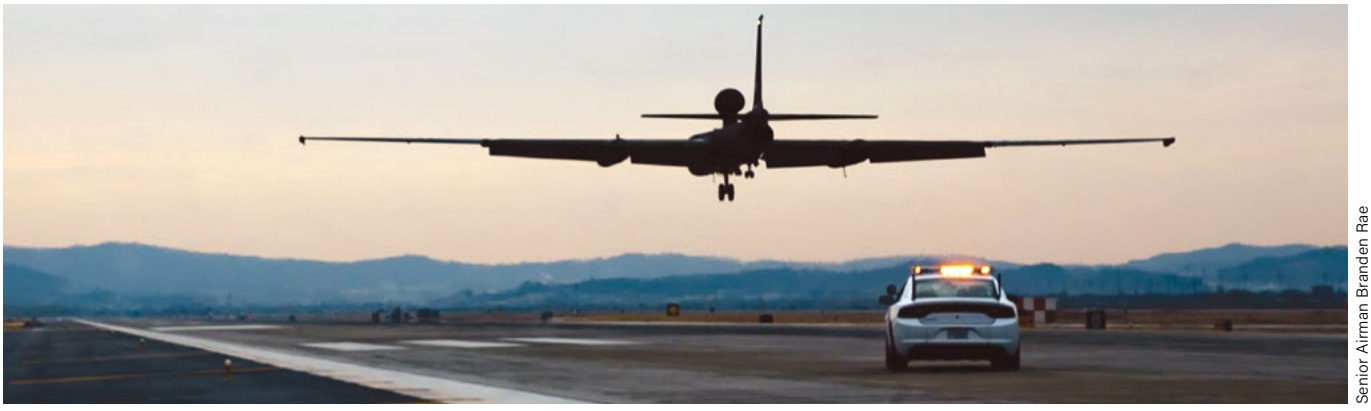
EQUIPMENT (TAI)	
Fighter/Attack	257
Helicopter	13
ISR/BM/C3	4
Tanker	15
Transport	30

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
3rd Wing	JB Elmendorf-Richardson, Alaska	C-12, C-17, E-3, F-22A
8th Fighter Wing (FW)	Kunsan AB, South Korea	F-16C/D
15th Wing	JB Pearl Harbor-Hickam, Hawaii	C-17A, C-37A, C-40B, F-22A (AA), KC-135R (AA)
18th Wing	Kadena AB, Japan	E-3B/C, F-15C/D, HH-60G, KC-135R
35th FW	Misawa AB, Japan	F-16C/D
36th Wing	Andersen AFB, Guam	Operational platform for rotating combat forces
51st FW	Osan AB, South Korea	A-10C, F-16C/D
354th FW	Eielson AFB, Alaska	F-16C/D
374th Airlift Wing	Yokota AB, Japan	C-12J, C-130H, UH-1N
607th Air Operations Center (AOC)	Osan AB, South Korea	Plan and direct air operations
611th AOC	JB Elmendorf-Richardson, Alaska	Plan and direct air operations
613th AOC	JB Pearl Harbor-Hickam, Hawaii	Plan and direct air operations
673rd Air Base Wing	JB Elmendorf-Richardson, Alaska	Joint base facilities support
Regional Support Center	JB Elmendorf-Richardson, Alaska	Remote facility operations, communications, engineering

PACAF AIRCRAFT BY TYPE

A-10C	24	E-3B	3	F-22A	47
C-12F	2	E-3C	1	HH-60G	9
C-12J	3	F-15C	49	KC-135R	10
C-130J	14	F-15D	4	KC-135T	5
C-17A	9	F-16C	121	UH-1	4
C-37A	2	F-16D	12		

Source: U.S. Air Force Total Aircraft Inventory (TAI) as of Sept. 30, 2020



Senior Airman Branden Rae

A U-2 Dragon Lady assigned to 5th Reconnaissance Squadron descends to land at Osan Air Base, South Korea, March 12. While driving the chase cars, U-2 pilots aid the pilot flying the Dragon Lady by radioing altitude and runway alignments during take offs and landings.

USAFE-AFA

U.S. Air Forces in Europe - Air Forces Africa

Headquarters: Ramstein AB, Germany
Date of current designation: April 20, 2012
Commander: Gen. Jeffrey L. Harrigian

Primary Mission

Serves as the air component for U.S. European Command and U.S. Africa Command, directing air operations, including warfighting and humanitarian/peacekeeping actions, and maintains combat-ready forces for NATO responsibilities.

USAFE-AFA Structure

COMMANDER

3rd Air Force
Ramstein AB, Germany
Commander: **

Hq. USAFE-AFAFRICA
Ramstein AB, Germany
Commander: ***

PERSONNEL	
Active Duty	**23,081**

EQUIPMENT (TAI)	
Fighter/Attack	155
Helicopter	5
Tanker	15
Transport	22

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
31st Fighter Wing (FW)	Aviano AB, Italy	F-16C/D, HH-60G
39th Air Base Wing	Incirlik AB, Turkey	Operational location for deployed U.S. and NATO forces
48th FW	RAF Lakenheath, U.K.	F-15C/D, F-15E, HH-60G
52nd FW	Spangdahlem AB, Germany	F-16J
86th Airlift Wing	Ramstein AB, Germany	C-21A, C-37A, C-130J
100th Air Refueling Wing	RAF Mildenhall, U.K.	CV-22, KC-135R/T, MC-130J, RC-135V/W
435th Air Ground Operations Wing	Ramstein AB, Germany	Battlefield airmen support and operations
501st Combat Support Wing	RAF Alconbury, U.K.	Facilitates support for seven geographically separated units
603rd Air Operations Center	Ramstein AB, Germany	Plan and direct air operations

USAFE-AFA AIRCRAFT BY TYPE

C-130J	14	F-15D	2	HH-60G	5
C-21A	5	F-15E	55	KC-135R	14
C-37A	3	F-16C	75	KC-135T	1
F-15C	19	F-16D	4		

Source: U.S. Air Force Total Aircraft Inventory (TAI) as of Sept. 30, 2020

U.S. Air Force Staff Sgt. Cornelius Ijezie, a 52nd Maintenance Squadron Munitions Stockpile Supervisor, inspects a munition on a U.S. Air Force F-16 Fighting Falcon, while in Mission Oriented Protective Posture gear during an ACE exercise at Ramstein AB, Germany, March 25. ACE, is Agile Combat Employment, an operational concept that allows forces to generate sorties from various locations with the support of multi-capable Airmen.

Tech Sgt. Warren Spearman Jr.

ANG

Air National Guard

Headquarters: Washington, D.C.
Date of current designation: Sept. 18, 1947
Director: Lt. Gen. Michael A. Loh

Primary Mission

Provide combat capability to the Active-duty force and security for the homeland. Support U.S. domestic and foreign humanitarian and disaster relief.

PERSONNEL	
Selected Reserve	**107,414**

EQUIPMENT (TAI)			
Fighter/Attack	594	Tanker	139
Helicopter	23	Transport	219
ISR/BM/C3	59		

WING (STATE)	SYSTEM/MISSION
101st Air Refueling Wing (Maine)	KC-135R, CC
102nd Intelligence Wing (Mass.)	DCGS, cyber, ISR, EISG, WXF
103rd Airlift Wing (Conn.)	C-130H
104th Fighter Wing (Mass.)	F-15C/D
105th AW (N.Y.)	C-17, EIS, WXF
106th Rescue Wing (N.Y.)	HC-130, HH-60G, GA
107th ATKW (N.Y.)	MQ-9
108th Wing (N.J.)	KC-135R, C-32B, intel, SOS
109th AW (N.Y.)	LC-130
110th Wing (Mich.)	MQ-9, AOG, C2, cyber
111th Attack Wing (Pa.)	MQ-9, cyber, EIS
113th Wing (D.C.)	C-40C, F-16C/D, WXF
114th FW (S.D.)	F-16C/D
115th FW (Wis.)	F-16C/D, RC-26B, WXF
116th Air Control Wing (Ga.)	E-8C, WXF
117th ARW (Ala.)	KC-135R, DCGS
118th Wing (Tenn.)	MQ-9, cyber
119th Wing (N.D.)	MQ-9, ISR, WXF
120th AW (Mont.)	C-130H, WXF
121st ARW (Ohio)	KC-135R, WXF
122nd FW (Ind.)	A-10C
123rd AW (Ky.)	C-130H, CRG, special tactics, WXF, intel
124th FW (Idaho)	A-10C, TACP, cyber
125th FW (Fla.)	F-15C/D, WXF
126th ARW (Ill.)	KC-135R, SCMS
127th Wing (Mich.)	A-10C, KC-135T, WXF
128th ARW (Wis.)	KC-135R
129th RQW (Calif.)	HC-130J, HH-60G, GA
130th AW (W.Va.)	C-130H, RC-26B
131st Bomb Wing (Mo.)	B-2 (CA*)
132nd Wing (Iowa)	MQ-9, cyber, ISR
133rd AW (Minn.)	C-130H, ALCF, WXF
134th ARW (Tenn.)	KC-135R
136th AW (Texas)	C-130H, ALCF, WXF
137th SOW (Okla.)	MC-12, EIS, SOS, TACP
138th FW (Okla.)	F-16C/D, EIS, WXF
139th AW (Mo.)	C-130H, AATTC (ANG/AFRC), ATCS
140th Wing (Colo.)	F-16C/D, CEF, WXF
141st ARW (Wash.)	KC-135R, CC, RC-26B, intel
142nd FW (Ore.)	F-15C/D, special tactics, WXF
143rd AW (R.I.)	C-130J, cyber
144th FW (Calif.)	F-15C/D, WXF
145th AW (N.C.)	C-17, CEF, MAFFS
146th AW (Calif.)	C-130J, ALCF, MAFFS, WXF
147th AW (Texas)	MQ-9, RC-26, TACP, EIS, WXF

WING (STATE)	SYSTEM/MISSION
148th FW (Minn.)	F-16C/D
149th FW (Texas)	F-16C/D
150th SOW (N.M.)	Special ops training (CA*), RC-26B
151st ARW (Utah)	KC-135R
152nd AW (Nev.)	C-130H, DCGS
153rd AW (Wyo.)	C-130H, MAFFS
154th Wing (Hawaii)	C-17 (CA*), F-22, KC-135R, intel, WXF
155th ARW (Neb.)	KC-135R
156th AW (Puerto Rico)	WC-130H
157th ARW (N.H.)	KC-135R, KC-46A
158th FW (Vt.)	F-16C, F-35A, WXF
159th FW (La.)	F-15C/D, CC
161st ARW (Ariz.)	KC-135R
162nd Wing (Ariz.)	F-16, RC-26B, WXF
163rd Attack Wing (Calif.)	MQ-9, FTU, WXF
164th AW (Tenn.)	C-17A
165th AW (Ga.)	C-130H, CRTC, AOS
166th AW (Del.)	C-130H, cyber
167th AW (W.Va.)	C-17A
168th Wing (Alaska)	KC-135R
169th FW (S.C.)	F-16C/D, ATCS
171st ARW (Pa.)	KC-135R/T, WXF
172nd AW (Miss.)	C-17, ALCF
173rd FW (Ore.)	F-15C/D, FTU, ATCS
174th Attack Wing (N.Y.)	MQ-9, RC-26B, AOC, FTU,
175th Wing (Md.)	A-10C, CEF, cyber, intel
176th Wing (Alaska)	C-17 (CA*), HC-130J, HH-60G, GA, RAOC
177th FW (N.J.)	F-16C, AOS, WXF
178th Wing (Ohio)	MQ-9, cyber, ISR, MCE
179th AW (Ohio)	C-130H
180th FW (Ohio)	F-16C/D
181st IW (Ind.)	DCGS, ISR, TACP, WXF
182nd AW (Ill.)	C-130H, CC, TACP
183rd Wing (Ill.)	CRF, DCGS
184th IW (Kan.)	CACS, cyber, DCGS, ISR, NOSS, TACP
185th ARW (Iowa)	KC-135R
186th ARW (Miss.)	KC-135R, RC-26B, AOG, ATCS
187th FW (Ala.)	F-16C/D, RC-26B
188th Wing (Ark.)	MQ-9, MCE, ISR, DCGS
189th AW (Ark.)	C-130H, intel, FTU, WXF
190th ARW (Kan.)	KC-135R, CW
192nd Wing (Va.)	F-22 (CA*), cyber, DCGS
193rd SOW (Pa.)	EC-130J, AOS, CC, cyber, TACP
194th Wing (Wash.)	CC, CW
195th Wing (Calif.)	DCGS, intel

*Classic associate

FOAs, DRUs, and Civil Air Patrol

A FOA Is a Field Operating Unit, an organization that performs a specialized function not performed by any other command, which reports to Headquarters, USAF. A Direct Reporting Unit (DRU) reports directly to the Chief of Staff. The Air Force Auxiliary is the Civil Air Patrol. Personnel numbers are for Active Duty.

Air Force Agency for Modeling and Simulation

Headquarters: Orlando, Fla.
Date of Current Designation: June 3, 1996
Type: Field Operating Agency (FOA)
Mission: Oversee air, space, and cyberspace modeling and simulation requirements and provide joint interoperability standards within live, virtual, and constructive (LVC) domains. **Personnel:** 8

Air Force Audit Agency

Headquarters: Pentagon
Date of Current Designation: Dec. 31, 1971
Type: FOA
Mission: Provide independent, objective, and quality internal audit service. **Personnel:** 0

Air Force Cost Analysis Agency

Headquarters: Arlington, Va.
Date of Current Designation: Aug. 1, 1991
Type: FOA
Mission: Perform independent cost and risk analyses and provide special studies to aid long-range planning.
Personnel: 12

Air Force District of Washington

Headquarters: JB Andrews, Md.
Date of Current Designation: July 7, 2005
Type: Direct Reporting Unit (DRU)
Mission: Orchestrate support for National Capital Region activities; train, equip, and provide forces for contingency, homeland, and ceremonial support operations. **Personnel:** 125

Air Force Flight Standards Agency

Headquarters: Tinker AFB, Okla.
Date of Current Designation: Oct. 1, 1991
Type: FOA
Mission: Develop, standardize, evaluate, and certify policy, procedures, and equipment for flight operations and centrally manage air traffic control and landing systems.
Personnel: 116

Air Force Historical Research Agency

Headquarters: Maxwell AFB, Ala.
Date of Current Designation: Sept. 1, 1991
Type: FOA
Mission: Research, record, and disseminate history; collect, preserve, and manage historical document collection and oral history program; determine unit lineage and honors; verify aerial victory credits. **Personnel:** 0

Air Force Inspection Agency

Headquarters: Kirtland AFB, N.M.
Date of Current Designation: Aug. 1, 1991
Type: FOA
Mission: Provide independent assessments of operations and activities; conduct nuclear surety inspection oversight, training, and certification; serve as primary action arm of the Secretary of the Air Force's inspection system.
Personnel: 94

Air Force Legal Operations Agency

Headquarters: JB Andrews, Md.
Date of Current Designation: Sept. 1, 1991
Type: FOA
Mission: Administer military justice programs; provide legal research technology and train legal professionals; support the Department of Justice in civil or criminal litigation pertaining to the Air Force. **Personnel:** 555

Air Force Manpower Analysis Agency

Headquarters: JBSA-Randolph, Texas
Date of Current Designation: June 1, 2015
Type: FOA
Mission: Measure and document Air Force manpower requirements. **Personnel:** 139

Air Force Medical Readiness Agency

Headquarters: Falls Church, Va.
Date of Current Designation: June 28, 2019
Type: FOA
Mission: Enterprise-level policy development, management and oversight of medical readiness programs, strategic partnerships, medical capability development, operational medical logistics, dental operations, and programs unique to the deployed environment and to the Air Force. The Air Force activated the agency while simultaneously deactivating the Air Force Medical Operations Agency and Air Force Medical Support Agency. **Personnel:** 302

Air Force Mortuary Affairs Operations

Headquarters: Dover AFB, Del.
Date of Current Designation: Jan. 6, 2009
Type: FOA
Mission: Ensure respectful handling, dignity, and honor of the fallen; provide care, service, and support to family of the fallen; transfer remains. **Personnel:** 19

Air Force Office of Special Investigations

Headquarters: Quantico, Va.
Date of Current Designation: Dec. 20, 1971
Type: FOA
Mission: Provide investigative service to USAF commanders; identify, exploit, and neutralize criminal, terrorist, and intelligence threats; combat threats to information systems and technologies; defeat fraud affecting acquisitions and base-level capabilities. **Personnel:** 120

Air Force Operational Test and Evaluation Center

Headquarters: Kirtland AFB, N.M.
Date of Current Designation: April 4, 1983
Type: DRU
Mission: Test and evaluate new weapon systems. **Personnel:** 298

Air Force Operations Group

Headquarters: Pentagon
Date of Current Designation: April 1, 1995
Type: FOA
Mission: Provide 24-hour watch on current operations; train and staff Crisis Action Team; develop weather data for National Command Authority, Joint Chiefs of Staff, National Military Command Center, Army Operations Center, and other federal agencies. **Personnel:** 34

Air Force Personnel Center

Headquarters: JBSA-Randolph, Texas
Date of Current Designation: Oct. 1, 1995
Type: FOA
Mission: Identify proper grades, specialties, and skill levels for USAF mission; manage assignments; monitor professional development; plan and schedule expeditionary forces; oversee airmen and family readiness centers; assist casualty reporting and missing in action/prisoner of war actions. **Personnel:** 666

Air Force Public Affairs Agency

Headquarters: JBSA-Lackland, Texas
Date of Current Designation: Oct. 1, 2008
Type: FOA
Mission: Develop and sustain public affairs products; provide combat camera and graphics support; test emerging technologies; manage public affairs personnel deployments.
Personnel: 55

Air Force Review Boards Agency

Headquarters: JB Andrews, Md.
Date of Current Designation: Aug. 1, 1991
Type: FOA
Mission: Manage military and civilian appellate processes; serve as lead agent for DOD Physical Disability Board of Review. **Personnel:** 29

Air Force Safety Center

Headquarters: Kirtland AFB, N.M.
Date of Current Designation: Jan. 1, 1996
Type: FOA
Mission: Manage mishap prevention, risk management, and nuclear surety programs; provide flight, ground, weapons, human factors, and space safety technical assistance; oversee major command mishap investigations and evaluate corrective actions; direct safety education programs.
Personnel: 48

Air National Guard Readiness Center

Headquarters: JB Andrews, Md.
Date of Current Designation: June 1, 1992
Type: FOA
Mission: Ensure field units have resources to train and equip forces for state and federal missions; sustain airmen and help shape leadership capability. **Personnel:** 36

National Air and Space Intelligence Center

Headquarters: Wright-Patterson AFB, Ohio
Date of Current Designation: Feb. 20, 2003
Type: FOA
Mission: To discover and characterize air, space, missile, and cyber threats to enable full-spectrum multi-domain operations, drive weapon system acquisition, and inform national defense policy. **Personnel:** 148

US Air Force Academy

Headquarters: Colorado Springs, Colo.
Date of Current Designation: April 1, 1954
Type: DRU
Mission: Develop, educate, and inspire young men and women to become USAF officers with knowledge, character, and discipline. **Personnel:** 201 **Cadets:** 4,000

Civil Air Patrol

Headquarters: Maxwell AFB, Ala.
Date of Current Designation: Dec. 1, 1941
Type: Auxiliary
Mission: Provide operational capabilities to support search and rescue, disaster relief, a nationwide communications network, and counterdrug and homeland security missions; conduct leadership training, and career and technical education for CAP Cadet Program; promote aerospace education. **Total Volunteers:** 60,00

AIR FORCE WINGS

There are 144 wings in the U.S. Air Force. All of them trace their history to the 1st Pursuit Wing, formed in France by the American Expeditionary Forces of the U.S. Army in July 1918. The term "wing" has remained in use ever since.

Air wings in World War II were administrative and operational organizations that typically controlled multiple combat groups and service organizations. Today's wings are smaller, dating their history to 1948, when the newly independent Air Force established permanent combat wings consisting of a combat group, an air base group, a maintenance and supply group, and a medical group.

In most cases, wings' numerical designator evolved from the combat group that preceded it. For example, today's 14th Flying Training Wing traces its history to the 14th Fighter Wing and, before that, the 14th Fighter Group. Each group within the wing takes on the wing's numerical designator.

Every wing has a distinct mission and scope, whether that is operational, managing an air base, or performing specialized missions such as intelligence or training. Operational wings typically consist of an operations group and provide their own maintenance, supply, munitions, and often base support. Those that are tenant organizations rely on host commands to provide base and related support services.

1st Fighter Wing
JB Langley-Eustis, Va.
ACC
F-22, T-38A

1st Special Operations Wing
Hurlburt Field, Fla.
AFSOC
AC-130J/U, CV-22, MC-130, MQ-9, U-28A

2nd Bomb Wing
Barksdale AFB, La.
AFGSC
B-52H

3rd Wing
JB Elmendorf-Richardson, Alaska
PACAF
C-12, C-17, E-3, F-22

4th Fighter Wing
Seymour Johnson AFB, N.C.
ACC
F-15E

5th Bomb Wing
Minot AFB, N.D.
AFGSC
B-52H

6th Air Mobility Wing
MacDill AFB, Fla.
AMC
C-37, KC-135

7th Bomb Wing
Dyess AFB, Texas
AFGSC
B-1B

8th Fighter Wing
Kunsan Air Base, South Korea
PACAF
F-16C/D

9th Reconnaissance Wing
Beale AFB, Calif.
ACC
RQ-4, T-38A, U-2

10th Air Base Wing
Air Force Academy, Colo.
USAFA
Education, Medical, Infrastructure

11th Wing
JB Andrews, Md.
UH-1N
AFDW

12th Flying Training Wing
JB San Antonio-Randolph, Texas
AETC
T-1A, T-6A, T-38C

14th Flying Training Wing
Colombus AFB, Miss.
AETC
T-1A, T-6A, T-38C

15th Wing
JB Pearl Harbor-Hickam, Hawaii
PACAF
C-17, C-37, C-40B, F-22, KC-135

17th Training Wing
Goodfellow AFB, Texas
AETC
Technical Training, Crypto/Intelligence Training-All Services

18th Wing
Kadena Air Base, Japan
PACAF
E-3, F-15C/D, HH-60, KC-135

19th Airlift Wing
Little Rock AFB, Ark.
AMC
C-130H/J

20th Fighter Wing
Shaw AFB, S.C.
ACC
F-16CM

22nd Air Refueling Wing
McConnell AFB, Kan.
AMC
KC-46, KC-135

23rd Wing
Moody AFB, Ga.
ACC
A-10, HC-130J, HH-60

24th Operations Wing
Hurlburt Field, Fla.
AFSOC
Special Training and Tactics

27th Special Operations Wing
Cannon AFB, N.M.
AFSOC
AC-130J, C-46, CV-22, MC-130J, MQ-9, U-28A

28th Bomb Wing
Ellsworth AFB, S.D.
AFGSC
B-1B

31st Fighter Wing
Aviano Air Base, Italy
USAFE
F-16C/D, HH-60

33rd Fighter Wing
Eglin AFB, Fla.
AETC
F-35

35th Fighter Wing
Misawa Air Base, Japan
PACAF
F-16CM

36th Wing
Andersen AFB, Guam
PACAF
Host Unit, Base Operations

37th Training Wing
JB San Antonio-Lackland, Texas
AETC
Host Unit, Training Operations

39th Air Base Wing
Incirlik Air Base, Turkey
USAFE
Host Unit, Base Operations/Support

42nd Air Base Wing
Maxwell-Gunter AFB, Ala.
AETC
Host Unit, Air University Support

EXPEDITIONARY WINGS

Expeditionary wings include headquarters staffs, but do not own their own aircraft and personnel. Instead, deployed personnel and equipment are assigned based on mission requirements.

332nd Air Expeditionary Wing
Southwest Asia (Undisclosed Locations)
ACC
A-10C F-15E, F-16C, HC-130P, HH-60G, KC-135R, MQ-9

379th Air Expeditionary Wing
Al Udeid Air Base, Qatar
ACC
B-1, B-52, C-17, C-21, C-130H/J, E-8C, KC-135, RC-135V/W

380th Air Expeditionary Wing
Al Dhafra Air Base, UAE
ACC
E-3, KC-10, RQ-4, U-2

386th Air Expeditionary Wing
Ali Al Salem Air Base, Kuwait
ACC
C-130E/H, EC-130

47th Flying Training Wing
Laughlin AFB, Texas
AETC
T-1A, T-6A, T-38C

48th Fighter Wing
RAF Lakenheath, U.K.
USAFE
F-15C/D, F-15E, HH-60

49th Wing
Holloman AFB, N.M.
AETC
MQ-9

51st Fighter Wing
Osan Air Base, South Korea
PACAF
A-10, F-16C/D

52nd Fighter Wing
Spangdahlem Air Base, Germany
USAFE
F-16C/D

53rd Wing
Eglin AFB, Fla.
ACC
Testing and Evaluation. A-10, B-1B, B-2, B-52H, BQM-167, E-9A, F-15C/D/E, F-16C/D, F-22, F-35, HC-130J, HH-60, MQ-9, QF-16, RQ-4, U-2

55th Wing
Offutt AFB, Neb.
ACC
EC-130H, OC-135B, RC-135S/U/V/W, TC-135S/W, WC-135

56th Fighter Wing
Luke AFB Ariz.
AETC
Training. F-16, F-35

57th Wing
Nellis AFB, Nev.
ACC
Training and Tactics. A-10, E-3C, E-8C, EC-130, F-15C/C/E, F-16, F-22, F-35, HH-60, MQ-9, RC-135

58th Special Operations Wing
Kirtland AFB, N.M.
AETC
Training, Special Operations. Combat Search and Rescue. CV-22, HC-130J/P/N, HH-60, MC-130H/J/P, TH-1H, UH-1N

59th Medical Wing
JB San Antonio, Texas
AETC
Military Medical Services

60th Air Mobility Wing
Travis AFB, Calif.
AMC
C-5M, C-17, KC-10

62nd Airlift Wing
JB Lewis-McChord, Wash.
AMC
C-17

67th Cyberspace Wing
JB San Antonio-Lackland, Texas
ACC
Cyber Operations

70th Intelligence, Surveillance and Reconnaissance Wing
Fort George Meade, Md.
AFISRA
ACC
Primary provider of signals intelligence to national leaders and combat commanders

71st Flying Training Wing
Vance AFB, Okla.
AETC
T-1A, T-6A, T-38C

72nd Air Base Wing
Tinker AFB, Okla.
AFMC
Host Unit, Base Operations and Support

75th Air Base Wing
Hill AFB, Utah
AFMC
Host Unit, Base Operations and Support

76th Maintenance Wing
Tinker AFB, Okla.
AFSC
AFMC
Aircraft Depot Maintenance, Repair, Modifications

78th Air Base Wing
Robins AFB
AFMC
Host Unit, Base Operations and Support

80th Flying Training Wing
Sheppard AFB, Texas
AETC
T-6A, T-38C

81st Training Wing
Keesler AFB, Miss.
AETC
Electronics Training for USAF, USN, USA, USMC, CG, Federal/Civilian Personnel

82nd Training Wing
Sheppard AFB, Texas
AETC
Host Unit, Base Operations and Support

86th Airlift Wing
Ramstein Air Base, Germany
USAFE
C-21, C-37A, C-40B, C-130J

87th Air Base Wing
JB McGuire-Dix-Lakehurst, N.J.
AMC
Host Unit, Base Operations and Support

88th Air Base Wing
Wright-Patterson AFB, Ohio
AFMC
Host Unit, Base Operations and Support

89th Airlift Wing
JB Andrews, Md.
AMC
C-20B, C-32A, C-37A/B, C-40B, VC-25A

90th Missile Wing
F.E. Warren AFB, Wyo.
AFGSC
Minuteman III, UH-1N

91st Missile Wing
Minot AFB, N.D.
Minuteman III, UH-1N

92nd Air Refueling Wing
Fairchild AFB, Wash.
AMC
C-17, KC-135

93rd Air Ground Operations Wing
Moody AFB, Ga.
ACC
Manage/Provide combat-ready TACAIR personnel, battlefield weather, and force protection assets

94th Airlift Wing
Dobbins ARB, Ga.
AFRC
C-130H

96th Test Wing
Eglin AFB, Fla.
AFMC
Aircraft Test and Evaluation Center. A-10, F-15C/E, F-16CG/CJ, UH-1N

97th Air Mobility Wing
Altus AFB, Okla.
AETC
C-17, KC-46, KC-135

99th Air Base Wing
Nellis AFB, Nev.
ACC
Host unit, base installation and support, Nevada Test and Training Range

100th Air Refueling Wing
RAF Mildenhall, U.K.
USAFE
CV-22, KC-135, MC-130J, RC-135V/W

301st Fighter Wing
Naval Air Station JRB, Fort Worth, Texas
AFRC
F-16C/D

302nd Airlift Wing
Peterson AFB, Colo.
AFRC
C-130H (Modular Airborne Firefighting System)

305th Air Mobility Wing
JB McGuire-Dix-Lakehurst, N.J.
AMC
C17, KC-10

307th Bomb Wing
Barksdale AFB, La.
AFRC
B-52H

310th Space Wing
Schriever AFB, Colo.
AFRC
Space operations, control, warning

314th Airlift Wing
Little Rock AFB, Ark.
AETC
C-130J

315th Airlift Wing
JB Charleston, S.C.
AFRC
C-17

317th Airlift Wing
Dyess AFB, Texas
ACC
C-130J

319th Reconnaissance Wing
Grand Forks AFB, N.D.
ACC
RQ-4

432nd Wing
Creech AFB, Nev.
ACC
MQ-9, RQ-170

433rd Airlift Wing
JB San Antonio-Lackland (Kelly Field Annex), Texas
AFRC
C-5M

434th Air Refueling Wing
Grissom AFB, Ind.
AFRC
KC-135

435th Air Ground Operations Wing
Ramstein Air Base, Germany
USAFE
Expeditionary airfield operations

436th Airlift Wing
Dover AFB, Del.
AMC
C-5M, C-17

325th Fighter Wing
Tyndall AFB, Fla.
ACC
F-22

341st Missile Wing
Malmstrom AFB, Mont.
AFGSC
Minuteman III, UH-1N

349th Air Mobility Wing
Travis AFB, Calif.
AFRC
C-5M, C-17, KC-10

352nd Special Operations Wing
RAF Mildenhall, U.K.
AFSOC
MC-130J, CV-22

354th Fighter Wing
Eielson AFB, Alaska
PACAF
F-16C/D

437th Airlift Wing
JB Charleston, S.C.
AMC
C-17

439th Airlift Wing
Westover AFB, Mass.
AFRC
C-5M

442nd Fighter Wing
Whiteman AFB, Mo.
AFRC
A-10C

445th Airlift Wing
Wright-Patterson AFB, Ohio
AFRC
C-17

446th Airlift Wing
JB Lewis-McChord (McChord Field), Wash.
AFRC
C-17

355th Fighter Wing
Davis-Monthan AFB, Ariz.
ACC
A-10, EC-130, F-16, HC-130J, HH-60

363rd Intelligence, Surveillance and Reconnaissance Wing
JB Langley-Eustis, Va.
ACC
Analysis for air, space and cyber operations, ISR, testing, tactics development

366th Fighter Wing
Mountain Home AFB, Idaho
ACC
F-15E

374th Airlift Wing
Yokota Air Base, Japan
PACAF
C-12J, C-130J, UH-1N

375th Air Mobility Wing
Scott AFB, Ill.
AMC
C-21, C-40, KC-135, NC-21

448th Supply Chain Maintenance Wing
Tinker AFB, Okla.
AFMC
Supply chain management and global logistics

452nd Air Mobility Wing
March ARB, Calif.
AFRC
C-17, KC-135

459th Air Refueling Wing
JB Andrews, Md.
AFRC
KC-135

461st Air Control Wing
Robins AFB, Ga.
ACC
E-8C

480th ISR Wing
JB Langley-Eustis, Va.
ACC
DCGS, ISR, cyber support/operations for USAF

377th Air Base Wing
Kirtland AFB, N.M.
AFGSC
Base support, nuclear operations, expeditionary force training

388th Fighter Wing
Hill AFB, Utah
ACC
F-35A
F-16C/D

403rd Wing
Keesler AFB, Miss.
AFRC
C-130J, WC-130J

412th Test Wing
Edwards AFB, Calif.
AFTC
Base support, aircraft flying, systems testing, maintenance, engineering, test pilot school

419th Fighter Wing
Hill AFB, Utah
AFRC
F-35A

482nd Fighter Wing
Homestead AFB, Fla.
AFRC
F-16C

501st Combat Support Wing
RAF Alconbury, U.K.
USAFE
Administrative support

502nd Air Base Wing
JB San Antonio-Sam Houston, Texas
AETC
Installation support

505th Command & Control Wing
Hurlburt Field, Fla.
ACC
Training, tactics, operations, command/control

507th Air Refueling Wing
Tinker AFB, Okla.
AFRC
KC-135

509th Bomb Wing
Whiteman AFB, Mo.
AFGSC
B-2

512th Airlift Wing
Dover AFB, Del.
AFRC
C-5M, C-17

514th Air Mobility Wing
JB McGuire-Dix-Lakehurst, N.J.
AFRC
C-17, KC-10

515th Air Mobility Operations Wing
JB Pearl Harbor-Hickam, Hawaii
AMC
Contingency airfield operations/logistics

521st Air Mobility Operations Wing
Ramstein Air Base, Germany
AMC
Contingency airfield operations/logistics

552nd Air Control Wing
Tinker AFB, Okla.
ACC
E-3

557th Wing
Offutt AFB, Neb.
Worldwide weather information for USAF and unified combatant commands

621st Contingency Response Wing
JB McGuire-Dix-Lakehurst, N.J.
AMC
Air mobility operations, training, development

628th Air Base Wing
JB Charleston, S.C.
AMC
Base support, administration, operations

633rd Air Base Wing
JB Langley-Eustis, Va.
ACC
Base support, administration, operations

635th Supply Chain Management Wing
Scott AFB, Ill.
AFMC
Global supply chain management

655th Intelligence, Surveillance and Reconnaissance Wing
Wright-Patterson AFB, Ohio
AFRC
Intelligence operations

673rd Air Base Wing
JB Elmendorf-Richardson, Alaska
PACAF
Joint base facilities support

688th Cyberspace Wing
JB San Antonio-Lackland, Texas
ACC
Cyberspace military operations, intelligence, communications

711th Human Performance Wing
Wright-Patterson AFB, Ohio
AFRL
Human performance research in air, space, cyberspace

908th Airlift Wing
Maxwell AFB, Ala.
AFRC
C-130H

910th Airlift Wing
Youngstown-Warren Air Reserve Station, Ohio
AFRC
C-130H

911th Airlift Wing
Pittsburgh Air Reserve Station, Pa.
AFRC
C-17

914th Air Refueling Wing
Niagara Falls Air Reserve Station, N.Y.
AFRC
KC-135

916th Air Refueling Wing
Seymour Johnson AFB, N.C.
AFRC
KC-135

919th Special Operations Wing
Duke Field, Fla.
AFRC
C-130, C-145A, C-146A, MQ-9, U-28

920th Rescue Wing
Patrick SFB, Fla.
AFRC
HC-130N, HH-60

926th Wing
Nellis AFB, Nev.
AFRC
F-16, F-15C/E, F-22, F-35, RQ-4, MQ-9

927th Air Refueling Wing
MacDill AFB, Fla.
AFRC
KC-135

931st Air Refueling Wing
McConnell AFB, Kan.
AFRC
KC-46, KC-135

932nd Airlift Wing
Scott AFB, Ill.
AFRC
C-40

934th Airlift Wing
Minneapolis-St. Paul Joint Air Reserve Station, Minn.
AFRC
C-130

940th Air Refueling Wing
Beale AFB, Calif.
AFRC
KC-135

944th Fighter Wing
Luke AFB, Ariz.
AFRC
A-10, F-15E, F-16C, F-35A

USAF AIRCRAFT TAIL CODES

AC 177th FW (ANG), Atlantic City Arpt., N.J.
AF USAF Academy, Colo.
AK 3rd Wing (PACAF), JB Elmendorf-Richardson, Alaska
354th FW (PACAF), Eielson AFB, Alaska
176th Wing (ANG), JB Elmendorf-Richardson, Alaska
AL 187th FW (ANG), Montgomery Regional Arpt., Ala.
AP 12th FTW (AETC), NAS Pensacola, Fla.
AV 31st FW (USAFE), Aviano AB, Italy
AZ 162nd Wing (ANG), Tucson Arpt., Ariz.
BB 9th RW (ACC), Beale AFB, Calif.
Det. 2, 53rd Wing (ACC), Beale AFB, Calif.
BD 307th BW (AFRC), Barksdale AFB, La.
CA 129th RQW (ANG), Moffett ANGB, Calif.
144th FW (ANG), Fresno Yosemite Arpt., Calif.
163rd ATKW (ANG), March ARB, Calif.
CB 14th FTW (AETC), Columbus AFB, Miss.
CH 432nd Wing (ACC), Creech AFB, Nev.
CO 140th Wing (ANG), Buckley SFB, Colo.
CT 103rd AW (ANG), Bradley ANGB, Conn.
D 100th ARW (USAFE), RAF Mildenhall, U.K.
DC 113th Wing (ANG), JB Andrews, Md.
DM 355th FW (ACC), Davis-Monthan AFB, Ariz.
DR 943rd RQG (AFRC), Davis-Monthan AFB, Ariz.
DY 7th BW (AFGSC), Dyess AFB, Texas
ED 412th TW (AFMC), Edwards AFB, Calif.
EG 33rd FW (AETC), Eglin AFB, Fla.
EL 28th BW (AFGSC), Ellsworth AFB, S.D.
EN 80th FTW (AETC), Sheppard AFB, Texas
ET 96th TW (AFMC), Eglin AFB, Fla.
FC 336th TRG (AETC), Fairchild AFB, Wash.
FE 90th MW (AFGSC), F. E. Warren AFB, Wyo.
FF 1st FW (ACC), JB Langley-Eustis, Va.
192nd FW (ANG), JB Langley-Eustis, Va.
FL 920th RQW (AFRC), Patrick SFB, Fla.
FM 482nd FW (AFRC), Homestead ARB, Fla.
FS 188th Wing (ANG), Fort Smith Arpt., Ark.
FT 23rd Wing (ACC), Moody AFB, Ga.
GA 116th ACW (ANG), Robins AFB, Ga.
165th AW (ANG), Savannah Hilton Head Arpt., Ga.
HD Det. 1, 53rd Wing (ACC), Holloman AFB, N.M.
HH 15th Wing (PACAF), JB Pearl Harbor-Hickam, Hawaii
154th Wing (ANG), JB Pearl Harbor-Hickam, Hawaii
HL 388th FW (ACC), Hill AFB, Utah
419th FW (AFRC), Hill AFB, Utah
HO 49th Wing (ACC), Holloman AFB, N.M.
IA 132nd Wing (ANG), Des Moines Arpt., Iowa
ID 124th FW (ANG), Boise Air Terminal, Idaho
IN 122nd FW (ANG), Fort Wayne, Ind.
JZ 159th FW (ANG), NAS JRB New Orleans, La.
KC 442nd FW (AFRC), Whiteman AFB, Mo.
LA 2nd BW (AFGSC), Barksdale AFB, La.
LF 56th FW (AETC), Luke AFB, Ariz.
LI 106th RQW (ANG), F. S. Gabreski Arpt., N.Y.
LN 48th FW (USAFE), RAF Lakenheath, U.K.
MA 104th FW (ANG), Barnes Arpt., Mass.
MD 175th Wing (ANG), Warfield ANGB/Martin State Arpt., Md.
MI 127th Wing (ANG), Selfridge ANGB, Mich.
MM 341st MW (AFGSC), Malmstrom AFB, Mont.
MN 133rd AW (ANG), Minn.-St. Paul Arpt./ARS, Minn.
148th FW (ANG), Duluth Arpt., Minn.
MO 366th FW (ACC), Mountain Home AFB, Idaho
MT 5th BW (AFGSC), Minot AFB, N.D.
91st MW (AFGSC), Minot AFB, N.D.
NY 174th ATKW (ANG), Hancock Fld., N.Y.
OF 55th Wing (ACC), Offutt AFB, Neb.
OH 179th AW (ANG), Mansfield Lahm Arpt., Ohio
180th FW (ANG), Toledo Express Arpt., Ohio
OK 137th SOW (ANG), Will Rogers ANGB, Okla.
138th FW (ANG), Tulsa Arpt., Okla.
552nd ACW (ACC), Tinker AFB, Okla.
OS 51st FW (PACAF), Osan AB, South Korea
OT 31st TES (ACC), Edwards AFB, Calif.
49th TES (ACC), Barksdale AFB, La.
53rd Wing (ACC), Eglin AFB, Fla.
88th TES (ACC), Nellis AFB, Nev.
337th TES (ACC), Dyess AFB, Texas
422nd TES (ACC), Nellis AFB, Nev.
556th TES (ACC), Creech AFB, Nev.
Det. 4, 53rd Wing (ACC), Creech AFB, Nev.
RA 12th FTW (AETC), JBSA-Randolph, Texas
RS 86th AW (USAFE), Ramstein AB, Germany
SA 149th FW (ANG), JBSA-Lackland, Texas
SC 169th FW (ANG), McEntire JNGB, S.C.
SD 114th FW (ANG), Joe Foss Fld., S.D.
SJ 4th FW (ACC), Seymour Johnson AFB, N.C.
SP 52nd FW (USAFE), Spangdahlem AB, Germany
SW 20th FW (ACC), Shaw AFB, S.C.
TD 53rd WEG (ACC), Tyndall AFB, Fla.
TX 147th ATKW (ANG), Ellington Fld., Texas
301st FW (AFRC), NAS Fort Worth JRB, Texas
TY 325th FW (ACC), Tyndall AFB, Fla.
VN 71st FTW (AETC), Vance AFB, Okla.
WA 57th Wing (ACC), Nellis AFB, Nev.
WI 115th FW (ANG), Truax Fld., Wis.
WM 72nd TES (AFGSC), Whiteman AFB, Mo.
509th BW (AFGSC), Whiteman AFB, Mo.
WP 8th FW (PACAF), Kunsan AB, South Korea
WV 130th AW (ANG), Yeager Arpt., W.Va.
WW 35th FW (PACAF), Misawa AB, Japan
XL 47th FTW (AETC), Laughlin AFB, Texas
YJ 374th AW (PACAF), Yokota AB, Japan
ZZ 18th Wing (PACAF), Kadena AB, Japan

AIR FORCE LEADERS THROUGH THE YEARS

The Nation's Air Arm and Its Early Leaders

DESIGNATION	COMMANDER	DATES OF SERVICE	
AERONAUTICAL DIVISION, US SIGNAL CORPS **Aug. 1, 1907 - July 18, 1914**			
Chief, Aeronautical Division	Capt. Charles deForest Chandler	Aug. 1, 1907	June 30, 1910
	Capt. Arthur S. Cowan	July 1, 1910	June 19, 1911
	Capt. Charles deForest Chandler	June 20, 1911	Sept. 9, 1913
	Maj. Samuel Reber	Sept. 10, 1913	July 17, 1914
AVIATION SECTION, US SIGNAL CORPS[a] July 18, 1914 - May 20, 1918			
Chief, Aviation Section	Lt. Col. Samuel Reber	July 18, 1914	May 5, 1916
	Lt. Col. George O. Squier	May 20, 1916	Feb. 19, 1917
	Lt. Col. John B. Bennet	Feb. 19, 1917	June 30, 1917
	Maj. Benjamin D. Foulois	June 30, 1917	Nov. 12, 1917
	Brig. Gen. Arthur I. Dade	Nov. 12, 1917	Feb. 27, 1918
	Col. Lawrence Brown	Feb. 27, 1918	May 20, 1918
DIVISION OF MILITARY AERONAUTICS, SECRETARY OF WAR May 20, 1918 - May 24, 1918			
Director of Military Aeronautics	Maj. Gen. William L. Kenly	May 20, 1918	August 1918
	(Kept same title three months into absorption by Air Service)		
AIR SERVICE May 24, 1918 - July 2, 1926			
Director of Air Service	John D. Ryan	Aug. 28, 1918	Nov. 27, 1918
	Maj. Gen. Charles T. Menoher	Jan. 2, 1919	June 4, 1920
Chief of Air Service	Maj. Gen. Charles T. Menoher	June 4, 1920	Oct. 4, 1921
	Maj. Gen. Mason M. Patrick	Oct. 5, 1921	July 2, 1926
AIR CORPS[b] July 2, 1926 - Sept. 18, 1947			
Chief of Air Corps	Maj. Gen. Mason M. Patrick	July 2, 1926	Dec. 13, 1927
	Maj. Gen. James E. Fechet	Dec. 14, 1927	Dec. 19, 1931
	Maj. Gen. Benjamin D. Foulois	Dec. 20, 1931	Dec. 21, 1935
	Maj. Gen. Oscar Westover	Dec. 22, 1935	Sept. 21, 1938
	Maj. Gen. Henry H. Arnold	Sept. 29, 1938	June 20, 1941
ARMY AIR FORCES (AAF) June 20, 1941 - Sept. 18, 1947			
Chief, Army Air Forces	Lt. Gen. Henry H. Arnold	June 20, 1941	March 9, 1942
Commanding General, AAF	Gen. of the Army Henry H. Arnold[c]	March 9, 1942	Feb. 9, 1946
	Gen. Carl A. Spaatz	Feb. 9, 1946	Sept. 26, 1947
UNITED STATES AIR FORCE[d] Sept. 18, 1947			
Chief of Staff	Gen. Carl A. Spaatz	Sept. 26, 1947	April 29, 1948

[a]Between April 1917 and May 1918, the Aviation Section was known by various other names: Aeronautical Division, Airplane Division, Air Division, and Air Service Division.

[b]The Air Corps became a subordinate element of the Army Air Forces June 20, 1941. Since the Air Corps had been established by statute in 1926, its disestablishment required an act of Congress, which did not take place until 1947. Between March 9, 1942, and Sept. 18, 1947, the Air Corps continued to exist as a combatant arm, and personnel of the Army Air Forces were still assigned to the Air Corps.

[c]The title General of the Army for Henry H. Arnold was changed to General of the Air Force by an act of Congress May 7, 1949. The position of Chief of Staff was established by a DOD-approved Army-Air Force Transfer Order issued Sept. 28, 1947.

[d]For U.S. Space Force lineage, see p. tk.

Air Force Leaders

SECRETARY OF THE AIR FORCE

Stuart Symington	Sept. 18, 1947	April 24, 1950
Thomas K. Finletter	April 24, 1950	Jan. 20, 1953
Harold E. Talbott	Feb. 4, 1953	Aug. 13, 1955
Donald A. Quarles	Aug. 15, 1955	April 30, 1957
James H. Douglas Jr.	May 1, 1957	Dec. 10, 1959
Dudley C. Sharp	Dec. 11, 1959	Jan. 20, 1961
Eugene M. Zuckert	Jan. 23, 1961	Sept. 30, 1965
Harold Brown	Oct. 1, 1965	Feb. 14, 1969
Robert C. Seamans Jr.	Feb. 15, 1969	May 14, 1973
John L. McLucas*	May 15, 1973	Nov. 23, 1975
James W. Plummer (acting)	Nov. 23, 1975	Jan. 2, 1976
Thomas C. Reed	Jan. 2, 1976	April 6, 1977
John C. Stetson	April 6, 1977	May 18, 1979
Hans M. Mark*	May 18, 1979	Feb. 9, 1981
Verne Orr	Feb. 9, 1981	Nov. 30, 1985
Russell A. Rourke	Dec. 6, 1985	April 7, 1986
Edward C. Aldridge Jr.*	April 8, 1986	Dec. 16, 1988
James F. McGovern (acting)	Dec. 16, 1988	April 29, 1989
John J. Welch Jr. (acting)	April 29, 1989	May 21, 1989
Donald B. Rice	May 22, 1989	Jan. 20, 1993
Michael B. Donley (acting)	Jan. 20, 1993	July 13, 1993
Gen. Merrill A. McPeak (acting)	July 14, 1993	Aug. 5, 1993
Sheila E. Widnall	Aug. 6, 1993	Oct. 31, 1997
F. Whitten Peters*	Nov. 1, 1997	Jan. 20, 2001
Lawrence J. Delaney (acting)	Jan. 20, 2001	June 1, 2001
James G. Roche	June 1, 2001	Jan. 20, 2005
Peter B. Teets (acting)	Jan. 20, 2005	March 25, 2005
Michael L. Dominguez (acting)	March 25, 2005	July 29, 2005
Preston M. Geren (acting)	July 29, 2005	Nov. 3, 2005
Michael W. Wynne	Nov. 3, 2005	June 20, 2008
Michael B. Donley*	June 21, 2008	June 21, 2013
Eric K. Fanning (acting)	June 21, 2013	Dec. 20, 2013
Deborah Lee James	Dec. 20, 2013	Jan. 19, 2017
Lisa S. Disbrow (acting)	Jan. 20, 2017	May 16, 2017
Heather A. Wilson	May 16, 2017	May 31, 2019
Matthew P. Donovan (acting)	June 1, 2019	Oct. 16, 2019
Barbara M. Barrett	Oct. 16, 2019	Jan. 20, 2021
John P. Roth (acting)	Jan. 20, 2021	

*Served as acting Secretary: McLucas until July 18, 1973; Mark until July 26, 1979; Aldridge until June 9, 1986; Peters until July 30, 1999; Donley until Oct. 17, 2008.

CHIEF OF STAFF OF THE AIR FORCE

Gen. Carl A. Spaatz	Sept. 26, 1947	April 29, 1948
Gen. Hoyt S. Vandenberg	April 30, 1948	June 29, 1953
Gen. Nathan F. Twining	June 30, 1953	June 30, 1957
Gen. Thomas D. White	July 1, 1957	June 30, 1961
Gen. Curtis E. LeMay	June 30, 1961	Jan. 31, 1965
Gen. John P. McConnell	Feb. 1, 1965	July 31, 1969
Gen. John D. Ryan	Aug. 1, 1969	July 31, 1973
Gen. George S. Brown	Aug. 1, 1973	June 30, 1974
Gen. David C. Jones	July 1, 1974	June 20, 1978
Gen. Lew Allen Jr.	July 1, 1978	June 30, 1982
Gen. Charles A. Gabriel	July 1, 1982	June 30, 1986
Gen. Larry D. Welch	July 1, 1986	June 30, 1990
Gen. Michael J. Dugan	July 1, 1990	Sept. 17, 1990
Gen. John Michael Loh (acting)	Sept. 18, 1990	Oct. 27, 1990
Gen. Merrill A. McPeak	Oct. 27, 1990	Oct. 25, 1994
Gen. Ronald R. Fogleman	Oct. 25, 1994	Sept. 1, 1997
Gen. Ralph E. Eberhart (acting)	Sept. 1, 1997	Oct. 6, 1997
Gen. Michael E. Ryan	Oct. 6, 1997	Sept. 6, 2001
Gen. John P. Jumper	Sept. 6, 2001	Sept. 2, 2005
Gen. T. Michael Moseley	Sept. 2, 2005	July 12, 2008
Gen. Duncan J. McNabb (acting)	July 12, 2008	Aug. 12, 2008
Gen. Norton A. Schwartz	Aug. 12, 2008	Aug. 10, 2012
Gen. Mark A. Welsh III	Aug. 10, 2012	July 1, 2016
Gen. David L. Goldfein*	July 1, 2016	Aug. 6, 2020
Gen. Charles Q. Brown Jr.	Aug. 6, 2020	

VICE CHIEF OF STAFF OF THE AIR FORCE

Gen. Hoyt S. Vandenberg	Oct. 10, 1947	April 28, 1948
Gen. Muir S. Fairchild	May 27, 1948	March 17, 1950
Lt. Gen. Lauris Norstad (acting)	May 22, 1950	Oct. 9, 1950
Gen. Nathan F. Twining	Oct. 10, 1950	June 29, 1953
Gen. Thomas D. White	June 30, 1953	June 30, 1957
Gen. Curtis E. LeMay	July 1, 1957	June 30, 1961
Gen. Frederic H. Smith Jr.	July 1, 1961	June 30, 1962
Gen. William F. McKee	July 1, 1962	July 31, 1964
Gen. John P. McConnell	Aug. 1, 1964	Jan. 31, 1965
Gen. William H. Blanchard	Feb. 19, 1965	May 31, 1966
Lt. Gen. Hewitt T. Wheless (acting)	June 13, 1966	July 31, 1966
Gen. Bruce K. Holloway	Aug. 1, 1966	July 31, 1968
Gen. John D. Ryan	Aug. 1, 1968	July 31, 1969
Gen. John C. Meyer	Aug. 1, 1969	April 30, 1972
Gen. Horace M. Wade	May 1, 1972	Oct. 31, 1973
Gen. Richard H. Ellis	Nov. 1, 1973	Aug. 18, 1975
Gen. William V. McBride	Sept. 1, 1975	March 31, 1978
Gen. Lew Allen Jr.	April 1, 1978	June 30, 1978
Gen. James A. Hill	July 1, 1978	Feb. 29, 1980
Gen. Robert C. Mathis	March 1, 1980	May 31, 1982
Gen. Jerome F. O'Malley	June 1, 1982	Oct. 5, 1983
Gen. Lawrence A. Skantze	Oct. 6, 1983	July 31, 1984
Gen. Larry D. Welch	Aug. 1, 1984	July 31, 1985
Gen. John L. Piotrowski	Aug. 1, 1985	Jan. 31, 1987
Gen. Monroe W. Hatch Jr.	Feb. 1, 1987	May 24, 1990
Gen. John Michael Loh	May 25, 1990	March 25, 1991
Gen. Michael P. C. Carns	May 16, 1991	July 28, 1994
Gen. Thomas S. Moorman Jr.	July 29, 1994	July 11, 1997
Gen. Ralph E. Eberhart	July 11, 1997	May 26, 1999
Gen. Lester L. Lyles	May 27, 1999	April 17, 2000
Gen. John W. Handy	April 17, 2000	Nov. 5, 2001
Gen. Robert H. Foglesong	Nov. 5, 2001	Aug. 11, 2003
Gen. T. Michael Moseley	Aug. 12, 2003	Sept. 2, 2005
Gen. John D. W. Corley	Sept. 2, 2005	Sept. 17, 2007
Gen. Duncan J. McNabb	Sept. 17, 2007	Sept. 4, 2008
Gen. William M. Fraser III	Oct. 8, 2008	Aug. 27, 2009
Gen. Carrol H. Chandler	Aug. 27, 2009	Jan. 14, 2011
Gen. Philip M. Breedlove	Jan. 14, 2011	July 27, 2012
Gen. Larry O. Spencer	July 27, 2012	Aug. 6, 2015
Gen. David L. Goldfein	Aug. 6, 2015	July 1, 2016
Gen. Stephen W. Wilson	July 22, 2016	Nov. 16, 2020
Gen. David W. Allvin	Nov. 16, 2020	

CHIEF MASTER SERGEANT OF THE AIR FORCE

CMSAF Paul W. Airey	April 3, 1967	July 31, 1969
CMSAF Donald L. Harlow	Aug. 1, 1969	Sept. 30, 1971
CMSAF Richard D. Kisling	Oct. 1, 1971	Sept. 30, 1973
CMSAF Thomas N. Barnes	Oct. 1, 1973	July 31, 1977
CMSAF Robert D. Gaylor	Aug. 1, 1977	July 31, 1979
CMSAF James M. McCoy	Aug. 1, 1979	July 31, 1981
CMSAF Arthur L. Andrews	Aug. 1, 1981	July 31, 1983
CMSAF Sam E. Parish	Aug. 1, 1983	June 30, 1986
CMSAF James C. Binnicker	July 1, 1986	July 31, 1990
CMSAF Gary R. Pfingston	Aug. 1, 1990	Oct. 25, 1994
CMSAF David J. Campanale	Oct. 26, 1994	Nov. 4, 1996
CMSAF Eric W. Benken	Nov. 5, 1996	July 30, 1999
CMSAF Frederick J. Finch	July 30, 1999	July 1, 2002
CMSAF Gerald R. Murray	July 1, 2002	June 30, 2006
CMSAF Rodney J. McKinley	June 30, 2006	June 30, 2009
CMSAF James A. Roy	June 30, 2009	Jan. 24, 2013
CMSAF James A. Cody	Jan. 24, 2013	Feb. 17, 2017
CMSAF Kaleth O. Wright	Feb. 17, 2017	Aug. 14, 2020
CMSAF JoAnne S. Bass	Aug. 14, 2020	

MAJOR COMMAND AND ANG LEADERS

This section presents the leaders of USAF's Major Commands and the Air National Guard (ANG) under a command's current designation. **Leaders of historic Air Force major commands (and of active commands' previous designations) are listed online.**

AIR COMBAT COMMAND

Gen. John Michael Loh	June 1, 1992	June 23, 1995
Gen. Joseph W. Ralston	June 23, 1995	Feb. 28, 1996
Lt. Gen. Brett M. Dula (acting)	Feb. 28, 1996	April 5, 1996
Gen. Richard E. Hawley	April 5, 1996	June 11, 1999
Gen. Ralph E. Eberhart	June 11, 1999	Feb. 8, 2000
Gen. John P. Jumper	Feb. 8, 2000	Aug. 25, 2001
Lt. Gen. Donald G. Cook (acting)	Aug. 25, 2001	Nov. 14, 2001
Gen. Hal M. Hornburg	Nov. 14, 2001	Nov. 17, 2004
Lt. Gen. Bruce A. Wright (acting)	Nov. 17, 2004	Feb. 3, 2005
Lt. Gen. William Fraser III (acting)	Feb. 3, 2005	May 27, 2005
Gen. Ronald E. Keys	May 27, 2005	Oct. 2, 2007
Gen. John D. W. Corley	Oct. 2, 2007	Sept. 10, 2009
Gen. William M. Fraser III	Sept. 10, 2009	Sept. 13, 2011
Gen. Gilmary Michael Hostage III	Sept. 13, 2011	Nov. 4, 2014
Gen. Herbert J. Carlisle	Nov. 4, 2014	March 10, 2017
Gen. James M. Holmes	March 10, 2017	Aug. 28, 2020
Gen. Mark D. Kelly	Aug. 28, 2020	

For past leaders, see Tactical Air Command in Historic Major Command Leaders.

AIR EDUCATION AND TRAINING COMMAND

Gen. Henry Viccellio Jr.	July 1, 1993	June 20, 1995
Gen. Billy J. Boles	June 20, 1995	March 17, 1997
Gen. Lloyd W. Newton	March 17, 1997	June 22, 2000
Gen. Hal M. Hornburg	June 22, 2000	Nov. 10, 2001
Lt. Gen. John D. Hopper Jr. (acting)	Nov. 10, 2001	Dec. 15, 2001
Gen. Donald G. Cook	Dec. 15, 2001	June 17, 2005
Gen. William R. Looney III	June 17, 2005	July 2, 2008
Gen. Stephen R. Lorenz	July 2, 2008	Nov. 17, 2010
Gen. Edward A. Rice Jr.	Nov. 17, 2010	Oct. 10, 2013
Gen. Robin Rand	Oct. 10, 2013	July 21, 2015
Lt. Gen. Darryl L. Roberson	July 21, 2015	Nov. 16, 2017
Lt. Gen. Steven L. Kwast	Nov. 16, 2017	July 26, 2019
Gen. Marshall B. Webb	July 26, 2019	

For past leaders see Air Training Command in Historic Major Command Leaders.

AIR FORCE GLOBAL STRIKE COMMAND

Lt. Gen. Frank G. Klotz	Aug. 7, 2009	Jan. 6, 2011
Lt. Gen. James M. Kowalski	Jan. 6, 2011	Oct. 23, 2013
Lt. Gen. Stephen W. Wilson	Oct. 23, 2013	July 28, 2015
Gen. Robin Rand	July 28, 2015	Aug. 21, 2018
Gen. Timothy M. Ray	Aug. 21, 2018	

For past leaders, see Strategic Air Command in Historic Major Command leaders.

AIR FORCE MATERIEL COMMAND

Gen. Ronald W. Yates	July 1, 1992	June 30, 1995
Gen. Henry Viccellio Jr.	June 30, 1995	May 9, 1997
Lt. Gen. Kenneth Eickmann (acting)	May 9, 1997	May 29, 1997
Gen. George T. Babbitt Jr.	May 29, 1997	April 20, 2000
Gen. Lester L. Lyles	April 20, 2000	Aug. 22, 2003
Gen. Gregory S. Martin	Aug. 22, 2003	Aug. 19, 2005
Gen. Bruce Carlson	Aug. 19, 2005	Nov. 21, 2008
Gen. Donald J. Hoffman	Nov. 21, 2008	June 5, 2012
Gen. Janet C. Wolfenbarger	June 5, 2012	June 8, 2015
Gen. Ellen M. Pawlikowski	June 8, 2015	Sept. 1, 2018
Lt. Gen. Robert D. McMurry Jr. (interim)	Sept. 1, 2018	May 31, 2019
Gen. Arnold W. Bunch Jr.	May 31, 2019	

AIR FORCE RESERVE COMMAND

Maj. Gen. Robert A. McIntosh	Feb. 17, 1997	June 9, 1998
Maj. Gen. David R. Smith (acting)	June 9, 1998	Sept. 25, 1998
Lt. Gen. James E. Sherrard III	Sept. 25, 1998	June 1, 2004
Maj. Gen. J. J. Batbie Jr. (acting)	June 1, 2004	June 24, 2004
Lt. Gen. John A. Bradley	June 24, 2004	June 24, 2008
Lt. Gen. Charles E. Stenner Jr.	June 24, 2008	July 30, 2012
Lt. Gen. James F. Jackson	July 30, 2012	July 15, 2016
Lt. Gen. Maryanne Miller	July 15, 2016	Sept. 7, 2018
Lt. Gen. Richard W. Scobee	Sept. 7, 2018	

For past leaders, see Air Force Reserve in Historic Major Command Leaders.

AIR FORCE SPECIAL OPERATIONS COMMAND

Maj. Gen. Thomas E. Eggers	May 22, 1990	June 30, 1991
Maj. Gen. Bruce L. Fister	June 30, 1991	July 22, 1994
Maj. Gen. James L. Hobson Jr.	July 22, 1994	July 9, 1997
Maj. Gen. Charles R. Holland	July 9, 1997	Aug. 5, 1999
Lt. Gen. Maxwell C. Bailey	Aug. 5, 1999	Jan. 16, 2002
Lt. Gen. Paul V. Hester	Jan. 16, 2002	July 1, 2004
Lt. Gen. Michael W. Wooley	July 1, 2004	Nov. 27, 2007
Lt. Gen. Donald C. Wurster	Nov. 27, 2007	June 24, 2011
Lt. Gen. Eric E. Fiel	June 24, 2011	July 3, 2014
Lt. Gen. Bradley A. Heithold	July 3, 2014	July 19, 2016
Lt. Gen. Marshall B. Webb	July 19, 2016	May 31, 2019
Lt. Gen. James C. Slife	June 1, 2019	

On Dec. 20, 2019, Air Force Space Command was redesignated U.S. Space Force, and Gen. John W. Raymond became Chief of Space Operations, USSF.

AIR MOBILITY COMMAND

Gen. Hansford T. Johnson	June 1, 1992	Aug. 25, 1992
Gen. Ronald R. Fogleman	Aug. 25, 1992	Oct. 18, 1994
Gen. Robert L. Rutherford	Oct. 18, 1994	July 15, 1996
Gen. Walter Kross	July 15, 1996	Aug. 3, 1998
Gen. Charles T. Robertson Jr.	Aug. 3, 1998	Nov. 5, 2001
Gen. John W. Handy	Nov. 5, 2001	Sept. 7, 2005
Lt. Gen. Christopher Kelly (acting)	Sept. 7, 2005	Oct. 14, 2005
Gen. Duncan J. McNabb	Oct. 14, 2005	Sept. 7, 2007
Gen. Arthur J. Lichte	Sept. 7, 2007	Nov. 20, 2009
Gen. Raymond E. Johns Jr.	Nov. 20, 2009	Nov. 30, 2012
Gen. Paul J. Selva	Nov. 30, 2012	May 5, 2014
Gen. Darren W. McDew	May 5, 2014	Aug. 11, 2015
Gen. Carlton D. Everhart II	Aug. 11, 2015	Sept. 7, 2018
Gen. Maryanne Miller	Sept. 7, 2018	Aug. 20, 2020
Gen. Jacqueline D. Van Ovost	Aug. 20, 2020	

For past leaders, see Military Airlift Command in Historic Major Command Leaders.

AIR NATIONAL GUARD

Col. William A. R. Robertson	Nov. 28, 1945	October 1948
Maj. Gen. George G. Finch	October 1948	Sept. 25, 1950
Maj. Gen. Earl T. Ricks	Oct. 13, 1950	Jan. 4, 1954
Maj. Gen. Winston P. Wilson	Jan. 26, 1954	Aug. 5, 1962
Maj. Gen. I. G. Brown	Aug. 6, 1962	April 19, 1974
Maj. Gen. John J. Pesch	April 20, 1974	Jan. 31, 1977
Maj. Gen. John T. Guice	Feb. 1, 1977	April 1, 1981
Maj. Gen. John B. Conaway	April 1, 1981	Nov. 1, 1988
Maj. Gen. Philip G. Killey	Nov. 1, 1988	Jan. 28, 1994
Maj. Gen. Donald W. Shepperd	Jan. 28, 1994	Jan. 28, 1998
Maj. Gen. Paul A. Weaver Jr.	Jan. 28, 1998	Dec. 3, 2001
Brig. Gen. David Brubaker (acting)	Dec. 3, 2001	June 3, 2002
Lt. Gen. Daniel James III	June 3, 2002	May 20, 2006
Lt. Gen. Craig R. McKinley	May 20, 2006	Nov. 17, 2008
Maj. Gen. Emmett Titshaw (acting)	Nov. 17, 2008	Feb. 2, 2009
Lt. Gen. Harry M. Wyatt III	Feb. 2, 2009	March 22, 2013
Lt. Gen. Stanley E. Clarke III	March 22, 2013	Dec. 18, 2015
Maj. Gen. Brian G. Neal (acting)	Dec. 18, 2015	May 10, 2016
Lt. Gen. L. Scott Rice	May 10, 2016	July 28, 2020
Lt. Gen. Michael A. Loh	July 28, 2020	

PACIFIC AIR FORCES

Gen. Laurence S. Kuter	July 1, 1957	Aug. 1, 1959

Gen. Emmett O'Donnell Jr.	Aug. 1, 1959	Aug. 1, 1963
Gen. Jacob E. Smart	Aug. 1, 1963	Aug. 1, 1964
Gen. Hunter Harris Jr.	Aug. 1, 1964	Feb. 1, 1967
Gen. John D. Ryan	Feb. 1, 1967	Aug. 1, 1968
Gen. Joseph J. Nazzaro	Aug. 1, 1968	Aug. 1, 1971
Gen. Lucius D. Clay Jr.	Aug. 1, 1971	Oct. 1, 1973
Gen. John W. Vogt Jr.	Oct. 1, 1973	July 1, 1974
Gen. Louis L. Wilson Jr.	July 1, 1974	June 3, 1977
Lt. Gen. James A. Hill	June 3, 1977	June 15, 1978
Lt. Gen. James D. Hughes	June 15, 1978	June 8, 1981
Lt. Gen. Arnold W. Braswell	June 8, 1981	Oct. 8, 1983
Gen. Jerome F. O'Malley	Oct. 8, 1983	Sept. 25, 1984
Gen. Robert W. Bazley	Sept. 25, 1984	Dec. 16, 1986
Gen. Jack I. Gregory	Dec. 16, 1986	July 22, 1988
Gen. Merrill A. McPeak	July 22, 1988	Nov. 5, 1990
Lt. Gen. James B. Davis	Nov. 5, 1990	Feb. 19, 1991
Gen. Jimmie V. Adams	Feb. 19, 1991	Jan. 22, 1993
Gen. Robert L. Rutherford	Jan. 22, 1993	Oct. 12, 1994
Gen. John G. Lorber	Oct. 12, 1994	July 7, 1997
Gen. Richard B. Myers	July 7, 1997	July 23, 1998
Gen. Patrick K. Gamble	July 23, 1998	April 9, 2001
Lt. Gen. Lansford E. Trapp (acting)	April 9, 2001	May 4, 2001
Gen. William J. Begert	May 4, 2001	July 2, 2004
Gen. Paul V. Hester	July 2, 2004	Nov. 30, 2007
Gen. Carrol H. Chandler	Nov. 30, 2007	Aug. 19, 2009
Gen. Gary L. North	Aug. 19, 2009	Aug. 3, 2012
Gen. Herbert J. Carlisle	Aug. 3, 2012	Oct. 16, 2014
Gen. Lori J. Robinson	Oct. 16, 2014	May 11, 2016
Lt. Gen. Russell J. Handy (acting)	May 11, 2016	July 12, 2016
Gen. Terrence J. O'Shaughnessy	July 12, 2016	May 20, 2018
Lt. Gen. Jerry P. Martinez (acting)	May 20, 2018	July 26, 2018
Gen. Charles Q. Brown Jr.	July 26, 2018	July 8, 2020
Gen. Kenneth S. Wilsbach	July 8, 2020	

US AIR FORCES IN EUROPE

Lt. Gen. John K. Cannon	Aug. 7, 1945	Aug. 14, 1947
Brig. Gen. John F. McBlain (acting)	Aug. 14, 1947	Oct. 20, 1947
Lt. Gen. Curtis E. LeMay	Oct. 20, 1947	Oct. 16, 1948

*Gen. Charles Q. Brown Jr. was confirmed to be USAF Chief of Staff on June 9, 2020. For past leaders, see Far East Air Forces in Historic Major Command Leaders.

Tommie Horton/USAF

Gen. Ellen Pawlikowski (right), then commander of Air Force Materiel Command, discusses F-15 maintenance with Donald Brock, 561st Aircraft Maintenance Group sheet metal mechanic, during a visit to Robins Air Force Base, Ga., on March 22, 2018.

NATO

Gen. Lauris Norstad commanded USAFE, headquartered in Germany, in the early 1950s, and was commanding general of the Allied Air Forces in Central Europe under the Supreme Headquarters of the Allied Powers in Europe.

Lt. Gen. John K. Cannon	Oct. 16, 1948	Jan. 21, 1951
Gen. Lauris Norstad	Jan. 21, 1951	July 27, 1953
Lt. Gen. William H. Tunner	July 27, 1953	July 1, 1957
Gen. Frank F. Everest	July 1, 1957	Aug. 1, 1959
Gen. Frederic H. Smith Jr.	Aug. 1, 1959	July 1, 1961
Gen. Truman H. Landon	July 1, 1961	Aug. 1, 1963
Gen. Gabriel P. Disosway	Aug. 1, 1963	Aug. 1, 1965
Gen. Bruce K. Holloway	Aug. 1, 1965	Aug. 1, 1966
Gen. Maurice A. Preston	Aug. 1, 1966	Aug. 1, 1968
Gen. Horace M. Wade	Aug. 1, 1968	Aug. 1, 1969
Gen. Joseph R. Holzapple	Feb. 1, 1969	Sept. 1, 1971
Gen. David C. Jones	Sept. 1, 1971	July 1, 1974
Gen. John W. Vogt	July 1, 1974	Sept. 1, 1975
Gen. Richard H. Ellis	Sept. 1, 1975	Aug. 1, 1977
Gen. William J. Evans	Aug. 1, 1977	Aug. 1, 1978
Gen. John W. Pauly	Aug. 1, 1978	Aug. 1, 1980
Gen. Charles A. Gabriel	Aug. 1, 1980	June 30, 1982
Gen. Billy M. Minter	July 1, 1982	Nov. 1, 1984
Gen. Charles L. Donnelly Jr.	Nov. 1, 1984	May 1, 1987
Gen. William L. Kirk	May 1, 1987	April 12, 1989
Gen. Michael J. Dugan	April 12, 1989	June 26, 1990
Gen. Robert C. Oaks	June 26, 1990	July 29, 1994
Gen. James L. Jamerson	July 29, 1994	July 17, 1995
Gen. Richard E. Hawley	July 17, 1995	April 4, 1996
Gen. Michael E. Ryan	April 4, 1996	Oct. 6, 1997
Lt. Gen. William J. Begert (acting)	Oct. 6, 1997	Dec. 5, 1997
Gen. John P. Jumper	Dec. 5, 1997	Jan. 13, 2000
Gen. Gregory S. Martin	Jan. 13, 2000	Aug. 12, 2003
Gen. Robert H. Foglesong	Aug. 12, 2003	Dec. 6, 2005
Gen. William T. Hobbins	Dec. 6, 2005	Dec. 10, 2007
Lt. Gen. Robert D. Bishop Jr. (acting)	Dec. 10, 2007	Jan. 9, 2008
Gen. Roger A. Brady	Jan. 9, 2008	Dec. 13, 2010
Gen. Mark A. Welsh III	Dec. 13, 2010	July 31, 2012
Gen. Philip M. Breedlove	July 31, 2012	May 10, 2013
Lt. Gen. Noel T. Jones (acting)	May 10, 2013	Aug. 2, 2013
Gen. Frank Gorenc	Aug. 2, 2013	Aug. 11, 2016
Gen. Tod D. Wolters	Aug. 11, 2016	May 1, 2019
Gen. Gen. Jeffrey L. Harrigian	May 1, 2019	

For past leaders, see U.S. Strategic Air Forces in Europe in Historic Major Command Leaders.

HEADQUARTERS DOD LEADERS

SECRETARY OF DEFENSE

James V. Forrestal	Sept. 17, 1947	March 28, 1949
Louis A. Johnson	March 28, 1949	Sept. 19, 1950
George C. Marshall	Sept. 21, 1950	Sept. 12, 1951
Robert A. Lovett	Sept. 17, 1951	Jan. 20, 1953
Charles E. Wilson	Jan. 28, 1953	Oct. 8, 1957
Neil H. McElroy	Oct. 9, 1957	Dec. 1, 1959
Thomas S. Gates	Dec. 2, 1959	Jan. 20, 1961
Robert S. McNamara	Jan. 21, 1961	Feb. 29, 1968
Clark M. Clifford	March 1, 1968	Jan. 20, 1969
Melvin R. Laird	Jan. 22, 1969	Jan. 29, 1973
Elliot L. Richardson	Jan. 30, 1973	May 24, 1973
James R. Schlesinger	July 2, 1973	Nov. 19, 1975
Donald H. Rumsfeld	Nov. 20, 1975	Jan. 20, 1977
Harold Brown	Jan. 21, 1977	Jan. 20, 1981
Caspar W. Weinberger	Jan. 21, 1981	Nov. 23, 1987
Frank C. Carlucci	Nov. 23, 1987	Jan. 20, 1989
Richard B. Cheney	March 21, 1989	Jan. 20, 1993
Les Aspin	Jan. 21, 1993	Feb. 3, 1994
William J. Perry	Feb. 3, 1994	Jan. 23, 1997
William S. Cohen	Jan. 24, 1997	Jan. 20, 2001
Donald H. Rumsfeld	Jan. 20, 2001	Dec. 18, 2006
Robert M. Gates	Dec. 18, 2006	July 1, 2011
Leon E. Panetta	July 1, 2011	Feb. 27, 2013
Chuck Hagel	Feb. 27, 2013	Feb. 17, 2015
Ashton B. Carter	Feb. 17, 2015	Jan. 19, 2017
James N. Mattis	Jan. 20, 2017	Dec. 31, 2018
Patrick. M. Shanahan (acting)	Jan. 1, 2019	June 24, 2019
Mark T. Esper	July 23, 2019	Nov. 9, 2020
Lloyd J. Austin III	Jan. 22, 2021	

CHAIRMAN OF THE JOINT CHIEFS OF STAFF

Gen. of the Army Omar N. Bradley	Aug. 16, 1949	Aug. 15, 1953
Adm. Arthur W. Radford, USN	Aug. 15, 1953	Aug. 15, 1957
Gen. Nathan F. Twining, USAF	Aug. 15, 1957	Sept. 30, 1960
Gen. Lyman L. Lemnitzer, USA	Oct. 1, 1960	Sept. 30, 1962
Gen. Maxwell D. Taylor, USA	Oct. 1, 1962	July 1, 1964
Gen. Earle G. Wheeler, USA	July 3, 1964	July 2, 1970
Adm. Thomas H. Moorer, USN	July 2, 1970	July 1, 1974
Gen. George S. Brown, USAF	July 1, 1974	June 20, 1978
Gen. David C. Jones, USAF	June 21, 1978	June 18, 1982
Gen. John W. Vessey Jr., USA	June 18, 1982	Sept. 30, 1985
Adm. William J. Crowe Jr., USN	Oct. 1, 1985	Sept. 30, 1989
Gen. Colin L. Powell, USA	Oct. 1, 1989	Sept. 30, 1993
Adm. David Jeremiah, USN (acting)	Oct. 1, 1993	Oct. 24, 1993
Gen. John M. Shalikashvili, USA	Oct. 25, 1993	Sept. 30, 1997
Gen. Henry H. Shelton, USA	Oct. 1, 1997	Oct. 1, 2001
Gen. Richard B. Myers, USAF	Oct. 1, 2001	Sept. 30, 2005
Gen. Peter Pace, USMC	Sept. 30, 2005	Oct. 1, 2007
Adm. Michael G. Mullen, USN	Oct. 1, 2007	Sept. 30, 2011
Gen. Martin E. Dempsey, USA	Sept. 30, 2011	Sept. 25, 2015
Gen. Joseph F. Dunford Jr., USMC	Sept. 25, 2015	Sept. 30, 2019
Gen. Mark A. Milley, USA	Oct. 1, 2019	

VICE CHAIRMAN OF THE JOINT CHIEFS OF STAFF

Gen. Robert T. Herres, USAF	Feb. 6, 1987	Feb. 28, 1990
Adm. David E. Jeremiah, USN	March 1, 1990	Feb. 28, 1994
Adm. William A. Owens, USN	March 1, 1994	Feb. 27, 1996
Gen. Joseph W. Ralston, USAF	March 1, 1996	Feb. 29, 2000
Gen. Richard B. Myers, USAF	March 1, 2000	Oct. 1, 2001
Gen. Peter Pace, USMC	Oct. 1, 2001	Aug. 12, 2005
Adm. Edmund Giambastiani Jr., USN	Aug. 12, 2005	Aug. 3, 2007
Gen. James E. Cartwright, USMC	Aug. 4, 2007	Aug. 4, 2011
Adm. James A. Winnefeld Jr., USN	Aug. 4, 2011	July 31, 2015
Gen. Paul J. Selva, USAF	July 31, 2015	Nov. 21, 2019
Gen. John E. Hyten, USAF	Nov. 21, 2019	

UNIFIED COMMAND, NATIONAL GUARD BUREAU, AND NORAD LEADERS

This section presents the leaders of DOD's Unified Commands, the National Guard Bureau, and NORAD under the current designation.

Leaders of historic DOD commands (and of active commands' previous designations) are listed online.

Staff Sgt. R.J. Biermann

Gen. Philip Breedlove, U.S. Air Forces in Europe and Air Forces Africa commander, greets Airmen from Combined Joint Task Force-Horn of Africa in 2012.

US AFRICA COMMAND

Gen. William E. Ward, USA	Oct. 1, 2008	March 9, 2011
Gen. Carter F. Ham, USA	March 9, 2011	April 5, 2013
Gen. David M. Rodriguez, USA	April 5, 2013	July 18, 2016
Gen. Thomas D. Waldhauser, USMC	July 18, 2016	July 26, 2019
Gen. Stephen J. Townsend, USA	July 26, 2019	

US CENTRAL COMMAND

Gen. Robert C. Kingston, USA	Jan. 1, 1983	Nov. 27, 1985
Gen. George B. Crist, USMC	Nov. 27, 1985	Nov. 23, 1988
Gen. H. Norman Schwarzkopf, USA	Nov. 23, 1988	Aug. 9, 1991
Gen. Joseph P. Hoar, USMC	Aug. 9, 1991	Aug. 5, 1994
Gen. J. H. Binford Peay III, USA	Aug. 5, 1994	Aug. 13, 1997
Gen. Anthony C. Zinni, USMC	Aug. 13, 1997	July 6, 2000
Gen. Tommy R. Franks, USA	July 6, 2000	July 7, 2003
Gen. John P. Abizaid, USA	July 7, 2003	March 16, 2007
Adm. William J. Fallon, USN	March 16, 2007	March 31, 2008
Lt. Gen. Martin Dempsey, USA (acting)	March 31, 2008	Oct. 31, 2008
Gen. David H. Petraeus, USA	Oct. 31, 2008	June 30, 2010
Lt. Gen. John R. Allen, USMC (acting)	June 30, 2010	Aug. 11, 2010
Gen. James N. Mattis, USMC	Aug. 11, 2010	March 22, 2013
Gen. Lloyd J. Austin III, USA	March 22, 2013	March 30, 2016
Gen. Joseph L. Votel, USA	March 30, 2016	March 28, 2019
Gen. Kenneth F. McKenzie Jr., USMC	March 28, 2019	

US EUROPEAN COMMAND

Gen. Matthew B. Ridgway, USA	Aug. 1, 1952	July 11, 1953
Gen. Alfred M. Gruenther, USA	July 11, 1953	Nov. 20, 1956
Gen. Lauris Norstad, USAF	Nov. 20, 1956	Nov. 1, 1962
Gen. Lyman L. Lemnitzer, USA	Nov. 1, 1962	May 5, 1969
Gen. Andrew J. Goodpaster, USA	May 5, 1969	Nov. 1, 1974
Gen. Alexander M. Haig Jr., USA	Nov. 1, 1974	June 27, 1979
Gen. Bernard W. Rogers, USA	June 27, 1979	June 25, 1987
Gen. John R. Galvin, USA	June 25, 1987	June 23, 1992

UNIFIED COMMAND, NATIONAL GUARD BUREAU, AND NORAD LEADERS (continued)

Gen. John M. Shalikashvili, USA	June 23, 1992	Oct. 21, 1993
Gen. George A. Joulwan, USA	Oct. 21, 1993	July 10, 1997
Gen. Wesley K. Clark, USA	July 10, 1997	May 2, 2000
Gen. Joseph W. Ralston, USAF	May 2, 2000	Jan. 16, 2003
Gen. James L. Jones, USMC	Jan. 16, 2003	Dec. 4, 2006
Gen. Bantz J. Craddock, USA	Dec. 4, 2006	June 30, 2009
Adm. James G. Stavridis, USN	June 30, 2009	May 10, 2013
Gen. Philip M. Breedlove, USAF	May 10, 2013	May 3, 2016
Gen. Curtis M. Scaparrotti, USA	May 3, 2016	May 3, 2019
Gen. Tod D. Wolters, USAF	May 3, 2019	

US NORTHERN COMMAND

Gen. Ralph E. Eberhart, USAF	Oct. 1, 2002	Nov. 5, 2004
Adm. Timothy J. Keating, USN	Nov. 5, 2004	March 23, 2007
Gen. Victor E. Renuart Jr., USAF	March 23, 2007	May 19, 2010
Adm. James A. Winnefeld Jr., USN	May 19, 2010	Aug. 4, 2011
Gen. Charles H. Jacoby Jr., USA	Aug. 4, 2011	Dec. 5, 2014
Adm. William E. Gortney, USN	Dec. 5, 2014	May 13, 2016
Gen. Lori J. Robinson, USAF	May 13, 2016	May 24, 2018
Gen. Terrence J. O'Shaughnessy	May 24, 2018	Aug. 20, 2020
Gen. Glen D. Vanherck, USAF	Aug. 20, 2020	

US INDO-PACIFIC COMMAND

Adm. John H. Towers, USN	Jan. 1, 1947	Feb. 28, 1947
Adm. Louis E. Denfeld, USN	Feb. 28, 1947	Dec. 3, 1947
Adm. Dewitt C. Ramsey, USN	Dec. 3, 1947	April 30, 1949
Adm. Arthur W. Radford, USN	April 30, 1949	July 10, 1953
Adm. Felix B. Stump, USN	July 10, 1953	July 31, 1958
Adm. Harry D. Felt, USN	July 31, 1958	June 30, 1964
Adm. U. S. Grant Sharp, USN	June 30, 1964	July 31, 1968
Adm. John S. McCain Jr., USN	July 31, 1968	Sept. 1, 1972
Adm. Noel A. M. Gayler, USN	Sept. 1, 1972	Aug. 30, 1976
Adm. Maurice E. Weisner, USN	Aug. 30, 1976	Oct. 31, 1979
Adm. Robert L. J. Long, USN	Oct. 31, 1979	July 1, 1983

Master Sgt. Jose Roman via National Archives

Gen. Ralph Eberhart, then commander of North American Aerospace Defense Command and the United States Northern Command (NORTHCOM), speaks to 126th Air Refueling Wing Airmen.

Adm. William J. Crowe Jr., USN	July 1, 1983	Sept. 18, 1985
Adm. Ronald J. Hays Jr., USN	Sept. 18, 1985	Sept. 30, 1988
Adm. Huntington Hardisty, USN	Sept. 30, 1988	March 1, 1991
Adm. Charles R. Larson, USN	March 1, 1991	July 11, 1994
Lt. Gen. Harold Fields, USA (acting)	July 11, 1994	July 19, 1994
Adm. Richard C. Macke, USN	July 19, 1994	Jan. 31, 1996
Adm. Joseph W. Prueher, USN	Jan. 31, 1996	Feb. 20, 1999
Adm. Dennis C. Blair, USN	Feb. 20, 1999	May 2, 2002
Adm. Thomas B. Fargo, USN	May 2, 2002	Feb. 26, 2005
Adm. William J. Fallon, USN	Feb. 26, 2005	March 12, 2007
Lt. Gen. Daniel Leaf, USAF (acting)	March 12, 2007	March 26, 2007
Adm. Timothy J. Keating, USN	March 26, 2007	Oct. 19, 2009
Adm. Robert F. Willard, USN	Oct. 19, 2009	March 9, 2012

UNIFIED COMMAND, NATIONAL GUARD BUREAU, AND NORAD LEADERS (continued)

Adm. Samuel J. Locklear III, USN	March 9, 2012	May 27, 2015
Adm. Harry B. Harris Jr., USN	May 27, 2015	May 31, 2018
Adm. Philip S. Davidson, USN	May 31, 2018	April 30, 2021
Adm. John C. Aquilino, USN	April 30, 2021	

US SOUTHERN COMMAND

Gen. Andrew P. O'Meara, USA	June 6, 1963	Feb. 22, 1965
Gen. Robert W. Porter Jr., USA	Feb. 22, 1965	Feb. 18, 1969
Gen. George R. Mather, USA	Feb. 18, 1969	Sept. 20, 1971
Gen. George V. Underwood, USA	Sept. 20, 1971	Jan. 17, 1973
Gen. William B. Rosson, USA	Jan. 17, 1973	Aug. 1, 1975
Lt. Gen. Dennis P. McAuliffe, USA	Aug. 1, 1975	Oct. 1, 1979
Lt. Gen. Wallace H. Nutting, USA	Oct. 1, 1979	May 24, 1983
Gen. Paul F. Gorman, USA	May 24, 1983	March 1, 1985
Gen. John R. Galvin, USA	March 1, 1985	June 6, 1987
Gen. Fred F. Woerner, USA	June 6, 1987	Oct. 1, 1989
Gen. Maxwell R. Thurman, USA	Oct. 1, 1989	Nov. 21, 1990
Gen. George A. Joulwan, USA	Nov. 21, 1990	October 1993
Maj. Gen. W. Worthington, USAF (acting)	October 1993	Feb. 17, 1994
Gen. Barry R. McCaffrey, USA	Feb. 17, 1994	March 1, 1996
RAdm. James Perkins, USN (acting)	March 1, 1996	June 26, 1996
Gen. Wesley K. Clark, USA	June 26, 1996	July 13, 1997
RAdm. Walter F. Doran, USN (acting)	July 13, 1997	Sept. 25, 1997
Gen. Charles E. Wilhelm, USMC	Sept. 25, 1997	Sept. 8, 2000
Gen. Peter Pace, USMC	Sept. 8, 2000	Sept. 30, 2001
Maj. Gen. G. D. Speer, USA (acting)	Sept. 30, 2001	Aug. 18, 2002
Gen. James T. Hill, USA	Aug. 18, 2002	Nov. 9, 2004
Gen. Bantz J. Craddock, USA	Nov. 9, 2004	Oct. 19, 2006
Adm. James G. Stavridis, USN	Oct. 19, 2006	June 25, 2009
Gen. Douglas M. Fraser, USAF	June 25, 2009	Nov. 19, 2012
Gen. John F. Kelly, USMC	Nov. 19, 2012	Jan 14, 2016
Adm. Kurt W. Tidd, USN	Jan. 14, 2016	Nov. 26, 2018
Adm. Craig S. Faller, USN	Nov. 26, 2018	

Formerly US Caribbean Command Nov. 1, 1947. Redesignated June 6, 1963. For historical leaders, see US Caribbean Command in Historic Unified Command Leaders section.

US SPECIAL OPERATIONS COMMAND

Gen. James J. Lindsay, USA	April 16, 1987	June 27, 1990
Gen. Carl W. Stiner, USA	June 27, 1990	May 20, 1993
Gen. Wayne A. Downing, USA	May 20, 1993	Feb. 29, 1996
Gen. Henry H. Shelton, USA	Feb. 29, 1996	Sept. 25, 1997
Gen. Peter J. Schoomaker, USA	Nov. 5, 1997	Oct. 27, 2000
Gen. Charles R. Holland, USAF	Oct. 27, 2000	Sept. 2, 2003
Gen. Bryan D. Brown, USA	Sept. 2, 2003	July 9, 2007
Adm. Eric T. Olson, USN	July 9, 2007	Aug. 15, 2011
Adm. William H. McRaven, USN	Aug. 15, 2011	Aug. 28, 2014
Gen. Joseph L. Votel, USA	Aug. 28, 2014	March 30, 2016
Gen. Raymond A. Thomas, USA	March 30, 2016	March 29, 2019
Gen. Richard D. Clarke, USA	March 29, 2019	

US STRATEGIC COMMAND

Gen. George L. Butler, USAF	June 1, 1992	Feb. 13, 1994
Adm. Henry G. Chiles Jr., USN	Feb. 14, 1994	Feb. 21, 1996
Gen. Eugene E. Habiger, USAF	Feb. 22, 1996	June 25, 1998
Adm. Richard W. Mies, USN	June 26, 1998	Nov. 30, 2001
Adm. James O. Ellis Jr., USN	Nov. 30, 2001	July 9, 2004
Gen. James E. Cartwright, USMC	July 9, 2004	Aug. 10, 2007
Lt. Gen. Robert Kehler, USAF (acting)	Aug. 10, 2007	Oct. 3, 2007
Gen. Kevin P. Chilton, USAF	Oct. 3, 2007	Jan. 28, 2011
Gen. Robert Kehler, USAF	Jan. 28, 2011	Nov. 15, 2013
Adm. Cecil D. Haney, USN	Nov. 15, 2013	Nov. 3, 2016
Gen. John E. Hyten, USAF	Nov. 3, 2016	Nov 18, 2019
Adm Charles A. Richard, USN	Nov. 18, 2019	

Merged the functions of US Space Command into US Strategic Command Oct. 1, 2002.

US TRANSPORTATION COMMAND

Gen. Duane H. Cassidy, USAF	July 1, 1987	Sept. 21, 1989
Gen. H. T. Johnson, USAF	Sept. 22, 1989	Aug. 24, 1992
Gen. Ronald R. Fogleman, USAF	Aug. 25, 1992	Oct. 17, 1994
Gen. Robert L. Rutherford, USAF	Oct. 18, 1994	July 14, 1996
Gen. Walter Kross, USAF	July 15, 1996	Aug. 2, 1998
Gen. Charles T. Robertson Jr., USAF	Aug. 3, 1998	Nov. 5, 2001
Gen. John W. Handy, USAF	Nov. 5, 2001	Sept. 7, 2005
Gen. Norton A. Schwartz, USAF	Sept. 7, 2005	Aug. 11, 2008
VAdm. Ann E. Rondeau, USN (acting)	Aug. 12, 2008	Sept. 4, 2008
Gen. Duncan J. McNabb, USAF	Sept. 5, 2008	Oct. 14, 2011
Gen. William M. Fraser III, USAF	Oct. 14, 2011	May 5, 2014
Gen. Paul J. Selva, USAF	May 5, 2014	July 31, 2015
VAdm. William Brown, USN (acting)	July 31, 2015	Aug. 26, 2015
Gen. Darren W. McDew, USAF	Aug. 26, 2015	Aug. 24, 2018
Gen. Stephen R. Lyons, USA	Aug. 24, 2018	

NATIONAL GUARD BUREAU

Maj. Gen. Butler B. Miltonberger, USA	Feb. 1, 1946	Sept. 29, 1947
Maj. Gen. Kenneth F. Cramer, USA	Sept. 30, 1947	Sept. 4, 1950
Maj. Gen. Raymond H. Fleming, USA*	Sept. 5, 1950	Feb. 15, 1953
Maj. Gen. Earl T. Ricks, USAF (acting)	Feb. 16, 1953	June 21, 1953
Maj. Gen. Edgar C. Erickson, USA	June 22, 1953	May 31, 1959
Maj. Gen. Winston P. Wilson, USAF (acting)	June 1, 1959	July 19, 1959
Maj. Gen. Donald W. McGowan, USA	July 20, 1959	Aug. 30, 1963
Maj. Gen. Winston P. Wilson, USAF	Aug. 31, 1963	Aug. 31, 1971
Maj. Gen. Francis S. Greenlief, USA	Sept. 1, 1971	June 23, 1974
Lt. Gen. La Vern E. Weber, USA	Aug. 16, 1974	Aug. 15, 1982
Lt. Gen. Emmett H. Walker Jr., USA	Aug. 16, 1982	Aug. 15, 1986
Lt. Gen. Herbert R. Temple Jr., USA	Aug. 16, 1986	Jan. 31, 1990
Lt. Gen. John B. Conaway, USAF	Feb. 1, 1990	Dec. 1, 1993
Maj. Gen. Raymond Rees, USA (acting)	Jan. 1, 1994	July 31, 1994
Lt. Gen. Edward D. Baca, USA	Oct. 1, 1994	July 31, 1998
Lt. Gen. Russell C. Davis, USAF	Aug. 4, 1998	Aug. 3, 2002
Maj. Gen. Raymond Rees, USA (acting)	Aug. 4, 2002	April 10, 2003
Lt. Gen. H. Steven Blum, USA	April 11, 2003	Nov. 16, 2008
Gen. Craig R. McKinley, USAF	Nov. 17, 2008	Sept. 7, 2012
Gen. Frank J. Grass, USA	Sept. 7, 2012	Aug. 3, 2016
Gen. Joseph L. Lengyel, USAF	Aug. 3, 2016	Aug. 3, 2020
Gen. Daniel R. Hokanson, USA	Aug. 3, 2020	

*Fleming served as acting Chief until Aug. 14, 1951.

NORTH AMERICAN AEROSPACE DEFENSE COMMAND

Gen. Earle E. Partridge, USAF	Sept. 12, 1957	July 30, 1959
Gen. Laurence S. Kuter, USAF	Aug. 1, 1959	July 30, 1962
Gen. John K. Gerhart, USAF	Aug. 1, 1962	March 30, 1965
Gen. Dean C. Strother, USAF	April 1, 1965	July 29, 1966
Gen. Raymond J. Reeves, USAF	Aug. 1, 1966	July 31, 1969
Gen. Seth J. McKee, USAF	Aug. 1, 1969	Sept. 30, 1973
Gen. Lucius D. Clay Jr., USAF	Oct. 1, 1973	Aug. 29, 1975
Gen. Daniel James Jr., USAF	Sept. 1, 1975	Dec. 5, 1977
Gen. James E. Hill, USAF	Dec. 6, 1977	Dec. 31, 1979
Gen. James V. Hartinger, USAF	Jan. 1, 1980	July 30, 1984
Gen. Robert T. Herres, USAF	July 30, 1984	Feb. 5, 1987
Gen. John L. Piotrowski, USAF	Feb. 6, 1987	March 30, 1990
Gen. Donald J. Kutyna, USAF	April 1, 1990	June 30, 1992
Gen. Charles A. Horner, USAF	June 30, 1992	Sept. 12, 1994
Gen. Joseph W. Ashy, USAF	Sept. 13, 1994	Aug. 26, 1996
Gen. Howell M. Estes III, USAF	Aug. 27, 1996	Aug. 13, 1998
Gen. Richard B. Myers, USAF	Aug. 14, 1998	Feb. 22, 2000
Gen. Ralph E. Eberhart, USAF	Feb. 22, 2000	Nov. 5, 2004
Adm. Timothy J. Keating, USN	Nov. 5, 2004	March 23, 2007
Gen. Victor E. Renuart Jr., USAF	March 23, 2007	May 19, 2010
Adm. James A. Winnefeld Jr., USN	May 19, 2010	Aug. 4, 2011
Gen. Charles H. Jacoby Jr., USA	Aug. 4, 2011	Dec. 5, 2014
Adm. William E. Gortney, USN	Dec. 5, 2014	May 13, 2016
Gen. Lori J. Robinson, USAF	May 13, 2016	May 24, 2018
Gen. Terrance J. O'Shaughnessy	May 24, 2018	Aug. 20, 2020
Gen. Glen D. Vanherck, USAF	Aug. 20, 2020	

2021 ALMANAC

USAF & USSF INSTALLATIONS

William Lewis/USAF

A B-52 Stratofortress bomber aircraft assigned to the 340th Weapons Squadron at Barksdale Air Force Base, La., takes off during a U.S. Air Force Weapons School Integration exercise at Nellis Air Force Base, Nev., June 2.

Domestic Installations

Bases owned, operated by, or hosting substantial Department of the Air Force activities. Bases marked "USSF" were part of the former Air Force Space command and may not ultimately transfer to the Space Force. For sources and definitions, see *p. 121.*

Active Reserve Guard Range USSF States

United States

ALABAMA

Dannelly Field, Montgomery Regional Airport, Ala. 36108. ***Nearest city:*** Montgomery. ***Phone:*** 334-394-7200. ***Acres:*** 70. ***Total Force:*** civilian, 0; military, 1,237. ***Component:*** ANG. ***Unit/mission:*** 187th FW, fighter, ISR operations. ***History:*** Originally named for Ens. Clarence Dannelly, Navy pilot killed in WWII.

Hall ANGS, Dothan Regional Airport, Ala. 36303. ***Nearest city:*** Dothan. ***Phone:*** 334-596-0184. ***Acres:*** 21. ***Total Force:*** civilian, 0; military, 256. ***Component:*** ANG. ***Unit/mission:*** 280th Special Operations Communications Squadron, strategic air defense.

Maxwell AFB, Ala. 36112. ***Nearest city:*** Montgomery. ***Phone:*** 334-953-1110. ***Acres:*** 3,530 (Maxwell), 355 (Gunter annex). ***Total Force:*** civilian, 2,589; military, 4,131. ***Active-duty USAF:*** enlisted, 1,517; officer, 1501. ***Owning command:*** AETC. ***Unit/mission:*** 42nd ABW (AETC), support; 908th AW (AFRC), air mobility operations; Air Force Historical Research Agency (USAF), historical documentation, research; Air University (AETC); Hq. Civil Air Patrol (USAF), management; Hq. Air Force Judge Advocate General Corps (USAF), management; PEO-Business and Enterprise Systems (AFMC), acquisition. ***History:*** Activated 1918 at the site of the Wright brothers' flight school. Named for 2nd Lt. William C. Maxwell, killed in air accident Aug. 12, 1920. ***Museum:*** Air Park. ***Inn:*** 334-953-3931. (Maxwell); 334-416-2501 (Gunter). ***Golf:*** Cypress Tree.

Sumpter Smith ANGB, Birmingham-Shuttlesworth Intl. Airport, Ala. 35217. ***Nearest city:*** Birmingham. ***Phone:*** 205-714-2855. ***Acres:*** 140. ***Total Force:*** civilian, 0; military, 1,710. ***Component:*** ANG. ***Unit/mission:*** 99th ARS (AMC) (active associate), air mobility operations; 117th ARW, air mobility, intelligence operations. ***History:*** Named for Col. Walter Sumpter Smith, electrical engineer and pilot.

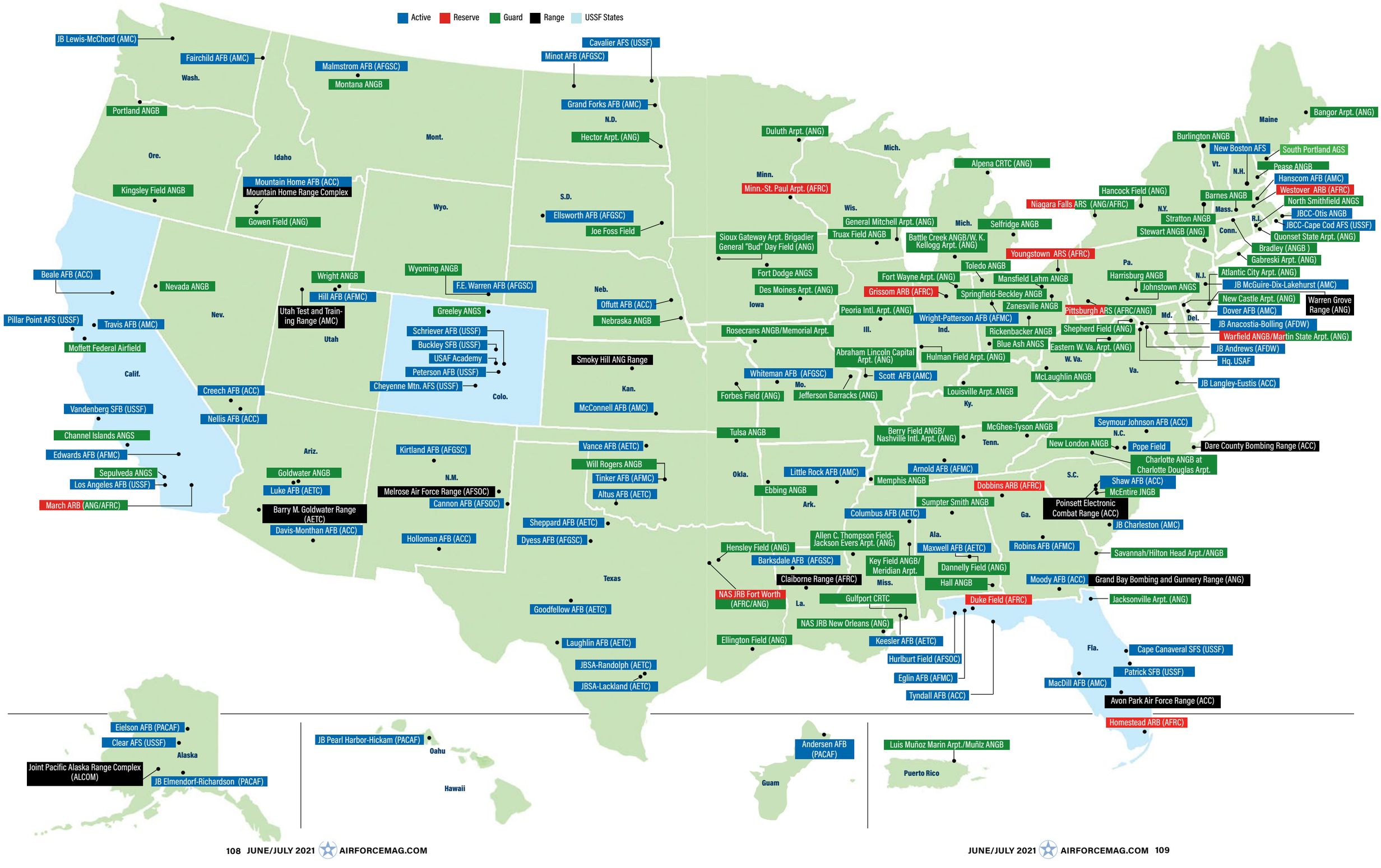
ALASKA

Clear AFS, Alaska 99704. ***Nearest city:*** Fairbanks. ***Phone:*** 907-585-6110. ***Acres:*** 11,438. ***Total Force:*** civilian, 0; military, 118. ***Owning command:*** USSF. ***Unit/mission:*** 13th SWS (USSF), 213th SWS (ANG), missile warning. ***History:*** Dates from 1961.

Eielson AFB, Alaska 99702. ***Nearest city:*** Fairbanks. ***Phone:*** 907-377-1110. ***Acres:*** 24,919. ***Total Force:*** civilian, 685; military, 3,227. ***Active-duty USAF:*** enlisted, 2,286; officer, 232. ***Owning command:*** PACAF. ***Unit/mission:*** 168th ARW (ANG), air mobility operations; 354th FW (PACAF), aggressor force, fighter, Red Flag-Alaska operations, Joint Pacific Alaska Range Complex support; Arctic Survival School (AETC), training. ***History:*** Activated October 1944. Named for Carl Ben Eielson, Arctic aviation pioneer who died in Arctic rescue mission in November 1929. ***Museum:*** Heritage Park. ***Inn:*** 907-377-1844.

JB Elmendorf-Richardson, Alaska 99506. ***Nearest city:*** Anchorage. ***Phone:*** 907-552-1110. ***Acres:*** 13,455 (Elmendorf), 60,027 (Richardson). ***Total Force:*** civilian, 309; military, 13,450. ***Active-duty USAF:*** enlisted, 4,684; officer, 825. ***Owning command:*** PACAF. ***Unit/mission:*** 3rd Wing (PACAF), air mobility, C2, fighter operations; 176th Wing (ANG), air mobility, personnel recovery operations; 477th FG (AFRC), fighter operations; 673rd ABW (PACAF), support; 715th AMOG (AMC), air mobility operations; Alaskan NORAD Region, operational leadership; Hq. 11th Air Force (PACAF), operational leadership; Hq. Alaskan Command (PACOM), management. ***His***

DEPARTMENT OF THE AIR FORCE BASES IN THE U.S.



tory: Activated July 1940. Formed as joint base under Air Force lead 2010. Elmendorf named for Capt. Hugh M. Elmendorf, killed Jan. 13, 1933, flying an experimental fighter. Richardson named for Army Brig. Gen. Wilds P. Richardson, who served in Alaska territory from 1897 to 1917. ***Museum:*** Kulis ANGB Museum. ***Inn:*** 907-552-2454. ***Golf:*** Moose Run.

Joint Pacific Alaska Range Complex, Alaska. ***Nearest city:*** Fairbanks. ***Phone:*** 907-552-2341. ***Owning command:*** ALCOM. ***Available airspace:*** 65,000 square miles. ***Acres of maneuver land:*** 1.5 million. ***Unit/mission:*** Unit training, joint training exercises.

ARIZONA

Barry M. Goldwater Range, Ariz. ***Nearest city:*** Gila Bend. ***Phone:*** 623-856-7216. ***Acres:*** 1,102,325 (BMGR East, Air Force); 692,800 (BMGR West, Marine Corps). ***Owning command:*** AETC ***Unit/mission:*** 56th Range Management Office, range operations. Includes Gila Bend Air Force Auxiliary Field. ***History:*** Training range on the U.S. southern border used by military pilots since 1941 that now hosts more than 68,000 training sorties a year.

Davis-Monthan AFB, Ariz. 85707. ***Nearest city:*** Tucson. ***Phone:*** 520-228-1110. ***Acres:*** 10,529. ***Total Force:*** civilian, 1,815; military, 7,726. ***Active-duty USAF:*** enlisted, 5,555; officer, 956. ***Owning command:*** ACC. ***Unit/mission:*** 55th ECG (ACC), electronic combat operations; 214th RG (ANG), RPA operations; 309th Aerospace Maintenance and Regeneration Group (AFMC), aerospace vehicle storage, regeneration; 355th Wing (ACC), fighter operations; 563rd RQG (AFRC), personnel recovery operations; 924th FG (AFRC), fighter operations; 943rd RQG (AFRC), personnel recovery operations; Hq. 12th Air Force (ACC), operational leadership. ***History:*** Activated 1927. Named for two local aviators: 2nd Lt. Samuel H. Davis Jr., killed Dec. 28, 1921, and 2nd Lt. Oscar Monthan, killed March 27, 1924. ***Museum:*** Pima Air and Space Museum. ***Inn:*** 520-228-3309.

Goldwater ANGB, Phoenix Sky Harbor Intl. Airport, Ariz. 85034. ***Nearest city:*** Phoenix. ***Phone:*** 602-302-9004. ***Total Force:*** civilian, 0; military, 829. ***Component:*** ANG. ***Unit/mission:*** 161st ARW, air mobility operations.

Luke AFB, Ariz. 85309. ***Nearest city:*** Phoenix. ***Phone:*** 623-856-1110. ***Acres:*** 4,833. ***Total Force:*** civilian, 1,170; military, 7,259. ***Active-duty USAF:*** enlisted, 4,413; officer, 500. ***Owning command:*** AETC. ***Unit/mission:*** 56th FW (AETC), training, Barry M. Goldwater Range operations; 944th FW (AFRC), training. ***History:*** Activated 1941. Named for 2nd Lt. Frank Luke Jr., observation balloon-busting ace of WWI and first aviator to receive MOH, killed in action Sept. 29, 1918. ***Museum:*** Air Park. ***Inn:*** 623-935-2641. ***Golf:*** Falcon Dunes.

Morris ANGB, Tucson Intl. Airport, Ariz. 85706. ***Nearest city:*** Tucson. ***Phone:*** 520-295-6192. ***Total Force:*** civilian, 0; military, 1,817. ***Component:*** ANG. ***Unit/mission:*** 162nd Wing, fighter, ISR, RPA (at Davis- Monthan AFB, Ariz.) operations, training.

ARKANSAS

Ebbing ANGB, Fort Smith Regional Airport, Ark. 72903. ***Nearest city:*** Fort Smith. ***Phone:*** 479-573-5100. ***Acres:*** 144. ***Total Force:*** civilian, 0; military, 944. ***Component:*** ANG. ***Unit/mission:*** 188th Wing, RPA, ISR.

Little Rock AFB, Ark. 72099. ***Nearest city:*** Jacksonville. ***Phone:*** 501-987-1110. ***Acres:*** 7,151. ***Total Force:*** civilian, 680; military, 5,025. ***Active-duty USAF:*** enlisted, 3,164; officer, 457. ***Owning command:*** AMC. ***Unit/mission:*** 19th AW (AMC), air mobility operations; 913th AG (AFRC), 189th AW (ANG), air mobility operations, training; 314th AMW (AETC), training. ***History:*** Base opened Oct. 9, 1955. ***Inn:*** 501-988-1141. ***Golf:*** Deer Run.

CALIFORNIA

Beale AFB, Calif. 95903. ***Nearest city:*** Marysville. ***Phone:*** 530-634-3000. ***Acres:*** 22,451. ***Total Force:*** civilian, 885; military, 5,399. ***Active-duty USAF:*** enlisted, 3,375; officer, 609. ***Owning command:*** ACC. ***Unit/mission:*** 7th SWS (AFSPC), missile warning; 9th RW (ACC), ISR, RPA operations; 195th Wing (ANG), DCGS, intel; 548th ISRG (ACC), DCGS; 940th Air Refueling Wing (AFRC), KC-135R. ***History:*** Opened October 1942 as Army's Camp Beale. Named for Edward F. Beale, a former Navy officer who became a hero of the Mexican-American War and early developer of California, as well as a senior appointee/diplomat for four presidents. Transferred to USAF 1948. Designated AFB April 1951. ***Museum:*** Edward F. Beale Museum. ***Inn:*** 530-634-3662. ***Golf:*** Coyote Run.

California ANGB, Fresno Yosemite Intl. Airport, Calif. 93727. ***Nearest city:*** Fresno. ***Phone:*** 559-454-5100. ***Acres:*** 77. ***Total Force:*** civilian, 0; military, 1,805. ***Component:*** ANG. ***Unit/mission:*** 144th FW, fighter, ISR operations.

Channel Islands ANGS, Calif. 93041. ***Nearest city:*** Oxnard. ***Phone:*** 805-986-8000. ***Acres:*** 206 ***Total Force:*** civilian, 3,844; military, 1,042. ***Component:*** ANG. ***Unit/mission:*** 146th AW, air mobility, MAFFS operations.

Edwards AFB, Calif. 93524. ***Nearest city:*** Rosamond. ***Phone:*** 661-277-1110. ***Acres:*** 307,517. ***Total Force:*** civilian, 4,024; military, 2,192. ***Active-duty USAF:*** enlisted, 2,100; officer, 597. ***Owning command:*** AFMC. ***Unit/mission:*** 412th TW (AFMC), T&E, base support; Hq. Air Force Test Center (AFMC), T&E management; U.S. Air Force Test Pilot School (AFMC), training. ***History:*** Muroc Bombing and Gunnery Range established September 1933. Designated Muroc AAB 1942. Renamed in 1949 for Capt. Glen W. Edwards, killed June 5, 1948, in crash of YB-49 "Flying Wing." ***Museum:*** Air Force Flight Test Museum. ***Inn:*** 661-277-3394/4101. ***Golf:*** Muroc Lake.

Los Angeles AFB, Calif. 90245. ***Nearest city:*** El Segundo. ***Phone:*** 310-653-1110. ***Acres:*** 56. ***Total Force:*** civilian, 1,378; military, 1,491. ***Active-duty USAF and USSF:*** enlisted, 305; officer, 914. ***Owning command:*** USSF. ***Unit/mission:*** 61st ABG (USSF), support; Hq. Space and Missile Systems Center (USSF), acquisition, R&D. ***History:*** Designated Los Angeles AFS April 30, 1964. Redesignated Los Angeles AFB Sept. 15, 1987. SMC, activated July 1, 1992, dates from Air Research and Development Command's Western Development Division, activated July 1, 1954. ***Museum.*** SMC Heritage Center. ***Inn:*** 310-653-8296.

March ARB, Calif. 92518. ***Nearest city:*** Moreno Valley/Riverside. ***Phone:*** 951-655-4138. ***Acres:*** 2,385. ***Total Force:*** civilian, 0; military, 6,671. ***Component:*** AFRC/ANG. ***Unit/mission:*** 452nd AMW (AFRC), air mobility operations; 163rd ATKW (ANG), RPA operations, training; Hq. 4th Air Force (AFRC), operational leadership. ***History:*** activated March 1, 1918. Named for 2nd Lt. Peyton C. March Jr., who died of injuries sustained in a crash Feb. 18, 1918. ***Inn:*** 951-655-5241. ***Golf:*** General Old.

Moffett Federal Airfield, Calif. 94035. ***Nearest city:*** Mountain View. ***Phone:*** 650-603-9129. ***Acres:*** 112. ***Total Force:*** civilian, 605; military, 988. ***Component:*** ANG. ***Unit/mission:*** 129th RQW, personnel recovery operations. ***History:*** Activated as NAS Sunnyvale April 1933. Renamed Moffett Field June 1933 for Rear Adm. William A. Moffett, killed in crash of USS Akron airship April 4, 1933. Later renamed to Moffett Air National Guard Base.

Pillar Point AFS, Calif. ***Nearest city:*** Half Moon Bay. ***Phone:*** 650-728-3246. ***Acres:*** 55. ***Owning Command:*** USSF. ***Unit/mission:*** supports space and ballistic missile launches. ***History:*** opened as an Army observation post in 1940; taken over by the Navy in 1958 as a control site for missile testing; transferred to the Air Force in 1964.

Sepulveda ANGS, Calif. 91406. ***Nearest city:*** Van Nuys. ***Phone:*** 858-276-9351 ***Acres:*** 26. ***Total Force:*** civilian, 0; military, 218. ***Component:*** ANG. ***Unit/mission:*** 261st Cyberspace Operations Squadron, mission assurance and threat mitigation support.

Travis AFB, Calif. 94535. ***Nearest city:*** Fairfield. ***Phone:*** 707-424-1110. ***Acres:*** 6,446. ***Total Force:*** civilian, 1,663; military, 9,763. ***Active-duty USAF and USSF:*** enlisted, 5,540; officer, 1,362. ***Owning command:*** AMC. ***Unit/mission:*** 60th AMW (AMC), 349th AMW (AFRC), air mobility operations; David Grant USAF Medical Center. ***History:*** Activated May 17, 1943. Named for Brig. Gen. Robert F. Travis, killed Aug. 5, 1950. ***Museum:*** Heritage Center. ***Inn:*** 707-424-8000. ***Golf:*** Cypress Lakes.

Vandenberg SFB, Calif. 93437. ***Nearest city:*** Lompoc. ***Phone:*** 805-606-1110. ***Acres:*** 118,312. ***Total Force:*** civilian, 1,261; military, 2,797. ***Active-duty USAF and USSF:*** enlisted, 1,872; officer, 681. ***Owning command:*** USSF. ***Unit/mission:*** 30th SW (USSF), space and launch range operations, host unit; 381st TRG (AETC), training; 576th FLTS (USSF), test; 21st SOPS (AFSPC), space operations; Hq. 14th Air Force (AFSPC), operational leadership; Joint Space Operations Center (STRATCOM), space C2 operations. ***History:*** Originally Army's Camp Cooke; activated October 1941. Reassigned to USAF June 7, 1957. Renamed for Gen. Hoyt S. Vandenberg, USAF's second Chief of Staff. ***Museum:*** Space and Missile Heritage Center. ***Inn:*** 805-606-1844.

COLORADO

Buckley SFB, Colo. 80011. ***Nearest city:*** Aurora. ***Phone:*** 720-847-9431. ***Acres:*** 4,234. ***Total Force:*** 7,463. ***Active-duty USAF and USSF:*** enlisted, 1,310; officer, 411. ***Owning command:*** USSF. ***Unit/mission:*** 140th Wing (ANG), air mobility, fighter operations, mobile missile warning; 460th SW (USSF), space surveillance, missile warning; 566th IS (ACC), intelligence;

Air Reserve Personnel Center, Guard and Reserve personnel support. ***History:*** Activated April 1, 1942, as gunnery training facility. ANG assumed control from Navy 1959. Became Active-duty Air Force facility Oct. 1, 2000. Renamed Buckley Space Force Base on June 4, 2021. Named for 1st Lt. John H. Buckley, WWI flier, killed Sept. 17, 1918. ***Inn:*** 720-847-5899.

Cheyenne Mountain AFS, Colo. 80914. ***Nearest city:*** Colorado Springs. ***Phone:*** 719-556-7321 (Peterson AFB). ***Acres:*** 567. ***Total Force:*** part of Peterson AFB. ***Owning command:*** USSF. ***Unit/mission:*** 721st MSG (USSF), support; NORAD/NORTHCOM Alternate Command Center, Integrated Tactical Warning and Attack Assessment operations, training. ***History:*** operational April 20, 1966.

Greeley ANGS, Colo. 80631. ***Nearest city:*** Greeley. ***Phone:*** 720-259-5001. ***Acres:*** 17. ***Total Force:*** civilian, 95; military, 297. ***Component:*** ANG. ***Unit/mission:*** 233rd Space Group, missile warning and space launch detection. ***History:*** Activated January 1996.

Peterson AFB, Colo. 80914. ***Nearest city:*** Colorado Springs. ***Phone:*** 719-556-7321. ***Acres:*** 1,442. ***Total Force:*** civilian, 3,722; military, 5,825. ***Active-duty USAF and USSF:*** enlisted, 2,602; officer, 1,021. ***Owning command:*** USSF. ***Unit/mission:*** 21st SW (USSF), missile warning, space operations, support; 52nd AS (AMC) (active associate), 200th AS (ANG), air mobility operations; 302nd AW (AFRC), air mobility, MAFFS operations; Hq. AFSPC, management; Hq. NORAD, Hq. NORTHCOM, operational leadership. Part of the USSF's Peterson-Schriever Garrison. ***History:*** Activated 1942. Named for 1st Lt. Edward J. Peterson, killed Aug. 8, 1942. ***Museum:*** Peterson Air and Space Museum. ***Inn:*** 719-556-7851. ***Golf:*** Silver Spruce.

Schriever AFB, Colo. 80912. ***Nearest city:*** Colorado Springs. ***Phone:*** 719-567-1110. ***Acres:*** 5,634. ***Total Force:*** civilian, 0; military, 2,665. ***Active-duty USAF and USSF:*** enlisted, 1,039; officer, 624. ***Owning command:*** USSF. ***Unit/mission:*** 50th SW (USSF), 310th SW (AFRC), space operations; U.S. Air Force Warfare Center-Space (ACC/USSF), R&D. Part of the USSF's Peterson-Schriever Garrison. ***History:*** Activated as Falcon AFS Sept. 26, 1985. Redesignated AFB June 13, 1988. Renamed for Gen. Bernard A. Schriever June 5, 1998.

US Air Force Academy, Colo. 80840. ***Nearest city:*** Colorado Springs. ***Phone:*** 719-333-1110. ***Acres:*** civilian, 1,606; military, 2,175. ***Total Force:*** civilian, 1,606; military, 2,175. ***Active-duty USAF:*** enlisted, 1,347; officer, 943. ***Next Higher Echelon of Command:*** HQ Air Force. ***Unit/mission:*** Air Force Academy (USAFA), education/training; Preparatory School, education/training; 10th ABW (Air Force Academy), support; 306th FTG (AETC), training. ***History:*** established April 1, 1954; headquartered at Lowry AFB until August 1958. Moved to permanent location in Colorado Springs August 1958. ***Museum:*** Visitor Center. ***Inn:*** 719-472-1940. ***Golf:*** Eisenhower.

CONNECTICUT

Bradley ANGB, Conn. 06026. ***Nearest cities:*** Hartford, Conn., and Springfield, Mass. ***Phone:*** 860-292-2460. ***Acres:*** 148. ***Total Force:*** civilian, 235; military, 0. ***Component:*** ANG. ***Unit/mission:*** 103rd AW, air mobility operations. ***History:*** named for Lt. Eugene M. Bradley, killed in P-40 crash August 1941.

DELAWARE

Dover AFB, Del. 19902. ***Nearest city:*** Dover. ***Phone:*** 302-677-3000. ***Acres:*** 3,824. ***Total Force:*** civilian, 0; military, 5,127. ***Active-duty USAF:*** enlisted, 3,193; officer, 371. ***Owning command:*** AMC. ***Unit/mission:*** 436th AW (AMC), 512th AW (AFRC), air mobility operations; Air Force Mortuary Affairs Operations (USAF). ***History:*** Activated December 1941. Inactivated 1946. Reactivated February 1951. ***Museum:*** Air Mobility Command Museum. ***Inn:*** 302-677-2840. ***Golf:*** Eagle Creek.

New Castle ANGB, New Castle Airport, Del. 19720. ***Nearest city:*** Wilmington. ***Phone:*** 302-323-3408. ***Acres:*** 78. ***Total Force:*** civilian, 457; military, 1,592. ***Component:*** ANG. ***Unit/mission:*** 166th AW, air mobility, cyber operations.

DISTRICT OF COLUMBIA

JB Anacostia-Bolling, D.C. 20032. ***Nearest city:*** Washington, D.C. ***Phone:*** 703-545-6700. ***Acres:*** 1,027. ***Total Force:*** civilian, 1,958; military, 3,132. ***Active-duty USAF:*** enlisted, 1,480; officer, 894. ***Bolling owning command:*** AFDW. ***Unit/mission:*** 11th Operations Group (AFDW), support; 579th MDG (AFDW), clinic operations; Hq. Surgeon General (USAF). ***History:*** Activated October 1917 with Army air and Navy elements. Formed joint base under Navy lead 2010. Naval Support Facility Anacostia named for adjacent Anacostia River. Bolling named for Col. Raynal C. Bolling, first high-ranking Army Air Service officer killed in WWI. ***Inn:*** Navy Gateway: 202-664-8587

FLORIDA

Avon Park AFR, Fla. ***Nearest city:*** Avon Park. ***Phone:*** 863-452-4120. ***Acres:*** 100,929. ***Total Force:*** civilian, 55; military, 44. ***Owning command:*** ACC. ***Unit/mission:*** 598th Range Squadron, training.

Cape Canaveral Space Force Station, Fla. 32920. ***Nearest city:*** Cocoa Beach. ***Phone:*** 321-494-5933. ***Acres:*** 16,239. ***Total Force:*** civilian, 541; military, 417. ***Active-duty USAF and USSF:*** (Part of Patrick SFB). ***Owning command:*** USSF. ***Unit/mission:*** 45th Space Wing (USSF), space launch operations. ***History:*** formerly NAS Banana River. Site of Joint Long Range Proving Ground 1949. USAF took sole control 1950. Combined with NASA to form John F. Kennedy Space Center 1973. Designated Cape Canaveral AS in 1974. ***Museums:*** Air Force Space and Missile Museum, Sands Space History Center.

Duke Field, Fla. 32542. ***Nearest city:*** Crestview. ***Phone:*** 850-883-6347. ***Acres:*** 1,946. ***Total Force:*** part of Eglin AFB. ***Component:*** AFRC. ***Unit/mission:*** 919th SOW (classic associate), special operations. ***History:*** named for Lt. Robert L. Duke, pilot killed Dec. 29, 1943, in test flight. Also known as Eglin AFB Auxiliary Field 3.

Eglin AFB, Fla. 32542. ***Nearest city:*** Niceville-Valparaiso. ***Phone:*** 850-882-1110. ***Acres:*** 449,421. ***Total Force:*** civilian, 5,822; military, 10,535. ***Active-duty USAF:*** enlisted, 4,959; officer, 1,434. ***Owning command:*** AFMC. ***Unit/mission:*** 20th SPCS (USSF), space surveillance; 33rd FW (AETC), training; 53rd Wing (ACC), OT&E; 96th TW (AFMC), T&E, base support; AFRL Munitions Directorate (AFMC), R&D; PEO-Weapons/Air Force Life Cycle Management Center Armament Directorate (AFMC), acquisition. ***History:*** Activated 1935. Named for Lt. Col. Frederick I. Eglin, WWI flier killed in aircraft accident Jan. 1, 1937. ***Museum:*** Air Force Armament Museum. ***Inn:*** 850-389-4943/8761. ***Golf:*** Eglin.

Homestead ARB, Fla. 33039. ***Nearest city:*** Homestead. ***Phone:*** 786-415-7000. ***Acres:*** 2,465. ***Total Force:*** civilian, 574; military, 2,323. ***Component:*** AFRC. ***Unit/mission:*** 367th FS (active associate), 125th FW Det. 1 (ANG), 482nd FW (AFRC), fighter operations. ***Inn:*** 786-415-7198.

Hurlburt Field, Fla. 32544. ***Nearest city:*** Fort Walton Beach. ***Phone:*** 850-884-1110. ***Acres:*** 6,341. ***Total Force:*** civilian, 1,725; military, 9,405. ***Active-duty USAF:*** enlisted, 7,015; officer, 2,255. ***Owning command:*** AFSOC. ***Unit/mission:*** 1st SOW (AFSOC), special operations; 24th SOW (AFSOC), special tactics operations; 39th IOS (AFSPC), training; 361st ISRG (ACC), ISR operations; 492nd SOW (AFSOC) training; 505th CCW (ACC), C2, ISR TTP development, test; 556th RED HORSE (AFRC), 823rd RED HORSE (ACC), bare base operations; 2nd Combat Weather Systems Squadron (ACC), OT&E, training; Hq. AFSOC, management. ***History:*** Activated 1943. Named for Lt. Donald W. Hurlburt, WWII pilot killed Oct. 1, 1943. ***Museum:*** Memorial Air Park. ***Inn:*** 850-884-7115. ***Golf:*** Gator Lakes.

Jacksonville ANGB, Jacksonville Intl. Airport, Fla. 32218. ***Nearest city:*** Jacksonville. ***Phone:*** 904-741-7030. ***Acres:*** 342. ***Total Force:*** civilian, 0; military, 1,070. ***Component:*** ANG. ***Unit/mission:*** 125th FW, fighter, ISR operations.

MacDill AFB, Fla. 33621. ***Nearest city:*** Tampa. ***Phone:*** 813-828-1110. ***Acres:*** 5,866. ***Total Force:*** civilian, 0; military, 8,762. ***Active-duty USAF:*** enlisted, 3,139; officer, 739. ***Owning command:*** AMC. ***Unit/mission:*** 6th ARW (AMC), 927th ARW (AFRC), air mobility operations; Hq. CENTCOM, operational leadership; Hq. SOCOM, operational leadership; Hq. Joint Communications Support Element, C4 operations, management; Joint Special Operations University (SOCOM), education. ***History:*** Activated April 15, 1941. Named for Col. Leslie MacDill, killed in aircraft accident Nov. 8, 1938. ***Inn:*** 813-828-4259. ***Golf:*** Bay Palms.

Patrick Space Force Base, Fla. 32925. ***Nearest city:*** Cocoa Beach. ***Phone:*** 321-494-1110. ***Acres:*** 2,324. ***Total Force:*** civilian, 1,736; military, 2,926. ***Active-duty USAF and USSF:*** enlisted, 1,368; officer, 483. ***Owning command:*** USSF. ***Unit/mission:*** 45th SW (USSF), space launch operations; 114th SPCS (ANG), launch range support; 920th RQW (AFRC), personnel recovery operations; Air Force Technical Applications Center (ACC), nuclear monitoring. ***History:*** Activated 1940. Named for Maj. Gen. Mason M. Patrick, Chief of American Expeditionary Forces' Air Service in WWI and Chief of Air Service/Air Corps, 1921-27. ***Museum:*** Khobar Tower Memorial. ***Inn:*** 321-494-5428. ***Golf:*** Manatee Cove.

Tyndall AFB, Fla. 32403. ***Nearest city:*** Panama City. ***Phone:*** 850-282-1110. ***Acres:*** 28,891. ***Total Force:*** civilian, 2,622; military, 2,487. ***Active-duty USAF:*** enlisted, 1,521; officer, 402. ***Owning command:*** ACC. ***Unit/mission:*** 53rd WEG (ACC), T&E; 101st AOG (ANG), C2 operations; 325th FW (ACC), 325th FW associate unit

Staff Sgt. Ridge Shan

Special Tactics operators watch a C-17 Globemaster III land during an exercise at JB Lewis-McChord, Wash.

(ANG), training; 601st AOC (ACC/ANG), plan/direct air operations; Air Force Rescue Coordination Center (ACC), plan/direct inland rescue operations; Hq. Continental U.S. NORAD Region (NORAD)/1st Air Force (Air Forces Northern) (ACC/ANG), operational leadership. ***History:*** Activated Dec. 7, 1941. Named for 1st Lt. Frank B. Tyndall, WWI fighter pilot killed July 15, 1930. ***Inn:*** 850-283-4210. ***Golf:*** Pelican Point.

GEORGIA

Brunswick ANGS, Brunswick Golden Isles Airport, Fla. 31525. ***Nearest city:*** Brunswick. ***Phone:*** 912-261-5604. Acres: 14. ***Total Force:*** civilian, 0; military, 160. ***Component:*** ANG. ***Unit/mission:*** 224th Joint Communications Support Squadron, combat communications.

Dobbins ARB, Ga. 30069. ***Nearest city:*** Marietta. ***Phone:*** 678-655-5000. ***Acres:*** 1,913. ***Total Force:*** civilian, 0; military, 1,688. ***Component:*** AFRC. ***Unit/mission:*** 94th AW, aeromedical evacuation, air mobility operations; Hq. 22nd Air Force, operational leadership. ***History:*** Activated 1943. Named for Capt. Charles Dobbins, pilot killed in WWII. ***Inn:*** 678-655-4745.

Grand Bay Bombing and Gunnery Range, Ala. ***Phone:*** 229-257-3510/2765. ***Nearest city:*** Lakeland. ***Acres:*** 5,874. ***Owning command:*** ACC. ***Unit/mission:*** tactical air and ground maneuvers, weapons training.

Moody AFB, Ga. 31699. ***Nearest city:*** Valdosta. ***Phone:*** 229-257-1110. ***Acres:*** 5,521. ***Total Force:*** civilian, 0; military, 4,853. ***Active-duty USAF: enlisted,*** 4,390; officer, 460. ***Owning command:*** ACC. ***Unit/mission:*** 23rd Wing (ACC), fighter, personnel recovery operations; 81st FS (AETC); 93rd AGOW (ACC), battlefield airmen operations, expeditionary force protection, support; 476th FG (AFRC), fighter operations. ***History:*** Activated June 1941. Named for Maj. George P. Moody, killed May 5, 1941. ***Inn:*** 229-257-3893. ***Golf:*** Quiet Pines.

Robins AFB, Ga. 31098. ***Nearest city:*** Warner Robins. ***Phone:*** 478-926-1110. ***Acres:*** 6,935. ***Total Force:*** civilian, 15,087; military, 5.846. ***Active-duty USAF:*** enlisted, 2,792; officer, 772. ***Owning command:*** AFMC. ***Unit/mission:*** 78th ABW (AFMC), support; 94th APS (AFRC), aerial port operations; 116th ACW (ANG), 461st ACW (ACC), C2 operations; 638th SCMG (AFMC), systems life cycle support; 5th CCG (ACC), combat communications operations; Hq. AFRC, management; Warner Robins ALC (AFMC), weapons maintenance, repair. ***History:*** Activated March 1942. Named for Brig. Gen. Augustine Warner Robins, an early chief of the Air Corps' Materiel Division, who died June 16, 1940. ***Museum:*** Museum of Aviation. ***Inn:*** 478-926-2100. ***Golf:*** Pine Oaks.

Savannah ANGB, Savannah/Hilton Head Intl. Airport, Ga. 31408. ***Nearest city:*** Garden City. ***Phone:*** 912-966-8290. ***Acres:*** 207. ***Total Force:*** civilian, 1; military, 1,021. ***Component:*** ANG. ***Unit/mission:*** 165th AW, air mobility, tactical communications, TACP operations, Air Dominance Center.

GUAM

Andersen AFB, Guam APO AP 96543. ***Nearest city:*** Yigo. ***Phone:*** 671-366-1110. ***Acres:*** 16,117. ***Total Force:*** civilian 0; military, 3,232. ***Active-duty USAF :*** enlisted, 1,941; officer, 185. ***Owning command:*** PACAF. ***Unit/mission:*** 9th Operations Group Det. 4 (ACC), RPA operations; 22nd SOPS Det. 5 (AFSPC), space operations; 36th Wing (PACAF), support; 36th CRG (PACAF), bare base operations; 44th APS (AFRC), aerial port operations; 254th ABG (ANG), support, bare base operations (254th RED HORSE); 724th ASTF (AFRC); 734th AMS (AMC), air transportation services. ***History:*** Activated 1945 as North Field. Renamed 1949 for Brig. Gen. James R. Andersen, lost at sea Feb. 26, 1945. Became part of Joint Region Marianas 2009. ***Inn:*** Navy Gateway: 671-979-5501. ***Golf:*** Palm Tree.

HAWAII

JB Pearl Harbor-Hickam, Hawaii 96853. ***Nearest city:*** Honolulu. ***Phone:*** 808-449-7110. ***Acres:*** 6,129. ***Total Force:*** civilian, 6,318; military, 12,625. ***Active-duty Air Force:*** enlisted, 4,486; officer, 1,113. ***Hickam owning command:*** PACAF. ***Unit/mission:*** 15th Wing (PACAF), 154th Wing (ANG), air mobility, fighter operations; 515th AMOW (AMC); 613th AOC (PACAF), C2 operations; 624th RSG (AFRC), bare base operations; 647th ABG (PACAF), support; Hq. PACAF, management, operational leadership. ***History:*** Pearl Harbor established 1908. Hickam dedicated 1935. Activated 1938. Formed as joint base under Navy lead 2010. Hickam named for Lt. Col. Horace M. Hickam, aviation pioneer killed in crash in Texas Nov. 5, 1934. ***Museums:*** USS Arizona Memorial, Bowfin Memorial and Museum. ***Inn:*** Navy Gateway: 808-800-2337. ***Golf:*** Mamala Bay.

IDAHO

Gowen Field, Boise Air Terminal, Idaho 83705. ***Nearest city:*** Boise. ***Phone:*** 208-422-5333. ***Acres:*** 354. ***Total Force:*** civilian, 0; military, 2,105. ***Component:*** ANG. ***Unit/mission:*** 124th FW, fighter, cyber, TACP operations. ***History:*** named for Lt. Paul R. Gowen, killed in B-10 crash in Panama July 11, 1938.

Mountain Home AFB, Idaho 83648. ***Nearest city:*** Mountain Home. ***Phone:*** 208-828-2111. ***Acres:*** 6,858. ***Total Force:*** civilian, 492; military, 3,605. ***Active-duty USAF:*** enlisted, 3,159; officer, 363. ***Owning command:*** ACC. ***Unit/mission:*** 366th FW (ACC), fighter operations, range management. ***History:*** Activated August 1943 as B-24 training base. Inactivated October 1945. Reactivated December 1948. Inactivated April 1950. Reactivated 1951. ***Inn:*** 208-828-5200. ***Golf:*** Silver Sage.

Mountain Home Range Complex, Idaho. ***Nearest city:*** Bruneau. ***Phone:*** 208-828-0154. ***Acres:*** 12,141 (Juniper Butte); 109,466 (Saylor Creek). ***Owning command:*** ACC (366th FW, Mountain Home AFB). ***Unit/mission:*** 266th Range Squadron (squadron is based at Mountain Home AFB), unit-level and composite force training with air-to-ground training ranges, no-drop target complexes, and electronic combat sites.

ILLINOIS

Capital Airport ANGS, Abraham Lincoln Capital Airport, Ill. 62707. ***Nearest city:*** Springfield. ***Phone:*** 217-757-1267. ***Acres:*** 78. ***Total Force:*** civilian, 0; military, 877. ***Component:*** ANG. ***Unit/mission:*** 183rd Wing, 183rd Centralized Repair Facility (CRF), 183rd Air Operations Group (AOG).

Peoria ANGB, Gen. Wayne A. Downing Peoria Intl. Airport, Ill. 62707. ***Nearest city:*** Peoria. ***Acres:*** 720. ***Phone:*** 800-942-3771. ***Total Force:*** civilian, 20; military, 2,014. ***Component:*** ANG. ***Unit/ mission:*** 182nd AW, air mobility, combat communications, TACP operations. Group (AOG).

Scott AFB, Ill. 62225. ***Nearest city:*** Belleville. ***Phone:*** 618-256-1110. ***Acres:*** 3,648. ***Total Force:*** civilian, 4,132; military, 7,090. ***Active-duty USAF:*** enlisted, 3,752; enlisted, 1,126. ***Owning command:*** AMC. ***Unit/mission:*** 126th ARW (ANG), 375th AMW (AMC), air mobility operations; 618th AOC (TACC) (AMC), planning/directing worldwide air mobility operations; 635th SCOW (AFMC), global logistics support; 932nd AW (AFRC), air mobility operations; Cyberspace Capabilities Center (ACC), network integration, engineering, simulation; Hq. 18th Air Force (AMC), operational leadership; Hq. AMC, management; Hq. TRANSCOM, operational leadership. ***History:*** Activated June 14, 1917. Named for Cpl. Frank S. Scott, first enlisted man to die in an aircraft accident, Sept. 28, 1912. ***Museum:*** Heritage Air Park. ***Inn:*** 618-256-1844. ***Golf:*** Cardinal Creek.

INDIANA

Fort Wayne ANGB, Fort Wayne Int. Airport, Ind. 46809. ***Nearest city:*** Fort Wayne. ***Phone:*** 260-478-3700. ***Acres:*** 69. ***Total Force:*** civilian, 0; military, 1,329. ***Component:*** ANG. ***Unit/mission:*** 122nd FW, fighter operations.

Grissom ARB, Ind. 46971. ***Nearest city:*** Kokomo. ***Phone:*** 765-688-5211. Acres: 1,719. ***Total Force:*** civilian, 538; military, 1,721. ***Component:*** AFRC. ***Unit/mission:*** 434th ARW, air refueling operations. ***History:*** Activated 1942 as NAS Bunker Hill. Reactivated June 1954 as Bunker Hill AFB. Renamed May 1968 for Lt. Col. Virgil I. "Gus" Grissom, killed Jan. 27, 1967, in Apollo capsule fire. Realigned as AFRC base Oct. 1, 1994. Home to Air Force Reserve, Army Reserve, and Marine Corps Reserve units. ***Inn:*** 765-681-5082. ***Golf:*** Grissom.

Hulman Field ANGB, Ind. 47803. ***Nearest city:*** Terre Haute. ***Phone:*** 812-877-5210. ***Acres:*** 121. ***Total Force:*** civilian, 0; military, 1,022. ***Component:*** ANG. ***Unit/mission:*** 181st IW, DCGS, TACP operations.

IOWA

Des Moines ANGB, Des Moines Intl. Airport, Iowa 50321. ***Nearest city:*** Des Moines. ***Phone:*** 515-261-8290. ***Acres:*** 172. ***Total Force:*** civilian, 0; military, 1,329. ***Component:*** ANG. ***Unit/mission:*** 132nd Wing, DTOC and RPA, cyber, and ISR operations.

Fort Dodge ANGS, Iowa 50501. ***Nearest city:*** Fort Dodge. ***Phone:*** (515) 574-3208. ***Acres:*** 13. ***Total Force:*** civilian, 43; military, 232. ***Component:*** ANG. ***Unit/mission:*** 133rd Test Squadron, command and control.

Sioux Gateway Airport Brigadier General "Bud" Day Field, Iowa 51111. ***Nearest city:*** Sioux City. ***Phone:*** 712-233-0732/0809. ***Acres:*** 269. ***Total Force:*** civilian, 0; military, 1,121. ***Component:*** ANG. ***Unit/mission:*** 185th ARW, air mobility operations. ***History:*** Activated as Sioux City AAB in July 1942. Closed in December 1945. Reopened in September 1946 as Sioux City ARB. Returned to joint civil-military use. Named in 2002 for retired Col. George E. "Bud" Day, Vietnam POW and MOH recipient, and renamed in 2018 following Day's posthumous promotion to brigadier general.

Senior Airman Alexi Bosarge

Airman 1st Class Jeremiah Epps works at McConnell Air Force Base, Kan.

KANSAS

Forbes Field ANGB, Kan. 66619. ***Nearest city:*** Topeka. ***Phone:*** 785-862-1234. ***Acres:*** 215. ***Total Force:*** civilian, 341; military, 1,750. ***Component:*** ANG. ***Unit/ mission:*** 190th ARW, air mobility, combat weather operations. ***History:*** named for Maj. Daniel H. Forbes Jr., pilot killed June 5, 1948, test-flying Northrop YB-49 "Flying Wing."

McConnell AFB, Kan. 67221. ***Nearest city:*** Wichita. ***Phone:*** 316-759-6100. ***Acres:*** 3,577. ***Total Force:*** civilian, 0; military, 4,745. ***Active-Duty USAF:*** enlisted, 2,607; officer, 346. ***Owning command:*** AMC. ***Unit/mission:*** 22nd ARW (AMC), air mobility operations; 184th IW (ANG), cyber, DCGS, ISR operations, space C2, TACP operations; 931st ARW (AFRC), air mobility operations. ***History:*** Activated June 5, 1951. Named for three Wichita natives, the McConnell brothers—Lt. Col. Edwin M. (died Sept. 1, 1997), Capt. Fred J. (died in a private airplane crash Oct. 22, 1945), and 2nd Lt. Thomas L. (killed July 10, 1943)—all WWII B-24 pilots. ***Inn:*** 316-759-6999.

Smoky Hill Weapons Range, Kan. 67401. ***Nearest city:*** Salina. ***Acres:*** 33,878. ***Component:*** ANG. ***Unit/mission:*** 284th Air Support Operations Squadron; bombing range, combined arms training.

KENTUCKY

Louisville ANGB, Louisville Intl. Airport, Ky. 40213. ***Nearest city:*** Louisville. ***Phone:*** 502-413-4400. ***Total Force:*** civilian, 0; military, 1,228. ***Component:*** ANG. ***Unit/mission:*** 123rd AW, air mobility, bare base, special tactics operations.

LOUISIANA

Barksdale AFB, La. 71110. ***Nearest city:*** Bossier City. ***Phone:*** 318-456-1110. ***Acres:*** 22,504. ***Total Force:*** civilian, 1,459; military, 6,367. ***Active-duty USAF:*** enlisted, 4,304; officer, 978. ***Owning command:*** AFGSC. ***Unit/mission:*** 2nd BW (AFGSC), bomber operations; 307th BW (AFRC), bomber operations, training; Hq. AFGSC, management; Hq. 8th Air Force (AFGSC), operational leadership. ***History:*** Activated Feb. 2, 1933. Named for Lt. Eugene H. Barksdale, WWI airman killed in August 1926 crash. ***Museum:*** Barksdale Global Power Museum. ***Inn:*** 318-456-3091. ***Golf:*** Bomber Bayou.

Claiborne Range, La. ***Nearest city:*** Alexandria. ***Phone:*** 318-487-0378. ***Acres:*** 7,800. ***Owning command:*** AFRC. ***Unit/mission:*** 307th Operations Support Squadron; bombing, exercise and target training, and electronic countermeasure training.

NAS JRB New Orleans, La. 70143. ***Nearest city:*** New Orleans. ***Phone:*** 504-678-7569. ***Acres:*** 5,299 (ANG: 89). ***Total Force:*** civilian, 0; military, 3,194. ***Component:*** ANG. ***Unit/mission:*** 122nd ASOS (Pineville, La.), TACP; 159th FW, fighter operations; 214th EIS, cyber operations; 236th CBCS (Hammond, La.), combat communications.

MAINE

Bangor ANGB, Bangor Intl. Airport, Maine 04401. ***Nearest city:*** Bangor. ***Phone:*** 207-404-7700 ***Acres:*** 281. ***Total Force:*** civilian, 383; military, 1,427. ***Component:*** ANG. ***Unit/mission:*** 101st ARW, air mobility, combat communications.

South Portland AGS, Maine 04106. ***Nearest city:*** South Portland. ***Phone:*** 207-756-7904 ***Acres:*** 12. ***Total Force:*** civilian, 31; military, 432. ***Component:*** ANG. ***Unit/mission:*** 265th Combat Communications Squadron, 243rd Engineering Installation Squadron.

MARYLAND

JB Andrews, Md. 20762. ***Nearest city:*** Washington, D.C. ***Phone:*** 301-981-1110. ***Acres:*** 4,903. ***Total Force:*** civilian, 0; military, 10,583. ***Active-duty USAF:*** enlisted, 4,058; officer, 1,902. ***Owning command:*** AFDW. ***Unit/mission:*** 11th Wing (AFDW), helicopter operations, support; 89th AW (AMC), air mobility operations; 113th Wing (ANG), air mobility, fighter operations; 459th ARW (AFRC), air mobility operations; 844th CG (AFDW), cyber operations; Air Force Legal Operations Agency (USAF); Air Force Review Boards Agency (USAF); ANG Readiness Center (ANG), support. ***History:*** Activated May 1943. NAF Washington dates from 1919 at Anacostia (above); moved to Andrews 1958. Formed JB Andrews-NAF Washington under Air Force lead 2010. Andrews named for Lt. Gen. Frank M. Andrews, military air pioneer and WWII commander of the European Theater, killed in aircraft accident May 3, 1943, in Iceland. ***Inn:*** 301-981-4614. ***Golf:*** The Courses at Andrews.

Warfield ANGB, Martin State Airport, Md. 21220. ***Nearest city:*** Baltimore. ***Phone:*** 410-918-6001. ***Acres:*** 175. ***Total Force:*** civilian, 240; military, 1,250. ***Component:*** ANG. ***Unit/mission:*** 175th Wing, cyber, fighter operations.

MASSACHUSETTS

Barnes ANGB, Westfield-Barnes Regional Airport, Mass. 01085. ***Nearest city:*** Westfield. ***Phone:*** 413-568-9151. ***Total Force:*** civilian, 389; military, 1,159. ***Component:*** ANG. ***Unit/mission:*** 104th FW, fighter operations.

Hanscom AFB, Mass. 01731. ***Nearest city:*** Boston. ***Phone:*** 781-225-1110. ***Acres:*** 846. ***Total Force:*** civilian, 2,686; military, 1,403. ***Active-duty Air Force:*** enlisted, 679; officer, 809. ***Owning command:*** AFMC. ***Unit/mission:*** 66th ABG (AFMC), support; PEO-Battle Management, PEO-C3I and Networks (AFMC), PEO-Nuclear Command, Control, and Communications (NC3) (AFMC) acquisition. ***History:*** Activated 1941. Named for Laurence G. Hanscom, a pre-WWII advocate of private aviation, killed in light plane accident 1941. ***Inn:*** 781-225-4444. ***Golf:*** Patriot.

Joint Base Cape Cod, Mass., 02542. ***Nearest city:*** Buzzards Bay. ***Phone:*** 508-968-4000. ***Total Force:*** civilian, 340; military, 2,246. ***Major components:*** Camp Edwards, Massachusetts Army National Guard; Otis ANGB; Cape Cod AFS; Coast Guard Air Station Cape Cod.

JBCC-Cape Cod AFS, Mass. 02561. ***Nearest city:*** Sandwich. ***Phone:*** 508-968-3277. ***Acres:*** 101. ***Total Force:*** civilian, 3; military, 101. ***Owning command:*** USSF. ***Unit/mission:*** 6th SWS (USSF), missile warning. ***History:*** established April 4, 1980, as Cape Cod Missile Early Warning Station. Renamed Jan. 5, 1982.

JBCC-Otis ANGB, Mass. 02542. ***Nearest city:*** Falmouth. ***Phone:*** 508-968-4003. ***Acres:*** 4,026. ***Total Force:*** part of JB Cape Cod. ***Component:*** ANG. ***Unit/mission:*** 102nd IW, C2, DCGS operations, EIG, WXF; 202nd ISRG, cyber intelligence; 253rd CEIG, combat communications, cyber. ***History:*** named for 1st Lt. Frank J. Otis, Massachusetts ANG flight surgeon and pilot, killed in 1937 crash.

Westover ARB, Mass. 01022. ***Nearest city:*** Chicopee. ***Phone:*** 413-557-1110. ***Acres:*** 2,181. ***Total Force:*** civilian, 675; military, 2,975. ***Component:*** AFRC. ***Unit/mission:*** 439th AW, C-5M air mobility operations. ***History:*** dedicated April 6, 1940. Named for Maj. Gen. Oscar Westover, Chief of the Air Corps, killed Sept. 21, 1938. ***Inn:*** 413-593-5421.

MICHIGAN

Alpena CRTC, Alpena County Regional Airport, Mich. 49707. ***Nearest city:*** Alpena. ***Phone:*** 989-354-6583. ***Acres:*** 657. ***Total Force:*** civilian, 8; military, 115. ***Component:*** ANG. ***Unit/mission:*** training support and facilities.

Battle Creek ANGB, W. K. Kellogg Airport, Mich. 49037. ***Nearest city:*** Battle Creek. ***Phone:*** 269- 969-3234. ***Total Force:*** civilian, 0; military, 1,345. ***Component:*** ANG. ***Unit/mission:*** 110th Wing, MQ-9 Reaper, C2, cyber, agile combat support.

Selfridge ANGB, Mich. 48045. ***Nearest city:*** Mount Clemens. ***Phone:*** 586-239-4011. ***Acres:*** 3,603. ***Total Force:*** civilian, 976; military, 2,457. ***Component:*** ANG. ***Unit/mission:*** 127th Wing, air mobility, fighter operations. ***History:*** Activated July 1917. Transferred to Michigan ANG July 1971. Named for 1st Lt. Thomas E. Selfridge, killed Sept. 17, 1908, at Fort Myer, Va., when airplane piloted by Orville Wright crashed. ***Museum:*** Selfridge Military Air Museum. ***Golf:*** Selfridge.

MINNESOTA

Duluth ANGB, Duluth Intl. Airport, Minn. 55811. ***Nearest city:*** Duluth. ***Phone:*** 218-788-7210. Acres: 174. ***Total Force:*** civilian, 0; military, 1,463. ***Component:*** ANG. ***Unit/mission:*** 148th FW, EOD, fighter operations.

Minneapolis-St. Paul ARS, Minneapolis-St. Paul Intl. Airport, Minn. 55450. ***Nearest city:*** Minneapolis. ***Phone:*** 612-713-1000. ***Acres:*** 246. ***Total Force:*** civilian, 0; military, 809. ***Component:*** ANG/AFRC. ***Unit/mission:*** 133rd AW (ANG), air mobility operations; 934th AW (AFRC), air mobility, cyber operations.

MISSISSIPPI

Allen C. Thompson Field ANGB, Jackson-Medgar Wiley Evers Intl. Airport, Miss. 39232. ***Nearest city:*** Jackson. ***Phone:*** 601-405-8300. ***Acres:*** 308. ***Total Force:*** civilian, 352; military, 1,205. ***Component:*** ANG. ***Unit/mission:*** 172nd AW, 183rd AS, 183rd Air Evacuation Squadron, air mobility operations.

Columbus AFB, Miss. 39710. ***Nearest city:*** Columbus. ***Phone:*** 662-434-1110. ***Acres:*** 4,919. ***Total Force:*** civilian, 601; military, 1,408. ***Active-duty USAF:*** enlisted, 558; officer, 941. ***Owning command:*** AETC. ***Unit/mission:*** 14th FTW (AETC), pilot training. ***History:*** Activated 1942 for pilot training. ***Inn:*** 662-434-2548.

Gulfport CRTC, Gulfport-Biloxi Intl. Airport, Miss. 39507. ***Nearest city:*** Gulfport. ***Phone:*** 228-214-6047. ***Acres:*** 277. ***Total Force:*** civilian, 784; military, 3,417. ***Component:*** ANG. ***Unit/mission:*** 209th Special Operations Civil Engineering Squadron, 255th Air Control Squadron; cross-domain training.

Keesler AFB, Miss. 39534. ***Nearest city:*** Biloxi. ***Phone:*** 228-377-1110. ***Acres:*** 1,670. ***Total Force:*** civilian, 1,638; military, 6,719. ***Active-duty USAF:*** enlisted, 3,668, officer, 779. ***Owning command:*** AETC. ***Unit/mission:*** 81st TRW (AETC), training; 403rd Wing (AFRC), air mobility operations, weather reconnaissance; Hq. 2nd Air Force (AETC), operational leadership. ***History:*** Activated June 12, 1941. Named for 2nd Lt. Samuel R. Keesler Jr., a native of Mississippi and WWI aerial observer killed in action Oct. 9, 1918. ***Inn:*** 228-374-0088. ***Golf:*** Bay Breeze.

Key Field ANGB, Meridian Regional Airport, Miss. 39307. ***Nearest city:*** Meridian. ***Phone:*** 601-484-9000. ***Acres:*** 126. ***Total Force:*** civilian, 0; military, 1,258. ***Component:*** ANG. ***Unit/mission:*** 186th ARW, air mobility, C2, ISR, TACP operations. ***History:*** named after Fred and Al Key, air-to-air refueling pioneers and 1935 flight-endurance record holders for 27 days aloft in *Ole Miss,* on permanent display at the National Air and Space Museum.

Senior Airman Duncan Bevan

A U.S. Air Force crew chief assigned to the 13th Aircraft Maintenance Squadron motions a U.S. Air Force F-16 Fighting Falcon assigned to the 13th Fighter Squadron to taxi during exercise Cope North 21 at Andersen Air Force Base, Guam, Feb. 17.

MISSOURI

Jefferson Barracks ANGB, Mo. 63125. ***Nearest city:*** St. Louis. ***Phone:*** 314-527-8000. ***Acres:*** 135. ***Total Force:*** civilian, 108; military, 1,311. ***Component:*** ANG. ***Unit/mission:*** 131st MSG, support: 157th AOG, C2 operations; 239th CBCS, combat communications.

Rosecrans ANGB, Rosecrans Memorial Airport, Mo. 64503. ***Nearest city:*** St. Joseph. ***Phone:*** 816-236-3300. ***Acres:*** 90. ***Total Force:*** civilian, 0; military, 1,058. ***Component:*** ANG. ***Unit/mission:*** 139th AW (ANG), air mobility operations; Advanced Airlift Tactics Training Center (ANG/AFRC).

Whiteman AFB, Mo. 65305. ***Nearest city:*** Knob Noster. ***Phone:*** 660-687-1110. ***Acres:*** 5,566. ***Total Force:*** civilian, 1,098; military, 5,875. ***Active-duty USAF:*** enlisted, 3,514; officer, 537. ***Owning command:*** AFGSC. ***Unit/mission:*** 72nd Test and Evaluation Squadron (AFGSC), T&E; 131st BW (ANG), bomber operations; 325th WPS (ACC), tactics training; 442nd FW (AFRC), fighter operations; 509th BW (AFGSC), bomber operations. ***History:*** Activated 1942. Named for 2nd Lt. George A. Whiteman, first pilot to die in aerial combat during the attack on Pearl Harbor. ***Inn:*** 660-687-1844. ***Golf:*** Royal Oaks.

MONTANA

Malmstrom AFB, Mont. 59402. ***Nearest city:*** Great Falls. ***Phone:*** 406-731-1110. ***Acres:*** 3,628. ***Total Force:*** civilian, 628; military, 3,486. ***Active-duty USAF:*** enlisted, 2,960; officer, 452. ***Owning command:*** AFGSC. ***Unit/mission:*** 341st MW (AFGSC), ICBM operations; 819th RED HORSE (ACC/ANG), bare base operations. ***History:*** Activated Dec. 15, 1942. Named for Col. Einar A. Malmstrom, WWII fighter commander killed in air accident Aug. 21, 1954. ***Inn:*** 406-727-8600.

Montana ANGB, Great Falls Intl. Airport, Mont. 59404. ***Nearest city:*** Great Falls. ***Phone:*** 406-791-0159. ***Acres:*** 139. ***Total Force:*** civilian, 0; military, 792. ***Component:*** ANG. ***Unit/mission:*** 120th AW, air mobility operations, RED HORSE.

NEBRASKA

Nebraska ANGB, Lincoln Airport., Neb. 68524. ***Nearest city:*** Lincoln. ***Phone:*** 402-309-1219. ***Acres:*** 129. ***Total Force:*** civilian, 0; military, 1,784. ***Component:*** ANG. ***Unit/mission:*** 155th ARW, air mobility operations.

Offutt AFB, Neb. 68113. ***Nearest city:*** Bellevue. ***Phone:*** 402-294-1110. ***Acres:*** 1,923. ***Total Force:*** civilian, 2,608; military, 6,933. ***Active-duty USAF:*** enlisted, 4,668; officer, 1,210. ***Owning command:*** ACC. ***Unit/mission:*** 55th Wing (ACC), ISR, electronic attack; Hq. STRATCOM, operational leadership; 557th Weather Wing (ACC), management; 595th C2 Group (AFGSC), operations (NC2); 170th Group (ANG), support, training. ***History:*** Activated 1896 as Army's Fort Crook. Used for airships from 1918 and aircraft cross-country stop from 1921. Landing field named May 10, 1924, for 1st Lt. Jarvis J. Offutt, WWI pilot who died Aug. 13, 1918. Served as bomber production facility January 1942 to September 1945. Redesignated Offutt Field June 1946. Redesignated Offutt AFB on Jan. 13, 1948, transferred to USAF. ***Museum:*** Zorinsky Memorial Air Park. ***Inn:*** 402-294-3671. ***Golf:*** Willow Lakes.

Airman 1st Class Jacob Wrightsman

Senior Airman Christian X. Brewer, 2nd Aircraft Maintenance Squadron, 2nd Bomb Wing, weapons load crew member, yells instructions in order to load munitions onto a B-52H Stratofortress during Combat Hammer at Barksdale Air Force Base, La., March 10.

NEVADA

Creech AFB, Nev. 89018. ***Nearest city:*** Indian Springs. ***Phone:*** 702-652-1110. ***Acres:*** 2,318. ***Total Force:*** civilian, 93; military, 3,079. ***Active-duty USAF:*** enlisted, 1,982; officer, 778. ***Owning command:*** ACC. ***Unit/mission:*** 432nd WG (ACC), 726th OG (AFRC), 556th Test and Evaluation Sq. (ACC), 232nd Operations Sq. (ANG), RPA operations; 799th ABG (ACC), support. ***History:*** built in 1943 as auxiliary landing field to support air-to-air gunnery and other AAF training. Called Indian Springs Airport. Closed in 1947. Reopened in 1949. Became Indian Springs AFB in 1950. Transferred to Air Research and Development Command in 1952. Redesignated Indian Springs Air Force Auxiliary Field and assigned to Nellis AFB in 1964. In 2005, renamed Creech AFB for Gen. Wilbur L. "Bill" Creech, commander, Tactical Air Command, 1978 to 1984.

Nellis AFB, Nev. 89191. ***Nearest city:*** Las Vegas. ***Phone:*** 702-652-1110. ***Acres:*** 14,160. ***Total Force:*** civilian, 1,603; military, 8,730. ***Active-duty USAF:*** enlisted, 6,487; officer, 1,293. ***Owning command:*** ACC. ***Unit/mission:*** 57th Wing (ACC), combat training; 99th ABW (ACC), support; 820th RED HORSE (ACC), bare base operations; 926th Wing (AFRC), associate missions at Beale, Creech, Eglin, Hurlburt, Nellis, Schriever; USAF Warfare Center (ACC), operational testing, tactics development, training; Nevada Test and Training Range (ACC), range management, operations. ***History:*** Activated July 1941 as Las Vegas AAF with Army Air Corps Flexible Gunnery School. Closed 1947. Reopened 1948. Named for 1st Lt. William H. Nellis, WWII P-47 fighter pilot, killed Dec. 27, 1944. ***Museum:*** The Thunderbirds Museum. ***Inn:*** 702-652-2711. ***Golf:*** Sunrise Vista.

Nevada ANGB, Reno-Tahoe Intl. Airport, Nev. 89502. ***Nearest city:*** Reno. ***Phone:*** 775-788-4515. ***Acres:*** 60. ***Total Force:*** civilian, 0; military, 1,204. ***Component:*** ANG. ***Unit/mission:*** 152nd AW, air mobility, DCGS operations. ***History:*** Named for Maj. Gen. James A. May, Nevada adjutant general, 1947 to 1967.

NEW HAMPSHIRE

New Boston AFS, N.H. 03070. **Nearest city:** New Boston. ***Phone:*** 719-567-5040 (50th Space Wing). ***Acres:*** 2,873. ***Total Force:*** civilian, 36; military, 6. ***Component:*** USSF. ***Unit/mission:*** 23rd Space Operations Squadron, satellite command and control. ***History:*** Began as a research-and-development facility in 1960 with van-mounted equipment, becoming part of the operational Air Force in 1987.

Pease ANGB, Portsmouth Intl. Airport at Pease, N.H. 03803. ***Nearest city:*** Portsmouth. ***Phone:*** 603-430-3577. ***Acres:*** 216. ***Total Force:*** civilian, 0; military, 1,063. ***Component:*** ANG. ***Unit/mission:*** 64th ARS (AMC) (active associate), 157th ARW (ANG), air mobility operations. ***History:*** Site of former Portsmouth AFB, activated June 1956. Renamed Sept. 7, 1957, for Capt. Harl Pease Jr., MOH recipient, B-17 pilot killed in WWII. Air Force base closed March 31, 1991.

NEW JERSEY

Atlantic City ANGB, Atlantic City Intl. Airport., N.J. 08234. ***Nearest city:*** Egg Harbor Township. ***Phone:*** 609-761-6000. ***Acres:*** 307. ***Total Force:*** civilian, 0; military, 1,403. ***Component:*** ANG. ***Unit/mission:*** 177th FW, fighter, TACP operations.

JB McGuire-Dix-Lakehurst, N.J. 08641. ***Nearest city:*** Wrightstown. ***Phone:*** 609-754-1100. ***Acres:*** 3,620 (McGuire AFB); 30,720 (Fort Dix). ***Total Force:*** civilian, 5,064; military, 14,268. ***Active-duty USAF:*** enlisted, 4,583; officer, 736. ***Owning command:*** AMC. ***Unit/mission:*** 87th ABW (AMC), support; 108th Wing (ANG), air mobility, bare base operations; 305th AMW (AMC), 514th AMW (AFRC), air mobility operations; 621st CRW (AMC), bare base operations; US Air Force Expeditionary Center (AMC), training. ***History:*** McGuire activated 1941 as Fort Dix AAB. Closed after WWII. Reopened as McGuire 1948. Dix activated 1917. Navy purchased Army's Camp Kendrick in 1921 for airship station, renamed Lakehurst for city of Lakehurst, N.J. Formed as joint base under Air Force lead 2009. McGuire named for Maj. Thomas B. McGuire Jr., P-38 pilot, second leading U.S. ace of WWII, MOH recipient, killed in action Jan. 7, 1945. Dix named for Maj. Gen. John Adams Dix, War of 1812 and Civil War veteran and U.S senator. ***Museum:*** Fort Dix Military Heritage Hall, Army Reserve Mobilization Museum. ***Inn:*** 609-754-4667; 732-323-2266 (Lakehurst). ***Golf:*** Fountain Green, Pine Ridge.

Warren Grove Range, N.J. ***Nearest city:*** Warren Grove. ***Phone:*** 609-754-1100. (108th Wing at JB McGuire-Dix-Lakehurst). ***Acres:*** 9,416. ***Component:*** ANG. ***Unit/mission:*** air and ground combat training. ***History:*** Began as a World War II weapons research location and became part of the New Jersey Air National Guard in the early 1960s.

NEW MEXICO

Cannon AFB, N.M. 88103. ***Nearest city:*** Clovis. **Phone:** 575-784-4131. ***Acres:*** 4,522. **Total Force:** civilian, 0; military, 4,716. ***Active-duty USAF:*** enlisted, 3,830; officer, 844. ***Owning command:*** AFSOC. ***Unit/mission:*** 27th SOW (AFSOC), special operations. **History:** Activated August 1942. Named for Gen. John K. Cannon, WWII commander of all Allied air forces in the Mediterranean Theater and former commander, Tactical Air Command. ***Inn:*** 575-784-2918/2919. ***Golf:*** Whispering Winds.

Holloman AFB, N.M. 88330. **Nearest city:** Alamogordo. ***Phone:*** 575-572-7381. ***Acres:*** 57,152. ***Total Force:*** civilian, 839; military, 4,227. ***Active-duty USAF:*** enlisted, 4,009; officer, 595. ***Owning command:*** AETC. ***Unit/mission:*** 49th Wing (AETC), RPA training; 54th FG (AETC), fighter operations; 704th TG (AFMC), test; 429th ACTS (AFRC), RPA training. ***History:*** Activated 1941. Named for Col. George Holloman, guided-missile pioneer. ***Inn:*** 505-595-1905. ***Golf:*** Apache Mesa.

Kirtland AFB, N.M. 87117. ***Nearest city:*** Albuquerque. ***Phone:*** 505-846-0011. ***Acres:*** 43,842. ***Total Force:*** civilian, 2,789; military, 4,980. ***Active-duty USAF:*** enlisted, 2,470; officer, 804. ***Owning command:*** AFGSC. ***Unit/mission:*** 58th SOW (AETC), 150th SOW (ANG), special operations, CSAR training; 377th ABW (AFGSC), executive agent for installation, support, nuclear operations; AFNWC (AFMC), acquisition, sustainment; Air Force Safety Center (USAF), management; AFRL Directed Energy Directorate (AFMC), R&D; PEO-Strategic Systems (AFMC), acquisition; Space Development and Test Directorate (AFSPC), test; AFRL Space Vehicles Directorate (AFMC), R&D. ***History:*** Activated January 1941. Named for aviation pioneer Col. Roy C. Kirtland. ***Inn:*** 505-846-9653. ***Golf:*** Tijeras Arroyo.

Melrose AF Range, N.M. ***Nearest city:*** Floyd.

Airman 1st Class Dwane Young

An F-16 Fighting Falcon fighter jet assigned to the 64th Aggressor Squadron flies over the Nevada Test and Training Range during a Red Flag 21-1 exercise Feb. 1. Red Flag exercises test the capabilities of pilots and teams while increasing efficiency and strengthening their teamwork.

Acres: 79,973. ***Owning command:*** AFSOC. ***Unit/mission:*** part of 27th Special Operations Wing. ***History:*** Established as a bombing range in 1952.

NEW YORK

Francis S. Gabreski ANGB, Francis S. Gabreski Airport, N.Y. 11978. ***Nearest city:*** Westhampton Beach. ***Phone:*** 631-723-7470. ***Acres:*** 80. ***Total Force:*** civilian, 174; military, 1,122. ***Component:*** ANG. ***Unit/mission:*** 106th RQW, personnel recovery operations. ***History:*** named for Col. Francis S. Gabreski, WWII and Korean War ace.

Hancock Field ANGB, N.Y. 13211. ***Nearest city:*** Syracuse. ***Phone:*** 1-800-982-3696. ***Acres:*** 322. ***Total Force:*** civilian, 18; military, 2,215. ***Component:*** ANG. ***Unit/mission:*** 174th ATKW, ISR, RPA, space C2, TACP operations; ISR, RPA training.

Niagara Falls ARS, Niagara Falls Intl. Airport, N.Y. 14304. ***Nearest city:*** Niagara Falls. ***Phone:*** 716-236-2000. ***Acres:*** 986. ***Total Force:*** civilian, 0; military, 2,285. ***Component:*** ANG/AFRC. ***Unit/mission:*** 107th ATKW (ANG), RPA operations; 914th ARW (AFRC), air mobility operations.

Stewart ANGB, Stewart Intl. Airport, N.Y. 12550. ***Nearest city:*** Newburgh. ***Phone:*** 845-563-2031. ***Acres:*** 267. ***Total Force:*** civilian, 290; military, 2,000. ***Component:*** ANG. ***Unit/mission:*** 105th AW, air mobility, EIS. ***History:*** Stewart AFB until 1969. Acquired by state of New York 1970.

Stratton ANGB, Schenectady County Airport, N.Y. 12302. ***Nearest city:*** Scotia. ***Phone:*** 518-344-2000. ***Acres:*** 129. ***Total Force:*** civilian, 207; military, 1,362. ***Component:*** ANG. ***Unit/mission:*** 109th AW, air mobility operations, Antarctic support.

NORTH CAROLINA

Charlotte ANGB, Charlotte Douglas Intl. Airport, N.C. 28208. ***Nearest city:*** Charlotte. ***Phone:*** 704-391-4100. ***Acres:*** 110. ***Total Force:*** civilian, 0; military, 1,672. ***Component:*** ANG. ***Unit/mission:*** 145th AW, aeromedical evacuation, air mobility, combat communications, TACP operations.

Dare County Bombing Range, N.C. ***Nearest city:*** Goldsboro. ***Phone:*** 919-722-1110 (Seymour Johnson AFB operator). ***Acres:*** 46,604. ***Owning command:*** ACC. ***Unit/mission:*** air-to-surface target training.

New London ANGB, Stanly County Airport, N.C. 28127. ***Phone:*** 704-391-4141 (145th AW public affairs). ***Acres:*** 114. ***Total Force:*** civilian, 32; military, 278. ***Component:*** ANG. ***Unit/mission:*** 263rd CCS, strategic emergency communications; 118th ASOS, terminal attack control of joint close air support missions; 235th ATS, air traffic control.

Pope Field, N.C. 28308. ***Nearest city:*** Fayetteville. ***Phone:*** 910-394-1110. ***Acres:*** N/A. **Total Force:** civilian, 240; military, 1,491. ***Active-duty USAF:*** enlisted, 1,876; officer, 464. ***Unit/mission:*** 18th ASOG (ACC), combat weather, TACP operations; 21st STS, 24th STS (AFSOC), special tactics operations; 43rd AG (AMC), air mobility operations; USAF Combat Control School (AF SOC), training. ***History:*** Activated 1919. Pope AFB became Pope Field, part of Fort Bragg, March 1, 2011. Named for 1st Lt. Harley H. Pope, WWI pilot, killed Jan. 7, 1919. ***Museum:*** Air Park. ***Inn:*** IHG Army Hotels, 910-396-7700.

Seymour Johnson AFB, N.C. 27531. ***Nearest city:*** Goldsboro. ***Phone:*** 919-722-1110. ***Acres:*** 4,129. ***Total Force:*** civilian, 0; military, 5,953. ***Active-duty USAF:*** enlisted, 4,005; officer, 561. ***Owning command:*** ACC. ***Unit/mission:*** 4th FW (ACC), 414th FG (AFRC), fighter operations; 567th RED HORSE (ACC), bare base operations; 916th ARW (AFRC), air mobility operations. ***History:*** Activated Sept. 12, 1942, and named for Navy Lt. Seymour A. Johnson, Goldsboro native, killed March 5, 1941. **Inn:** 919-722-0385.

NORTH DAKOTA

Cavalier AFS, N.D. 58220. ***Nearest city:*** Cavalier. ***Phone:*** 701-993-3292. ***Acres:*** 295. ***Total Force:*** civilian, 6; military, 30. ***Owning command:*** USSF. ***Unit/mission:*** 10th SWS (USSF), missile warning. ***History:*** established 1975 as Army's Mickelsen Complex, an anti-ballistic missile facility. All but perimeter acquisition radar inactivated 1976. USAF took radar operational control 1977 and site control 2007.

Grand Forks AFB, N.D. 58205. ***Nearest city:*** Grand Forks. ***Phone:*** 701-747-3000. **Acres:** 5,420. ***Total Force:*** civilian, 0; military, 1,815. ***Active-duty USAF:*** enlisted, 1,636; officer, 256. ***Owning command:*** ACC. ***Unit/mission:*** 319th RW (ACC), support. ***History:*** Activated 1956. Named after town of Grand Forks, whose citizens bought the property for the Air Force. ***Inn:*** 701-747-7200. ***Golf:*** Plainsview.

Hector Field, Hector Intl. Airport, N.D. 58102. ***Nearest city:*** Fargo. ***Phone:*** 701-451-2259. ***Acres:*** 255. ***Total Force:*** civilian, 320; military, 1,775. ***Component:*** ANG. ***Unit/mission:*** 119th Wing, 178th ATKS (MQ-9 operations), 119th ISRG (targeting).

Minot AFB, N.D. 58705. ***Nearest city:*** Minot. **Phone:** 701-723-7979. ***Acres:*** 5,615. ***Total Force:*** civilian, 50; military, 5,843. ***Active-duty USAF:*** enlisted, 5,029; officer, 695. ***Owning command:*** AFGSC. ***Unit/mission:*** 5th BW (AFGSC), bomber operations; 91st MW (AFGSC), ICBM operations. ***History:*** Activated January 1957. Named after city of Minot, whose citizens donated $50,000 toward purchase of the land. ***Inn:*** 701-723-6161. ***Golf:*** Rough Rider.

OHIO

Blue Ash ANGS, Ohio 45242. ***Nearest city:*** Cincinnati. **Phone:** 513-936-2982. ***Acres:*** 12. ***Total Force:*** civilian, 0; military, 0 (unit deployed overseas in November 2020). ***Component:*** ANG. ***Unit/mission:*** 123rd ACS, command and control.

Mansfield Lahm ANGB, Ohio 44903. ***Nearest city:*** Mansfield. ***Phone:*** 419-520-6420. ***Acres:*** 2,987. ***Total Force:*** civilian, 0; military, 1,517. ***Component:*** ANG. ***Unit/mission:*** 179th AW, air mobility operations. ***History:*** Named in 1948 for nearby city and aviation pioneer Brig. Gen. Frank P. Lahm.

Rickenbacker ANGB, Rickenbacker Intl. Airport, Ohio 43217. ***Nearest city:*** Columbus. ***Phone:*** 614-492-3269. **Acres:** 169. ***Total Force:*** civilian, 396; military, 3,026. ***Component:*** ANG. ***Unit/mission:*** 121st ARW, air mobility operations. ***History:*** Activated 1942. Formerly Lockbourne AFB. Renamed May 7, 1974, for Capt. Edward V. Rickenbacker. Base transferred from Strategic Air Command to ANG April 1, 1980.

Springfield-Beckley ANGB, Springfield-Beckley Intl. Airport, Ohio 45502. ***Nearest city:*** Springfield. ***Phone:*** 800-851-4503. ***Acres:*** 180. ***Total Force:*** civilian, 0; military, 557. ***Component:*** ANG. ***Unit/mission:*** 178th Wing, cyber, ISR, space, RPA operations.

Toledo Express ANGB, Toledo Express Airport, Ohio 43558. ***Nearest city:*** Swanton. ***Phone:*** 419-868-4250. ***Acres:*** 135. ***Total Force:*** civilian, 0; military, 1,048. ***Component:*** ANG. ***Unit/mission:*** 180th FW, fighter operations.

Wright-Patterson AFB, Ohio 45433. ***Nearest city:*** Dayton. ***Phone:*** 937-257-1110. ***Acres:*** 7,947. ***Total Force:*** civilian, 15,127; military, 7,719. ***Active-duty USAF:*** enlisted, 2,960; officer, 2,850. ***Owning command:*** AFMC. ***Unit/mission:*** 88th ABW (AFMC), support; 445th AW (AFRC), air mobility operations; 591st SCMG (AFMC), systems life cycle support; 655th ISR Wing (AFRC), intelligence; Air Force Installation Contracting Agency (AFMC) operational acquisition; Air Force Institute of Technology (AETC), education; PEO-Agile Combat Support, PEO-Fighters and Bombers, PEO-ISR and SOF, PEO-Mobility, PEO-Tanker (AFMC), acquisition; Hq. Air Force Life Cycle Management Center (AFMC), acquisition and development; Hq. AFMC, management; Hq. AFRL (AFMC), R&D; National Air and Space Intelligence Center (USAF), foreign aerospace analysis; National Museum of the US Air Force (AFMC). ***History:*** Originally separate, Wright Field and Patterson Field were merged and redesignated Wright-Patterson AFB on Jan. 13, 1948. Named for aviation pioneers Orville and Wilbur Wright and for 1st Lt. Frank S. Patterson, killed June 19, 1918. ***Museum:*** National Museum of the US Air Force. ***Inn:*** 937-257-3451. ***Golf:*** Prairie Trace, Twin Base.

Youngstown ARS, Ohio 44473. ***Nearest city:*** Youngstown. ***Phone:*** 330-609-1000. **Acres:** 659. **Total Force:** civilian, 0; military, 1,470. **Component:** AFRC. **Unit/mission:** 910th AW, air mobility operations.

Staff Sgt. J.D. Strong II

U.S. Air Force Airman 1st Class Aulbri Runion, 58th Maintenance Squadron C-130 inspection section journeyman, displays MC-130J components he replaced at Kirtland Air Force Base, N.M., March 27, 2020.

Zanesville ANGB, Zanesville Municipal Airport, Ohio 43701. ***Nearest city:*** Zanesville. ***Phone:*** 740-450-4748. ***Acres:*** 13. ***Total Force: civilian,*** 19; military, 94. ***Component:*** ANG. Unit/mission: 220th Engineering Installation Squadron.

OKLAHOMA

Altus AFB, Okla. 73523. ***Nearest city:*** Altus. ***Phone:*** 580-482-8100. ***Acres:*** 6,823. ***Total Force:*** civilian, 1,306; military, 1,402. ***Active-duty USAF:*** enlisted, 1,093, officer, 248. ***Owning command:*** AETC. ***Unit/mission:*** 97th AMW (AETC), training. ***History:*** Activated January 1943. Inactivated May 1945. Reactivated August 1953. ***Inn:*** 580-481-7356. ***Golf:*** Windy Trails.

Tinker AFB, Okla. 73145. ***Nearest city:*** Oklahoma City. ***Phone:*** 405-739-2026. ***Acres:*** 4,858. ***Total Force:*** civilian, 0; military, 7,860. ***Active-duty USAF:*** enlisted, 3,652; officer, 1,127. ***Owning command:*** AFMC. ***Unit/mission:*** 72nd ABW (AFMC), support; 137th ARW (ANG), air mobility, cyber, TACP operations; 448th SCMW (AFMC), supply chain management; 507th ARW (AFRC), air mobility operations; 513th ACG (AFRC), 552nd ACW (ACC), C2 operations; Hq. Air Force Sustainment Center (AFMC), weapon systems sustainment; Oklahoma City ALC (AFMC), weapon systems maintenance, repair, overhaul. ***History:*** Activated March 1942. Named for Maj. Gen. Clarence L. Tinker, who went down at sea June 7, 1942, leading a group of LB-30 bombers against Japan. ***Museum:*** Tinker AFB Museum, Charles B. Hall Air Park. ***Inn:*** 405-734-5095. ***Golf:*** Tinker.

Tulsa ANGB, Tulsa Intl. Airport, Okla. 74115. ***Nearest city:*** Tulsa. ***Phone:*** 918-833-7000. ***Acres:*** 145. ***Total Force:*** civilian, 0; military, 1,085. ***Component:*** ANG. ***Unit/mission:*** 138th FW, fighter, cyber operations, TACP training.

Vance AFB, Okla. 73705. ***Nearest city:*** Enid. ***Phone:*** 580-213-5000. ***Acres:*** 3,738. ***Total Force:*** civilian, 0; military, 1,472. ***Active-duty USAF:*** enlisted, 352; officer, 871. ***Owning command:*** AETC. ***Unit/mission:*** 71st FTW (AETC), training. ***History:*** Activated November 1941. Named for Lt. Col. Leon R. Vance Jr., Enid native, 1939 West Point graduate, and MOH recipient, killed July 26, 1944. ***Museum:*** Air Park. ***Inn:*** 580-213-7358.

Will Rogers ANGB, Will Rogers World Airport, Okla. 73179. ***Nearest city:*** Oklahoma City. ***Phone:*** 405-686-5227. ***Acres:*** 135. ***Total Force:*** civilian, 0; military, 1,178. ***Component:*** ANG/AFSOC. ***Unit/mission:*** 137th SOW, ISR operations; 146th ASOS, TACP operations; 205th EIS, cyber operations.

OREGON

Kingsley Field, Crater Lake-Klamath Regional Airport, Ore. 97603. **Nearest city:** Klamath Falls. **Phone:** 541-885-6350. **Acres:** 776. **Total Force:** civilian, 0; military, 995. **Component:** ANG. **Unit/mission:** 173rd FW (active associate), training. **History:** named for 2nd Lt. David R. Kingsley, MOH recipient, killed June 23, 1944, on Ploesti, Romania, oil field bombing mission.

Portland ANGB, Portland Intl. Airport, Ore. 97218. ***Nearest city:*** Portland. ***Phone:*** 503-335-4104. ***Acres:*** 222. ***Total Force:*** civilian, 0; military, 1,683. ***Component:*** ANG/AFRC. ***Unit/mission:*** 123rd WF (ANG), combat weather operations; 125th STS (ANG), special tactics operations; 142nd FW (ANG), fighter operations; 304th RQS (AFRC), personnel recovery operations.

PENNSYLVANIA

Harrisburg ANGB, Harrisburg Intl. Airport, Pa. 17057. ***Nearest city:*** Middletown. ***Phone:*** 717-948-2311. ***Acres:*** 42. ***Total Force:*** civilian, 241; military, 1,119. ***Component:*** ANG. ***Unit/mission:*** 193rd SOW, C2, combat communications, cyber, special, TACP operations.

Johnstown ANGS, John Murtha Johnstown-Cambria County Airport, Okla. 15904. ***Nearest city:*** Johnstown. ***Phone:*** 814-532-5901 ***Acres:*** 10. ***Total Force:*** civilian, 0; military, 561. ***Component:*** ANG. ***Unit/mission:*** 258th ATCS, air traffic control.

Pittsburgh ARS, Pittsburg Intl. Airport, Pa. 15108. ***Nearest city:*** Coraopolis. ***AFRC phone:*** 412-474-8511. ***ANG phone:*** 412-776-8010. ***Acres:*** 205. ***Total Force:*** civilian, 0; military, 1,202. ***Components:*** ANG/ AFRC. ***Unit/mission:*** 171st ARW (ANG), air mobility operations; 911th AW (AFRC), aeromedical evacuation, air mobility operations.

PUERTO RICO

Muñiz ANGB, Luis Muñoz Marin Intl. Airport, Puerto Rico 00979. ***Nearest city:*** San Juan. ***Phone:*** 787-253-5108. Acres: 95. ***Total Force:*** civilian, 0; military, 811. ***Component:*** ANG. ***Unit/mission:*** 156th AW, air mobility operations, weather reconnaissance.

RHODE ISLAND

North Smithfield ANGS, R.I. 02986. ***Nearest city:*** Johnstown. ***Phone:*** 401-762-8600. ***Acres:*** 34. ***Total Force:*** civilian, 0; military, 81. ***Component:*** ANG. ***Unit/mission:*** 282nd CCS, combat communications.

Quonset ANGB, Quonset State Airport, R.I. 02852. ***Nearest city:*** North Kingstown. ***Phone:*** 401-267-3229. ***Acres:*** 104. ***Total Force:*** civilian, 278; military, 1,135. ***Component:*** ANG. **Unit/mission:** 143rd AW, air mobility operations, cyber.

SOUTH CAROLINA

JB Charleston, S.C. 29404. ***Nearest city:*** Charleston. ***Phone:*** 843-963-1110. ***Acres:*** 3,877 (Charleston AFB). ***Total Force:*** civilian, 1,471; military, 16,498. ***Active-duty USAF:*** enlisted, 3,208; officer 531. ***Owning command:*** AMC. ***Unit/mission:*** 315th AW (AFRC), 437th AW (AMC), air mobility operations; 628th ABW (AMC), support. ***History:*** Activated 1942. Inactivated March 1946. Reactivated August 1953. Formed joint base with Naval Weapons Station Charleston under Air Force lead 2010. Named for city of Charleston. ***Museum:*** Air Park. ***Inn:*** 843-963-8000. ***Golf:*** Wrenwoods.

McEntire JNGB, S.C. 29044. ***Nearest city:*** Columbia. ***Phone:*** 803-647-8200. **Acres:** 2,421. ***Total Force:*** civilian, 741; military, 3,044. ***Component:*** ANG. ***Unit/mission:*** 169th FW, 316th Fighter Squadron (active associate), fighter operations. ***History:*** Named for ANG Brig. Gen. B. B. McEntire Jr., killed in F-104 accident 1961.

Poinsett Electronic Combat Range, S.C. ***Nearest city:*** Wedgefield. ***Phone:*** 803-895-1110 (Shaw AFB operator); 803-895-2019 (20th FW public affairs). ***Acres:*** 12,521. ***Owning command:*** ACC. ***Unit/mission:*** air and ground training such as close air support controls and roadside bombing training in field conditions.

Shaw AFB, S.C. 29152. ***Nearest city:*** Sumter. ***Phone:*** 803-895-1110. ***Acres:*** 3,479. ***Total Force:*** civilian, 818; military, 6,112. ***Active-duty USAF: enlisted,*** 6,341; officer, 1,035. ***Owning command:*** ACC. ***Unit/mission:*** 20th FW (ACC), fighter operations; Hq. 9th Air Force (ACC), management (Hq. Air Forces Central in Southwest Asia, operational leadership). ***History:*** Activated Aug. 30, 1941. Named for 1st Lt. Ervin D. Shaw, one of the first Americans to see air action in WWI, killed in France July 9, 1918. ***Inn:*** 803-895-3803. ***Golf:*** Carolina Lakes.

SOUTH DAKOTA

Ellsworth AFB, S.D. 57706. ***Nearest city:*** Rapid City. ***Phone:*** 605-385-5056. ***Acres:*** 6,034. ***Total Force:*** civilian,615; military, 3,337. ***Active-duty USAF:*** enlisted, 2,988; officer, 363. ***Owning command:*** AFGSC. ***Unit/mission:*** 28th BW (AFGSC), bomber operations; Air Force Financial Services Center (AFMC). ***History:*** Activated January 1942 as Rapid City AAB. Renamed June 13, 1953, for Brig. Gen. Richard E. Ellsworth, killed March 18, 1953, in RB-36 crash. ***Museum:*** South Dakota Air and Space Museum. ***Inn:*** 605-593-0415. ***Golf:*** Prairie Ridge.

Joe Foss Field, S.D. 57104. ***Nearest city:*** Sioux Falls. ***Phone:*** 605-988-5700. **Acres:** 215. ***Total Force:*** civilian, 0; military, 402. ***Component:*** ANG. ***Unit/mission:*** 114th FW, fighter operations. ***History:*** Named for ANG Brig. Gen. Joseph J. Foss, WWII USMC ace and MOH recipient, former governor, former Air Force Association national president and board chairman, and founder of the South Dakota ANG.

TENNESSEE

Arnold AFB, Tenn. 37389. ***Nearest city:*** Manchester. ***Phone:*** 931-454-3000. ***Acres:*** 38,866. **Total Force:** civilian, 428; military, 66. ***Owning command:*** AFMC. ***Unit/mission:*** Arnold Engineering Development Complex (AFTC/AFMC), flight, space, and missile ground testing. ***History:*** Dedicated June 25, 1951. Named for General of the Air Force Henry H. "Hap" Arnold, legendary airpower advocate and co-founder of the Air Force Association. ***Inn:*** 931-454-3051. ***Golf:*** Arnold.

Berry Field ANGB, Nashville Intl. Airport, Tenn. 37217. ***Nearest city:*** Nashville. ***Phone:*** 615-660-8062. ***Acres:*** 88. ***Total Force:*** civilian, 0; military, 1,344. **Component:** ANG. ***Unit/mission:*** 118th Wing, cyber, intel, RPA operations.

McGhee Tyson ANGB, McGhee Tyson Airport, Tenn. 37777. ***Nearest city:*** Knoxville. ***Phone:*** 865-336-3205. ***Acres:*** 346. ***Total Force:*** civilian, 86; military, 1,483. ***Component:*** ANG. ***Unit/mission:*** 134th ARW, air mobility operations; 119th CACS, space C2 operations; 228th CBCS, combat communications; I. G. Brown ANG Training and Education Center. ***History:*** Named for Naval aviator Lt. j.g. Charles McGhee Tyson, killed in WWI.

Memphis ANGB, Memphis Intl. Airport, Tenn. 38118. ***Nearest city:*** Memphis. **Phone:** 901-291-7435. ***Acres:*** 119. ***Total Force:*** civilian, 0; military, 1,269. ***Component:*** ANG. ***Unit/mission:*** 164th AW, air mobility operations.

TEXAS

Dyess AFB, Texas 79607. ***Nearest city:*** Abilene. ***Phone:*** 325-696-2863. ***Acres:*** 6,320. ***Total Force:*** civilian, 499; military, 4,990. ***Active-duty USAF:*** enlisted, 4,214, officer, 566. ***Owning command:*** AFGSC. ***Unit/mission:*** 7th BW (AFGSC), bomber operations; 317th AW (AMC), air mobility operations. ***History:*** Abilene AAB opened Dec. 18, 1942. Inactivated Jan. 31, 1946. Reopened and renamed Dec. 1, 1956, for Lt. Col. William E. Dyess, WWII pilot who escaped from a Japanese prison camp, killed in P-38 crash in December 1943. ***Museum:*** Dyess AFB Memorial Museum and Linear Air Park. ***Inn:*** 325-696-2681/1874. **Golf:** Mesquite Grove.

Ellington Field, Ellington Airport, Texas 77034. ***Nearest city:*** Houston. ***Phone:*** 281-929-2662. ***Acres:*** 213. ***Total Force:*** civilian, 0; military, 3,785. ***Component:*** ANG. ***Unit/mission:*** 147th Attack Wing, ISR, RPA, TACP operations. ***History:*** Named for Lt. Eric L. Ellington, pilot killed November 1913.

Goodfellow AFB, Texas 76908. ***Nearest city:*** San Angelo. ***Phone:*** 325-654-1110. ***Acres:*** 1,083. ***Total Force:*** civilian, 674; military, 2,814. ***Active-duty USAF:*** enlisted, 3,225; officer, 595. ***Owning command:*** AETC. ***Unit/mission:*** 17th TRW (AETC), training. ***History:*** Established August 1940. Officially activated January 1941. Named for 1st Lt. John J. Goodfellow Jr., WWI observation airplane pilot killed in combat Sept. 14, 1918. **Inn:** 325-654-5870.

Hensley Field AGS, Grand Prairie Armed Forces Reserve Complex, Texas 75211. ***Nearest city:*** Dallas. ***Phone:*** 972-619-4444. ***Acres:*** 23. **Total Force:** 0. ***Component:*** ANG. ***Unit/mission:*** 254th CCG, combat communications.

JB San Antonio, Texas 78234 (Fort Sam Houston). **Nearest city:** San Antonio. ***Phone:*** 210-221-1211 (Fort Sam Houston operator). ***Acres:*** 2,808 (Fort Sam Houston). ***Total Force:*** civilian, 9,128; military, 14,219 (JBSA-Fort Sam Houston only). ***Major components:*** JBSA-Fort Sam Houston, JBSA-Lackland, JBSA-Randolph, JBSA-Camp Bullis. ***Unit/mission:*** 502nd ABW (AETC), located at Fort Sam Houston, support. ***History:*** Established 2009 to consolidate the installation management and support functions for the military facilities in San Antonio as part of 2005 base realignment and closure actions. ***Museum:*** Fort Sam Houston. ***Inn:*** IHG Army Hotel at JBSA-Fort Sam Houston, 210-357-2705. ***Golf:*** Fort Sam Houston.

JBSA-Lackland, Texas 78236. ***Nearest city:*** San Antonio. ***Phone:*** 210-671-1110. ***Acres:*** 2,723. ***Medina Annex acres:*** 4,028. ***Total Force:*** civilian, 5,757; military, 18,991. ***Active-duty USAF:*** enlisted, 9,604; officer, 2,700. ***Owning command:*** AETC. ***Unit/mission:*** 37th TRW (AETC), training; 59th MDW (AETC), ambulatory surgical, management, training; 67th CW (ACC), network defense operations; 149th FW (ANG), cyber, fighter operations; 433rd AW (AFRC), air mobility operations; 624th Operations Center (ACC), cyberspace operations; 688th Cyberspace Wing (ACC), information operations, engineering infrastructure services; 960th Cyberspace Wing (AFRC), cyberspace operations; Air Force Civil Engineer Center (AFMC), engineering services; Air Force Installation and Mission Support Center (AFMC), resourcing and combat support; Air Force Services Agency (AFMC) support; Hq. 24th Air Force (ACC), operational leadership; Hq. 25th Air Force (ACC), operational leadership; Hq. Air Force Security Forces Center (AFMC), management. ***History:*** Activated 1941 as part of Kelly Field. designated an independent installation July 1942 as San Antonio Aviation Cadet Center. Placed under Joint Base San Antonio installation management umbrella 2009. (See JBSA entry.) Named 1947 for Brig. Gen. Frank D. Lackland, early commandant of Kelly Field flying school, who died 1943. (Note: Several USAF agencies reside within Port San Antonio, the business development area created from the former Kelly AFB, but maintain JBSA-Lackland mailing addresses.). ***Museum:*** Airman Heritage Museum. ***Inn:*** 210-673-6930. ***Golf:*** Gateway Hills.

JBSA-Randolph, Texas 78150. ***Nearest city:*** San Antonio. ***Phone:*** 210-652-1110. ***Acres:*** 3,180. ***Total Force:*** civilian, 1; military, 3,233. ***Active-duty USAF:*** enlisted, 1,640; officer, 1,159. ***Owning command:*** AETC. ***Unit/mission:*** 12th FTW (AETC), training; 340th FTG (AFRC), training; 502 ABW (AETC), support; Air Force Personnel Center (USAF), management; Air Force Recruiting Service (AETC), management; Hq. AETC, management. ***History:*** Dedicated June 20, 1930. Placed under Joint Base San Antonio installation management umbrella 2009. (See JBSA) Named for Capt. William M. Randolph, died Feb. 17, 1928, on a training mission. ***Inn:*** 210-652-1844. ***Golf:*** Randolph Oaks.

Laughlin AFB, Texas 78843. ***Nearest city:*** Del Rio. ***Phone:*** 830-298-3511. ***Acres:*** 4,695. ***Total Force:*** civilian, 0; military, 1,360. ***Active-duty USAF:*** enlisted, 456; officer, 807. ***Owning command:*** AETC. ***Unit/mission:*** 47th FTW (AETC), training. ***History:*** Activated July 1942. Named for 1st Lt. Jack Thomas Laughlin, Del Rio native, B-17 pilot, killed Jan. 29, 1942. ***Museum:*** Laughlin Heritage Foundation. ***Inn:*** 830-298-5741. ***Golf:*** Leaning Pine.

NAS JRB Fort Worth, Texas 76127. ***Nearest city:*** Fort Worth. ***Navy-hosted switchboard:*** 817-782-5000. ***ANG Phone:*** 817-852-3136. ***Acres:*** 2,342. ***Total Force:*** civilian, 194; military, 7,946. ***Component:*** ANG/AFRC. ***Unit/mission:*** 136th AW (ANG), air mobility, combat communications operations; 301st FW (AFRC), fighter operations; Hq. 10th Air Force (AFRC), operational leadership. ***Inn:*** Navy Gateway, 817-782-5393.

Sheppard AFB, Texas 76311. ***Nearest city:*** Wichita Falls. ***Phone:*** 940-676-2732. ***Acres:*** 5,296. ***Total Force:*** civilian, 1,119; military, 5,7,30. ***Active-duty USAF:*** enlisted, 5,263; officer, 524. ***Owning command:*** AETC. ***Unit/mission:*** 80th FTW (AETC), Euro-NATO Joint Jet Pilot Training program; 82nd TRW (AETC), training. ***History:*** Activated June 14, 1941. Named for U.S. Sen. Morris Sheppard, who died April 9, 1941. ***Museum:*** Heritage Center. ***Inn:*** 940-676-2707/2970.

UTAH

Hill AFB, Utah 84056. ***Nearest city:*** Salt Lake City. ***Phone:*** 801-777-1110. ***Acres:*** 6,683. ***Total Force:*** civilian, 13,729; military, 5,579. ***Active-duty USAF:*** enlisted, 3,759; officer, 603. ***Owning command:*** AFMC. ***Unit/mission:*** 75th ABW (AFMC), support; 388th FW (ACC), fighter, Utah Test and Training Range operations; 419th FW (AFRC), fighter operations; 748th SCMG (AFMC), systems life cycle support; AFNWC ICBM Systems Directorate (AFMC), ICBM acquisition, support; Ogden ALC (AFMC), weapons maintenance, repair. ***History:*** Activated 1940. Named for Maj. Ployer P. Hill, killed Oct. 30, 1935, test-flying first B-17. ***Museum:*** Hill Aerospace Museum. ***Inn:*** 801-777-1844, ***Golf:*** Hubbard Memorial.

Utah Test and Training Range, Utah. ***Acres:*** 572,656 (South); 366,877 (North). ***Total Force:*** part of Hill AFB. ***Owning command:*** ACC. ***Unit/mission:*** training for air-to-air combat, air-to-ground inert and live practice bombing, gunnery training by aircrews, large force training exercises and large footprint weapons testing. ***History:*** first parcel activated in 1942 as Wendover Army Air Base; consolidated ranges redesignated UTTR in 1979.

Wright ANGB, Salt Lake City Intl. Airport, Utah 84116. ***Nearest city:*** Salt Lake City. ***Phone:*** 801-245-2200. ***Acres:*** 135. ***Total Force:*** civilian, 0; military, 1,571. ***Component:*** ANG. ***Unit/mission:*** 151st ARW, air mobility operations; 101st IOF, 130th EIS, cyber operations; 169th IS, intelligence operations.

VERMONT

Burlington ANGB, Burlington Intl. Airport., Vt. 05403. ***Nearest city:*** South Burlington. ***Phone:*** 802-660-5379 (Public Affairs). **Acres:** 248. ***Total Force:*** civilian, 0; military, 1,154. ***Component:*** ANG. ***Unit/mission:*** 158th FW, fighter operations; 229th COS, cyber training.

VIRGINIA

JB Langley-Eustis, Va. 23665. ***Nearest city:*** Hampton. **Phone:** 757-764-1110. ***Acres:*** 3,727 (Langley), 8,275 (Eustis). ***Total Force:*** civilian, 5669; military, 15,939. ***Active-duty USAF:*** enlisted, 6,351; officer, 1,403. ***Langley owning command:*** ACC. ***Unit/mission:*** 1st FW (ACC), 192nd FW (ANG), cyber, fighter operations; 480th ISRW (ACC), ISR operations; 633rd ABW (ACC), support; 363rd ISRW (ACC), ISR operations; Hq. ACC, management. ***History:*** Activated Dec. 30, 1916. Formed as joint base under Air Force lead 2010. Langley is first military base in US purchased and built specifically for military aviation. Langley named for aviation pioneer and scientist Samuel Pierpont Langley, who died 1906. Eustis named for Brevet Brig. Gen. Abraham Eustis, first commanding officer of Fort Monroe, Va. ***Inn:*** 757-764-4667. ***Golf:*** Eaglewood.

WASHINGTON

Fairchild AFB, Wash. 99011. ***Nearest city:*** Spokane. ***Phone:*** 509-247-1212. ***Acres:*** 6,102. **Total Force:** civilian, 877; military, 5,056. ***Active-duty USAF:*** enlisted, 2,969; officer, 462. ***Owning command:*** AMC. ***Unit/mission:*** 92nd ARW (AMC), 141st ARW (ANG), air mobility operations; USAF SERE School (AETC), training. ***History:*** Activated January 1942. Named for Gen. Muir S. Fairchild, USAF Vice Chief of Staff at his death in 1950. ***Museum:*** Heritage Museum and Air Park. ***Inn:*** 509-247-5519.

JB Lewis-McChord, Wash. 98438. Nearest city: Tacoma. ***Phone:*** 253-967-1110. ***Acres:*** 86,213. ***Total Force:*** civilian, 705; military, 5,114. ***Active-duty USAF:*** enlisted, 2,808; officer, 527. ***McChord Field owning command:*** AMC. ***Unit/mission:*** 62nd AW (AMC), 446th AW (AFRC), air mobility operations; 627th ABG (AMC), support; Western Air Defense Sector (NORAD/ANG), warning and control. ***History:*** Fort Lewis established 1917; McChord Field activated July 3, 1940. Formed as joint base under Army lead in 2010. Lewis named for Capt. Meriwether Lewis of Lewis and Clark Expedition (1804-05). McChord named for Col. William C. McChord, died in aircraft crash, Aug. 18, 1937. ***Museums:*** Heritage Air Park, Lewis Army Museum, McChord AFB Museum. ***Inn:*** IHG Army Hotels, 253-982-5613. ***Golf:*** Eagles Pride, Whispering Firs.

WEST VIRGINIA

McLaughlin ANGB, Yeager Airport, W.Va. 25311. ***Nearest city:*** Charleston. ***Phone:*** 304-341-6249. **Acres:** 283. ***Total Force:*** civilian, 0; military, 1,371. ***Component:*** ANG. ***Unit/mission:*** 130th AW, air mobility, ISR operations. ***History:*** Named for Brig. Gen. Charles E. "Chuck" Yeager; and Brig. Gen. James K. McLaughlin, West Virginia ANG's first commanding officer.

Shepherd Field, Eastern West Virginia Regional Airport, W.Va. 25401. ***Nearest city:*** Martinsburg. ***Phone:*** 304-616-5100. ***Acres:*** 339. ***Total Force:*** civilian, 0; military, 1,517. ***Component:*** ANG. ***Unit/mission:*** 167th AW, air mobility operations.

WISCONSIN

General Mitchell Field, Milwaukee Mitchell Intl. Airport, Wis. 53207. ***Nearest city:*** Milwaukee. ***Phone:*** 414-944-8715. ***Acres:*** 67. ***Total Force:*** Madison. ***Phone:*** 608-427-1204. ***Acres:*** 2,385. ***Total Force:*** civilian, 183; military, 569. ***Component:*** ANG. ***Unit/mission:*** Combat Readiness Training Center; 128th ACS, C2 operations. ***History:*** Named for Lt. Jerome A. Volk, first Wisconsin ANG pilot to be killed in the Korean War.

WYOMING

F.E. Warren AFB, Wyo. 82005. ***Nearest city:*** Cheyenne. ***Phone:*** 307-773-3381. ***Acres:*** 6,834. ***Total Force:*** civilian, 1,082; military, 4,780. **Active-duty USAF:** enlisted, 2,719; officer, 485. ***Owning command:*** AFGSC. ***Unit/mission:*** 90th MW (AFGSC), ICBM operations; 153rd CACS (ANG), space C2 operations; Hq. 20th Air Force (AFGSC), operational leadership. ***History:*** Activated as Fort D. A. Russell July 4, 1867. Renamed in 1930 for Francis Emory Warren, Wyoming senator and first state governor. Reassigned to USAF in 1947 and received current designation in 1949. ***Museum:*** Warren ICBM and Heritage Museum. ***Inn:*** 307-773-1844. ***Golf:*** Warren.

Wyoming ANGB, Cheyenne Regional Airport, Wyo. 82001. ***Nearest city:*** Cheyenne. ***Phone:*** 307-772-6424. **Acres:** 719. ***Total Force:*** 2,017. ***Component:*** ANG. ***Unit/mission:*** 153rd AW, air mobility, MAFFS operations.

Overseas Installations

Overseas installations owned, operated by, or housing substantial U.S. Air Force or U.S. Space Force activities. Individual listings may not include all units or agencies at every location.

BELGIUM

Kleine Brogel AB, Belgium APO AE 09719. ***Nearest city:*** Peer. ***Phone:*** 011-003-211-51-9412. **Total Force:** 134. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 701st Munitions Support Squadron, receive, store and maintain U.S. munitions for Belgium's F-16 aircraft in support of NATO. ***History:*** established as an Allied airfield in 1944, expanded by the Belgian Air Force in 1951, and first joined by the U.S. support personnel in 1962. ***Museum:*** Kleine-Brogel Air Museum.

Senior Airman Breanna Klemm

U.S. Air Force KC-135 Stratotankers taxi for takeoff after an Elephant Walk at Altus Air Force Base, Okla., during a large formation exercise, April 2.

Hardwood Range, Wis. 54646 ***Nearest city:*** Necedah. **Acres:** 7,865. ***Component:*** ANG. ***Unit/mission:*** air-to-ground weapons delivery and threat awareness training for combat aircrews.

Truax Field ANGB, Dane County Regional Airport, Wis. 53704. ***Nearest city:*** Madison. ***Phone:*** 608-245-4395. ***Acres:*** 152. ***Total Force:*** civilian, 0; military, 3,178. ***Component:*** ANG. **Unit/mission:** 115th FW, fighter, ISR operations (active associate), WFX. ***History:*** Activated June 1942 as AAF base. Taken over by Wisconsin ANG April 1968. Named for Lt. T. L. Truax, killed in P-40 training accident 1941.

Volk Field ANGB, Wis. 54618. ***Nearest city:*** Tomah. ***Phone:*** 608-427-1204. ***Acres:*** 2,385. ***Total Force:*** civilian, 183; military, 569. ***Component:*** ANG. ***Unit/mission:*** Combat Readiness Training Center; 128th ACS, C2 operations. ***History:*** Named for Lt. Jerome A. Volk, first Wisconsin ANG pilot to be killed in the Korean War.

GERMANY

Buechel AB, Germany APO AE 09719. **Nearest city:** Cochem. ***Phone:*** 011-49-0267-89-5208. **Total Force:** 147. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 702nd Munitions Support Squadron, receive, store and maintain U.S. munitions for Germany's PA-200 Tornado aircraft in support of NATO.

Ramstein AB, Germany APO AE 09094. ***Nearest city:*** Landstuhl. ***Phone:*** 011-49-6371-47-1110. ***Acres:*** 3,094. ***Active-duty USAF:*** enlisted, 8,049; officer, 1,440. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 86th AW (USAFE-AFAFRICA), air mobility operations, support (including Kaiserslautern Military Community); 435th AGOW (USAFE-AFAFRICA), bare base, combat communications, combat weather, TACP operations; 521st AMOW (AMC), air transportation services; 603rd AOC (USAFE), C2 operations; Hq. 3rd AF (USAFE-AFAFRICA), operational leadership; Hq. USAFE-AFAFRICA, management, operational leadership. ***History:*** originally Landstuhl AB, activated August 1952. Reactivated December 1957 as Ramstein-Landstuhl AB; later redesignated Ramstein AB. ***Inn:*** 011-49-6371-47-4920. ***Golf:*** Woodlawn.

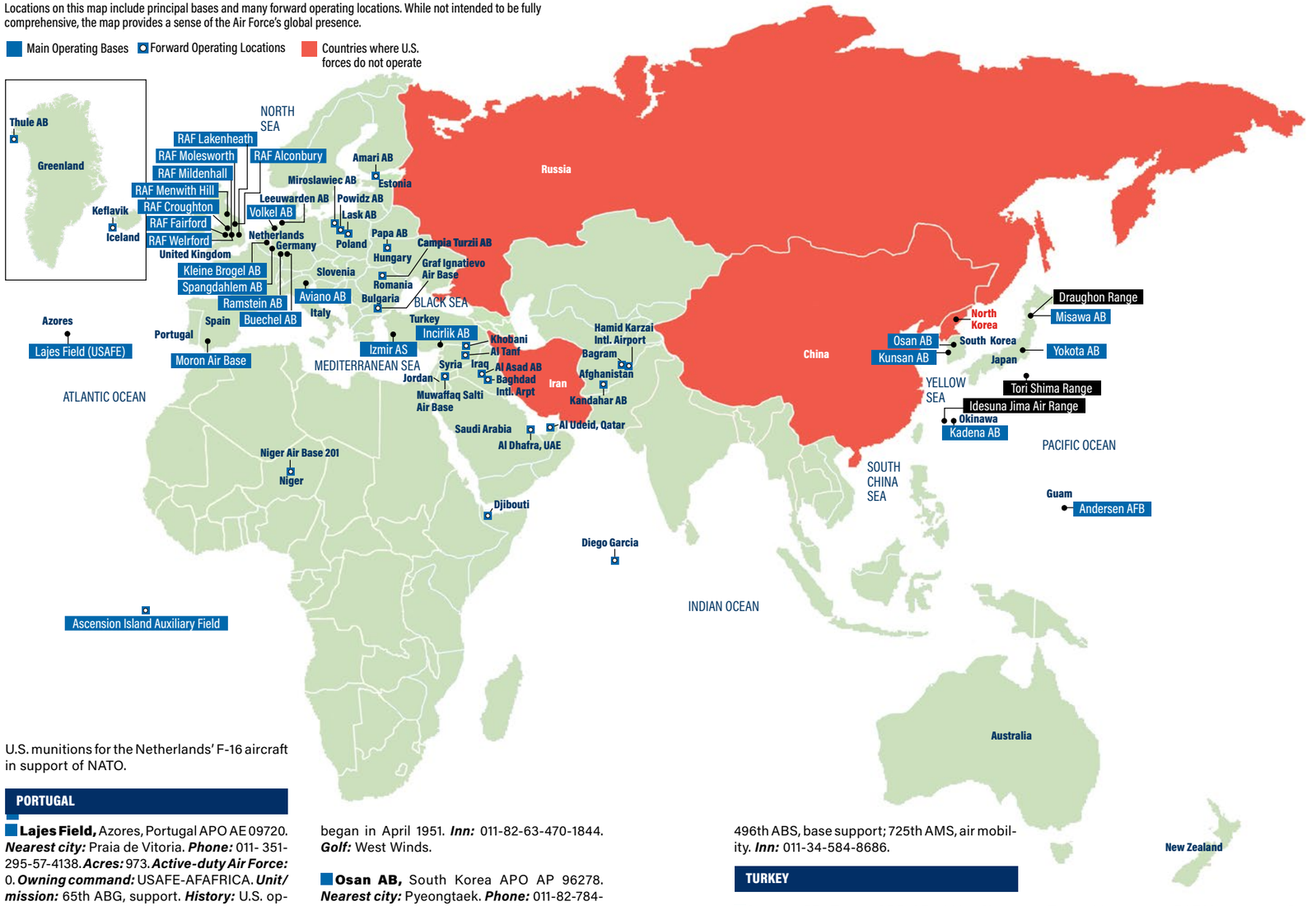
Spangdahlem AB, Germany APO AE 09126. ***Nearest city:*** Bitburg. ***Phone:*** 011-49-6565-61-1110. ***Acres:*** 1,617. ***Active-duty USAF:*** enlisted, 3,485; officer, 525. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 52nd FW (USAFE), fighter operations, 726th AMS (AMC), air transport services. ***History:*** built by French 1951 and turned over to U.S. 1952. ***Museum:*** Air Park. **Inn:** 011-49-06565-0500. ***Golf:*** Eifel Mountain.

GREENLAND

Thule AB, Greenland APO AE 09704. ***Nearest city:*** Qaanaaq. ***Phone:*** (through Peterson AFB operator) 719-556-7321. **Acres:** 233,034. ***Total Force:*** 144. ***Owning command:*** USSF. ***Unit/mission:*** 12th SWS (USSF), missile warning; 821st ABG (USSF), support. ***History:*** dates from

MAJOR OVERSEAS AIR FORCE OPERATING LOCATIONS

Locations on this map include principal bases and many forward operating locations. While not intended to be fully comprehensive, the map provides a sense of the Air Force's global presence.



1946 as a Danish-American radio and weather station. USAF Ballistic Missile Early Warning System radar began operations 1961. ***Inn:*** 719-474-3840, ext. 3276. ***Golf:*** Mount Dundas.

ITALY

Aviano AB, Italy APO AE 09604. ***Nearest city:*** Aviano. ***Phone:*** 011-39-0434-30-5407. ***Acres:*** 1,226. ***Active-duty USAF:*** enlisted, 4,047; officer, 427. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 31st FW (USAFE-AFAFRICA), fighter operations; 724th AMS (AMC), air transportation services. ***History:*** dates from 1911 as Italian air base. USAF began operations 1954. ***Inn:*** 011-39-0434-94-7111. ***Golf:*** Alpine.

JAPAN

Draughon Range, Japan. ***Phone:*** 011-81-176-77-4713 (35th Operations Group, Misawa AB). ***Acres:*** 1,889. ***Owning command:*** PACAF. ***Unit/mission:*** training for US, Japanese, and multilateral forces.

Idesuna Jima Range, Japan (uninhabited island). ***Acres:*** 61. ***Owning command:*** PACAF. ***Unit/mission:*** managed by 18th Wing, live-fire exercises from the air onto the island.

Kadena AB, Japan APO AP 96368. ***Nearest city:*** Naha. ***Phone:*** 011-81-98-961-1110. ***Acres:*** 4,906. ***Active-duty USAF:*** enlisted, 5,911; officer, 737. ***Owning command:*** PACAF. ***Unit/mission:*** 18th Wing (PACAF), air mobility, fighter, ISR, personnel recovery operations; 82nd RS (ACC), reconnaissance; 353rd SOG (AFSOC), special operations; 733rd AMS (AMC), air transportation services. ***History:*** Occupied by U.S. forces April 1945. Named for city of Kadena on island of Okinawa. ***Inn:*** 01-81-98-962-1100. ***Golf:*** Banyan Tree.

Misawa AB, Japan APO AP 96319. ***Nearest city:*** Misawa. ***Phone:*** 011-81-176-53-5181. ***Acres:*** 3,864. ***Total Force:*** 3,102. ***Active-duty USAF:*** enlisted, 2,411, officer, 275. ***Owning command:*** PACAF. ***Unit/mission:*** 35th FW (PACAF), fighter operations. ***History:*** occupied by U.S. forces September 1945. ***Inn:*** 011-81-176-66-1290. ***Golf:*** Gosser Memorial.

Tori Shima Range, Japan (uninhabited island). ***Acres:*** 10. ***Owning command:*** PACAF. ***Unit/mission:*** managed by 18th Wing.

Yokota AB, Japan APO AP 96328. ***Nearest city:*** Tokyo. ***Phone:*** 011-81-425-52-2510-5-1110. ***Acres:*** 1,750. **Active-duty USAF:** enlisted, 2,830; officer, 449. ***Owning command:*** PACAF. ***Unit/mission:*** 374th AW (PACAF), air mobility, personnel recovery operations; 515th AMOG (AMC), air transportation services; Hq. 5th Air Force (PACAF), Hq. US Forces Japan (PACOM), operational leadership. ***History:*** Opened as Tama AAF by Japan 1939. Turned over to U.S. forces and renamed Yokota AB on Sept. 6, 1945. ***Inn:*** 011-81-42-507-6533. ***Golf:*** Yokota Golf Center, Tama Hills.

NETHERLANDS

Volkel AB, Netherlands APO AE 09717. ***Nearest city:*** Uden. ***Phone:*** 011-31-0413-335-5834. ***Total Force:*** 155. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 703rd Munitions Support Squadron, receive, store and maintain U.S. munitions for the Netherlands' F-16 aircraft in support of NATO.

PORTUGAL

Lajes Field, Azores, Portugal APO AE 09720. ***Nearest city:*** Praia de Vitoria. ***Phone:*** 011- 351-295-57-4138. ***Acres:*** 973. ***Active-duty Air Force:*** 0. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 65th ABG, support. ***History:*** U.S. operations began 1943. ***Inn:*** 011-351-295-545100.

SAINT HELENA

Ascension Island Auxiliary Field, Saint Helena (UK island territory in the South Atlantic). ***Phone:*** 321-494-1110 (45th Space Wing operator at Patrick SFB). ***Acres:*** 3,463. ***Owning command:*** USSF. ***Unit/mission:*** 45th Mission Support Squadron, Det. 2, airfield maintenance, radar and telemetry tracking of space launches.

SOUTH KOREA

Kunsan AB, South Korea APO AP 96264. ***Nearest city:*** Gunsan City. ***Phone:*** 011-82-63-470-1110. **Acres:** 2,549. ***Active-duty Air Force:*** 2,435. ***Owning command:*** PACAF. **Unit/mission:** 8th FW (PACAF), fighter operations. ***History:*** built by the Japanese in 1938. U.S. operations began in April 1951. ***Inn:*** 011-82-63-470-1844. ***Golf:*** West Winds.

Osan AB, South Korea APO AP 96278. ***Nearest city:*** Pyeongtaek. ***Phone:*** 011-82-784-1110. **Acres:** 1,523. ***Active-duty USAF:*** enlisted, 4,677; officer, 646. ***Owning command:*** PACAF. ***Unit/mission:*** 5th RS (ACC), reconnaissance operations; 51st FW (PACAF), fighter operations; 694th ISRG (ACC), DCGS operations; 731st AMS (AMC), air transportation services; Hq. 7th Air Force (PAC- AF), operational leadership. ***History:*** originally designated K-55. Runway opened December 1952. Renamed Osan AB in 1956 for nearby town that was the scene of first fighting in July 1950 between U.S. and North Korean forces. ***Inn:*** 011-82-31-661-1844. ***Golf:*** The Lakes at Osan.

SPAIN

Moron AB, Spain, APO AE 09643. ***Nearest city:*** Moron de la Frontera. ***Phone:*** 011-34955-84-8205. ***Acres:*** 2,808. **Total Force:** 144. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 496th ABS, base support; 725th AMS, air mobility. ***Inn:*** 011-34-584-8686.

TURKEY

Incirlik AB, Turkey APO AE 09824. ***Nearest city:*** Adana. ***Phone:*** 011-90-322-316-6060. ***Acres:*** 3,336. ***Active-duty USAF:*** enlisted, 1,342; officer, 132. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 39th ABW (USAFE-AFAFRICA), support; 728th AMS (AMC), air transportation services. ***History:*** Activated 1954. Named Adana AB Feb. 21, 1955. Renamed Incirlik AB on Feb. 28, 1958. ***Inn:*** 011-90-322-316-9357. ***Golf:*** Hodja Lakes.

Izmir AS, Turkey APO AE 09821. ***Nearest city:*** Izmir. ***Phone:*** 011-90-232-455-6694. ***Total Force:*** 115. ***Unit/mission:*** 425th ABS, support.

UNITED KINGDOM

RAF Alconbury, UK APO AE 09470. ***Nearest city:*** Huntingdon. ***Phone:*** 011-44-1480-84-3557 (Alconbury/Molesworth). ***Acres:*** 218. **Total Force:** 327 (includes RAF Molesworth). ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 423rd ABG, including munitions, civil engineer, communications, medical, and Security Forces squadrons. ***History:*** began in WWII. The U.S. 93rd Bombardment Group arrived in 1942 flying B-24 Liberators. ***Inn:*** 011-44-01480-82-6000.

RAF Croughton, UK APO AE 09494. ***Nearest City:*** Brackley. ***Phone:*** 011-44-1280-70-8716 (RAF Croughton/Fairford/Welford). ***Acres:*** 694. **Total Force:** 415. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 422nd ABG, civil engineer, communications, medical and Security Forces squadrons. ***History:*** built in 1938 and originally known as Braclkey Landing Ground, in use by U.S. since 1950. ***Inn:*** 011-44-1280-70-8394.

RAF Fairford, UK APO AE 09456. ***Nearest city:*** Fairford. ***Phone:*** 011-44-1280-70-8716 (RAF Croughton/Fairford/Welford). ***Acres:*** 1,170. **Total Force:** 16. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 420th ABS, mission support. ***History:*** Built in 1944 to support D-Day operations, in use by U.S. since 1950.

RAF Lakenheath, UK APO AE 09461. ***Nearest city:*** Cambridge. ***Phone:*** 011-44-1638-52-1110. ***Acres:*** 1,879. ***Active-duty USAF:*** enlisted, 3,907; officer, 509. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 48th FW (USAFE-AFAFRICA), fighter, personnel recovery operations. ***History:*** Began as Royal Air Force decoy field in 1930s. Activated as RAF airfield November 1941. USAF bombers arrived August 1948. USAF took administrative control May 1951. Named after nearby village. ***Inn:*** 011-44-1638-52-6713. **Golf:** Breckland Pines.

RAF Menwith Hill, UK APO AE 09468. ***Nearest city:*** Harrogate. ***Phone:*** 011-44-1423-777-356. ***Acres:*** 545. **Total Force:** 25. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 421st Air Base Squadron, communications and intelligence support services. ***History:*** B ecame operational in 1959.

RAF Mildenhall, UK APO AE 09459. ***Nearest city:*** Cambridge. ***Phone:*** 011-44-1638-54-1110. ***Acres:*** 1,163. ***Active-duty USAF:*** enlisted, 3,786; officer, 508. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 95th RS (ACC), reconnaissance operations; 100th ARW (USAFE), air mobility operations; 352nd SOW (AFSOC), special operations; 488th IS (ACC), intelligence operations; 727th AMS (AMC), air transportation services. ***History:*** Activated as RAF bomber base October 1934. Named after nearby town. U.S. bomber operations began July 1950. Strategic Air Command had control from October 1951 to September 1959, when USAFE took over. ***Inn:*** 011-44-1638-71-1236.

RAF Molesworth, UK APO AE 09470. ***Nearest city:*** Huntingdon. ***Phone:*** 011-44-1480-84-3557 (Alconbury/Molesworth). ***Acres:*** 659. **Total Force:** 327 (includes RAF Alcornbury). ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** Joint Intelligence Operations Center Europe Analytic Center. ***History:*** Started as a WWI airfield.

RAF Welford, UK APO AE 09494. ***Nearest city:*** Welford. ***Phone:*** 011-44-1280-70-8716 (RAF Croughton/Fairford/Welford). ***Acres:*** 806. **Total Force:** 415. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 420th Munitions Squadron; munitions storage area. ***History:*** first used by U.S. Army Air Forces in 1943.

Sources and definitions

Addresses, phone numbers, and the names of museums and golf courses are from official installation websites, the Air National Guard's recruiting website goang.com, the Defense Department's Military OneSource listings, and the official online directories of Air Force Inns and other DOD lodging. Acres are the total acres reported in the DOD's Base Structure Report—Fiscal Year 2018 Baseline, the most recent available in which installations are listed by name. Acres may not include storage annexes or other associated sites. Total Force combines all Active, Reserve, and appropriated fund civilian personnel, regardless of military service branch, derived from ZIP code data provided by the Defense Manpower Data Center.

USAF & USSF ALMANAC 2021

WEAPONS & PLATFORMS

By Aaron M. U. Church

Chalk 2 for the 163rd Attack Wing

BOMBER AIRCRAFT

Senior Airman Tristan Day

B-1B LANCER

Long-range conventional bomber

Brief: The B-1B is a conventional, long-range, supersonic penetrating strike aircraft, derived from the canceled B-1A. The B-1A first flew on Dec. 23, 1974, and four prototypes were developed and tested before the program was canceled in 1977. The Reagan administration revived the program as the B-1B in 1981, adding 74,000 lb of usable payload, improved radar, and reduced radar cross section, although speed was reduced to Mach 1.2. Its three internal weapons bays can each carry different weapons, and the aircraft's blended wing/body and variable-geometry wing permit long-range/loiter time. Offensive avionics include terrain following SAR and a fully-integrated Sniper ATP to track and target moving vehicles. B-1B made its combat debut over Iraq during Desert Fox in 1998. USAF completed Integrated Battle Station (IBS) upgrades fleetwide in September 2020. The three-part program begun in 2012 was the most comprehensive refresh in the bomber's history. IBS included Vertical Situation Display (VSD) for a digital glass cockpit, Fully Integrated Data Link (FIDL) to enhance targeting/LOS/BLOS C2, and Central Integrated Test System (CITS) for real-time simplified troubleshooting. A total of 62 aircraft were upgraded. Development includes Multifunctional Information Distribution System/Joint Tactical Radio System (MIDS/JTRS) to improve situational awareness and retargeting abilities, updated BLOS cryptography to sustain connectivity, and bomb rack safety improvements. FY21 continues accelerated ADS-B/Mode 5 IFF mod to bring the fleet into compliance with current airspace standards by 2022. Structural and reliability issues due to prolonged combat CAS resulted in the stand-up of a depot-level Structural Repair Line in 2020, and shifting the fleet to a strike-only role. Efforts are underway to expand weapon carriage via internal bay expansion and external hardpoints, potentially enabling carriage of large hypersonic or multiple 5,000 lb-class freefall weapons. Phased replacement by the B-21 is planned by 2032, and FY21 cuts 17 of the least serviceable airframes, four of which will be stored in recallable condition.

Contractor: Boeing (formerly Rockwell International).
First Flight: Oct. 18, 1984 (B-1B).
Delivered: June 1985-May 1988.
IOC: Oct. 1, 1986, Dyess AFB, Texas.
Production: 104.
Inventory: 62.
Operator: AFGSC, AFMC.
Aircraft Location: Dyess AFB, Texas; Edwards AFB, Calif.; Eglin AFB, Fla.; Ellsworth AFB, S.D.
Active Variant:
▪B-1B. Upgraded production version of the B-1A.
Dimensions: Span 137 ft (forward sweep) to 79 ft (aft sweep), length 146 ft, height 34 ft.
Weight: Max T-O 477,000 lb.
Power Plant: Four GE Aviation F101-GE-102 turbofans, each 30,780 lb thrust.
Performance: Speed 900+ mph at S-L, range approx. 7,455 miles (further with air refueling).
Ceiling: More than 30,000 ft.
Armament: 84 Mk 82 (500-lb) or 24 Mk 84 (2,000-lb) general-purpose bombs; 84 Mk 62 (500-lb) or eight Mk 65 (2,000-lb) Quickstrike naval mines; 30 CBU-87/89 cluster bombs or 30 CBU-103/104/105 WCMDs; 24 GBU-31 or 15 GBU-38 JDAMs/GBU-54 JDAM; 24 AGM-158A JASSM, JASSM-ER, or LRASM.
Accommodation: Pilot, copilot, and two WSOs (offensive/defensive), on ACES II zero/zero ejection seats.

Staff Sgt. Sadie Colbert

B-2 SPIRIT

Long-range heavy bomber

Brief: The B-2 is a stealthy, long-range, penetrating nuclear and conventional strike bomber. It is based on a flying wing design combining LO with high aerodynamic efficiency. The aircraft's blended fuselage/wing holds two weapons bays capable of carrying nearly 60,000 lb in various combinations. Spirit entered combat during Allied Force on March 24, 1999, striking Serbian targets. Production was completed in three blocks, and all aircraft were upgraded to Block 30 standard with AESA radar. Production was limited to 21 aircraft due to cost, and a single B-2 was subsequently lost in a crash at Andersen, Feb. 23, 2008. Ongoing research and development aims to significantly modernize the B-2A to maintain its penetrating strike capability against advanced air defenses and improve fleet availability. Modernization includes avionics and comms, engines, stealth features, and advanced weapons. Adaptable Communications Suite (ACS) will provide time-sensitive mission updates and Link 16-based, jam-resistant, in-flight retasking, while FAB-T will add wideband nuclear C2, and airspace-compliant CNS/ATM. The Defensive Management System upgrade was downsized cutting EW sensors to detect ground threats due to delays. DMS-M improves survivability in signal-dense, anti-access/area denial (A2/D2) environments, aids situational awareness, and enables real-time threat avoidance. RATS will add radar-aided nuclear precision guidance for GPS-denied strike. Additional efforts include low-observable signature improvements to coatings, materials, and radar-absorptive structures such as the radome and engine inlets/exhausts. Flex Strike will feed GPS data to the bays pre-release to thwart jamming (required for B61-12) and a notional Phase 2 could allow simultaneous nuclear and conventional loadout. Other weapons efforts increase loadout, improve hardened/buried target strike, as well as testing and integrating B61-12 guided nuclear bomb, JASSM-ER, GBU-57 Massive Ordnance Penetrator, and eventually GBU-53 SDB II. A total of 12 aircraft are considered deployed in the nuclear deterrent role under the New START agreement. The B-2 is slated for replacement by the B-21 Raider by 2032.

Contractors: Northrop Grumman; Boeing; Vought.
First Flight: July 17, 1989.
Delivered: December 1993-December 1997.
IOC: April 1997, Whiteman AFB, Mo.
Production: 21.
Inventory: 20.
Operator: AFGSC, AFMC, ANG (associate).
Aircraft Location: Edwards AFB, Calif.; Whiteman AFB, Mo.
Active Variant:
▪B-2A. Production aircraft upgraded to Block 30 standards.
Dimensions: Span 172 ft, length 69 ft, height 17 ft.
Weight: Max T-O 336,500 lb.
Power Plant: Four GE Aviation F118-GE-100 turbofans, each 17,300 lb thrust.
Performance: Speed high subsonic, range 6,900 miles (further with air refueling).
Ceiling: 50,000 ft.
Armament: Nuclear: 16 B61-7, B61-12, B83, or eight B61-11 bombs (on rotary launchers). Conventional: 80 Mk 62 (500-lb) sea mines, 80 Mk 82 (500-lb) bombs, 80 GBU-38 JDAMs, or 34 CBU-87/89 munitions (on rack assemblies); or 16 GBU-31 JDAMs, 16 Mk 84 (2,000-lb) bombs, 16 AGM-154 JSOWs, 16 AGM-158 JASSMs, or eight GBU-28 LGBs.
Accommodation: Two pilots on ACES II zero/zero ejection seats.

Senior Airman Tessa B. Corrick

B-52 STRATOFORTRESS

Long-range heavy bomber

Brief: The B-52H is a long-range nuclear/conventional bomber and USAF's primary standoff cruise missile carrier. The YB-52 prototype first flew on April 15, 1952, and Strategic Air Command declared IOC with the B-52A on June 19, 1955. The H model is now the last serving variant of the Stratofortress. Multimission capabilities include long-range precision strike, CAS, air interdiction, defense suppression, and maritime surveillance utilizing both Litening and Sniper targeting pods. The B-52 is undergoing major upgrades to replace key obsolescent systems. Combat Network Communications Technology (CONECT) replaces cockpit displays and comms, adds Link 16, and enabling machine-to-machine tasking/retargeting. The Internal Weapons Bay Upgrade enables internal carriage of smart weapons, with the Conventional Rotary Launcher roughly doubling advanced weapon payloads, reducing drag, and increasing range. CRL transitions from CALCM to the AGM-158B JASSM-ER long-range cruise missile. Some 31 B-52s were modified to prevent their nuclear use under the New START agreement, and a total of 36 aircraft are currently "deployed" nuclear platforms under the treaty. Major development includes AESA radar, and replacing the TF33 engines with a more modern and efficient power plant. Future upgrades include VLF/LF receiver modernization, ATP color MFDs to enhance targeting and situational awareness, and AEHF SATCOM integration. Ongoing mods include Tactical Data Link to add low-latency, jam-resistant C2/comms in conjunction with CONECT, and GPS updates. USAF expects to award an engine replacement contract in June 2021, and both CONECT and weapons bay upgrades are slated for completion this year. AESA radar is slated for introduction in 2026. Upgraded B-52 will eventually complement the B-21 Raider after retirement of the B-1 and B-2, potentially serving into the 2050s.

Contractor: Boeing.
First Flight: July 20, 1960 (B-52H).
Delivered: May 9, 1961-Oct. 26, 1962 (B-52H).
IOC: May 1961 (B-52H).
Production: 744 (incl 102 B-52H).
Inventory: 76.
Operator: AFGSC, AFMC, AFRC.
Aircraft Location: Barksdale AFB, La.; Edwards AFB, Calif.; Minot AFB, N.D.
Active Variants:
▪B-52H. Longer-range development of the original B-52A, with more efficient turbofan engines.
Dimensions: Span 185 ft, length 159.3 ft, height 40.7 ft.
Weight: Max T-O 488,000 lb.
Power Plant: Eight Pratt & Whitney TF33-P-3 turbofans, each 17,000 lb thrust.
Performance: Speed 650 mph, range 8,800 miles (further with air refueling).
Ceiling: 50,000 ft.
Armament: Nuclear: 12 AGM-86B ALCMs externally, and eight ALCMs or gravity weapons internally. 12 AGM-158 JASSM externally, and eight JASSM-ER/MALD/ MALD-J internally (upgraded aircraft).
Conventional: AGM-86C/D CALCMs, Mk 62 sea mines, Mk 82/84 bombs, CBU-87/89 cluster bombs, CBU-103/104/105 WCMDs, GBU-31/38 JDAMs, AGM-158A JASSMs, and GBU-10/12/28 LGBs, MALD, and MALD-J jammer variant.
Accommodation: Two pilots, navigator, radar navigator, and EWO on upward/downward ejection seats.

Ethan Wagner/USAF

AT-6 WOLVERINE

Light attack/armed reconnaissance

Brief: The AT-6E is a turboprop light attack/armed reconnaissance aircraft developed from the T-6 primary trainer. Wolverine incorporates the A-10C's mission computer, the F-16's Hands-On-Throttle Stick, HMCS, and a digital glass cockpit with three color MFDs for integrated navigation, sensor, and weapon's management/delivery. The aircraft can carry a wide array of air-to-ground weapons on six wing pylons in addition to a centerline-mounted MX-15D EO/IR sensor for targeting and tactical ISR. The AT-6 is equipped with LINK-16/SADL data links, real-time FMV/ROVER for integration with ground forces, and tactical VHF/UHF/SATCOMS. The type was originally proposed for USAF's Light Attack/Armed Reconnaissance (LAAR) requirement which fell prey to budget cuts a decade ago. The service launched a renewed effort in 2017, kicking off the Light Attack Experiment (OA-X) which evaluated rapidly procurable off-the-shelf CAS/ISR platforms to relieve pressure on existing fleets. USAF opted to procure two AT-6 Wolverines (in addition to an equal number of AFSOC A-29 Super Tucanos) to continue experimentation with a rapidly procurable, exportable, light CAS/ISR aircraft following the end of phase two trials in 2018. The AT-6s will continue that effort, moving to Nellis to develop secure-tactical networking for U.S./partner-nation COIN integration dubbed "AERONet." The first aircraft was handed over to USAF on Feb. 17, for joint-industry/USAF airworthiness certification and testing with Beechcraft in Wichita.

Contractor: Beechcraft/Textron Aviation Defense (formerly Raytheon); Lockheed Martin (mission systems), Esterline (glass cockpit), L3/Harris (sensors).
First Flight: Sep. 10, 2009 (AT-6).
Delivered: Feb. 17, 2021-present.
IOC: N/A.
Production: Three (planned).
Inventory: N/a.
Operator: ACC.
Aircraft Location: Wichita, Kan. Planned: Nellis.
Active Variants:
▪AT-6E Wolverine. Light attack/armed reconnaissance variant of the T-6A.
Dimensions: Span 33.5 ft, length 33.4 ft, height 10.7 ft.
Weight: Max T-O 10,000 lb.
Power Plant: One Pratt & Whitney Canada PT6A-68D turboprop 1,600 shp.
Performance: Speed 360 mph, range 1,700 miles (with four external tanks), mission endurance 4.5 hr (7.5 hr ferry).
Ceiling: 31,000 ft.
Armament: Wide-array of laser/inertial-guided PGMs as well as laser-guided rockets (APKWS), AGM-114 Hellfire, and/or .50 cal gun on six wing-mounted hardpoints.
Accommodation: Two pilots on Martin Baker MK16LA zero/zero ejection seats.

A-10 THUNDERBOLT II

Attack, close-air support, forward air control

Brief: The A-10 "Warthog" is a specialized CAS aircraft tasked with interdiction, Forward Air Controller-Airborne (FAC-A), CSAR, and Strike Control & Reconnaissance. It combines a heavy, diverse weapons load with low-level maneuverability, a large combat radius, and long loiter time over the battlefield. The A-10 is capable of carrying up to 16,000 lb of ordnance in addition to its 30 mm cannon which can destroy heavy armor while protecting the pilot in a titanium-armored cockpit. The prototype YA-10A first flew on May 10, 1972, wining USAF's A-X competition for a new attack aircraft. The A-10A development aircraft first flew Feb. 15, 1975, and A-10As

Staff Sgt. Sergio Gamboa

were delivered between October 1975 and March 1984. USAF declared IOC in October 1977. The fleet was modernized under the Precision Engagement Program, resulting in the A-10C which first flew at Eglin in 2005. The A-10C adds color cockpit MFDs, a Helmet Mounted Cueing System (HMCS), hands-on throttle and stick, digital stores management, improved fire-control, GPS-guided weapons, Litening/Sniper pods, advanced data links, and integrated sensors. The A-10C debuted in combat during Iraqi Freedom in 2007. With NVGs and targeting pods, the A-10C can operate under 1,000-ft ceilings at night. The Operational Flight Program (OFP) continuously updates the A-10's software to integrate advanced weapons and add situational awareness, targeting, navigation, comms, and cyber security improvements. Ongoing mods include HMCS improvements, cockpit display replacement to eliminate analog instruments and add hi-resolution target tracking, SDB-1 integration, directional audio threat cueing, ARC-210 UHF/ VHF comm modernization, and Ethernet to enable EW upgrades. An initial 173 aircraft were re-winged, and Boeing received a follow-on contract to re-wing up to 112 additional aircraft through FY30. USAF plans to retain the fleet through 2030 or beyond, and Congress denied the Air Force's request to retire 44 airframes in FY21.

Contractors: Fairchild Republic (Lockheed Martin); Boeing (re-wing).
First Flight: Jan. 20, 2005 (A-10C).
Delivered: 2006-2012 (A-10C).
IOC: September 2007 (A-10C).
Production: 713.
Inventory: 281.
Operator: ACC, AFMC, PACAF, ANG, AFRC.
Aircraft Location: Barksdale AFB, La.; Boise Air Terminal, Idaho; Davis-Monthan AFB, Ariz.; Eglin AFB, Fla.; Fort Wayne Arpt., Ind.; Martin State Arpt., Md.; Moody AFB, Ga.; Nellis AFB, Nev.; Osan AB, South Korea; Selfridge ANGB, Mich.; Whiteman AFB, Mo.
Active Variant:
▪A-10C. Upgraded version of the A-10A ground attack aircraft.
Dimensions: Span 57.5 ft, length 53.3 ft, height 14.7 ft.
Weight: Max T-O 51,000 lb.
Power Plant: Two GE Aviation TF34-GE-100 turbofans, each 9,065 lb thrust.
Performance: Speed 518 mph, range 800 miles (further with air refueling).
Ceiling: 45,000 ft.
Armament: One internally mounted 30 mm, seven-barrel GAU-8/A cannon (1,174 rd of high-explosive incendiary (HEI) or HEI/armor-piercing incendiary); four AIM-9 Sidewinders, AGM-65 Mavericks, laser-guided rockets, most free-fall or guided air-to-surface weapons in USAF inventory, and ECM pods.
Accommodation: Pilot on ACES II zero/zero ejection seat.

F-15 EAGLE

Air superiority fighter

Brief: The F-15 Eagle has been the world's dominant, supersonic, all-weather, day/night air-superiority fighter for more than 40 years. The F-15A first flew on July 27, 1972, and F-15A/Bs were delivered between 1974 and 1979, attaining IOC in September 1975. F-15C/Ds began replacing F-15A/Bs in 1979, offering superior maneuverability, acceleration, range, weapons, and avionics. The C/D incorporates internal EW countermeasures and an added 2,000 lb of internal fuel (with provision for CFTs). The aircraft accounted for 34 of 37 USAF air-to-air kills during its combat debut in Desert Storm. The final 43 production aircraft received the F-15E's APG-70 radar, and the subsequent Multistage Improvement Program enhanced its tactical capabilities. USAF received the first APG-63(V)3 AESA-modified F-15 in 2010, but comprehensive modernization, including Eagle Passive/Active Warning Survivability System (EPAWSS), was curtailed with the FY20 decision to replace the fleet with up to 144 new-build F-15EXs. The fleet averages 8,400 flying hours and suffers performance-limiting structural problems requiring wing/forward fuselage SLEP of 128 airframes

Senior Airman Matthew Seefeldt

through FY24. DOD European Deterrence Initiative funds continue to retain F-15C/Ds at Lakenheath to augment allied air superiority due to tensions with Russia.

Contractors: Boeing (previously McDonnell Douglas).
First Flight: Feb. 26, 1979 (F-15C).
Delivered: 1979-85 (F-15C/D).
IOC: 1979 (F-15C/D).
Production: 874.
Inventory: 211 (F-15C); 23 (F-15D).
Operator: ACC, AFMC, PACAF, USAFE, ANG.
Aircraft Location: Barnes Arpt., Mass.; Eglin AFB, Fla.; Fresno ANGB, Calif.; Jacksonville Arpt., Fla.; Kadena AB, Japan; Klamath Falls (Kingsley Field), Ore.; NAS JRB New Orleans, La.; Portland Arpt., Ore.; RAF Lakenheath, U.K.
Active Variants:
▪F-15C. Upgraded version of the single-seat F-15A.
▪F-15D. Upgraded version of the two-seat F-15B.
Dimensions: Span 42.8 ft, length 63.8 ft, height 18.7 ft.
Weight: Max T-O 68,000 lb.
Power Plant: Two Pratt & Whitney F100-PW-220 turbofan engines, each 23,450 lb thrust; or two P&W F100-PW-229 turbofan engines with afterburners, each 29,000 lb thrust.
Performance: Speed Mach 2.5, ferry range 2,878 miles (3,450 miles with CFTs and three external tanks; further with air refueling).
Ceiling: 60,000 ft.
Armament: One internally mounted M61A1 20 mm six-barrel cannon (940 rd); four AIM-9 Sidewinders and four AIM-120 AMRAAMs, or eight AIM-120s; in a one-time test, an Eagle successfully launched an anti-satellite missile.
Accommodation: Pilot (C); two pilots (D), on ACES II zero/zero ejection seats.

Tech. Sgt. Matthew Plew

F-15E STRIKE EAGLE

Multirole fighter

Brief: F-15E is an upgraded, two-seat, all-weather F-15 capable of deep interdiction/attack, tactical nuclear delivery, and air-to-air combat. Strike Eagle is capable of sustaining nine Gs throughout the flight envelope. It first saw combat in Desert Storm in 1991. F-15E's large, varied load of precision weapons and 20 mm cannon gives it potent ground-attack capability. Radar-guided and IR-homing missiles give it an additional air-to-air capability. Its advanced cockpit controls and displays include a wide-field-of-view HUD and helmet mounted cockpit-cueing, and its avionics permit all-weather day/night engagement. The F-15E carries LANTIRN, Sniper, and Litening ATPs on dedicated pylons. The "Dragon's Eye" SAR pod fielded in 2009 provides all-weather surveillance/reconnaissance capability. F-15Es are equipped with Link 16 and BLOS SATCOM. The Strike Eagle is undergoing major avionics modernization, centered on the new APG-82(V)1 AESA radar slated for fleetwide install by FY24. Eagle Passive/Active Warning Survivability System (EPAWSS) is a second major effort to replace its obsolete self-defense suite. Software is continuously updated on a two-to-three-year cycle integrating new mission capabilities as part of the Operational Flight Program in tandem with the F-15C/D. Ongoing avionics upgrades include Suite 9 software, AESA electronic countermeasure protection, standardizing APG-82 radar configurations, MIDS/ JTRS to enable higher capacity, jam-resistant Link 16, and anti-jam UHF satcom. Future enhancements include AESA-compatible large-area digital displays for improved targeting and fratricide prevention, mountable IRST to discreetly engage air targets, and Data Transfer Module replacement to improve flight planning and debrief. F-15E became the first type certified to deliver the future B61-12 guided nuclear freefall bomb on June 8, 2020, as well as the GBU-53/B SDB II StormBreaker on Sept. 23, 2020.

Contractors: Boeing (previously McDonnell Douglas); BAE Systems (EPAWSS); Raytheon (AESA).
First Flight: Dec. 11, 1986.
Delivered: April 1988-2004.
IOC: September 1989.
Production: 236.
Inventory: 218.
Operator: ACC, AFMC, USAFE.
Aircraft Location: Eglin AFB, Fla.; Mountain Home AFB, Idaho; Nellis AFB, Nev.; RAF Lakenheath, U.K.; Seymour-Johnson AFB, N.C.
Active Variant:
▪F-15E. All-weather strike aircraft derived from the F-15C/D.
Dimensions: Span 42.8 ft, length 63.8 ft, height 18.5 ft.
Weight: Max T-O 81,000 lb.
Power Plant: Two Pratt & Whitney F100-PW-220, each 23,450 lb thrust; or two F100-PW-229 turbofans with afterburners, each 29,000 lb thrust.
Performance: Speed Mach 2.5, range 2,762 miles with CFTs and three external tanks (further with air refueling).
Ceiling: 50,000 ft.
Armament: One internally mounted M61A1 20 mm six-barrel cannon (500 rd); four AIM-9 Sidewinders and four AIM-120 AMRAAMs or eight AIM-120s; most air-to-surface weapons in USAF inventory (nuclear and conventional) and ECM pods.
Accommodation: Pilot and WSO on ACES II zero/zero ejection seats.

Tech. Sgt. John McRell

F-15EX EAGLE II

Air superiority fighter

Brief: F-15EX is the most advanced Eagle variant based on the F-15QA as a replacement for the legacy F-15C/D. The Eagle II is the first USAF F-15 to boast digital fly-by-wire flight controls, Large Area Display (LAD) glass-cockpit, and incorporate APG-82 AESA radar, Joint Helmet Mounted Cueing System (JHMCS), and EPAWSS self-defensive suite from the outset. The aircraft pioneers Open Mission System (OMS) software to enable rapid upgrades and capability enhancement, as well as the latest Suite 9.1 software in common with upgraded legacy aircraft. F-15EX promises higher speed, longer range, increased payload (including two additional weapon stations), and lower operating costs than previous variants. Due to insufficient F-22 procurement, the F-15C/D fleet has continued flying beyond its designed service life, posing a serious risk of structural failure. Similar infrastructure, support, and training requirements will permit existing F-15 units to quickly transition to the F-15EX. The F-15EX incorporates two-seats enabling future crew/mission expansion. FY21 efforts focus on integrating F-15EX-unique software into the next Suite 9.2 build, ramping up production capability, preparing the two initial aircraft for flight testing, and continuing capability enhancement such as passive IRST targeting for highly contested engagements. USAF awarded Boeing a $1.2 billion contract for the first eight of up to 144 new-build F-15EX on July 13, 2020,

and FY21 funds procure an additional 12 aircraft. Two aircraft are slated for delivery in FY21, followed by six more in 2023, and upwards of 76 over the next five years. Aircraft serial number 20-0001 made the type's first flight from St. Louis Lambert Intl. Airport on Feb. 2 and was delivered to Eglin Mar. 11. The first jet will conduct accelerated developmental testing with AFMC while the second will fly operational tests with ACC.

Contractors: Boeing; BAE Systems (EPAWSS); Raytheon (AESA).
First Flight: Feb. 2, 2021.
Delivered: Mar. 11, 2021-present.
IOC: 2023 (planned).
Production: Two.
Inventory: N/A.
Operator: ACC, AFMC. Planned: ANG.
Aircraft Location: Eglin AFB, Fla. Planned: Klamath Falls (Kingsley Field) and Portland Arpt., Ore.
Active Variant:
▪F-15EX. Future F-15C/D replacement based on the F-15QA developed for Qatar.
Dimensions: Span 42.8 ft, length 63.8 ft, height 18.5 ft.
Weight: Max T-O 81,000 lb.
Power Plant: Two General Electric F100-PW-229 turbofans with afterburners, each 29,000 lb thrust.
Performance: Speed Mach 2.5, range approx. 2,762 miles (air refuelable).
Ceiling: 60,000 ft.
Armament: One internally mounted M61A1 20 mm six-barrel cannon (500 rd); combination of up to 12 AIM-9 Sidewinders or AIM-120 AMRAAMs, or combination of up to 24 air-to-ground munitions.
Accommodation: Pilot and (optional) second aircrew member on ACES 5 zero/zero ejection seats.

Senior Airman Mary Begy

F-16 FIGHTING FALCON

Multirole fighter

Brief: The F-16 is a lightweight, multirole fighter capable of air-to-air, CAS, SEAD, interdiction, FAC-A, tactical nuclear delivery and all-weather strike missions. The "Viper" makes up roughly half the fighter inventory, carries the majority of PGMs in service, and is one of the most maneuverable fighters ever built. The prototype YF-16 first flew Feb. 2, 1974, competing in the USAF Lightweight Fighter competition. After selection, F-16A flew on Dec. 8, 1976, followed by the two-seat F-16B on Aug. 8, 1977. Deliveries began in August 1978, and USAF declared F-16A IOC in October 1980. F-16C/D deliveries began at Block 25 in 1984, adding the APG-68 radar and AMRAAM missile as well as cockpit, airframe, and avionics improvements. Block 30/32 added the HARM missile and more powerful engines, and Block 40/42 introduced the terrain following LANTIRN pod and wide-angle HUD for high-speed night/all-weather penetration. These airframes boasted higher take-off weight and G-limits and an expanded flight envelope starting in 1988. Block 50/52 was introduced to replace the F-4G in the "Wild Weasel" SEAD-role mounting the HARM missile, longer-range radar, and even higher performance engines. The F-16 entered combat during Desert Storm in 1991 and scored its sole air-to-air kill during Southern Watch on Dec. 27, 1992. Most upgrades are managed in Pre-Block (Blocks 25-32) and Post-Block (Blocks 40-52) tranches. The fleet is now cockpit-standardized with color MFD, modular mission computer, Helmet Mounted Integrated Targeting (HMIT), and Link 16. The Operational Flight Program (OFP) continuously updates the F-16's software. Iteration 7.2+ debuted in 2020 introduced JASSM-ER and enhanced AMMRAM, as well as cockpit workload and weapon accuracy and lethality improvements. The fleet is undergoing significant combat system modernization centered on the new AN/APG-83 AESA radar. ANG alert aircraft pioneered full operational capability with AESA in 2020, following urgent efforts to combat cruise missile threats. A total of 330 Post-Block aircraft will be upgraded through FY25, and also receive digital RWR (as part of a notional, fully-integrated EW suite), as well as mission computer and cockpit display upgrades. Development is focused on these follow-on upgrades, as well as Automatic Ground Collision Avoidance System (A-GCAS) for Pre-Block aircraft. Ongoing mods also include SLEP, MIDS/JTRS for higher capacity, jam-resistant Link 16, Aggressor improvements, Mode 5 IFF, and A-GCAS.

Contractors: Lockheed Martin (previously General Dynamics); Northrop Grumman (AESA).
First Flight: June 19, 1984 (F-16C).
Delivered: July 13, 1984-2005 (F-16C/D).
IOC: 1981 (Block 25-32); 1989 (Block 40/42); 1994 (Block 50/52).
Production: 2,206.
Inventory: 781 (F-16C); 155 (F-16D).
Operator: ACC, AETC, AFMC, PACAF, USAFE, ANG, AFRC.
Aircraft Location: Aviano AB, Italy; Edwards AFB, Calif.; Eglin AFB, Fla.; Eielson AFB, Alaska; Holloman AFB, N.M.; Homestead ARB, Fla.; Kunsan AB, South Korea; Luke AFB, Ariz.; Misawa AB, Japan; NAS JRB Fort Worth, Texas; Nellis AFB, Nev.; Osan AB, South Korea; Shaw AFB, S.C.; Spangdahlem AB, Germany; and ANG in Alabama, Arizona, Colorado, District of Columbia (flying from Maryland), Minnesota, New Jersey, Ohio, Oklahoma, South Carolina, South Dakota, Texas, Wisconsin.
Active Variants:
▪F-16C/D Block 30/32. Multinational Staged Improvement Program II upgraded with new engines, flown by ANG, AFRC, and test/aggressor units.
▪F-16CG Block 40/42. Optimized for night/all-weather attack.
▪F-16CJ Block 50/52. Optimized for SEAD with long-range radar, engines, and weapons.
Dimensions: Span 32.8 ft, length 49.3 ft, height 16.7 ft.
Weight: Max T-O 37,500 lb (Block 30/32); 42,300 lb (Block 40/42); 48,000 lb (Block 50/52).
Power Plant: GE Aviation F110-GE-100, 29,000 lb thrust (Block 30); Pratt & Whitney F100-PW-220, 24,000 lb thrust (Block 32/42); F110-GE-129, 29,000 lb thrust (Block 50); F100-PW-229, 29,000 lb thrust (upgraded Block 42, Block 52).
Performance: Speed Mach 2+, ferry range 2,002+ miles.
Ceiling: 50,000 ft.
Armament: One M61A1 20 mm cannon (500 rd); up to six AIM-9 Sidewinder or AIM-120 AMRAAMs air-to-air missiles, most air-to-surface weapons in USAF inventory (nuclear and conventional).
Accommodation: Pilot (C), two pilots (D), on ACES II zero/zero ejection seats.

Senior Airman Mary Begy

F-22 RAPTOR

Air superiority/multirole fighter

Brief: The F-22 is a stealthy, penetrating, air dominance, and multirole attack fighter built for day, night, and adverse weather, full-spectrum operations. The world's most advanced fighter, it combines stealth, supercruise, and high maneuverability. Its integrated avionics and data links permit simultaneous multitarget engagement. Advanced flight controls and thrust-vectoring, high-performance engines enable high maneuverability. Features include six LCD color cockpit displays, APG-77 AESA radar, EW system with RWR and missile launch detection, JTIDS, IFF, and INS/GPS navigation. The prototype YF-22 first flew as part of

USAF's Advanced Tactical Fighter competition on Sept. 29, 1990, followed by the flight of the first F-22 test aircraft in 1997. The Raptor flew its first operational sortie during Noble Eagle in 2006 and debuted in combat striking Islamic State ground targets during Inherent Resolve in 2014. The F-22 program uses an "agile" modernization strategy to rapidly and continuously develop, test, and field incremental improvements. Significant efforts include the Reliability, Availability, and Maintainability Program (RAMP), Software Increment 3.2B, and tactical capability improvements. RAMP is adding AIM-9X-capable launch rails, more durable LO, as well as structural and wiring fixes. 3.2B software is the highest priority update, adding high-resolution ground mapping SAR, threat geolocation, EA capability, and integration of SDB I, AIM-120D, and AIM-9X. Link-16 (previously TACLink-16) will bundle transmit and receive capability with legacy aircraft via Multifunctional Information Distribution System/Joint Tactical Radio System (MIDS/JTRS) with initial fielding in FY22. Five 3.2B-modified aircraft began operational testing in 2018, and fleetwide rollout is planned through FY23. A fielding decision on sensor upgrades to preserve "first-shot, first-kill" advantage against advanced threats will follow a flight demo, now planned for late FY21. Additional efforts include engine safety, performance, and maintainability mods, crypto mods, Mode 5 IFF tactical improvements, and GPS-denied navigation capability. USAF completed structural life-extension mods in 2020, pushing the fleet's projected service life to 8,000 hours. The service is now evaluating the possibility of a Mid-Life Upgrade Program to increase survivability and lethality. An F-22 was destroyed in a crash at the Eglin Test and Training Range on May 15, 2020.

Contractors: Lockheed Martin; Boeing (production partner).
First Flight: Sept. 7, 1997.
Delivered: Oct. 23, 2002-May 2, 2012.
IOC: Dec. 15, 2005.
Production: 195.
Inventory: 186.
Operator: ACC, AFMC, AFRC (associate), PACAF, ANG.
Aircraft Location: Edwards AFB, Calif.; Eglin AFB, Fla.; JB Elmendorf-Richardson, Alaska; JB Langley-Eustis, Va.; JB Pearl Harbor-Hickam, Hawaii; Nellis AFB, Nev.
Active Variant:
▪F-22A. Fifth-generation air dominance fighter.
Dimensions: Span 44.5 ft, length 62 ft, height 16.6 ft.
Weight: Max T-O 83,500 lb.
Power Plant: Two Pratt & Whitney F119-PW-100 turbofans, each 35,000 lb thrust.
Performance: Speed Mach 2 with supercruise capability, ferry range 1,850+ miles with two external wing fuel tanks (further with air refueling).
Ceiling: Above 50,000 ft.
Armament: One internal M61A2 20 mm gun (480 rds); two AIM-9 Sidewinders inside internal weapons bays; six AIM-120 AMRAAMs (air-to-air loadout) or two AIM-120s and two GBU-32 JDAMs or eight SDBs (air-to-ground loadout) in main internal weapons bay.
Accommodation: Pilot on ACES II zero/zero ejection seat.

F-35 LIGHTNING II

Multirole fighter

Brief: The F-35 Lightning II is a multirole, stealthy, penetrating, all-weather fighter/attack family of tactical aircraft produced by the multinational Joint Strike Fighter program. USAF's conventional F-35A is complemented by the F-35B short takeoff and vertical landing (STOVL) version for USMC, and the carrier-capable F-35C for the Navy. The X-35 demonstrator first flew on Oct. 24, 2000, winning the go-ahead for the F-35A which first flew in developmental form in 2006. Lightning II is planned to replace the A-10 and F-16, offering better penetrating capability against advanced A2/AD threats to strike heavily defended targets. USAF's F-35A can carry up to 22,000 lb of weapons on 10 stations: two internal bays for stealth, and/or six wing and fuselage pylons for max loadout. An Israeli Air Force F-35I "Adir" drew first blood, hitting Iranian targets in Syria in May 2018, followed by USAF's initial combat deployment for Inherent Resolve in 2019. Development, production, and operations are pursued concurrently, requiring rolling retrofits to standardize the fleet. Block 3i software upgrades improved upon the baseline Block 2B software, adding 89 percent of the code needed for full-combat capability as a bridge to Block 3F. The current production/retrofit Block 3F software delivers full combat capability and adds a range of precision guided munitions. FY21 transitions to the next Block 4 iteration dubbed Continuous Capability Development and Delivery (C2D2). Block 4 will correct deficiencies discovered in concurrent development/testing and add B61-12 and SDB II weapons capability, sensors, improved EW, and maritime strike. USAF is holding to a lower delivery rate until Block 4 production to minimize retrofit costs. Fielded F-35As are capable of interdiction, basic CAS, and limited SEAD. FY21 funds procure 60 F-35As (including 12 congressionally added aircraft) and begins Block 4 and structural mods to upgrade capabilities of early production. Completion of operational testing has slipped to at least mid-2021, delaying full-rate production and cost-saving multiyear block buys. USAF also accepted eight jets ordered by Turkey after that country was expelled from the program, having potentially compromised the F-35's technical advantage by exposing its stealth secrets to Russia. F-35s suffered two landing accidents in 2020 including an excess-speed incident at Eglin, exacerbated by flight control software, helmet display, and oxygen system problems. The first two PACAF F-35s were delivered to Eielson on April 21, 2020.

Airman First Class Zachary Rufus

Contractors: Lockheed Martin; BAE Systems; Northrop Grumman; Pratt & Whitney (engine).
First Flight: Dec. 15, 2006.
Delivered: April 2011-present.
IOC: Aug. 2, 2016.
Production: Planned: 1,763 (USAF F-35As).
Inventory: 239 (USAF).
Operator: ACC, AETC, AFMC, AFRC (associate), ANG, PACAF. Planned: USAFE.
Aircraft Location: Burlington ANGB, Vt.; Edwards AFB, Calif.; Eglin AFB, Fla.; Eielson AFB, Alaska; Hill AFB, Utah; Luke AFB, Ariz.; Nellis AFB, Nev. Planned: Dannelly Field, Ala.; RAF Lakenheath, U.K.; Truax Field, Wis.; Tyndall AFB, Fla.
Active Variants:
▪F-35A. Conventional takeoff and landing (CTOL) variant for the Air Force.
Dimensions: Span 35 ft, length 51.4 ft, height 14.4 ft.
Weight: Max T-O 70,000 lb.
Power Plant: F-35A: one Pratt & Whitney F135-PW-100, 40,000 lb thrust.
Performance: Speed Mach 1.6 with full internal weapons load, range 1,380 miles.
Ceiling: 50,000 ft.
Armament: F-35A: one 25 mm GAU-22/A cannon; standard internal loadout: two AIM-120 AMRAAMs and two GBU-31 JDAMs.
Accommodation: Pilot on Martin Baker MK16 zero/zero ejection seat.

Airman 1st Class John Strong II

F-117 NIGHTHAWK

Attack

Brief: The F-117 was the world's first operational stealth aircraft, designed to expand USAF's ability to strike critical, heavily defended targets. Its small radar signature, LO technologies, and advanced targeting system allowed the aircraft to penetrate dense threat environments and deliver precision weapons against heavily defended, high-value targets with pinpoint accuracy. Primary missions included precision attack, air interdiction, SEAD, and special operations. The type was first publicly acknowledged in November 1988, and conducted its first operational deployment during Just Cause over Panama in 1989. Highly classified F-117A development and manufacture

began simultaneously in November 1978, using many parts transferred or modified from existing aircraft. The F-117As were first stationed at Tonopah Test Range in Nevada to conduct test flying before transferring operationally to Holloman in 1992. A single aircraft was shot down in combat over Serbia on March 27, 1999, and the F-117 fleet was officially retired on April 22, 2008. The remaining airframes entered climate-controlled storage at Tonopah, with several being maintained in flyable condition for the Air Force Flight Test Center. F-117s have recently reemerged, notably supporting several exercises in 2020 and operating more frequently and openly alongside Aggressor aircraft at Nellis and MCAS Miramar. USAF has acknowledged a need for more advanced, threat-representative training and recently reactivated the 65th Aggressor Squadron at Nellis with early F-35As to enhance fifth-generation combat training.

Contractors: Lockheed Martin.
First Flight: June 18, 1981.
Delivered: 1982-summer 1990.
IOC: October 1983.
Production: 59.
Inventory: N/A.
Operator: AFMC.
Aircraft Location: Tonopah Test Range, Nev.
Active Variants:
▪F-117A. First-generation stealth attack aircraft.
Dimensions: span 43.3 ft, length 65.9 ft, height 12.4 ft.
Weight: max gross 52,500 lb.
Weight: Max T-O 70,000 lb.
Power Plant: two General Electric F404-GE-F1D2 nonafterburning turbojets, each 9,040 lb thrust.
Performance: Speed 0.9 Mach, mission radius unrefueled (5,000-lb weapons load) 656 miles.
Ceiling: 35,000 ft.
Armament: Full internal carriage of a variety of tactical weapons, incl laser- and GPS-guided 2,000-lb munitions.
Accommodation: Pilot on ACES II zero/zero ejection seat.

SPECIAL OPERATIONS AIRCRAFT

Sierra Nevada Corp.

A-29 SUPER TUCANO

Light attack

Brief: The A-29 Super Tucano is a turboprop light attack/armed reconnaissance aircraft designed by Embraer in Brazil and built under license by Sierra Nevada Corp. USAF has long sought a cost-effective, manned light CAS/tactical ISR platform for operations in permissive counter-insurgency type scenarios. The A-29 was initially a contender for the Air Force's Light Attack/Armed Reconnaissance (LAAR) requirement for approximately 100 aircraft which fell prey to budget cuts a decade ago. The service launched a renewed effort in 2017, kicking off the Light Attack Experiment (OA-X) to rapidly evaluate off-the-shelf CAS/ISR platforms to relieve pressure on existing, higher-cost fleets such as the A-10 and F-16. A fatal A-29 crash abruptly ended the flight segment of evaluations at Holloman on June 22, 2018. Trials, however, yielded sufficient data for USAF to opt for two AT-6Bs and two (later increased to three) A-29s. The AT-6s assigned to ACC at Nellis will support tactics development and testing, while the A-29s slated for AFSOC will form the basis of a Combat Aviation Advisor and SOF-support capability. USSOCOM is simultaneously looking to replace its AFSOC-operated U-28A fleet with as many as 75 enhanced capability "armed overwatch" aircraft. Congress, however, banned funding the effort through FY23 pending study and justification. AETC's 81st Fighter Squadron also operated the A-29 as part of the Train, Advise, Assist Command-Air (TAAC-Air) training of Afghan Air Force crews at Moody. USAF handed-off training to the AAF, graduating its final class of pilots in November 2020. A total of 13 countries operate the A-29 world-wide. All three AFSOC aircraft are slated for delivery in 2021.

Contractor: Sierra Nevada Corp.
First Flight: June 2, 1999.
Delivered: Feb. 23, 2021-present.
IOC: N/A.
Production: Three (planned).
Inventory: N/A.
Operator: AETC (AAF); Planned: AFSOC.
Aircraft Location: Moody AFB, Ga. Planned: Hurlburt Field, Fla.
Active Variants:
▪A-29 Super Tucano. License-built version of the Embraer EMB-314 light attack aircraft.
Dimensions: Span 36.5 ft, length 37.3 ft, height 13 ft.
Weight: Max T-O 11,905 lb.
Power Plant: One Pratt & Whitney Canada PT6A-68C turboprop, 1,604 shp.
Performance: Speed 368 mph, range 1,900 miles (with wing-mounted external tanks).
Ceiling: 35,000 ft.
Armament: Two internal wing-mounted .50-caliber machine guns (200 rd each), up to 3,714 lb of external weapons on four wing and one centerline station.
Accommodation: Two aircrew on Martin Baker MK10 zero/zero ejection seats.

Senior Airman Dennis Spain

AC-130J GHOSTRIDER

Attack

Brief: The AC-130J is a CAS, air interdiction, and armed reconnaissance platform optimized for convoy escort, point defense, and supporting urban combat. The AC-130J is designed to provide ground forces a persistent direct-fire platform and deployed to combat for the first time in Afghanistan in June 2019. The next-generation gunship is based on a highly modified MC-130J, retrofit after delivery with a modular precision strike package, wing-mounted weapons, and gunship-specific systems. Airframes are upgraded and managed in common with the HC/MC-130J, receiving Block 8.1 avionics upgrades along with the baseline C-130J. SOF-specific enhancements are rapidly developed and integrated in response to operational requirements. PSP includes a dual mission management console, robust communications suite, two EO/IR sensors, advanced fire-control equipment, PGM delivery capability, and trainable cannons. Block 20 added/retrofit a 105 mm gun, laser guided SDB, side-facing pilot tactical HUD, and Large Aircraft Infrared Countermeasures (LAIRCM). The configuration was deemed operationally effective for most taskings in 2018. Upgrades based on initial operational testing resulted in the Block 20+/30 configuration which improved gun accuracy, hardened GPS, and added wing-mounted Hellfire missiles and ramp-deployed GBU-69 Small Glide Munitions. The first Block 30 was delivered for testing in 2019. Development includes a high-energy laser weapon planned for demonstration in 2022, radio frequency countermeasures (RFCM) to detect, locate, and respond to threats, mission networking, IR suppression, PSP and EO/IR sensor improvements, and HF/VHF/UHF/SATCOM suite modernization. FY21 funds delivery/conversion of five airframes and continues the multiyear contract for 23 combined AC/MC-130J airframes. Enhanced all-weather strike capability and sensors are aimed at adding future through-cloud engagement. AFSOC announced plans to shift AC-130J formal training from Hurlburt to Kirtland starting in FY22.

Contractor: Lockheed Martin, Sierra Nevada Corp (RFCM).
First Flight: Jan. 31, 2014.
Delivered: July 29, 2015-present.
IOC: Sept. 30, 2017.
Production: 20 (37 to be converted from new-build MC-130Js).

Inventory: 20.
Operator: AFSOC.
Aircraft Location: Hurlburt Field, Fla. Planned: Kirtland AFB, N.M.
Active Variants:
▪AC-130J Ghostrider Block 20. Production standard gunship with additional 105 mm gun.
▪AC-130J Ghostrider Block 30. Production aircraft with post operational test upgrades.
Dimensions: Span 132.6 ft, length 97.7 ft, height 39.1 ft.
Weight: Max T-O 164,000 lb.
Power Plant: Four Rolls-Royce AE 2100D3 turboprops, each 4,700 shp.
Performance: Speed 416 mph, range 3,000 miles (further with air refueling).
Ceiling: 28,000 ft.
Armament: Trainable 30 mm GAU-23/A cannon; 105 mm cannon; up to eight wing pylon-mounted GBU-39 SDB or AGM-114 Hellfire, and aft-firing GBU-69B Small Glide Munition and AGM-176 Griffin deployed from 10 Common Launch Tubes integrated into the aircraft's ramp/door.
Accommodation: Two pilots, CSO, WSO, sensor operator, loadmaster, and three gunners.

Senior Airman Mary Begy

AC-130W STINGER II

Attack, armed reconnaissance

Brief: The AC-130W is a gunship-modified C-130H optimized for CAS, interdiction, armed reconnaissance, convoy escort, strike coordination, overwatch, and point defense. AC-130Ws also provide strike coordination, nontraditional ISR, and C2. PSP mod includes a mission management console, communications suite, and flight-deck hardware. Airframes are significantly modified with improved navigation, threat detection, countermeasures, comms, and a standoff Precision Strike Package. The aircraft is entirely distinct from the retired AC-130H Spectre and AC-130U Spooky. The airframes were originally converted as MC-130W Combat Spear for SOF infiltration/exfiltration and in-flight refueling and redesignated Dragon Spear with the addition of the roll on/roll off PSP in 2010. The aircraft was rebranded AC-130W Stinger II after further enhancements in 2012. AC-130J will eventually replace the AC-130W fleet, which averages more than 26 years old. Upgrades include Enhanced Situational Awareness (ESA) for near real-time intel and data fusion including threat detection, avoidance, geolocation, and adversary-emitter identification, IR suppression, and the 105 mm gun (in common with the AC-130U/J). An AC-130W showcased the type's ability to conduct maritime strike/overwatch in a live-fire demo with Navy air and surface assets operating in the Persian Gulf in 2020. AFSOC plans to retire the fleet by 2023 and four airframes are slated for retirement in FY21.

Contractor: Lockheed Martin.
First Flight: Circa 2006 (Combat Spear).
Delivered: November 2010 (Dragon Spear).
IOC: 2010 (Dragon Spear).
Production: 12 (converted).
Inventory: 10.
Operator: AFSOC.
Aircraft Location: Cannon AFB, N.M.
Active Variant:
▪AC-130W Stinger II. Converted MC-130W armed with PSP and PGMs.
Dimensions: Span 132.6 ft, length 98.8 ft, height 38.5 ft.
Weight: Max T-O 155,000 lb.
Power Plant: Four Allison T56-A-15 turboprops, each 4,910 shp.
Performance: Speed 300 mph, range 2,875 miles.
Ceiling: 28,000 ft.
Armament: 105 mm cannon, 30 mm GAU-23/A Bushmaster II chain gun; PGMs, incl GBU- 39 SDB, GBU-69B Small Glide Munition, and AGM-176A Griffin.
Accommodation: Two pilots, two CSOs, flight engineer, two special-mission aviators.

Courtesy photo

C-145 SKYTRUCK

Foreign training and light mobility

Brief: The C-145 "Combat Coyote" is a STOL multipurpose utility and SOF proficiency training aircraft based on the Polish-built PZL Mielec M-28 Skytruck. The high-wing STOL aircraft features nonretractable landing gear for austere operations. USSOCOM assets are operated by AFSOC as a nonstandard fleet, initially supporting small combat teams. The aircraft first deployed in 2011 to Afghanistan. It is reconfigurable for 2,400 lb of cargo airdrop, casualty evacuation, CSAR, and humanitarian missions. C-145As later shifted to partnership capacity building Aviation Foreign Internal Defense (AvFID) missions. AFSOC now uses contract aircraft to provide partner countries with more tailored assistance and opted to cut the fleet from 16 to the current five aircraft in 2015. C-145s now provide aircrew proficiency for combat aviation advisers.

Contractor: PZL Mielec (Lockheed Martin/Sikorsky subsidiary).
First Flight: July 1993 (PZL M-28).
Delivered: 2009-2013.
IOC: N/A.
Production: 16.
Inventory: Five, USSOCOM-owned.
Operator: AFSOC, AFRC (associate).
Aircraft Location: Duke Field, Fla.
Active Variant:
▪C-145A. Militarized civilian M-28 Skytruck used for SOF support and training.
Dimensions: Span 72.3 ft, length 43 ft, height 16.1 ft.
Weight: Max T-O 16,534 lb.
Power Plant: Two Pratt & Whitney PT6A-65B turboprops, 1,100 shp.
Performance: Speed 256.5 mph, range 1,161.5 miles.
Ceiling: 25,000 ft.
Accommodation: Two pilots, one loadmaster. Load: 16 passengers or 10 paratroopers; up to four litters; max cargo 5,000 lb.

C-146 WOLFHOUND

Multimission mobility

Brief: The C-146 provides flexible, responsive airlift for special operations teams operating from austere and semiprepared airfields worldwide. Wolfhound is based on the German-built Dornier 328 regional airliner and was purchased by USSOCOM, modified by Sierra Nevada Corp., and designated C-146. The aircraft are operated by AFSOC as a nonstandard fleet providing direct support to SOF teams worldwide, often from austere airstrips. Modifications include ARC-231, PRC-117, and Iridium communications suite, troop/cargo-capable cabin, casualty evacuation capability, NVG compatibility, and STOL/austere operations enhancements. The aircraft first deployed in support of USAFRICOM in 2011. Recent upgrades include navigation enhancements to permit ops in GPS-degraded environments.

Staff Sgt. Joseph Pick

Contractors: Fairchild-Dornier; Sierra Nevada Corp.
First Flight: December 1991 (Dornier 328).
Delivered: 2011-2017.
IOC: N/A.
Production: 20 (converted).
Inventory: 20 (USSOCOM-owned).
Operator: AFSOC.
Aircraft Location: Cannon AFB, N.M.; Duke Field, Fla.
Active Variant:
▪C-146A. Preowned civil Dornier 328 modified for SOF airlift.
Dimensions: Span 69.6 ft, length 68.8 ft, height 23.8 ft.
Weight: Max T-O 30,843 lb.
Power Plant: Two Pratt & Whitney 119C turboprops, 2,150 shp.
Performance: Speed 335 mph, range 2,070 miles (2,000 lb cargo).
Ceiling: 31,000 ft.
Accommodation: Two pilots, one loadmaster. Load: 27 passengers; up to four litters; max cargo 6,000 lb.

Staff Sgt. Mackenzie Mendez

CV-22 OSPREY

Multimission lift

Brief: The CV-22 is a medium-lift, vertical takeoff and landing (VTOL) tiltrotor, primarily used for clandestine long-range, all-weather penetration to insert, recover, and support SOF teams in hostile, denied, and politically sensitive areas. Derived from the V-22, which flew in prototype form on March 19, 1989, USAF CV-22Bs are equipped with a fully integrated precision TF/TA radar navigation, digital cockpit management system, FLIR, integrated NVG/HUD, digital map system, robust self-defense systems, and secure anti-jam comms. The CV-22 can conduct shipboard and austere forward operations. It is capable of operating in nuclear, biological, and chemical (NBC) warfare conditions. CV-22s first deployed to Africa in November 2008 and debuted in combat in Iraq in 2009. AFSOC is retrofitting the CV-22 to Block 20 standards, in common with USMC MV-22s. Mods include new cabin lighting, color helmet mounted displays, IR searchlight, lightweight ballistic armor, EW upgrades, avionics, self-defensive improvements, weapons integration, and ISR and situational awareness enhancements. A CV-22 at Eglin completed the first test flight of the Silent Knight TF/TA radar June 23, 2020. AFSOC plans to complete fleetwide retrofit of the stealthier, low-altitude, night/all-weather navigation radar by FY25. Priority development includes improving the Osprey's rapid, long-distance self-deployment capabilities, and modifying nacelles to improve maintainability, engine IR suppression, and reduce dust/debris ingestion. Integration of a ventral-mounted 7.62 mm minigun will eventually give pilots a helmet-cued, 360-degree field of defensive fire to complement the ramp-mounted weapon. Hurlburt took delivery of the 400th joint service-production aircraft on June 22, 2020. USAF is slated to receive its final airframe under the current multiyear contract in 2022.

Contractors: Boeing; Bell Helicopter Textron.
First Flight: February 2000 (CV-22).
Delivered: Sept. 19, 2005-present.
IOC: 2009.
Production: 51 planned (CV-22; incl three replacements).
Inventory: 50.
Operator: AETC, AFSOC, ANG (associate).
Aircraft Location: Cannon AFB, N.M.; Hurlburt Field, Fla.; Kirtland AFB, N.M.; RAF Mildenhall, U.K.; Yokota AB, Japan.
Active Variant:
▪CV-22B. Air Force special operations variant of the V-22 Osprey.
Dimensions: Span 84.6 ft, length 57.3 ft, height 22.1 ft, rotor diameter 38 ft.
Weight: Max vertical T-O 52,870 lb; max rolling T-O 60,500 lb.
Power Plant: Two Rolls-Royce-Allison AE1107C turboshafts, each 6,200 shp.
Performance: Cruise speed 277 mph, combat radius 575 miles with one internal auxiliary fuel tank, self-deploy 2,100 miles with one in-flight refueling.
Ceiling: 25,000 ft.
Armament: One ramp-mounted .50-caliber machine gun. Planned: One belly mounted forward firing GAU-17 7.62 mm minigun.
Accommodation: Two pilots, two flight engineers.
Load: 24 troops seated, 32 troops on floor, or 10,000 lb cargo.

Airman 1st Class Dennis Spain

EC-130J COMMANDO SOLO/SUPER J

Psychological warfare/special operations airlift

Brief: The EC-130J is the Air Force's primary psychological warfare platform, providing military information support operations (MISO) and civil affairs broadcast. Roles include offensive counterinformation radio, television, and military communications broadcast, EA (or SOF mobility), depending on variant. EC-130J and legacy Commando Solo variants have conducted psychological operations in almost every US contingency since 1980. The EC-130J Commando Solo is equipped with radio and color television broadcast equipment for psychological warfare, enhanced navigation, and self-protection including Large Aircraft IR Countermeasures (LAIRCM) to counter MANPAD threats. With transition to the EC-130J, USAF added a new, secondary mission resulting in a second variant. Three heavily modified EC-130J Commando Solo aircraft serve as a standard broadcasting station for psychological warfare operations. Four EC-130Js, dubbed Super J, perform secondary, low-cost EA on top of their special operations mobility SOF-FLEX (Special Operations Flexible) mission. SOF-FLEX includes personnel and cargo airdrop, combat offload, and infiltration/exfiltration. USAF is working to develop an Operational Flight Program Block upgrade cycle for the EC-130J's mission specific equipment, and the airframe is undergoing Block 8.1 upgrades in tandem with the base-line C-130J. SOCOM is currently funding accelerated development, testing and fielding of the Multi-Mission Platform-Heavy (MMP-H) digital broadcast system which will allow all aircraft to be de-modified to a SOF multimission configuration. MMP-H enables standoff radio, television, UHF/ VHF, and cellular broadcast against denied threats from up to 175 miles away. The fleet is receiving Link 16 networking to integrate with other SOF assets, and critical needs include acquiring Communication EA Surveillance and Reconnaissance (CEASAR) and Long-Range Broadcast System (LRBS) pods for the four remaining non-equipped aircraft.

Contractors: Lockheed Martin; Raytheon.
First Flight: April 5, 1996 (C-130J).
Delivered: Oct. 17, 1999-2006.
IOC: 2004.
Production: Seven.
Inventory: Three (Commando Solo); four (Super J).
Operator: ANG.
Aircraft Location: Harrisburg Arpt., Pa.
Active Variants:
▪EC-130J Commando Solo. Modified C-130J used for broadcast and psyops.
▪EC-130J Super J. Modified C-130J used for SOF mobility and psyops.

Dimensions: Span 132.6 ft, length 97.8 ft, height 38.8 ft.
Weight: Max T-O 164,000 lb.
Power Plant: Four Rolls-Royce-Allison AE2100D3 turboprops, each 4,637 shp.
Performance: Speed 335 mph cruise, range 2,645 miles (air refuelable).
Ceiling: 28,000 ft.
Accommodation: Two pilots, flight systems officer, mission systems officer; two loadmasters, five electronic communications systems (CS) operators.

Master Sgt. Andrew LaMoreaux

MC-12W LIBERTY

Tactical ISR

Brief: The MC-12W is a manned, medium/low-altitude tactical ISR, SIGINT, and targeting platform based on the Beechcraft King Air 350ER (Extended Range). It was hastily developed under Project Liberty to meet an urgent operational need for manned battlefield ISR and deployed to Iraq and Afghanistan in less than a year in 2009. MC-12W is capable of complete ISR collection, processing, analysis, and dissemination. The aircraft provides targeting data and tactical ISR direct to special operations ground forces. Specialized equipment includes FMV, laser designation, SIGINT, advanced BLOS connectivity, and advanced SATCOM. ACC passed 20 airframes to USSCOM in 2015, and the Oklahoma ANG formed a dedicated SOF support mission with the remaining aircraft, deploying for the first time to Afghanistan in 2015. The ANG is seeking mission critical capability improvements including Link 16, adding a SAR sensor for ground moving target tracking in poor visibility, operator display upgrades, a second FMV sensor, and a high-fidelity roll-on/roll-off EO/IR sensor to meet COCOM requirements.

Contractors: Beechcraft; L3Harris (EO/IR sensors).
First Flight: April 28, 2009.
Delivered: April 2009-2012.
IOC: June 2009.
Production: 42.
Inventory: 13.
Operator: ANG.
Aircraft Location: Will Rogers ANGB, Okla.
Active Variant:
▪MC-12W. Modified Beechcraft King Air 350ER equipped for battlefield ISR and targeting.
Dimensions: Span 57.9 ft, length 46.7 ft, height 14.3 ft.
Weight: Max T-O 16,500 lb.
Power Plant: Two Pratt & Whitney Canada PT6A-60A turboprops, each 1,050 shp.
Performance: Speed 359 mph, range 2,760 miles.
Ceiling: 35,000 ft.
Accommodation: Two pilots, two sensor operators.

MC-130H COMBAT TALON II

Special operations airlift/aerial refueling

Brief: The MC-130H is a special operations tanker/mobility aircraft based on the C-130H. Its primary missions are covert day, night, and adverse-weather infiltration, exfiltration, and resupply of special operations forces in hostile or denied territory. They also provide air-drop resupply, rotary wing aerial refueling, and psyops. MC-130Hs are equipped with TF/TA radar, precision navigation systems using INS/GPS, and electronic and IR countermeasures for self-protection. All models are fitted with wing-mounted external fuel tanks and drogue refueling pods to refuel HH-60 and CV-22, and can also receive fuel in-flight. Aircraft are capable of airdrop using the Joint Precision Airdrop System and operating from austere and unmarked strips. The original MC-130Es were converted in the mid-1960s, followed by the MC-130P (previously HC-130N/P), which were delivered in the mid-1980s and retired in 2017. MC-130Hs were converted from base-

Airman 1st Class Blake Wiles

model C-130H to supplement the Combat Talon I and Combat Shadow fleets in the late 1980s and early 1990s. MC-130H have integrated glass cockpit and a modernized pod-based aerial refueling system. Kadena's final MC-130H transferred to Hurlburt Dec. 4, 2019, handing off to the MC-130J after 24 years forward-based in the Indo-Asia Pacific region.

Contractors: Lockheed Martin (airframe); Boeing.
First Flight: 1984.
Delivered: 1991-1994.
IOC: June 30, 1993.
Production: 24.
Inventory: 16.
Operator: AFSOC.
Aircraft Location: Hurlburt Field, Fla.
Active Variant:
▪MC-130H Combat Talon II. SOF support and aerial refueling tanker fielded in 1991.
Dimensions: Span 132.6 ft, height 38.5 ft, length 99.8 ft.
Weight: Max T-O 155,000 lb.
Power Plant: Four Allison T56-A-15 turboprops, each 4,910 shp.
Performance: Speed 300 mph, range 3,105 miles.
Fuel Capacity: Approx. 63,000 lb (81,120 lb with additional internal tanks) at up to 450 gpm.
Ceiling: 33,000 ft.
Accommodation: Two pilots, navigator, EWO, flight engineer, two loadmasters. Load: 77 troops, 52 paratroops, or 57 litters.

Capt. Renee Douglas

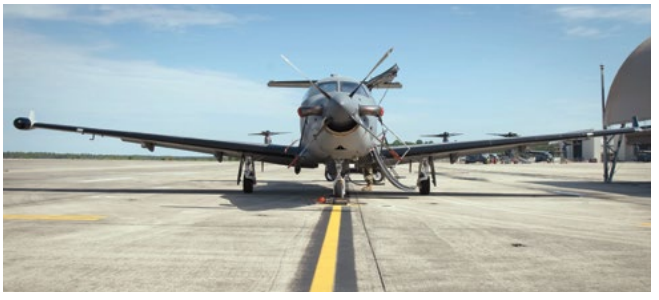
MC-130J COMMANDO II

Special operations airlift/aerial refueling

Brief: The MC-130J is a special operations tanker/mobility aircraft based on the C-130J and designated Commando II (previously Combat Shadow II) in honor of the WWII C-47. Its primary missions are covert day, night, and adverse weather infiltration, exfiltration, and resupply of special operations forces in hostile or denied territory. They also provide air-drop resupply, rotary wing aerial refueling, and psyops. MC-130J are fitted with wing-mounted external fuel tanks and drogue refueling pods to refuel HH-60 and CV-22, and can also receive fuel inflight. Specialized systems include fully integrated INS/GPS, color cockpit LCDs, NVG lighting, HUDs, integrated defensive systems including LAIRCM, digital moving map display, EO/IR system, dual secure voice/data satcom, enhanced cargo handling, and extended-life wings. MC-130Js have secondary leaflet and

rubber raiding craft aerial delivery roles for psyops and littoral ingress/egress. Crew is smaller than legacy models, but includes CSO/auxiliary flight deck stations to handle aerial refueling (otherwise performed by the flight engineer). Loadmasters handle remaining flight engineer/comms functions. FY21 funds procure four airframes under a follow-on multiyear contract through FY22. Funds continue Radio Frequency Countermeasure (RFCM) installation to detect, locate, and respond to emerging threats, as well as Airborne Mission Networking (AbMN), which gives aircrew a common air/ground picture to better manage complex workloads. MC-130J was pulled out of the baseline C-130J Block 7/8.1 upgrade to fund SOF-specific requirements, but will received Link 16 and CSO station upgrades separately. Development includes HF/VHF/UHF SATCOM Communications Modernization, and USSCOM plans to issue a multiyear Silent Knight TF/TA radar production contract in FY21. The TF/TA radar is housed in a second, small radome between the nose and cockpit giving the MC-130J low-level nighttime/adverse weather penetrating capability to fully replace the legacy MC-130H. Other mods include defensive systems upgrade, lightweight armor, and variable-speed drogue to refuel diverse aircraft types during a single sortie. FY21 begins Link 16 mods.

Contractors: Lockheed Martin (airframe); Boeing; Sierra Nevada Corp. (RFCM).
First Flight: April 20, 2011.
Delivered: Sept. 29, 2011-present.
IOC: Dec. 7, 2012.
Production: 57 (planned).
Inventory: 51.
Operator: AETC, AFSOC.
Aircraft Location: Cannon AFB, N.M.; Kadena AB, Japan; Kirtland AFB, N.M.; RAF Mildenhall, U.K.
Active Variant:
▪MC-130J. New-build aircraft based on the standard-length fuselage C-130J.
Dimensions: Span 132.6 ft, length 97.8 ft, height 38.8 ft.
Weight: Max T-O 164,000 lb.
Power Plant: Four Rolls-Royce AE2100D3 turboprops, each 4,591 shp.
Performance: Speed 416 mph, range 3,000 miles (further with air refueling).
Fuel Capacity: 61,360 lb at 150-300 gpm (100 gpm dual, simultaneous refueling).
Ceiling: 28,000 ft with 42,000-lb payload.
Accommodation: Two pilots, CSO, two loadmasters. Load: 42,000 lb of cargo/personnel (see C-130J for configurations).



Airman 1st Class Blake Wiles

U-28A DRACO

Tactical ISR

Brief: The U-28A is a manned, tactical ISR and targeting platform based on the Pilatus PC-12. The USSOCOM-owned aircraft are operated by AFSOC as a nonstandard fleet. It is employed worldwide in support of special operations ground forces, humanitarian efforts, and search and rescue. AFSOC first employed the aircraft during Enduring Freedom in Afghanistan and Iraqi Freedom. Mission equipment includes advanced radio-comms suite, IR suppression, missile, hostile fire, and laser warning, EO sensors, remote SIGINT, and advanced navigation systems. The primary Multispectral Targeting System includes FMV, EO-IR, IR real-time video, and co-aligned laser designator. U-28 EQ+ mods added high-definition, FMV to six EQ/PC-12 configured aircraft for extended standoff "find, fix, finish" capabilities in support of counter-ISIS ops. FY21 funds Enhanced Ground Proximity Warning to prevent flight-into-terrain accidents, improved BLOS SATCOM connectivity, continues navigation mods to enable ops in GPS-degraded environments, as well as FAA airspace compliance upgrades. USSOCOM sought to replace the fleet with 75 "armed overwatch" aircraft capable of tactical ISR and light CAS but was denied congressional funds through FY23 pending study and justification. Two aircraft were lost to fatal mishaps in Djibouti in 2012 and at Cannon in 2017, and Congress authorized FY21 funds for a loss replacement.

Contractor: Pilatus Aircraft Ltd.
First Flight: May 31, 1991 (PC-12).
Delivered: 2006-present.
IOC: June 2006.
Production: 36.
Inventory: 30 (U-28A); five (PC-12) (both USSOCOM-owned).
Operator: AFSOC, AFRC.
Aircraft Location: Cannon AFB, N.M.; Hurlburt Field, Fla.
Active Variant:
▪U-28A. Special operations variant of the civilian Pilatus PC-12.
▪PC-12. Converted civilian Pilatus PC-12 equipped for SOF support/training.
Dimensions: Span 53.3 ft, length 47.3 ft, height 14 ft.
Weight: Max T-O 10,935 lb.
Power Plant: Single Pratt & Whitney PT6A-67B, 1,200 shp.
Performance: Speed 253 mph, range 1,725 miles.
Ceiling: 30,000 ft.
Accommodation: Two pilots, CSO, tactical systems officer; up to nine passengers or 3,000 lb cargo (configuration dependent).

COMMAND, CONTROL, COMMUNICATION/BATTLE MANAGEMENT AIRCRAFT

Stefaano Benedetto

C-143 COMBAT FLIGHT INSPECTION

Combat flight inspection

Brief: The C-143B is a modified Bombardier Challenger CL-600 long-range, executive-class jet equipped with specialized instrumentation for Combat Flight Inspection (CFIN). The three-aircraft fleet is owned by the Federal Aviation Administration and operated by FAA/USAF to certify that air base NAVAIDs (Navigational Aids) such as TACAN, VOR, and ILS, as well as approach/departure procedures are safe and meet applicable standards before all-weather flight operations can begin. USAF has lacked a fully organic CFIN capability since retiring the C-29A and handing flight inspection over to the FAA in 1991. The FAA and USAF jointly funded replacing the aging and range-limited C-29A, and USAF procured a single airframe in FY09. Due to the high-risk environment, Air Force Flight Standards Agency Det. 1 crews from Will Rogers ANGB conduct flight checks in combat theaters, as well as forward locations including Antarctica. In addition to combat ops, the fleet is tasked with inspecting CONUS and OCONUS, and dual U.S.-partner-nation facilities. USAF funds support procurement and maintenance of military-specific equipment required for CFIN, including secure anti-jam radios, IFF, Mode 4/5 transponders, and self-defensive suites for protection during forward-deployed operations. FY21 launches Large Aircraft IR Countermeasures (LAIRCM) upgrades to improve self-defensive capabilities against MANPADs/small arms fire. An initial two aircraft will be upgraded with Block 40 LAIRCM, with a potential for additional airframes to be upgraded later.

Contractor: Canadair (Bombardier).
First Flight: Nov. 8, 1978.
Delivered: 2009.
IOC: Circa 2010.
Production: N/A.
Inventory: Three (FAA-owned).
Operator: AMC, AFRC (associate).
Aircraft Location: Will Rogers ANGB, Okla.
Active Variant:
▪ C-143B. CL-600-2B16 with uprated turbofans and winglets, equipped for the CFIN role.
Dimensions: Span 61.8 ft, length 68.4 ft, height 20.6 ft.
Weight: Max T-O 40,125 lb.
Power Plant: Two GE Aviation CF34 turbofans, each 9,140 lb thrust.
Performance: speed Mach 0.83, range 3,915 miles.
Ceiling: 45,000 ft.
Accommodation: Two pilots, flight inspection technician.

E-3 SENTRY

Battle management/early warning/C2

Brief: The E-3 Airborne Warning and Control System (AWACS) is a heavily modified Boeing 707-320B tasked with all-weather, air and maritime surveillance, command and control, battle management, target, threat, and emitter detection, classification, and tracking. The aircraft is capable of surveilling airspace in excess of a 250-mile radius from surface to stratosphere. AWACS coordinates theater air operations in direct subordination to joint/combined air and space operations centers. It can simultaneously conduct C2, BM, and target detection/tracking. E-3Bs were upgraded to Block 30/35 standards in 2001. Block 40/45 aircraft are redesignated E-3G. The upgrade is the most comprehensive enhancement to date and improves tracking/identification, system reliability, and life-cycle cost. Mods include open-architecture computing, operator workload reduction, new consoles, improved electronic support measures (ESM), and passive surveillance capability. DRAGON (Diminishing manufacturing sources Replacement of Avionics for Global Operations and Navigation) upgrades add a digital cockpit and next-generation CNS/GATM. Four USAF aircraft are slated for DRAGON in FY21 and mods are slated for completion fleetwide by 2027. Development includes efforts aimed at shortening the kill chains for time-sensitive targets, modernizing airborne moving target indication, adding high-speed jam-resistant Link 16 as well as fourth-to-fifth generation connectivity (to integrate F-22 and F-35). Additional

Staff Sgt. Justin Parsons

efforts accelerate install of Mode 5 IFF (for airspace compliance ahead of DRAGON), Electronic Protection (EP) to improve radar processing for classified requirements, advanced BLOS satcom/second-generation NATO UHF, and anti-jam GPS. Eight airframes will begin upgrade to Block 40/45 standards in FY21, and the single airframe will be redelivered. A total of 31 aircraft will be upgraded to Block 40/45 through 2024. NATO recently elected to modernize its 14 E-3As similarly to USAF's Block 40/45 standard, extending its fleet through 2035.

Contractors: Boeing, Northrop Grumman (radar); Lockheed Martin (computer); Rockwell Collins (DRAGON cockpit upgrade).
First Flight: Oct. 31, 1975 (full avionics).
Delivered: March 1977-1984.
IOC: 1977; July 28, 2014 (Block 40/45).
Production: 31.
Inventory: 11 (E-3B); one (E-3C); 23 (E-3G).
Operator: ACC, PACAF, AFRC (associate).
Aircraft Location: JB Elmendorf-Richardson, Alaska; Kadena AB, Japan; Tinker AFB, Okla.
Active Variants:
▪E-3B. Block 30/35 upgraded aircraft.
▪E-3C. Block 30/35 upgraded aircraft with additional advanced capabilities.
▪E-3G. Block 40/45 upgraded aircraft.
Dimensions: Span 145.8 ft, length 152.9 ft, height 41.8 ft.
Weight: Max T-O 335,000 lb.
Power Plant: Four Pratt & Whitney TF33-PW-100A turbofans, each 21,000 lb thrust.
Performance: Speed 360 mph, range 5,000+ miles (air refuelable).
Ceiling: Above 35,000 ft.
Accommodation: Two pilots, navigator, flight engineer, 13-19 mission specialists.

E-4 NATIONAL AIRBORNE OPERATIONS CENTER

Nuclear command and control

Brief: The E-4B is a highly survivable flying C3 center enabling national leaders to direct nuclear and conventional forces, execute emergency war orders, and coordinate civil response actions in support of the National Military Command System (NMCS). It is hardened against the effects

Senior Airman Benjamin Cooper

of nuclear detonations, including electromagnetic pulse (EMP). Comms and data processing capabilities include EHF Milstar satcom, six-channel International Maritime Satellite, and a triband radome houses the SHF communications antenna. All aircraft underwent Block 1 upgrades, enhancing electronic and communications infrastructure with commercial off-the-shelf (COTS) systems. Ongoing upgrades includes replacing Milstar data links with AEHF-compatible FAB-T, replacing the VLF/LF transmitter, and starting in FY21 replacing legacy SHF with Survivable Super High Frequency (SSHF) enabling uninterrupted, jam-resistant nuclear C2 fleetwide by 2023. E-4B airframes are viable to approximately 2033, but phaseout of commercial 747-200s hampers continued sustainment. USAF plans to replace the E-4B with the Survivable Airborne Operations Center (SAOC) and issued a request to industry for development of up to four, potentially used, but similarly sized commercial-derivative airframes in December 2020. Changes to acquisition strategy delayed initial solicitations, but the service aims to issue a development contract by late 2021.

Contractors: Boeing; Raytheon (FAB-T); L3Harris (SSHF).
First Flight: June 13, 1973 (E-4A); June 10, 1978 (E-4B).
Delivered: December 1974-1985.
IOC: December 1974 (E-4A); January 1980 (E-4B).
Production: Four.
Inventory: Four.
Operator: AFGSC.
Aircraft Location: Offutt AFB, Neb.
Active Variant:
▪E-4B. Modified Boeing 747-200 equipped as a NAOC.
Dimensions: Span 195.7 ft, length 231.3 ft, height 63.4 ft.
Weight: Max T-O 800,000 lb.
Power Plant: Four General Electric CF6-50E2 turbofans, each 52,500 lb thrust.
Performance: Speed 602 mph, range 7,130 miles, 12-hr normal endurance, 72-hr with air refueling.
Ceiling: Above 30,000 ft.
Accommodation: Two pilots, navigator, flight engineer, up to 110 battle staff/mission crew.

E-8 JSTARS

Command and control/ISR

Brief: E-8C is a ground moving target indication (GMTI), airborne battlefield management/command and control platform. Its primary mission is providing theater commanders with ground surveillance data to support tactical operations. E-8 evolved from the Army/Air Force Joint Surveillance Target Attack Radar System (JSTARS) program. The aircraft made its first radar-equipped test flight in December 1988, and the first two aircraft deployed for Desert Storm while the system was still under development. Early airframes were eventually retrofit to Block 20 production standards featuring more powerful computers, an internet protocol local area network, and BLOS connectivity. JSTARS is equipped with a canoe-shaped radome under the forward fuselage housing a 24-ft-long, side-looking phased array radar antenna. It can locate, classify, and track vehicles and ships at distances exceeding 124 miles, and more recent refinements added human-target tracking. Target data is transmitted via data link to ground stations or other aircraft. USAF began efforts to improve fleetwide availably starting in FY18, aiming to simultaneously have six aircraft deployable by 2022. Obsolescence and depot flow continue to hinder this goal. USAF dropped plans to replace JSTARS with a modern, business-class aircraft pursuing the Advanced Battle Management System (ABMS) instead. ABMS would disaggregate JSTARS functions among several platforms, instead of fielding a direct replacement. The service extended JSTARS through the mid-2020s, and Congress blocked retirement until ABMS offers equal or better capability. Ongoing upgrades include Secure Common Data

Staff Sgt. Trevor McBride

Link (SDL) for LOS networking to Common Ground Stations and FY21 launches UHF/VHF SATCOM modernization. USAF aims to re-engine the fleet with refurbished JT8D-219 turbofans as a cost-effective interim solution to improve performance and reliability.

Contractors: Northrop Grumman; Raytheon.
First Flight: April 1, 1988.
Delivered: March 22, 1996-March 23, 2005.
IOC: Dec. 18, 1997.
Production: 18.
Inventory: 16 (E-8C); one (TE-8).
Operator: ANG.
Aircraft Location: Robins AFB, Ga.
Active Variants:
▪E-8C. Block 20 upgraded JSTARS platform based on the Boeing 707-300.
▪TE-8A. Crew training aircraft based on the E-8.
Dimensions: Span 145.8 ft, length 152.9 ft, height 42.5 ft.
Weight: Max T-O 336,000 lb.
Power Plant: Four Pratt & Whitney TF33-102C turbojets, each 19,200 lb thrust.
Performance: Speed 584 mph (optimal orbit), range 11 hr normal endurance (longer with air refueling).
Ceiling: 42,000 ft.
Accommodation: Two pilots, navigator, flight engineer, 15 Air Force/three Army mission crew (mission dependent).

Staff Sgt. Bennie Davis III

E-9A WIDGET

Range control

Brief: The E-9A is a modified DHC-8 commuter aircraft that provides air-to-air telemetry support for weapons testing, target drone operations, and range clearance. The aircraft supports operations at the Eglin Test and Training Range over the Gulf of Mexico and provides telemetry for weapons system evaluation at Holloman and the Utah Test and Training Range. Mission modifications include AN/APS-143(V-1) airborne sea surveillance radar, UHF telemetry, and signal relay systems. The E-9 is able to track flying and surface targets. It can detect small watercraft at ranges up to 25 miles. The fleet operates in concert with three drone recovery vessels and two patrol boats to clear waterways and airspace of civil traffic before live-fire testing or hazardous military activities commence. It also provides tracking and assistance with recovering targets. The aircraft can remotely initiate destruction of damaged or malfunctioning aerial target drones. FY21 funds are limited to low-cost sustainment and development upgrades.

Contractors: Bombardier (formerly De Havilland Canada); Sierra Nevada Corp. (conversion).
First Flight: June 1983 (DHC-8).
Delivered: 1988.
IOC: June 1988.
Production: Two.
Inventory: Two.
Operator: ACC.
Aircraft Location: Tyndall AFB, Fla.
Active Variant:
▪E-9A. Military surveillance version of the DHC-8 commuter airliner.
Dimensions: Span 39.5 ft, length 48.6 ft, height 12.2 ft.
Weight: Max T-O 34,500 lb.
Power Plant: Two Pratt & Whitney PW-120A turboprop engines, each 1,800 shp.
Performance: Speed 280 mph, range 1,000 miles.
Ceiling: 30,000 ft.
Accommodation: Two pilots, two mission operators.

Senior Airman Bryan Guthrie

E-11A BATTLEFIELD AIRBORNE COMMUNICATIONS NODE

Communications relay

Brief: The E-11A is a modified, Bombardier Global Express 6000/BD-700-1A10 business jet equipped with specialized communications relay equipment to translate between tactical comm and data links. It provides joint range extension, BLOS C2, and internet protocol-based data transfer between dissimilar systems. E-11A was fielded to meet an urgent operational need for BLOS air-to-ground relay. The system entered combat in Afghanistan in 2008 and enables troops to overcome comm limitations in rugged terrain. The fleet was designated E-11A after USAF purchased the first previously leased aircraft in 2011. The Battlefield Airborne Communications Node (BACN) payload is integrated on a mixed fleet of manned E-11As and unmanned EQ-4B Global Hawks, though USAF is seeking to fully replace the EQ-4B with E-11As. The combined BACN fleet has provided near-constant coverage in theater, surpassing 100,000 flying hours in 2019. A single aircraft crashed north of Kandahar Airfield, Afghanistan, on Jan. 27, 2020, killing both aircrew. Northrop Grumman was awarded a $3.6 billion five-year support contract on Jan. 21, which also includes funding for research, development and testing, as well as the integration of future payloads. Ongoing upgrades include adding military GPS to operate in higher-end threat environments, fourth- to fifth-gen. gateway (to relay data between advanced and legacy fleets), Link 16, advanced navigation, and flight safety, reliability, and performance improvements. FY21 launches self-defensive/survivability improvement and procurement of six additional airframes at a rate of one aircraft per year.

Contractors: Bombardier, Northrop Grumman (integration and support).
First Flight: August 2007.
Delivered: Dec. 2008-Aug. 30, 2012.
IOC: Circa 2011.
Production: Four (nine planned).
Inventory: Three.
Operator: ACC.
Aircraft Location: Kandahar Airfield, Afghanistan.
Active Variant:
▪E-11A. Modified Bombardier BD-700 equipped with the BACN payload.
Dimensions: Span 94 ft, length 99 ft 5 in, height 25 ft 6 in.

Weight: Max T-O 99,500 lb.
Power Plant: Two Rolls-Royce BR710A2-20 turbofans, each 14,750 lb thrust.
Performance: Speed Mach 0.88, range 6,900 miles.
Ceiling: 51,000 ft.
Accommodation: Two pilots.

Gulfstream

EC-37B COMPASS CALL

EW/EA

Brief: The EC-37B is a next-generation, tactical jamming platform tasked with disruption of enemy C3, radar, and navigation. It will also offer offensive counterinformation, EA, and SEAD support. The aircraft is based on the ultra-long-range Gulfstream G550 business aircraft and adapted from the Navy's special mission configuration. USAF awarded L3 Technologies a contract on Sept. 7, 2017, to replace the EC-130H in the tactical EA role and transplant its "Compass Call" systems to a more modern aircraft. The program, originally dubbed "EC-X" will "re-host" upgraded EC-130H mission equipment directly to the EC-37 with nearly 70 percent remaining unchanged. EC-37B is faster, more economical, capable of higher altitude operations, and more survivable than the EC-130H. Upgrades will allow it to conduct standoff jamming/EA from greater distance for attacks against A2/AD targets. The first aircraft was purchased in FY17, followed by a second in FY18. Congress accelerated the program by funding two airframes in FY19, and USAF plans to procure and modify one aircraft a year through FY25. The first five aircraft are receiving the EC-130H's upgraded Baseline 3 package, including Advanced Radar Countermeasure System (ARCS) and other significant capability enhancements. FY21 procures the sixth airframe, which will be the first delivered with the future Baseline 4 configuration slated for deployment in 2026. Air Combat Command plans to field the first five EC-37Bs in 2023.

Contractors: Gulfstream Aerospace (airframe); BAE Systems; L3 Harris (mission equipment).
First Flight: N/A.
Delivered: 2023 (planned).
IOC: 2023 (planned).
Production: Four (two currently in modification).
Inventory: 10 (planned).
Operator: ACC (planned).
Aircraft Location: Davis-Monthan AFB, Ariz. (planned).
Active Variant:
▪EC-37B. Military Electronic Attack version of the Gulfstream G550.
Dimensions: Span 93.5 ft, length 96.4 ft, height 25.8 ft.
Weight: Max T-O 90,500 lb.
Power Plant: Two BR710C4-11 turbofans, each 15,385 lb thrust.
Performance: Speed 600 mph, range 6,300 miles.
Ceiling: 51,000 ft.
Accommodation: Two pilots; TBD.

EC-130H COMPASS CALL

Electronic warfare

Brief: The EC-130H is a modified C-130H designed to disrupt enemy C3 and limit adversary coordination and force management. Tasks include tactical jamming/disruption of communications, radar, and navigation, offensive counterinformation, EA, and SEAD support. The fleet has been deployed near-constantly since the beginning of combat operations in Afghanistan in 2001. The aircraft was designed to be easily updated and modified. All aircraft have been retrofit to Block 35 standards and are aerial refuelable. Mission equipment upgrades occur approximately every three years to ensure continued protection and effectiveness against evolving threats. Baseline 2 mods are ongoing, and the Baseline 3 configuration, including the Advanced Radar Countermeasure System (ARCS) and other significant capability enhancements, is slated for fielding in 2023. Baseline 4 will be fielded on the next-generation EC-37B platform in 2026. Some 70

Sgt. Miranda A. Loera

percent of the EC-130H's mission equipment will be directly cross-decked to the EC-37B. Funding delays required extending the EC-130H with center wing box replacement/structural mods (in common with the C-130H fleet) and upgrades include digital glass cockpits, Mode 5 IFF/airspace compliant CNS/ATM, and color weather radar. Ongoing system upgrades include counter-radar/counter satellite navigation, third-generation Special Purpose Emitter Array (SPEAR), and adaptive EA to quickly react to emerging threats. Ten primary mission aircraft are supplemented by two backups, two attrition reserves, and one system integration testbed. ACC retired the last Baseline 1 configured aircraft Jan. 15, 2020.

Contractors: Lockheed Martin; BAE Systems (mission equipment); L3Harris (integration and sustainment).
First Flight: 1981.
Delivered: March 19, 1982-unk.
IOC: 1983; Block 35 from 2011.
Production: (Converted).
Inventory: 11 (EC-130H).
Operator: ACC.
Aircraft Location: Davis-Monthan AFB, Ariz.
Active Variant:
▪EC-130H. Electronic attack variant of the C-130H.
Dimensions: Span 132.6 ft, length 99 ft, height 38 ft. Weight: Max T-O 155,000 lb.
Power Plant: Four Allison T56-A-15 turboprops, each 4,910 shp.
Performance: Speed 300 mph at 20,000 ft, unrefueled range 2,295 miles, seven hr normal endurance (air refuelable).
Ceiling: 25,000 ft.
Accommodation: Two pilots, navigator, flight engineer; mission crew: two EWOs; mission crew supervisor (cryptologic), four cryptologic linguists, acquisition operator, and airborne maintenance technician.

INTELLIGENCE, SURVEILLANCE, RECONNAISSANCE AIRCRAFT

Dmitry Terekhov

OC-135 OPEN SKIES

Observation/treaty verification

Brief: The OC-135 is a modified WC-135B used for arms control treaty observation and imagery collection over nations party to the 1992 Open Skies Treaty. Specialized mission equipment includes side-looking synthetic aperture radar, infrared line scanning devices, video camera, and framing and panoramic optical cameras installed in the rear of the aircraft. The two oblique KS-87E framing cameras permit photography from approximately 3,000-ft altitude, and one KA-91C panoramic allows

for wide sweep photography from approximately 35,000 ft. Ongoing efforts include installing digital camera suite on the remaining aircraft and replacing obsolete and difficult to maintain wet-film cameras. The U.S. State Department declared Russia in violation of the Open Skies Treaty for preventing access to Kaliningrad and the border with Georgia, resulting in no USAF sorties in 2018. After resuming flights in 2019, the U.S. withdrew from the treaty Nov. 22, 2020, citing continued Russian breaches. USAF canceled efforts to replace the fleet with more modern aircraft by 2022, pending direction on whether the U.S. will re-enter the treaty.

Contractor: Boeing.
First Flight: 1993.
Delivered: 1993-96.
IOC: October 1993.
Production: Three.
Inventory: Two.
Operator: ACC.
Aircraft Location: Offutt AFB, Neb.
Active Variant:
▪OC-135B. Modified C-135 equipped for photo reconnaissance/treaty verification.
Dimensions: Span 131 ft, length 135 ft, height 42 ft.
Weight: Max T-O 297,000 lb.
Power Plant: Four Pratt & Whitney TF33-P-5 turbofans, each 16,050 lb thrust.
Performance: Speed 500+ mph, range 3,900 miles.
Ceiling: 50,000 ft.
Accommodation: Three pilots, two navigators, three sensor maintenance technicians; Defense Threat Reduction Agency mission crew: mission commander, deputy, four sensor operator/translators, flight follower; total seating: 35, incl space for foreign country representatives.

Margo Wright/USAF

RC-26 CONDOR

Tactical ISR

Brief: The RC-26 is a modified Fairchild Metro 23 tasked with counter-narcotics, manned tactical ISR, disaster response, and civil support missions. USAF selected the C-26 to fulfill a joint ANG and Army National Guard airlift requirement in 1988, subsequently modifying the airframes to the RC-26 configuration. The aircraft is equipped with specialized digital cameras, IR video, and communications equipment to enable domestic and international anti-trafficking. The aircraft has a secondary role providing real-time video streaming to responders following hurricanes, wildfires, and other disasters. In the fire-support role, aircraft sensors can detect fires at up to 80 miles and accurately map them from up to 3 miles away. An extensive communications suite allows communications from 29 to 960 MHz including provisions for plugged-in 800 MHz handheld radio and airphones. The fleet is currently split between six Block 25R and five Block 20 configured aircraft. ANG priorities include bringing the fleet to a common standard with updated mission management, integrated comms, and upgraded antennas. Critical needs include adding SAR to enable all-weather ground moving target tracking, LOS/BLOS-secure FMV downlinks, avionics modernization, and five-bladed propellers to increase range and short-field performance. Ongoing upgrades include airspace compliance mods to meet FAA mandates. The ANG was barred from divesting the platform starting in FY20 unless it demonstrates the fleet's missions can be performed by other assets. RC-26s notably supported wildfire fighting efforts in California, and law enforcement activities during civil unrest in several U.S. cities in 2020.

Contractors: Fairchild (airframe); Elbit Systems (avionics upgrade).
First Flight: 1990.
Delivered: March 1989-1996 (delivered as C-26A/B).
IOC: N/A.
Production: 10 (C-26A); 33 (C-26B); 11 (RC-26).
Inventory: 11.
Operator: ANG.
Aircraft Location: Des Moines Aprt., Iowa; Ellington Field, Texas; Fairchild AFB, Wash.; Fresno Yosemite Arpt., Calif.; Key Field, Miss.; Kirtland AFB, N.M.; Montgomery Regional Arpt., Ala.; Truax Field, Wis.; Tucson Arpt., Ariz.; Yeager Arpt., W.Va.
Active Variants:
▪RC-26B. Surveillance version of Fairchild C-26.
Dimensions: Span 57 ft, length 59.5 ft, height 16.6 ft. Weight: Max T-O 16,500 lb.
Power Plant: Two Garrett TPE331-12UAR-701 turboprops, each 1,100 shp.
Performance: Speed 334 mph, range 2,070 miles.
Ceiling: 25,000 ft.
Accommodation: Two pilots, navigator/mission systems operator.

Senior Airman Jacob Skovo-Lane

RC-135S COBRA BALL

Electronic reconnaissance

Brief: The RC-135S gathers measurement and signature intelligence (MASINT) on missile-associated signatures and tracks during boost and reentry. Cobra Ball superseded Rivet Ball and Rivet Amber in 1969 and collects both optical and electronic data on ballistic missile activity. Its specialized equipment includes the long-range Medium Wave Infrared Array (MIRA) EO/IR sensor suite, all-weather tracking radar, and an advanced communications suite. Reconnaissance data is used to assess missile threats, evaluate missile performance, characterize adversary missiles, and analyze weapons testing and technology. Data also supports treaty verification and theater ballistic missile nonproliferation. It can deploy anywhere in the world in 24 hours and provide on-scene EO reconnaissance. Continuous baseline upgrades keep the fleet viable through 2040, and aircraft are currently undergoing integration and testing of Baseline 6 mods (similar to Rivet Joint Baseline 12). FY20 launched Baseline 7 development, and flexible funding permits rapid, variant-specific mods in response to emerging/evolving threats. Baseline 7 upgrades will include Rivet Joint COMINT suite integration, digital electromagnetic signature direction finding, digital search, and SATCOM-aided target discrimination.

Contractors: Boeing (airframe); L3Harris; Textron Systems.
First Flight: N/A.
Delivered: October 1969-November 2000 (redelivery as RC-135S).
IOC: March 1972 (Cobra Ball II).
Production: Four converted.
Inventory: Three.
Operator: ACC.
Aircraft Location: Offutt AFB, Neb.
Active Variant:
▪RC-135S Cobra Ball. Modified C-135 equipped for MASINT/treaty verification.
Dimensions: Span 131 ft, length 135 ft, height 42 ft.
Weight: Max T-O 297,000 lb.
Power Plant: Four CFM International F108-CF-201 turbofans, each 21,600 lb thrust.
Performance: Speed 517+ mph, range 3,900 miles (farther with air refueling).
Ceiling: 45,000 ft.
Accommodation: Two pilots, navigator, three EWOs, two airborne systems engineers, two airborne mission specialists.

Colin Cooke

RC-135U COMBAT SENT

Electronic reconnaissance

Brief: The RC-135U is tasked with strategic reconnaissance and technical intelligence (TECHINT) gathering on radar/emitter systems. Three Combat Sent aircraft were converted from RC-135Cs in 1970-71 to fill a critical need for data collection on adversary radar threats and defenses. Combat Sent's distinctive chin and wingtip antenna arrays, large cheek fairings, and extended tail contain specialized sensor suites to collect data and analyze airborne, land, and naval radar/emitter systems. Each airframe incorporates a different, tailored sensor suite, and the data gathered is critical to the effective design and programming of RWR (radar warning receivers), jammers, decoys, anti-radiation missiles, and threat simulators. Combat Sent additionally enables strategic analysis for National Command Authorities and combatant forces. The aircraft utilizes radar/solid-state doppler, INS, celestial, and GPS for navigation, and is capable of both operator, automated, and blended signal gathering and analysis. Continuous baseline upgrades keep the fleet viable through 2040, and flexible funding permits rapid variant-specific mods in response to emerging/evolving threats. FY21 focus on completing Baseline 5/6 upgrades (similar to Rivet Joint Baseline 12) including wideband SATCOM reachback, integrating Rivet Joint's COMINT suite, improving operator interface, enhancing antennas and processors, and capability upgrades for dense signal environments.

Contractors: Boeing (airframe); L3Harris; Textron.
First Flight: N/A.
Delivered: May-December 1971 (RC-135U).
IOC: 1971.
Production: Three converted.
Inventory: Two.
Operator: ACC.
Aircraft Location: Offutt AFB, Neb.; forward operating locations: Al Udeid AB, Qatar; NSF Diego Garcia, U.K.; Eielson AFB, Alaska; Kadena AB, Japan; RAF Mildenhall, U.K.; NSA Souda Bay, Greece.
Active Variant:
▪RC-135U Combat Sent. Modified C-135 equipped for radar/emitter analysis.
Dimensions: Span 135 ft, length 140 ft, height 42 ft.
Weight: Max T-O 322,500 lb.
Power Plant: Four CFM International F108-CF-201 turbofans, each 21,600 lb thrust.
Performance: Cruise speed 517 mph, range 4,140 miles, 8-hr normal endurance, 24-hr crew endurance (farther with air refueling).
Ceiling: 42,000 ft.
Accommodation: Two pilots, two navigators, three airborne systems engineers; Mission crew: 10 EW officers, six or more electronic, technical, mission-area specialists.

Staff Sgt. Benjamin Sutton

RC-135V/W RIVET JOINT

Electronic reconnaissance

Brief: The RC-135V/W is tasked with real-time electronic and signals intelligence-gathering, analysis, and dissemination in support of theater and strategic-level commanders. The extensively modified C-135s detect, identify, and geolocate signals throughout the electromagnetic spectrum. Rivet Joint is mostly used to exploit electronic battlefield intelligence and deliver near-real-time ISR information to tactical forces, combatant commanders, and National Command Authorities. The British Royal Air Force operates three RC-135W Airseeker aircraft, which are co-manned by USAF/RAF personnel. Onboard capabilities encompass rapid search, detection, measurement, identification, demodulation, geolocation, and fusion of data from potentially thousands of electronic emitters. Continuous baseline upgrades keep the fleet viable through 2040 and drive standards for Combat Sent/Cobra Ball. Flexible funds permit rapid, variant-specific mods in response to emerging/evolving threats. The fleet recently underwent Baseline 11/12 upgrades, adding new direction finding COMINT, precision ELINT/SIGINT system integration, wideband SATCOMs, enhanced near real-time data dissemination, as well as new steerable beam antenna, improved weather radar, digital cockpit instruments, and compliant CNS/ATM. Baseline 12 added modernized operator interface, improved dense-signal environment capabilities, increased signal bandwidth/exploitation, added operator 3D maps, and integrated RC-135 with Distributed Common Ground Station (DCGS). FY21 efforts focus on upgrading Baseline 11 airframes to Baseline 13, sustaining Baseline 12, and upgrading the aircraft's autopilot. USAF is working to increasingly automate intelligence gathering and employ artificial intelligence and collaboration to speed collection, analysis, and distribution of information. USAF reversed plans to shift forward-deployed RC-135s from RAF Mildenhall to RAF Fairford in 2023.

Contractors: Boeing (airframe); L3Harris (mission systems).
First Flight: N/A.
Delivered: Circa 1973-99 (continuous equipment updates).
IOC: Circa 1973.
Production: Converted.
Inventory: Eight (RC-135V); nine (RC-135W); three (TC-135W); one (NC-135W).
Operator: ACC, AFMC.
Aircraft Location: Offutt AFB, Neb.; Kadena AB, Japan; RAF Mildenhall, U.K.; RAF Waddington, U.K. (USAF co-manned). Planned: RAF Fairford, U.K.
Active Variants:
▪RC-135V/W Rivet Joint. Standoff airborne SIGINT variant of the C-135.
▪TC-135W. Training version of the operational aircraft.
▪NC-135W. Rivet Joint systems integration testbed operated by AFMC.
Dimensions: Span 131 ft, length 135 ft, height 42 ft.
Weight: Max T-O 297,000 lb.
Power Plant: Four CFM International F108-CF-201 turbofans, each 21,600 lb thrust.
Performance: Speed 500+ mph, range 3,900 miles (farther with air refueling).
Ceiling: 50,000 ft.
Accommodation: Three pilots, two navigators, three EWO, 14 intelligence operators, four airborne maintenance technicians (six additional, if required).

Airman 1st Class Luis Ruiz-Vazquez

U-2S DRAGON LADY

High-altitude reconnaissance

Brief: U-2S is the Air Force's only manned, strategic, high-altitude, long-endurance ISR platform and is capable of SIGINT, IMINT, and MASINT collection. The aircraft's modular payload systems allow it to carry a wide variety of advanced optical, multispectral, EO/IR, SAR, SIGINT, and other payloads simultaneously. Its open system architecture also permits rapid fielding of new sensors to counter emerging threats and requirements. The original U-2A first flew on Aug. 4, 1955. The type was further developed into the larger, more capable U-2R which first took flight on Aug. 28, 1967, and was delivered between 1967 and 1968. Current U-2s date to the 1980s when U-2R production was reopened under the designation TR-1 (later returned to U-2R designation in 1992). The TR-1A first flew on Aug. 1, 1981, and was reengined and modernized starting in 1994, emerging as the U-2S. Current Block 20 U-2S features glass cockpits, digital autopilot, modernized EW system, and updated data links. Its major sensors are the ASARS-2A SAR, SYERS-2A multispectral EO/IR imagery system, and enhanced Airborne Signals Intelligence Payload (ASIP). The legacy optical bar camera is still used to provide broad-area synoptic imagery. The fleet is currently undergoing Block 20.1 upgrades, adding ASARS-2B, next-generation SIGINT, avionics and navigation refresh, and data link (Link-16/ IFDL, MADL) modernization. ASARS-2B significantly improves the U-2's high-altitude, deep-look radar ground mapping, moving target, and maritime capabilities. ASARS-2B will begin flight-testing in FY22, and IOC is expected in FY23. U-2s are also receiving stellar and GPS-denied navigation, quick-change modular mission systems, multispectral sensor, and EW system upgrades. Airframe mods, helmet and pressure suit refresh, and egress improvement are also ongoing. U-2s conducted several

experiments in 2020, including using Artificial Intelligence to operate sensors and augment situational awareness, and using cloud computing to update mission software in-flight. The program continues to prioritize experimental sensors, systems, and software to meet emerging threats and develop networked, next-generation BM/C2.

Contractors: Lockheed Martin, Northrop Grumman (ASIP); Raytheon (ASARS); UTC Aerospace (SYERS/Optical Bar Camera).
First Flight: October 1994 (U-2S).
Delivered: September 1981-October 1989 (TR-1/U-2R).
IOC: Circa 1981 (U-2R).
Production: 35 (T/U-2S).
Inventory: 27 (U-2); four (TU-2).
Operator: ACC.
Aircraft Location: Beale AFB, Calif.; permanent forward operating locations worldwide.
Active Variants:
▪U-2S. Current variant of the U-2/TR-1.
▪TU-2S. A two-seat trainer aircraft originally designated U-2ST.
Dimensions: Span 105 ft, length 63 ft, height 16 ft.
Weight: Max T-O 40,000 lb.
Power Plant: GE Aviation F118-GE-101A turbofan, 17,000 lb thrust.
Performance: Speed 410 mph, range 7,000+ miles.
Ceiling: Above 70,000 ft.
Accommodation: Pilot (U-2S); two pilots (TU-2S) on RQ201 zero/zero ejection seats.

Grace Simoneau/FEMA

WC-130J

Weather reconnaissance

Brief: The WC-130J "Weatherbird" is a modularly configurable C-130J equipped with specialized systems to penetrate tropical and winter storms, capture meteorological data, and aid severe weather forecasting. Early WC-130Bs entered service in 1959, followed by the WC-130E in 1962, and WC-130H in 1964. The WC-130J began replacing legacy variants in 1999, though several H models remained in service with the Puerto Rico ANG until a fatal crash resulted in the fleet's retirement in 2019. All WC-130Js are operated by AFRC's 53rd Weather Reconnaissance Squadron "Hurricane Hunters" at Keesler. Mission equipment includes a pod-mounted Stepped-Frequency Microwave Radiometer (SFMR) for monitoring surface winds and precipitation rates, parachute-deployed GPS dropsondes to gather vertical atmospheric profiles, and palletized operator stations/equipment. WC-130Js are optionally equipped with two external wing tanks, as well as an internal auxiliary fuel tank to increase range and endurance. Crews include an added aerial weather reconnaissance officer/flight director and weather system specialist/loadmaster. Aircraft are capable of penetrating tropical cyclones from up to 10,000 ft to as low as 500 ft. The fleet primarily monitors oceanic weather over the Atlantic, Central Pacific, Caribbean, and Gulf of Mexico. Airframes are modernized in line with the baseline C-130J fleet, including Block 8.1 upgrades, airspace compliance mods, and enhanced service-life center wing sections. The 2020 hurricane season was the third busiest since 1975, with WC-130Js logging 146 missions monitoring 20 named storms in the Atlantic and two in the Pacific.

Contractor: Lockheed Martin.
First Flight: April 5, 1996 (C-130J).
Delivered: Sept. 30, 1999-September 2005.
IOC: October 2006.
Production: 10.
Inventory: 10.
Operator: AFRC.
Aircraft Location: Keesler AFB, Miss.
Active Variant:
▪WC-130J. Weather reconnaissance version of C-130J.
Dimensions: Span 132.6 ft, length 97.8 ft, height 38.8 ft.
Weight: Max T-O 155,000 lb; max payload 42,000 lb.
Power Plant: Four Rolls-Royce AE2100D3 turboprops, each 4,700 shp.
Performance: Speed 417 mph; range with 35,000 lb payload 1,841 miles (3,000+ miles with external/auxiliary tanks).
Ceiling: With max payload, 26,000 ft.
Accommodation: Two pilots, aerial reconnaissance weather officer, loadmaster/dropsonde operator. **Load:** palletized weather systems.

Susan Romano/USAF

WC-135 CONSTANT PHOENIX

Air sampling and collection

Brief: WC-135's primary mission is nuclear test monitoring, airborne radiological sampling, and arms control treaty verification. Airframes are either a modified C-135B or EC-135C Looking Glass equipped with air sampling and collection equipment. The aircraft primarily support monitoring under the 1963 Limited Nuclear Test Ban Treaty. Air sampling WB-29s detected debris from the Soviet Union's first atomic test in 1949, and subsequent aircraft have monitored recent weapons tests in North Korea, as well as the Chernobyl and Fukushima nuclear disasters. The WC-135's sampling and collection suite allows mission crew to detect radioactive "clouds" in real time. The collection system uses external flow-through devices to collect particles on filter paper for later analysis. The podded particulate sampler/Radiation Monitoring and Analysis System (RMAS) detects radiation contact, and the Directional Gamma Sensor System (DGSS) guides the crew toward the plume for collection. The Whole Air Collection System (WACS) captures and stores radioactive samples from the aircraft's bleed-air system. An integrated control system permits real-time mission system interface and monitors internal and external radiation-levels for safety and analysis. USAF deemed replacing the aging fleet to be more cost-effective than re-engining and modernization. Conversion of three KC-135R tankers to WC-135R standards began in 2019 utilizing the same sensor suite. The C-130J-mounted Harvester WACS/Particulate Airborne Collection Systems (PACS) augments Constant Phoenix and a modular system deployable on the KC-46 or RPA platform is under development. The sole WC-135C—serial 62-3582—retired on Nov. 16, 2020, and the remaining aircraft will be sustained until the WC-135R enters service in 2022.

Contractor: Boeing.
First Flight: 1965.
Delivered: 1965-96.
IOC: December 1965; 2022 (WC-135R) planned.
Production: Two (WC-135C/W); three (WC-135R) (planned).
Inventory: One (WC-135C); one (WC-135W).
Operator: ACC.
Aircraft Location: Offutt AFB, Neb.
Active Variants:
▪WC-135C. Modified EC-135C equipped for radiological monitoring and air sampling.
▪WC-135R. Modified KC-135R tankers, planned to replace the aging WC-135C/W fleet.
▪WC-135W. Modified C-135B equipped for radiological monitoring and air sampling.
Dimensions: Span 130.8 ft, length 136.3 ft, height 41.7 ft.
Weight: Max T-O 300,500 lb. (WC-135C/W); 322,500 lb. (WC-135R).
Power Plant: Four Pratt & Whitney TF33-P-5 turbofans, each 16,050 lb thrust. (WC-135C/W); Four CFM International CFM56-2 turbofans, each 21,634 lb thrust (WC-135R).
Performance: Speed 403 mph, range 4,600 miles (farther with air refueling) (WC-135C/W); speed 530 mph, range approx. 3,900 miles (farther with air refueling) (WC-135R).
Ceiling: 40,000 ft. (WC-135C/W); 50,000 ft. (WC-135R).
Accommodation: Two pilots, navigator, up to 31 special equipment operators/observers as required.

TANKER AIRCRAFT

Tech. Sgt. Kelly Goonan

HC-130J COMBAT KING II

Aerial refueling/airlift

Brief: The HC-130J is tasked with helicopter in-flight refueling support for CSAR/personnel recovery, tactical C2, and pararescue (PJ) deployment. It replaces legacy HC-130N/Ps and is based on the USMC's KC-130J tanker. It adds an enhanced service-life wing, improved cargo handling system, refueling receptacle, EO/IR sensor, flight deck CSO console, and dual SATCOM. Features include integrated INS/GPS, NVG-compatible lighting, FLIR, and integrated situational awareness. Recently added Advanced Threat Warning and RF countermeasures, as well as chaff/flares give the HC-130 the latest self-defensive capability for recovery operations in contested environments. USAF plans to standardize HC/AC/MC-130J block upgrades, and current efforts bring all HC-130Js to a common standard. Ongoing development and upgrades include avionics Block 8.1 (in common with the C-130J fleet), Lightweight Airborne Radio System (LARS), Situational Awareness Capabilities Upgrade (SACU), and wireless intercom to allow comms in/outside the aircraft during ground operations. LARS transitions to the new 406 MHz distress frequency and improves timely location of aircraft, vessels, and personnel. SACU replaces the legacy data link with Link 16, blue force tracking, advanced mission planning, and new displays to enhance secure networking/comms fleet-wide by 2023. The final operational HC-130N/Ps departed Patrick for storage in December 2019 and the 920th Rescue Wing received its first HC-130J on April 2, 2020. A single HC-130J is slated for delivery in FY21 and USAF expects to complete total recap by 2023.

Contractor: Lockheed Martin.
First Flight: July 29, 2010.
Delivered: Sept. 24, 2010-present.
IOC: April 25, 2013.
Production: 39 (planned).
Inventory: 31.
Operator: ACC, AETC, AFRC, ANG.
Aircraft Location: Davis-Monthan AFB, Ariz.; Francis S. Gabreski Arpt., N.Y.; JB Elmendorf-Richardson, Alaska; Kirtland AFB, N.M.; Moffett Field, Calif.; Moody AFB, Ga.; Patrick SFB, Fla.
Active Variants:
▪HC-130J. C-130J modified for CSAR and aerial refueling.
Dimensions: Span 132.6 ft, length 97.8 ft, height 38.8 ft.
Weight: Max T-O 164,000 lb.
Power Plant: Four Rolls-Royce AE2100D3 turboprops, each 4,591 shp.
Performance: Speed 363.4 mph at S-L, range 4,000+ miles (farther with air refueling).

KC-10 EXTENDER

Aerial refueling/airlift

Brief: The KC-10 is a multirole tanker/transport capable of aeromedical evacuation, based on the McDonnell Douglas DC-10-30CF. The aircraft is USAF's largest air-refueling aircraft. It is simultaneously capable of tanker and cargo roles, enabling it to support worldwide fighter deployments. The aircraft employs an advanced aerial refueling boom and hose/drogue system allowing it to refuel a wide variety of U.S. and allied aircraft, including the CV-22 tilt-rotor, within the same mission. The aircraft has three large fuel tanks under the cargo floor and an air-refueling operator's station recessed into the aft fuselage. It is refuelable by boom-equipped tankers. Ongoing mods include modernized navigation, surveillance, and air traffic management (CNS/ATM) to bring the fleet into compliance with

Staff Sgt. Dustin Mullen

FAA mandates, and advanced Mode 5 IFF. The fleet amassed more than 2.3 million flying hours before the first three tankers retired in 2020, the first of which arrived for storage at Davis Monthan July 13. USAF targeted fleet reduction to 40 aircraft in FY21, but Congress directed the service maintain at least 50 aircraft to provide sufficient tanker support due to shortfalls with the KC-46. Congress further directed USAF maintain a least 38 KC-10s through FY22, and 26 through FY23 before divesting the fleet in 2024.

Contractors: McDonnell Douglas (now Boeing); Collins Aerospace (CNS/ATM).
First Flight: April 1980.
Delivered: March 1981-April 1990.
IOC: August 1982.
Production: 60.
Inventory: 56.
Operator: AMC, AFRC (associate).
Aircraft Location: JB McGuire-Dix-Lakehurst, N.J.; Travis AFB, Calif.
Active Variant:
▪KC-10A. Modified McDonnell Douglas DC-10 designed as a multirole cargo-tanker.
Dimensions: Span 165.4 ft, length 181.6 ft, height 58 ft.
Weight: Max T-O 590,000 lb.
Power Plant: Three GE Aviation CF6-50C2 turbofans, each 52,500 lb thrust.
Performance: Speed 619 mph, range 11,500 miles, or 4,400 miles with max cargo (air refuelable).
Ceiling: 42,000 ft.
Fuel Capacity: 356,000+ lb. at 1,100 gpm (boom), 470 gpm (drogue).
Accommodation: Two pilots, flight engineer, boom operator; AE crew: two flight nurses, three medical technicians; other crew depending on mission.
Load: Up to 75 people and 17 pallets or 27 pallets up to approx. 170,000 lb.

USAF

KC-46 PEGASUS

Aerial refueling/airlift

Brief: The KC-46A is a heavily modified Boeing 767-200ER multirole passenger/cargo-tanker equipped with flying boom and probe/drogue refueling capability using the Wing Air Refueling Pod (WARP) system. It is also equipped for aeromedical evacuation. KC-46 incorporates the 787's state-of-the-art cockpit, a fly-by-wire boom, remote boom-operator's station, advanced self-defensive suite including Large Aircraft IR Countermeasures (LAIRCM), RWR, tactical situational awareness, comms relay hosting, and nuclear/chem/bio hardening. In 2011 Boeing was awarded a contract for 179 KC-46A tankers, the first increment (KC-X), to replace about half of USAF's KC-135R fleet. Compared to the 50-year-old KC-135, the KC-46A has more fuel capacity, improved efficiency, and enhanced cargo and AE capability. Like the KC-10, it employs an advanced refueling boom and independently operating hose/drogue system. The program's provisioned 767-2C prototype (minus refueling boom) flew on Dec. 28, 2014, and received FAA type-certification in December 2017. USAF accepted its first production KC-46 from Boeing on Jan. 10, 2019. The service awarded LRIP contracts for 19 aircraft in 2016, a follow-on Lot 3 contract for 15 aircraft in 2017, 18 aircraft in 2018, 15 in 2019, and 12 in the most recent Lot 6 contract issued Jan. 12, 2021. FY21 funds support Lot 7 purchase of 15

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tankers. The first KC-46 built for a launch international customer, Japan, flew on Feb. 9, 2021. The Japan Air Self-Defense Force plans to buy up to six tankers through FY24. The KC-46 completed developmental testing and entered operational testing in 2019, though planned IOC and full-rate production has slipped to FY24 or later due to remaining deficiencies with the boom and remote vision system. AMC began employing KC-46 for noncombat refueling of a limited number of types starting in 2021. Pease received its 12th aircraft, completing its fleet Feb. 5, 2021.

Contractor: Boeing.
First Flight: Sept. 25, 2015 (KC-46A).
Delivered: December 2018-present.
IOC: FY24 (planned).
Production: 179 (planned).
Inventory: 52 (KC-46A).
Operator: AFMC, AMC, ANG, Boeing.
Aircraft Location: Altus AFB, Okla.; Edwards AFB, Calif.; McConnell AFB, Kan.; Paine Field, Wash.; Pease ANGB, N.H. Planned: JB McGuire-Dix-Lakehurst, N.J.; Seymour-Johnson AFB, N.C.; Travis AFB, Calif.; others TBD.
Active Variant:
▪KC-46A. Modified Boeing 767 designed as a multirole cargo tanker.
Dimensions: Span 156 ft, length 165.5 ft, height 52.8 ft.
Weight: Max T-O 415,000 lb.
Power Plant: Two Pratt & Whitney PW4062, each 62,000 lb thrust.
Performance: Speed 650 mph, range 7,350 miles (farther with air refueling).
Ceiling: 43,000 ft.
Fuel Capacity: 212,299 lb., max transfer load 207,672 lb at 1,200 gpm (boom), 400 gpm (drogue).
Accommodation: Two pilots, boom operator, and up to 12 additional crew; 15 crew seats, incl AE crew. **Passenger Load:** 58 or up to 114 for contingency operations. AE load: 58 patients (24 litters and 34 ambulatory). **Cargo Load:** 18 pallet positions, max 65,000 lb.

Senior Master Sgt. Vincent DeGroot/ANG

KC-135 STRATOTANKER

Aerial refueling/airlift

Brief: The KC-135 is an aerial tanker capable of simultaneous cargo and AE missions and has been the mainstay of the USAF tanker fleet for more than 60 years. The C-135 family is similar in appearance to the commercial 707 but designed to unique military specifications and first flew on Aug. 31, 1956. The KC-135A fleet was delivered between June 1957 and January 1965, reaching IOC at Castle AFB, Calif., in 1957. KC-135s were re-engined under two separate but concurrent programs and redelivered as the KC-135E and finally the current KC-135R beginning in July 1984. Twenty KC-135Rs received Multipoint Refueling System (MPRS) hose/drogue pods on each wing to simultaneously refuel two NATO or Navy aircraft. (Standard KC-135s can use a single drogue adapter attached to the boom). A small number of McConnell-based aircraft are also receiver-capable, incorporating a forward-fuselage receptacle. KC-135s can be equipped with a podded Large-Aircraft IR Countermeasures (LAIRCM) system to track/jam IR missiles for high-threat missions. Modern features include a digital flight deck, Global Air Traffic Management upgrades completed in 2011, and Link 16 on a limited number of upgraded aircraft. USAF plans to modify 395 aircraft with Block 45 upgrades: additional glass cockpit display for engine instrumentation, a radar altimeter, advanced autopilot, and modern flight director at a rate of 38 aircraft per year through 2026. FY21 begins replacement of obsolete long-distance oceanic satellite tracking/C2 through FY24, and adding a rudder position indicator to increase crew awareness and prevent accidents like the fatal crash in Kyrgyzstan in 2013. FY21 also launches prototyping/development of modern, secure UHF SATCOM for enhanced worldwide voice/data coverage. Congress barred USAF from retiring serviceable KC-135s through FY23 to bridge a capacity shortfall from KC-46 delays. USAF plans to retain the fleet 10 years beyond its planned service life, keeping some jets in service to at least 2050. Three KC-135s are undergoing conversion to WC-135R standards to replace Constant Phoenix.

Contractors: Boeing; Rockwell Collins (Block 45).
First Flight: Aug. 4, 1982 (KC-135R).
Delivered: July 1984-June 9, 2005 (KC-135R).
IOC: June 1957.
Production: 732 (420 converted to KC-135R).
Inventory: 224 (KC-135R); 54 (KC-135T).
Operator: AETC, AFMC, AMC, PACAF, USAFE, ANG, AFRC.
Aircraft Location: Altus AFB, Okla.; Beale AFB, Calif.; Fairchild AFB, Wash.; Grissom ARB, Ind.; JB Andrews, Md.; Kadena AB, Japan; MacDill AFB, Fla.; March ARB, Calif.; McConnell AFB, Kan.; RAF Mildenhall, U.K.; Seymour-Johnson AFB, N.C.; Tinker AFB, Okla.; and ANG in Alabama, Alaska, Arizona, Hawaii, Illinois, Iowa, Kansas, Maine, Michigan, Mississippi, Nebraska, New Jersey, New York, Ohio, Pennsylvania, Tennessee, Utah, Washington, Wisconsin.
Active Variants:
▪KC-135R. Re-engined KC-135A fitted with CFM turbofan engines.
▪KC-135T. Reengined former KC-135Qs, able to carry different fuels in wing and fuselage tanks.
Dimensions: Span 130.8 ft, length 136.3 ft, height 41.7 ft.
Weight: Max T-O 322,500 lb.
Power Plant: Four CFM International CFM56-2 (USAF designation F108) turbofans, each 21,634 lb thrust.
Performance: Speed 530 mph at 30,000 ft, range 1,500 miles with 150,000 lb transfer fuel, up to 11,015 miles for ferry missions.
Ceiling: 50,000 ft.
Fuel Capacity: Max transfer load 200,000 lb at 1,100 gpm (boom), 450 gpm (MPRS pods).
Accommodation: Two pilots, navigator, boom operator, AE crew: two flight nurses, three medical technicians (adjusted as needed);
Load: 37 passengers, six cargo pallets, max 83,000 lb.

AIRLIFT AIRCRAFT

C-5 GALAXY

Strategic airlift

Brief: The C-5 is USAF's largest airlifter and one of the world's largest aircraft, capable of lifting unusually large/heavy cargo over intercontinental ranges. It is also able to take off and land in relatively short distances, and taxi on substandard surfaces if required. The Galaxy's front and rear cargo doors permit simultaneous drive-through loading/unloading. The aircraft's unique upper deck is split between the flight deck with galley and crew rest area forward of the wing and a troop compartment seating 75 passengers and a second gallery/lavatory aft of the wing. The C-5A first flew on June 30, 1968, and a total of 81 were delivered between 1969 and 1973 reaching IOC in September 1970. C-5As underwent major wing modifications to extend their service lives and all but one (converted to C-5M) are now retired. The C-5B first flew in 1985 and was delivered between 1986 and 1989. C-5Bs incorporated all C-5A improvements including strengthened wings, uprated turbofans, color weather radar, triple INS, and defensive systems (on some aircraft). Two C-5As were modified for outsize space cargo and redelivered as C-5Cs in 1989 and 1990. The combined Avionics Modernization Program (AMP)—completed in 2011—and Reliability Enhancement and Re-engining Program (RERP), resulted in the C-5M Super Galaxy. Upgraded aircraft incorporate new

Roland Balik/USAF

engines with 20 percent increase in thrust, as well as avionics, structural, and reliability fixes. A total of 49 B models, two C models, and a single C-5A were converted. Ongoing mods include CNS/ATM upgrades, improved Large Aircraft IR Countermeasures (LAIRCM) to counter MANPAD threats, a lavatory redesign to address corrosion, new mission computers, and an off-the-shelf weather radar. AMC is replacing key nose landing gear components and limiting "kneeling" to reduce wear following a spate of malfunctions. The combined fleet logged more than 32,000 flying hours over more than 7,000 sorties in FY20 alone.

Contractor: Lockheed Martin; Collins Aerospace and Honeywell (CNS/ATM, weather radar/mission computer).
First Flight: June 6, 2006 (C-5M).
Delivered: Feb. 9, 2009-Aug. 2, 2018 (C-5M).
IOC: Feb. 21, 2014 (C-5M).
Production: 131 (52 converted to C-5M).
Inventory: 50 (C-5M); two (C-5M-SCM).
Operator: AMC, AFRC.
Aircraft Location: Dover AFB, Del.; JBSA-Lackland, Texas; Travis AFB, Calif.; Westover ARB, Mass.
Active Variants:
▪C-5M. Super Galaxy converted from C-5A/B, incorporating AMP and RERP.
▪C-5M-SCM. Super Galaxy converted from C-5C to carry large NASA/space cargo.
Dimensions: Span 222.8 ft, length 247.8 ft, height 65.1 ft.
Weight: Max T-O 840,000 lb.
Power Plant: Four GE Aviation F138-GE-100 (CF6-80C2) turbofans, each 50,580 lb thrust.
Performance: Speed 518 mph, range 5,524 miles with 120,000 lb of cargo.
Ceiling: 45,000 ft.
Accommodation: Two pilots, two flight engineers, three loadmasters. Load: 81 troops and 36 standard pallets, max 285,000 lb; incl seven MRAP vehicles, six AH-64 Apache helicopters, four M2 Bradley fighting vehicles, or two M1 Abrams main battle tanks.

Justin Connaher/USAF

C-12 HURON

Light airlift

Brief: C-12 is tasked with multimission passenger and priority light-cargo airlift, medevac, as well as diplomatic and flight-test support. The family of aircraft includes military versions of the Beechcraft King Air and 1900C (C-12J). Flight decks and cabins are pressurized for high-altitude flight. The C-12D incorporates a cargo door with an integral airstair, high-flotation landing gear, structural improvements, and optional external wingtip tanks. Both C-12C and C-12D are deployed to U.S. embassies worldwide and incorporate earlier three-bladed propellers. The C-12F incorporated uprated engines, four-bladed propellers, and an increased service ceiling. The C-12J is a completely different aircraft based on the Beechcraft 1900C commuter airliner with a large, aft cargo door. C-12Js are operated by PACAF in support of U.S. Forces Japan and can transport two litters or 10 ambulatory patients in the AE role. C-12Js incorporate extensive avionics upgrades, including three MFDs, integrated GPS, flight management systems, autopilot, VHF/UHF radios, and weather radar. Current updates encompass basic safety, reliability, and maintainability mods.

Contractor: Beechcraft.
First Flight: Oct. 27, 1972 (Super King Air 200), March 1, 1990 (1900C).
Delivered: 1974-mid 1990s.
IOC: Circa 1974.
Production: 30 (C-12A/C); six (C-12D); 46 (C-12F): four (C-12J).
Inventory: 16 (C-12C); six (C-12D); three (C-12F); four (C-12J).
Operator: AFMC, PACAF.
Aircraft Location: Edwards AFB, Calif.; Holloman AFB, N.M. (J); JB Elmendorf- Richardson, Alaska; Yokota AB, Japan (J); various U.S. embassies.
Active Variants:
▪C-12C. C-12As retrofit with PT6A-41 engines.
▪C-12D. C-12 with an enlarged cargo door and strengthened wings.
▪C-12F. C-12 with uprated PT6A-42 engines, eight-passenger seating, and AE capability.
▪C-12J. Military version of the Beechcraft Model 1900C commuter airliner.
Dimensions: Span 54.5 ft, length 43.8 ft, height 15 ft (C/D/F); span 54.5 ft, length 57 ft, height 15 ft (J).
Weight: Max T-O 15,000 lb (F); 16,710 lb (J).
Power Plant: Pratt & Whitney Canada PT6A-41 (C/D) or PT6A-42 (F) turbo-props, each 850 shp; PT6A-65B turboprops, each 1,173 shp.
Performance: Speed 300 mph (C/D) 336 mph (F) range 2,271 miles; 284 mph, range 1,669 miles (J).
Ceiling: 31,000 ft (C/D); 35,000 ft (F); 25,000 ft (J).
Accommodation: Two pilots; Load: eight passengers (C/D/F), 19 passengers or 3,500 lb cargo (C-12J).

Senior Airman James Fritz

C-17 GLOBEMASTER III

Tactical/strategic airlift

Brief: C-17 is a heavy-lift, strategic transport capable of direct tactical delivery of all classes of military cargo. It is the U.S. military's core airlift asset, capable of operating on small, austere airfields (3,500 ft by 90 ft) previously limited to C-130s. It is the only aircraft able to directly deliver or airdrop outsize cargo into a tactical environment and it is the first military transport to feature full digital, fly-by-wire control. Boeing delivered the 223rd and final USAF aircraft on Sept. 12, 2013, and the final international aircraft on Nov. 29, 2015. Block 16 avionics and weather radar mods were completed in 2015. Block 20 upgrades included some 60 programs to bring early production aircraft to a common configuration, and Block 21 including Mode 5 IFF and airspace compliance were completed fleetwide in 2020. Ongoing mods include next-generation Large Aircraft Infrared Countermeasures (LAIRCM) to combat the proliferation of man-portable air defenses, as well as structural, safety, and sustainment mods. FY21 begins fleetwide HUD replacement through FY28, and development includes enhanced high-bandwidth BLOS voice/data SATCOMS and roll-on/roll-off C2 capsule (replacing the "Silver Bullet") for in-flight conferencing. The C-17 fleet surpassed 4 million combined flying hours during a flight from Charleston, Jan. 15, 2021.

Contractor: Boeing (previously McDonnell Douglas).
First Flight: Sept. 15, 1991.
Delivered: June 1993-September 2013.
IOC: Jan. 17, 1995.
Production: 257.
Inventory: 222.
Operator: AETC, AMC, PACAF, ANG, AFRC.
Aircraft Location: Altus AFB, Okla.; Dover AFB, Del.; JB Charleston, S.C.; JB Elmendorf-Richardson, Alaska; JB Lewis-McChord, Wash.; JB McGuire-Dix- Lakehurst, N.J.; JB Pearl Harbor-Hickam, Hawaii; March ARB, Calif.; Pittsburgh Arpt., Pa.; Travis AFB, Calif.; Wright-Patterson AFB, Ohio; and ANG in Hawaii (associate), Mississippi, North Carolina, West Virginia, and New York.
Active Variant:
▪C-17A. Long-range airlifter.
Dimensions: Span 169.8 ft, length 174 ft, height 55.1 ft.
Weight: Max T-O 585,000 lb.
Power Plant: Four Pratt & Whitney F117-PW-100 turbofans, each 40,440 lb thrust.
Ceiling: 45,000 ft.
Performance: Speed 518 mph at 25,000 ft, range 2,760 miles with 169,000

lb payload (farther with air refueling).
Accommodation: Two pilots, loadmaster; AE crew: Two flight nurses, three medical technicians (mission dependent).
Load: 102 troops/paratroopers; 36 litter and 54 ambulatory patients; 18 pallets up to max payload 170,900 lb.

Arie Church

C-21
Light airlift

Brief: The C-21 is a militarized Learjet 35 used for passenger and priority light-cargo airlift and aeromedical transport. It is equipped with color weather radar, TACAN, and HF/VHF/UHF radios. It provides medium-range operational support for time-sensitive movement of people and cargo throughout the U.S. and the European theater, including AE missions if required. Ongoing efforts include the C-21 Avionics Upgrade Program (AUP), which replaces the analogue cockpit with a modern glass cockpit with digital systems, including a new weather radar, GPS, flight management system, satellite-updating real-time flight information, digital black boxes, and ADS-B/Mode 5 transponder. USAF added BLOS comms concurrently with AUP to save costs. Fleetwide installs were slated for completion in 2020 with BLOS mods stretching through May 2021. The first C-21 retrofit with enlarged aft-fuselage "delta fins" was redelivered to AMC in November 2020. The modification improves low-speed stability and control, eliminates approach/landing flight restrictions, and is slated for fleetwide completion in October 2021.

Contractors: Bombardier (previously Gates Learjet); Avcon Industries (delta fin mods).
First Flight: January 1973.
Delivered: April 1984-October 1985.
IOC: April 1984.
Production: 84.
Inventory: 19.
Operator: AMC, USAFE.
Aircraft Location: Ramstein AB, Germany; Scott AFB, Ill.
Active Variant:
▪C-21A. Military version of the Learjet 35A.
Dimensions: Span 39.5 ft, length 48.6 ft, height 12.2 ft.
Weight: Max T-O 18,300 lb.
Power Plant: Two AlliedSignal TFE731-2 turbofans, each 3,500 lb thrust.
Performance: Speed 530 mph at 41,000 ft, range 2,306 miles.
Ceiling: 45,000 ft.
Accommodation: Two pilots; AE crew: Flight nurse, two medical technicians (mission dependent). **Load:** eight passengers, 3,153 lb cargo; one litter or five ambulatory patients (AE role).

C-32
VIP transport

Brief: The C-32A provides dedicated vice presidential and DV airlift. C-32B is tasked with politically sensitive crisis-mobility. Both types were acquired as commercial Boeing 757s. Aircraft assigned to the 89th Airlift Wing at Andrews fly under the call sign "Air Force Two" during vice presidential missions, but additionally serve the First Lady, Congress, and Cabinet officials. The cabin is divided into sections, including a worldwide clear and secure voice and data communications suite, first-class cabin, two business-class cabins, center galley, lavatories, fully enclosed stateroom, and a conference and staff area. The C-32B provides DOD discreet, rapid, global airlift in support of government crisis response efforts. The C-32's modern flight deck is designed to be easily upgraded, and the fleet recently underwent a full interior cabin refurbishment to more closely match the VC-25 fleet. Ongoing mods include installation of four, fully reclining crew rest seats to enable missions longer than the current 16-hour limit without pre-positioning relief crews. FY21 launches wide-band SATCOM upgrades as part of AMC's Senior Leader Communication Modernization effort across the executive fleets. The fleet has an average of nine years' life remaining, and DOD completed analysis in FY20 to potentially replace the C-32, E-4B, and Navy E-6B Mercury with a common airframe.


Phillip Ulmer/ANG

Contractor: Boeing.
First Flight: Feb. 11, 1998 (C-32A).
Delivered: June-December 1998.
IOC: 1998.
Production: Six.
Inventory: Four (C-32A); two (C-32B).
Operator: AMC, ANG.
Aircraft Location: JB Andrews, Md.; JB McGuire-Dix-Lakehurst, N.J.
Active Variants:
▪C-32A. Presidential support-configured commercial Boeing 757-200 airliner.
▪C-32B. Commercial Boeing 757-200 tasked with global crisis response airlift.
Dimensions: Span 124.6 ft, length 155.2 ft, height 44.5 ft.
Weight: Max T-O 255,000 lb.
Power Plant: Two Pratt & Whitney PW2040 turbofans, each 41,700 lb thrust.
Performance: Speed 530 mph, range 6,325 miles.
Ceiling: 42,000 ft.
Accommodation: Two pilots, up to 14 cabin and maintenance crew (varies with mission). **Load:** Up to 45 passengers.

Airman 1st Class Breanna Klemm

C-37 GULFSTREAM
VIP transport

Brief: The C-37 family provides worldwide special air mission and DV support, consisting of military versions of the ultra-long-range Gulfstream business aircraft. The C-37A is based on the Gulfstream V and is equipped with separate VIP and passenger areas, secure global voice and data communications suites, enhanced weather radar, autopilot, and advanced HUD. The C-37B, first delivered in 2004, is based on the G550 and adds directional IR countermeasures for self-defense and the advanced Honeywell Plane-View flight deck. Ongoing mods include commercial wideband SATCOM, to ensure senior leaders' access to secure data and voice networks, and FAA-required CNS/ATM updates. The fleet has an average 28,000 flying hours of remaining service life. USAF issued a request for proposal in FY18 for procurement of as many as 40 additional C-37Bs to backfill the now-retired C-20 fleet. FY21 launches wideband SATCOM upgrades as part the Senior Leader Communication Modernization effort across USAF's executive fleets. A total of 15 aircraft will be modified to ensure redundant, survivable and secure/top-secret voice, data, and video conferencing for uninterrupted worldwide C2. USAF took delivery of its fourth C-37B in 2019, a fifth on March 25, 2020, and awarded Gulfstream a $127.4 million contract for two additional aircraft for delivery by September 2021.

Contractor: Gulfstream Aerospace.
First Flight: October 1998 (C-37A).
Delivered: Oct. 14, 1998-present.
IOC: Dec. 9, 1998.
Production: 16 (planned).

Inventory: 10 (C-37A); five (C-37B).
Operator: AMC, PACAF, USAFE.
Aircraft Location: Chièvres, Belgium; JB Andrews, Md.; JB Pearl Harbor-Hickam, Hawaii; MacDill AFB, Fla.; Ramstein AB, Germany.
Active Variants:
- C-37A. Military version of the Gulfstream V.
- C-37B. Military version of the Gulfstream G550.

Dimensions: Span 93.5 ft, length 96.4 ft, height 25.8 ft.
Weight: Max T-O 90,500 lb.
Power Plant: Two BMW/Rolls-Royce BR710A1-10 turbofans, each 14,750 lb thrust (A); two BMW/Rolls-Royce BR710C4-11 turbofans, each 15,385 lb thrust (B).
Performance: Speed 600 mph, range 6,300 miles.
Ceiling: 51,000 ft.
Accommodation: Two pilots, flight attendant, crew chief.
Load: Up to 12 passengers (A); 14 passengers (B).

Courtesy

C-40 CLIPPER

VIP transport

Brief: The C-40 is a medium-range DV airlift aircraft based on the commercial Boeing 737-700. It is used to transport senior military commanders, Cabinet officials, and members of Congress, as well as performing other support missions. C-40A is a long-range medium airlift aircraft capable of operating in passenger, cargo, or split passenger/cargo "combi" configuration developed for and operated by the Navy. C-40Bs are equipped with an office-in-the-sky arrangement, including clear and secure voice/data communication and broadband data/video. C-40Cs lack the advanced communications suite, are VIP configured with sleep accommodations, and are reconfigurable to carry 42 to 111 passengers. All versions have modern avionics, integrated GPS and flight-management system/electronic-flight instrument system, and HUD. Each aircraft has auxiliary fuel tanks and managed passenger communications. The fleet is designed for a 30-year service life, with an average of 21 years remaining. Recent mods include commercial wideband SATCOM for the C-40B. FY21 launches wide-band SATCOM upgrades as part of AMC's Senior Leader Communication Modernization effort across the executive fleets. A total of 11 aircraft will be modified to ensure redundant, survivable and secure/top-secret voice, data, and video conferencing for uninterrupted worldwide C2.

Contractor: Boeing, L3Harris (Wideband SATCOM).
First Flight: April 14, 1999 (C-40A).
Delivered: 2002-2007.
IOC: Feb. 28, 2003.
Production: 11.
Inventory: Four (C-40A); six (C-40B); seven (C-40C).
Operator: AFMC, AMC, ANG, AFRC.
Aircraft Location: JB Andrews, Md.; Scott AFB, Ill.
Active Variants:
- C-40A. Military cargo/passenger "combi" version of the Boeing 737-700C, with forward fuselage cargo door.
- C-40B. VIP military-configured Boeing 737-700 with advanced comms.
- C-40C. Passenger-configured Boeing 737-700, lacking advanced comms.

Dimensions: Span 117.4 ft, length 110.3 ft, height 41.2 ft.
Weight: Max T-O 171,000 lb.
Power Plant: Two GE Aviation CFM56-7 turbofans, each 27,000 lb thrust.
Performance: Speed 530 mph, range 5,750 miles.
Ceiling: 41,000 ft.
Accommodation: Two pilots, up to eight cabin and maintenance crew (varies by model/mission); **Load:** Up to 121 passengers or 40,000 lb cargo, or 70 passengers and three pallets in "combi" configuration (A); up to 89 passengers (B); up to 111 passengers (C).

Tech. Sgt. Caila Arahood

C-130H HERCULES

Tactical airlift

Brief: The C-130H is an all-purpose theater transport that performs diverse roles, including tactical and inter-theater airlift and airdrop, AE, aerial spraying, aerial firefighting, and humanitarian support. The developmental YC-130A first flew in August 1954 with the C-130A entering USAF service in 1956. The H model improved on the later C-130E and was delivered starting in 1965, with delivery of the current, more advanced models starting in 1974. Improvements included uprated engines, redesigned outer wing, improved pneumatic systems, new avionics, improved radar, and NVG lighting. C-130Hs are being replaced by the C-130J. Ongoing upgrades include critical center wing box replacement, electronic propeller controls/engine efficiency mods, NP2000 propellers, and the C-130H Avionics Modernization Program (previously Viability and Airspace Access Program). USAF is upgrading 55 aircraft, including Modular Airborne Fire Fighting Systems (MAFFS)-equipped airframes, with eight-bladed NP2000 propellers to enhance performance and safety. The service eventually aims to retrofit the entire fleet. AMP increment 1, concluding in FY21, adds new CNS/ATM to bring the fleet into compliance with international airspace rules. Increment 2 will add terrain awareness and warning, new flight management, and modern MFDs starting in FY22. USAF announced plans to cut 24 ANG airframes in FY21, but Congress barred the service from cutting solely ANG tails or reducing the total tactical airlift fleet below 230 aircraft.

Contractor: Lockheed Martin, L3Harris (AMP Increment 2), Collins Aerospace (AMP/NP2000).
First Flight: 1965 (C-130H).
Delivered: March 1965 onward (C-130H1); April 1975-96 (current C-130H2/H3).
IOC: Circa 1974.
Production: 1,202 (C-130H).
Inventory: 167.
Operator: ANG, AFRC, AFSOC.
Aircraft Location: Dobbins ARB, Ga.; Little Rock AFB, Ark.; Maxwell AFB, Ala.; Minneapolis-St. Paul Arpt./ARS, Minn.; Peterson AFB, Colo. (MAFFS); Youngstown ARS, Ohio (Aerial Spray); and ANG in Arkansas, Connecticut, Delaware, Georgia, Illinois, Kentucky, Minnesota, Missouri, Montana, Nevada (MAFFS), Ohio, Texas, West Virginia, Wyoming (MAFFS).
Active Variant:
- C-130H Hercules. Updated late-production version of the legacy C-130.

Dimensions: Span 132.6 ft, length 97.8 ft, height 38.8 ft.; J-30 length 112.8 ft.
Weight: Max T-O 155,000 lb; max payload 42,000 lb.
Power Plant: Four Allison T56-A-15, or Rolls-Royce T56 3.5 turboprops, each 4,591 shp.
Performance: Speed 366 mph; range with 35,000 lb payload 1,496 miles.
Ceiling: With max payload, 23,000 ft.
Accommodation: Two pilots, navigator, flight engineer, loadmaster; **Load:** Up to 92 combat troops or 64 paratroopers or 74 litters or six cargo pallets or 16 Container Delivery System (CDS) bundles or any combination of these up to max weight.

C-130J SUPER HERCULES

Tactical airlift

Brief: The C-130J is the redesigned, current production version of the C-130 all-purpose theater transport. Missions include tactical and inter-theater airlift, airdrop, AE, wildfire suppression using the Modular Airborne Fire Fighting System (MAFFS), and humanitarian relief. The aircraft first deployed to combat in Southwest Asia in 2004. The Super Hercules features three-crew flight operations, more powerful engines, composite

Yasuo Osakabe/USAF

Courtesy

six-blade propellers, and digital avionics and mission computers. The C-130J can fly faster, higher, and farther than the C-130H. The C-130J-30 variant features a 15-foot longer "stretched" fuselage. The combined fleet is sustained via block upgrades. USAF combined Block 7/8.1 upgrades to reduce modification downtime. Block 7 includes Link 16, new flight management systems, civil GPS, and a special mission processor. Block 8.1 adds improved LOS data link and BLOS comms, improved precision navigational aids, enhanced covert lighting, replaces UHF comms with SATCOMS, and updates mission planning systems. Block 8.1's Mode 5 IFF and air traffic management upgrades were successfully fielded ahead of cycle to meet the FAA's 2020 compliance deadline. Airframes delivered since 2009 incorporate enhanced service life center wings, and five of the 23 early production airframes programmed will be retrofitted in 2021. The current multiyear contract procures 29 USAF C-130J-variants between FY19 and FY23 at a production rate of 16 aircraft per year. ANG units in Georgia, Texas, Kentucky, and West Virginia were selected to transition from the legacy C-130H to the C-130J starting in 2021, while Maryland will retain its A-10 mission instead of transitioning as previously planned.

Contractor: Lockheed Martin.
First Flight: April 5, 1996.
Delivered: February 1999-present.
IOC: October 2006.
Production: 2,600+ worldwide, 134 (USAF).
Inventory: 134.
Operator: AETC, AMC, PACAF, USAFE, ANG, AFRC.
Aircraft Location: Dyess AFB, Texas; Little Rock AFB, Ark.; Ramstein AB, Germany; Yokota AB, Japan; and ANG in California, Kentucky, Rhode Island. Planned: ANG in Georgia, Texas, Kentucky, and West Virginia.
Active Variants:
▪C-130J Super Hercules. Current production version.
▪C-130J-30 Super Hercules. Stretched version capable of accommodating larger loads.
Dimensions: Span 132.6 ft, length 97.8 ft, height 38.8 ft.; J-30 length 112.8 ft. Weight: Max T-O 155,000 lb (J), 164,000 lb (J-30); max payload 42,000 lb (J), 44,000 lb (J-30).
Power Plant: Four Rolls-Royce AE2100D3 turboprops, each 4,700 shp.
Performance: Speed 417 mph (J), 410 mph (J-30); range with 35,000 lb payload 1,841 miles (J), 2,417 miles (J-30).
Ceiling: With max payload, 26,000 ft (J), 28,000 ft (J-30).
Accommodation: Two pilots, loadmaster. **Load:** Up to 92 combat troops or 64 paratroopers or 74 litters or six cargo pallets or 16 Container Delivery System (CDS) bundles or any combination of these up to max weight (J); 128 combat troops or 92 paratroopers or 97 litters or eight pallets or 24 CDS bundles or any combination of these up to max weight (J-30).

LC-130H SKIBIRD

Arctic support/tactical airlift

Brief: The LC-130H is a ski-equipped, Arctic-support derivative of the C-130H. It is capable of direct resupply of Antarctic research stations and high-arctic radar sites utilizing ice and snowpack runways. The LC-130H fleet supports the National Science Foundation's (NSF) Antarctic research, ferrying much of the material, provisions, and personnel between Christchurch, New Zealand, and McMurdo Station, Antarctica. The aircraft also provide ongoing support to the remote Amundsen-Scott South Pole Station. USAF began augmenting the Navy's "Operation Deep Freeze" with the C-124 in 1956. C-130s began Antarctic support in 1959, operating without skis until the initial ski-borne deployment of the C-130D in January 1960. By 1975, the New York ANG's 109th AW operated USAF's only ski-equipped LC-130 supporting Distant Early Warning sites in the high-Arctic. The unit began augmenting Navy LC-130s during Deep Freeze in 1988, before taking over primary responsibility in 1999. Three aircraft were converted from ex-Navy LC-130Rs, and the NSF funded an additional three new-build aircraft in 1995-96. LC-130s have been upgraded with eight-bladed NP-2000 propellers to increase take-off performance, digital cockpit displays and flight management systems, multifunction radar, modernized comms, and a single air data computer. LC-130s are upgraded along with the baseline C-130H fleet, including center wing box replacement, Mode 5 IFF, as well as the C-130H Avionics Modernization Program which enters Increment 2 in FY22. Ice Pod experiments utilizing an aft, externally mounted sensor suite to record ice composition and density began in 2015. The pod includes radar, laser, and optical sensors. Required upgrades include NVG-compatible flight deck, secure BLOS data link, and increased reliability commercial SATCOM. The research season ending in February 2020 accomplished more than 200 missions airlifting 2,097 personnel and 1.5 million tons of cargo to and from the continent. Congress is pressing USAF to recapitalize the LC-130 (likely with C-130J) in line with its other special-mission C-130 fleets.

Contractor: Lockheed Martin.
First Flight: 1957 (ski-equipped C-130D).
Delivered: 1974-96.
IOC: Circa October 1984.
Production: 10.
Inventory: 10.
Operator: ANG.
Aircraft Location: Stratton ANGB, N.Y.
Active Variants:
▪LC-130H Skibird. Arctic support variant with wheel-ski gear and eight-bladed propellers.
Dimensions: Span 132.6 ft, length 97.8 ft, height 38.8 ft.; Nose Ski 10 ft by six ft wide, main gear skis 12 ft by six ft wide.
Weight: Max T-O 155,000 lb; max payload 45,000 lb.
Power Plant: Four Rolls-Royce T56 3.5 turboprops, each 4,591 shp.
Performance: Speed 366 mph; range with 35,000 lb payload 1,636 miles (with engine upgrades).
Ceiling: With max payload, 23,000 ft.
Accommodation: Two pilots, navigator, flight engineer, loadmaster; **Load:** Up to 92 passengers or 74 litters; six cargo pallets, 16 Container Delivery System (CDS) bundles, or any combination up to max weight.

Andrew Park/USAF

VC-25 AIR FORCE ONE

Presidential airlift

Brief: The VC-25 is a specially configured Boeing 747-200B equipped for airlifting the President and his entourage. VC-25s operate under the call sign "Air Force One" when the President is aboard, and SAM (Special Air Mission) during non-presidential flights. Aircraft are equipped with staff work areas, a conference room, a general seating area, and an executive office. Communications capability includes worldwide secure and clear

communications and a full suite of strategic C2 comm/data links. The aircraft also has a full self-defensive suite. The fleet is operated by the Presidential Airlift Group of the 89th Airlift Wing at JB Andrews. The VC-25A fleet has two years' estimated service life remaining and required recent life-extension/block upgrades to remain viable until replaced by the VC-25B (based on Boeing's modernized 747-8 Intercontinental). FY21 launches wideband SATCOM upgrades as part of AMC's Senior Leader Communication Modernization effort across the executive fleets. USAF issued Boeing a $3.9 billion presidential aircraft replacement contract to modify two undelivered commercial 747-8s to VC-25B standards on Feb. 20, 2018. Work is underway modifying the airframes and delivery is slated for 2024, though specifications exclude an aerial refueling capability to reduce program cost. The current VC-25A fleet is planned for retirement by the end of 2025.

Contractor: Boeing.
First Flight: Sept. 6, 1990 (VC-25A).
Delivered: August-December 1990.
IOC: Dec. 8, 1990; planned 2024 (VC-25B).
Production: Two VC-25A; two VC-25B (undergoing modification).
Inventory: Two (VC-25A); two (VC-25B).
Operator: AMC.
Aircraft Location: JB Andrews, Md.
Active Variants:
▪VC-25A. Specially configured presidential support version of the Boeing 747-200B.
▪VC-25B. Next-generation presidential aircraft based on the Boeing 747-8 Intercontinental.
Dimensions: Span 195.8 ft, length 231.8 ft, height 63.4 ft (A); span 224.5 ft, length 250.2 ft, height 63.4 ft (B).
Weight: Max T-O 833,000 lb (A); max T-O 987,000 lb (B).
Power Plant: Four GE Aviation CF6-80C2B1 turbofans, each 56,700 lb thrust (A); four GE Aviation GEnx-2B turbofans, each 66,500 lb thrust (B).
Performance: Speed 630 mph, range 7,800 miles (farther with air refueling) (A); speed 660 mph, range 8,900 miles (B).
Ceiling: 45,100 ft.
Accommodation: Two pilots, navigator, flight engineer, up to 22 cabin and maintenance crew; **Load:** Up to 102 passengers (A); TBD (B).

HELICOPTERS

Master Sgt. Kelly Goonan

HH-60 PAVE HAWK

Personnel recovery/medium lift

Brief: The HH-60G Pave Hawk is an armed, all-weather day/night CSAR helicopter derived from the UH-60 Blackhawk. Additional missions include casualty/medical evacuation, disaster and humanitarian response, firefighting, and combat/utility support. The HH-60G is equipped with advanced INS/GPS/Doppler navigation systems, SATCOM, and secure/anti-jam communications, and personnel locating system (PLS) that aids location of a survivor's radio. It includes automatic flight control, NVG lighting, FLIR, an engine/rotor blade anti-ice system, in-flight refueling probe, additional fuel tanks, and an integral rescue hoist. Combat enhancements include a full, self-defensive suite and two miniguns (or .50-caliber guns). Major upgrades include Block 162 which encompasses Avionics Communications Suite Upgrade and replaces obsolete systems with color weather radar, improved TACAN, new RWR, auto direction finding, and digital intercoms. USAF aimed to complete Block 162 upgrades in 2020, and standardize HH-60Us to the same configurations by 2024. Degraded Visual Environment (DVE)/Terrain Awareness and Warning System (TAWS) is planned for fleetwide integration starting in FY22. Additional efforts include safety/survivability, data-linking offboard ISR, and mission avionics. Delivery of the last of 21 Army-surplus HH-60U combat-loss replacements was expected in 2020, with two added airframes increasing the fleet to 116. Both types will be replaced by the HH-60W Jolly Green II currently undergoing testing.

Contractor: Lockheed Martin Sikorsky; Sierra Nevada Corp. (DVE).
First Flight: October 1974.
Delivered: 1982-1998 (HH-60G); 2019-present (HH-60U).
IOC: 1982.
Production: 112 (HH-60G); 19 (HH-60U) (21 planned).
Inventory: 104 (HH-60G); three (HH-60U).
Operator: ACC, AETC, AFMC (HH-60U), PACAF, USAFE, ANG, AFRC.
Aircraft Location: Aviano AB, Italy; Davis-Monthan AFB, Ariz.; Eglin AFB, Fla.; Francis S. Gabreski Arpt., N.Y.; JB Elmendorf-Richardson, Alaska; Kadena AB, Japan; Kirtland AFB, N.M.; Moffett Field, Calif.; Moody AFB, Ga.; Nellis AFB, Nev.; Patrick AFB, Fla.
Active Variants:
▪HH-60G. Modified UH-60 helicopter equipped for CSAR.
▪HH-60U. Converted surplus UH-60L combat-loss replacements.
Dimensions: Rotor diameter 53.6 ft, overall length 64.7 ft, height 16.7 ft.
Weight: Max T-O 22,000 lb.
Power Plant: Two GE Aviation T700-GE-700/701C turboshafts, each 1,560-1,940 shp.
Performance: Speed 184 mph; range 580 miles (farther with air refueling).
Ceiling: 14,000 ft.
Armament: Two 7.62 mm miniguns or two .50-caliber machine guns.
Accommodation: Two pilots, flight engineer, gunner; **Load:** Up to three PJs and four non-ambulatory patients.

Senior Airman Hayden Legg

HH-60 JOLLY GREEN II

Personnel recovery/medium lift

Brief: The HH-60W is an armed, all-weather day/night CSAR helicopter fielded to replace the HH-60G. The type is derived from the UH-60M Blackhawk and dubbed "Jolly Green II" in honor of the Vietnam-era HH-3 and HH-53. Additional missions include casualty/medical evacuation, disaster and humanitarian response, firefighting, and combat/utility support. The HH-60W features a fully digital glass cockpit, improved hot weather/high-altitude performance, onboard self-defenses capable of defeating higher-end threats, an enlarged cabin, and double the internal fuel capacity of the HH-60G. Features include digital RWR, laser/missile/hostile fire warning, integrated chaff/ flares, cabin and cockpit armor, externally mounted 7.62 mm and .50 cal weapons, LINK 16, SADL, integrated cockpit/cabin displays, advanced comms, ADSB, tactical moving map displays, upturned IR-masking exhausts, and efficient wide-chord rotor blades. USAF awarded Sikorsky Aircraft the $1.28 billion Combat Rescue Helicopter contract to replace the HH-60G on June 26, 2014. USAF accelerated procurement plans and now aims to procure a total of 113 HH-60Ws over six lots. A total of 61 LRIP helicopters will be procured in four lots from FY19-FY22, with the final two lots procured through 2024—two years earlier than originally planned. FY21 funds procure 19 aircraft, with a full-rate production decision now expected in 2023. Nine HH-60Ws support developmental testing at Eglin/Duke, and a tenth airframe was added for upgrade testing. Planned improvements include adding Distributed Aperture Infrared Counter Measure (DAIRCM), jam-resistant GPS, Degraded Visual Environment (DVE) system, Video Data Link (VDL), improved Blue Force Tracker, integrated system diagnostics, and wideband-UHF comms. Operational testing is slated to begin in July 2021, and the first production aircraft are planned for delivery in FY21. Moody received its first two aircraft Nov. 5, 2020, followed by Kirtland Dec. 17, 2020. Both bases will receive four initial aircraft for maintenance training and initial operational employment.

Contractor: Lockheed Martin Sikorsky.
First Flight: May 17, 2019.
Delivered: 2019-present.

IOC: 2022 (planned).
Production: 113 (planned).
Inventory: 16.
Operator: AFMC. Planned: ACC, AETC, PACAF, USAFE, ANG, AFRC.
Aircraft Location: Duke Field, Fla.; Kirtland AFB, N.M.; Moody AFB, Ga. **Planned:** Aviano AB, Italy; Davis-Monthan AFB, Ariz.; Francis S. Gabreski Arpt., N.Y.; JB Elmendorf-Richardson, Alaska; Kadena AB, Japan; Moffett Field, Calif.; Nellis AFB, Nev.; Patrick AFB, Fla.
Active Variants:
▪HH-60W. Developmental next-generation Combat Rescue Helicopter based on the UH-60M.
Dimensions: Rotor diameter 53.6 ft, overall length 64.7 ft, height 16.7 ft.
Weight: Max T-O 22,500 lb.
Power Plant: Two GE Aviation T700-GE-701D turboshafts, each 1,857 shp.
Performance: Speed 176 mph; range 690 miles (air refuelable).
Ceiling: 20,000 ft.
Armament: Two 7.62 mm miniguns or two .50-caliber machine guns.
Accommodation: Crew: two pilots, flight engineer, gunner.
Load: Mission dependent.

Samuel King Jr./USAF

MH-139 GREY WOLF

Missile field security/ light lift

Brief: The MH-139 is based on the Leonardo AW139 and is modified with mission-specific equipment, systems, and armament by prime contractor Boeing. Features include an open-architecture glass cockpit, weather radar, enhanced ground proximity warning, radar altimeter, engine IR signature reduction, and military UHF/satcoms. Modifications will include defensive systems such as chaff/flares and missile warning, cockpit and cabin ballistic protection, and crashworthy, self-sealing fuel tanks. AFGSC aircraft will be optionally armed with cabin-mounted 7.62 mm M240 machine guns. USAF awarded Boeing the $2.4 billion UH-1N replacement contract on Sept 24, 2018, following cancellation of the earlier Common Vertical Lift Support Program (CVLSP). Requirements were driven by the MH-139's primary ICBM-field security and support role, but it will eventually replace UH-1Ns in the DV lift and aircrew survival training roles as well. The service plans to procure up to 84 MH-139s through FY27, basing 30 at Andrews, 11 each at F. E. Warren, Kirtland (schoolhouse), Malmstrom, Minot, and four each at Fairchild and Yokota, retaining two for integration work at Eglin. Since the commercial AW139 is a mature system, developmental testing will be streamlined and tests will focus largely on ability to meet mission requirements. Two of the initial four airframes arrived at Duke Field in late 2019, and the first developmental test flight took to the air Feb. 11, 2020. Operational testing begins in FY21 and live-fire and aircraft survivability/self-defensive tests are ongoing. USAF plans to procure eight aircraft per year starting in FY21, with full-rate production ramping up to 15 aircraft per year starting in 2023. The service announced Maxwell is its preferred MH-139 formal training location, and Malmstrom will be the first operational location.

Contractors: Boeing (prime contractor); Leonardo (formerly Agusta-Westland) (airframe); Honeywell (avionics).
First Flight: 2019.
Delivered: Dec. 19, 2019-present.
IOC: 2023 (planned).
Production: 84 (planned).
Inventory: N/A.
Operator: AFMC. Planned: AETC, Air Force District of Washington, AFGSC, PACAF.
Aircraft Location: Duke Field, Fla. Planned: Fairchild AFB, Wash.; F. E. Warren AFB, Wyo.; JB Andrews, Md.; Kirtland AFB, N.M.; Malmstrom AFB, Mont.; Maxwell AFB, Ala.; Minot AFB, N.D.; Yokota AB, Japan.
Active Variants:
▪MH-139A. Military version of the Agusta-Westland AW139 for utility support and light lift.
Dimensions: Rotor diameter 45.2 ft, length 54.7 ft, height 16.3 ft.
Weight: Max gross 14,110 lb.
Power Plant: Two Pratt & Whitney PT6C-67C turboshaft, each 1,100 shp.
Performance: Speed 167 mph, range 890 miles.
Ceiling: 20,000 ft.
Armament: Two M240 7.62 mm machine guns (mission dependent).
Accommodation: Two pilots, flight engineer; Load: 15 passengers (depending on fuel, equipment, and atmospheric conditions) or up to four litters and five medical personnel.

Airman 1st Class Davis Donaldson

UH-1 HUEY/IROQUOIS

Light lift/training

Brief: The UH-1N aircraft initially provided search and rescue capabilities before replacing earlier Huey variants in the ICBM field security and support role. UH-1Ns also provide administrative/DV lift to U.S. National Capital Region at JB Andrews and U.S. Forces-Japan at Yokota, as well as supporting aircrew survival training at Fairchild. The TH-1H fleet provides Air Force helicopter pilot training at Fort Rucker. USAF converted all single-engine UH-1H models to TH-1H variants, extending their service lives' by at least 20 years. USAF awarded Boeing the $2.4 billion UH-1N replacement contract for up to 84 MH-139s in 2018, but contract delays pushed initial fielding to 2023 or beyond. The fleet recently received NVG-compatible cockpits, upgraded sensors, and safety and sustainment improvements. The ongoing SLEP of up to 63 airframes aims to bridge the gap until the MH-139A is fielded and USAF plans to begin retiring the fleet in 2022 with full retirement by 2032. UH-1N is the only DoD aircraft fleet to consistently achieve its target mission capable rate over the past decade.

Contractors: Bell Helicopter; Lockheed Martin (TH-1H prime).
First Flight: April 1969 (UH-1N).
Delivered: September 1970-1974; November 2005-2013 (TH-1H).
IOC: October 1970 (UH-1N); circa 2009 (TH-1H).
Production: 28 (TH-1H); 79 (USAF UH-1Ns).
Inventory: 28 (TH-1H); 63 (UH-1N).
Operator: AETC, Air Force District of Washington, AFGSC, AFMC, PACAF.
Aircraft Location: Eglin AFB, Fla.; Fairchild AFB, Wash.; F. E. Warren AFB, Wyo.; Fort Rucker, Ala.; JB Andrews, Md.; Kirtland AFB, N.M.; Malmstrom AFB, Mont.; Minot AFB, N.D.; Yokota AB, Japan.
Active Variants:
▪TH-1H. Modified twin-engine version of UH-1H used for flight training.
▪UH-1N. Military version of the Bell 212 used for utility support and light lift.
Dimensions: Rotor diameter 48 ft, length 57 ft, height 13 ft. (TH-1H); rotor diameter 48 ft, length 57.1 ft, height 12.8 ft. (UH-1N).
Weight: Max gross 10,500 lb.
Power Plant: One Honeywell T53-L-703 turboshaft, 1,800 shp (TH-1H); two Pratt & Whitney Canada T400-CP-400 turboshafts, 1,290 shp (UH-1N).
Performance: Speed 149 mph, range 300+ miles (UH-1N).
Ceiling: 15,000 ft (10,000 ft with 10,000+ lb).
Armament: (Optional) two General Electric 7.62 mm miniguns or two 40 mm grenade launchers; two seven-tube 2.75-in rocket launchers.
Accommodation: Two pilots, flight engineer; **Load:** Six to 13 passengers (depending on fuel, equipment, and atmospheric conditions) or up to six litters or, without seats, bulky, oversize cargo (UH-1N).

TRAINER AIRCRAFT

Master Sgt. JT May III

T-1 JAYHAWK

Advanced trainer

Brief: The T-1A is a military version of the Beechcraft 400A business jet used in the advanced phase of JSUPT for tanker/transport pilot and CSO training pipelines. The cockpit seats an instructor and two students. Mods include UHF/VHF radios, INS, TACAN, airborne direction finder, increased bird-strike resistance, and an additional fuselage fuel tank. CSO training aircraft also incorporate GPS-driven SAR and simulated RWR, as well as a second student and instructor station. Upgrade efforts are focused on avionics modernization and include new MFD and terrain collision avoidance systems. USAF awarded a $156 million Avionics Modernization Program (AMP) contract to replace the type's obsolescent flight deck with a commercial glass cockpit in 2018, and the first modified aircraft flew in March 2019. A total of 55 aircraft (including all CSO-training aircraft) will be upgraded using pre-purchased kits. USAF announced plans to divest the majority of the fleet starting in FY23 citing cost-prohibitive obsolescence issues. The service plans to retain only the 21 CSO-configured trainers at Pensacola. The last of 39 aircraft severely damaged in a hailstorm was rebuilt and redelivered to Laughlin on Dec. 17, 2020.

Contractors: Beechcraft (airframe); Field Aerospace/Rockwell Collins (AMP).
Operator: AETC.
First Flight: July 5, 1991 (T-1A).
Delivered: Jan. 17, 1992-July 1997.
IOC: January 1993.
Production: 180.
Inventory: 178.
Aircraft Location: Columbus AFB, Miss.; Laughlin AFB and JBSA-Randolph, Texas; Vance AFB, Okla.; NAS Pensacola, Fla.
Active Variant:
•T-1A. Military trainer version of Beechcraft 400A.
Dimensions: Span 43.5 ft, length 48.4 ft, height 13.9 ft.
Weight: Max T-O 16,100 lb.
Power Plant: Two Pratt & Whitney Canada JT15D-5B turbofans, each 2,900 lb thrust.
Performance: Speed 538 mph, range 2,555 miles.
Ceiling: 41,000 ft.
Accommodation: Three pilots (two students side by side, instructor in jump-seat); one pilot, one CSO trainee side-by side, instructor in jump-seat, one radar/system student and one instructor at aft-consoles (CSO-training configured aircraft).

Senior Airman Keith Holcomb

T-6 TEXAN II

Primary trainer

Brief: The T-6 is a joint Air Force/Navy undergraduate pilot trainer developed under the Joint Primary Aircraft Training System program. The aircraft is based on the Swiss Pilatus PC-9 and the Navy version is designated T-6B. Mods include a strengthened fuselage, zero/zero ejection seats, upgraded engine, increased fuel capacity, pressurized cockpit, bird-resistant canopy, and digital avionics with sunlight-readable LCDs. The tandem student and instructor positions are interchangeable, including single-pilot operation from either seat. The T-6 is fully aerobatic and features an anti-G system. USAF production was completed in 2010, with an expected service life of 21 years. Ongoing mods include airspace compliant avionics, improved canopy fracture system, and updated training aids. Development includes controlled flight into terrain avoidance, a crash-survivable flight data recorder, and Next-Generation Onboard Oxygen Generation System (OBOGS) to combat the hypoxia-like incidents expected starting in FY22. Improved maintenance and inspections will mitigate hypoxia risks until fleetwide retrofit is complete.

Contractor: Beechcraft/Textron Aviation Defense (formerly Raytheon).
First Flight: July 15, 1998.
Delivered: May 2000-May 2010.
IOC: May 2000.
Production: 452 (USAF); 328 (USN).
Inventory: 442 (USAF).
Operator: AETC, USN.
Aircraft Location: USAF: Columbus AFB, Miss.; Laughlin AFB, JBSA-Randolph, and Sheppard AFB, Texas; Vance AFB, Okla.; NAS Pensacola, Fla.
Active Variants:
•T-6A. Joint service primary training aircraft, based on the Pilatus PC-9.
Dimensions: Span 33.5 ft, length 33.4 ft, height 10.7 ft.
Weight: Max T-O 8,300 lb (T-6).
Power Plant: One Pratt & Whitney Canada PT6A-68 turboprop, 1,100 shp.
Performance: Speed 320 mph, range 1,035 miles.
Ceiling: 31,000 ft.
Accommodation: Two pilots on Martin Baker MK16LA zero/zero ejection seats.

USAF

T-7A RED HAWK

Advanced trainer

Brief: The T-7A Red Hawk is the Air Force's developmental next-generation, supersonic advanced jet trainer. The service selected the joint-venture Boeing-SAAB aircraft as the winner of the $9.2 billion "T-X" competition to replace the T-38 on Sept. 20, 2018. The Air Force dubbed the type "Red Hawk" in honor of the WWII Tuskegee Airmen. The T-7A was rapidly developed in less than three years using digital design techniques earning USAF's initial "e" prefix designating it part of the "Digital Century Series" to quickly field new, low-cost designs. eT-7A was designed from the outset to replicate the systems and performance of advanced 4th and 5th-generation aircraft including high-G/high angle of attack performance and a blend of synthetic and onboard systems including simulated radar, defensive systems, data links, and smart weapons. It incorporates fly-by wire controls, a fully digital glass cockpit, "stadium seating" to improve backseat visibility, next-gen ACES 5 ejection seats, modular systems architecture, and maintainer-friendly design to cut downtime and lifecycle cost. T-7A is being developed in tandem with the Ground-Based Training System simulator and courseware to provide AETC with a seamless, comprehensive flight training program. The first of two "production ready" airframes first flew from Boeing's facility at Saint Louis on Dec. 21, 2016. The first two aircraft launched initial flight testing and five additional airframes will support Engineering and Manufacturing Development testing at Edwards beginning flight-envelope expansion. The first production T-7A is planned for delivery to Randolph in 2023, and FY21 funds construction of the initial Ground-Based Training System simulator at JBSA Lackland.

Contractors: Boeing-SAAB, General Electric (engine), Collins Aerospace (cockpit/ejection seats).
First Flight: Dec. 20, 2016 (T-X).
Delivered: 2023 onward (planned).
IOC: 2024 (planned).
Production: 351 (planned).
Inventory: Three (contractor-owned test airframes).
Operator: Boeing, AFMC; Planned: AETC.
Aircraft Location: Edwards AFB, Calif. Planned: Columbus AFB, Miss.; Laughlin AFB, JBSA- Randolph, and Sheppard AFB, Texas; Vance AFB, Okla.
Active Variants:
▪eT-7A. Developmental next-generation advanced trainer.
Dimensions: Span 30.6 ft, length 46.9 ft, height 13.5 ft.
Weight: Max T-O 12,125 lb.
Power Plant: General Electric F404-GE-103 afterburning turbofan, 17,200 lb thrust with afterburning.
Performance: Speed Mach 1+, range approx. 1,140 miles.
Ceiling: 50,000 ft+.
Accommodation: Two pilots on ACES 5 zero/zero ejection seats.

Courtesy

T-38 TALON

Advanced trainer

Brief: The T-38 was the first supersonic trainer aircraft and primarily serves AETC's advanced JSUPT fighter/bomber tracks and Introduction to Fighter Fundamentals. The aircraft is used to teach supersonic techniques, aerobatics, formation, night and instrument flying, and cross-country/low-level navigation. The T-38 is also used by the USAF Test Pilot School to train test pilots and flight-test engineers and by ACC and AFGSC as a companion trainer to maintain pilot proficiency. ACC uses regenerated T-38s as dedicated Aggressor aircraft for F-22 training and companion trainers for the U-2 program. T-38Bs are equipped with a gunsight and centerline station for mounting external stores including ECM pod/practice bomb dispensers. Aircraft were redesignated T-38Cs after avionics modernization that added a glass cockpit and HUD, color MFDs, mission computer, integrated INS/GPS, and reshaped engine inlets. T-38s were designed for 7,000 flying hours but many have surpassed 20,000 hours, requiring life-extension to bridge the gap to replacement by the T-7A. Pacer Classic III is the type's third structural renewal effort and the most intensive in its history. It replaces major longerons, bulkheads/formers, intakes, internal skins, and structural floors on 180 high-risk T-38Cs. The first airframe was redelivered in 2015 and a total of 19 aircraft will complete upgrades in FY21. Additional efforts include wing replacement through 2033, a new forward canopy to improve bird-strike survivability, and low-cost safety mods. Development encompasses digital avionics, replacement HUD, VHF nav/comms, and airspace compliance. AETC plans to begin replacing its T-38s with the T-7A starting at Laughlin in 2033.

Contractors: Northrop Grumman; Boeing (sustainment); CPI Aerostructures (Pacer Classic III kits); Israel Aerospace Industries (re-wing).
First Flight: April 1959 (T-38A); July 8, 1998 (T-38C).
Delivered: 1961-72 (T-38A); 2002-07 (T-38C).
IOC: March 1961.
Production: 1,187.
Inventory: 53 (T-38A); six (AT-38B); 443 (T-38C).
Operator: ACC, AETC, AFGSC, AFMC.
Aircraft Location: Beale AFB and Edwards AFB, Calif.; Columbus AFB, Miss.; Holloman AFB, N.M.; JB Langley-Eustis, Va.; JBSA-Randolph and Sheppard AFB, Texas; JB Langley-Eustis, Va.; Eglin AFB and Tyndall AFB, Fla., Vance AFB, Okla.; Whiteman AFB, Mo.
Active Variants:
▪T-38A. Upgraded version with Pacer Classic I and II mods.
▪AT-38B. Armed weapons training version.
▪T-38C. Modernized airframes incorporating glass cockpits and upgraded engines.
Dimensions: Span 25.3 ft, length 46.3 ft, height 12.8 ft.
Weight: Max T-O 12,093 lb.
Power Plant: Two General Electric J85-GE-5 turbojets, each 2,900 lb thrust with afterburning.
Performance: Speed 812 mph, range 1,093 miles.
Ceiling: 55,000 ft+.
Accommodation: Two pilots on Martin Baker MK16T zero/zero ejection seats.

UNMANNED AIRCRAFT SYSTEMS

Bruce Hoffman/USAF

BMQ-167 SUBSCALE AERIAL TARGET

Full-scale aerial target

Brief: BMQ-167A is a subscale, unmanned aerial target and threat simulator serving missile/weapons development, testing, validation, and training over the Eglin Test and Training Range. The 82nd Aerial Targets Squadron employs the cheaper subscale targets to complement its QF-16 full scale aerial target fleet operating from Tyndall. The BMQ-167 is boosted to flying speed from a launch rail via a solid-fuel Rocket-Assisted Take Off (RATO) motor which is then jettisoned. BMQ-167 is capable of representing air targets maneuvering at up to nine Gs at speeds up to Mach 0.91 and altitudes between 50 and 50,000 feet. The drone is constructed of durable, lightweight composites, equipped with a recovery parachute, and depending on its condition capable of being refurbished and reused. BMQ-167s incorporate a scoring system and a range of threat-simulating systems/stores including IFF, EA pods, IR/radar countermeasures as well as IR/radar signature augmentation to simulate a variety of threats. The Air Force competitively awarded the first BMQ-167 production contract in 2002, and most recently awarded a $31.8 million Lot 15 sole-source contract to Kratos for 35 targets in June 2019. FY21 funds support Lot 17 production of 25 subscale targets.

Contractors: Kratos Unmanned Aerial Systems.
First Flight: Dec. 8 2004.
Delivered: 2004-present.
IOC: 2008.
Production: 800+ (planned).
Inventory: Unk.
Operator: ACC.
Aircraft Location: Tyndall AFB, Fla.
Active Variants:
▪BMQ-167A. Subscale aerial target.
Dimensions: Span 10.5 ft, length 20 ft, height 4 ft.
Weight: Max T-O 2,050 lb.
Power Plant: MicroTurbo (Safran) Tri 60-5 turbofan, 1,000 lb thrust.
Performance: Speed Mach 0.91, range unk.
Ceiling: 50,000 ft.
Defensive Systems: Chaff/flares, EA pods, IR/RF wing pods (augmentation).
Accommodation: Preprogramed, unmanned.

Staff Sgt. Omari Bernard

MQ-9 REAPER

Attack/armed reconnaissance

Brief: The MQ-9B is a medium-to high-altitude, long-endurance hunter-killer RPA, primarily tasked with eliminating time-critical and high-value targets in permissive environments. Additional roles include CAS, CSAR, precision strike, armed overwatch, target development/designation, and terminal weapon guidance. The MQ-9 fulfills a secondary tactical ISR role utilizing its Multispectral Targeting System-B (MTS-B), Lynx SAR, and/or Gorgon Stare wide-area surveillance. MTS-B integrates EO/ IR, color/ monochrome daylight TV, image-intensified TV, and a laser designator/ illuminator. MTS-B provides FMV as separate video streams or fused together. The MQ-9 employs SAR for JDAM targeting and dismounted target tracking. MQ-9B debuted in combat in Afghanistan in 2007. A Reaper system comprises three aircraft, GCS, LOS/BLOS satellite and terrestrial data links, support equipment/personnel, and crews for deployed 24-hour operations. MQ-9 is retrofitted under a flexible acquisition structure, which can rapidly change to meet demand. USAF plans to upgrade the entire fleet (including 144 Block 1, and 136 Block 5 aircraft) to Extended-Range standards. Reaper ER adds external fuel tanks, a four-bladed propeller, engine alcohol/water injection, heavyweight landing gear, longer wings and tail surfaces, and other enhancements. FY21 funds GCS Block 30, ER conversions, data link, GPS, and Gorgon Stare improvements, reliability and maintainability mods, capability upgrades and production line shut down. FY22 will launch DAS-4 high-definition EO/IR sensor retrofits to improve targeting accuracy. USAF is ending MQ-9 procurement and seeks to replace Reaper with a more survivable, flexible, and advanced platform as early as 2031.

Contractors: General Atomics Aeronautical Systems; L3Harris; Raytheon (sensors).
First Flight: February 2001.
Delivered: November 2003-present.
IOC: October 2007; 2015 (ER).
Production: 337 (planned).
Inventory: 289.
Operator: ACC, AFMC, AFRC (associate), AFSOC, ANG.
Aircraft Location: Cannon AFB, N.M.; Creech AFB, Nev.; Eglin AFB, Fla.; Ellington Field, Texas; Fort Drum, N.Y.; Fort Huachuca, Ariz.; Hancock Field, N.Y.; Hector Arpt., N.D.; Holloman AFB, N.M.; March ARB, Calif.; Nellis AFB, Nev., and deployed locations worldwide. Planned: Tyndall AFB, Fla.; Whiteman AFB, Mo.
GSC Location: Cannon AFB, N.M.; Creech AFB, Nev.; Battle Creek ANGB, Mich.; Davis-Monthan AFB, Ariz.; Des Moines Arpt., Iowa; Ellington Field, Texas; Ellsworth AFB, S.D.; Fort Smith Arpt., Ark.; Hancock Field, N.Y.; Hector Arpt., N.D.; Holloman AFB, N.M.; Horsham AGS, Pa.; Hurlburt Field, Fla.; March ARB, Calif.; Springfield-Beckley Arpt., Ohio. Planned: Niagara Falls Arpt., N.Y.; Shaw AFB, S.C.; Tyndall AFB, Fla.; Whiteman AFB, Mo.
Active Variants:
- MQ-9B Reaper Block 1. Air Force version of the General Atomics Predator B.
- MQ-9B Reaper Block 5. Improved, current production Reaper.
- MQ-9B Reaper ER. Extended-range MQ-9 with external fuel tanks, longer wings, and other enhancements.

Dimensions: Span 66 ft (79 ft, ER), length 36 ft, height 12.5 ft.
Weight: Max T-O 10,500 lb.
Power Plant: One Honeywell TPE331-10GD turboprop, max 900 shp.
Performance: Cruise speed 230 mph, range 1,150 miles, endurance 27 hr; 34 hr (ER).
Ceiling: 50,000 ft.
Armament: Combination of AGM-114 Hellfire (up to eight), GBU-12/49 Paveway II, and GBU-38 JDAMs.
Accommodation: Pilot, sensor operator (operating from GCS).

Tech Sgt. Perry Aston

QF-16 FULL-SCALE AERIAL TARGET

Full-scale aerial target

Brief: QF-16 is a manned/unmanned aerial target and threat simulator serving missile/weapons development, testing, validation, and training. QF-16s began replacing the dwindling and obsolescent QF-4 Full-Scale Aerial Target (FSAT) starting in 2015, through the type's retirement in December 2017. QF-16s are capable of manned or "not under live local operator" (NULLO) control operations. The first of 13 LRIP QF-16s was delivered to Tyndall in early 2015. Boeing is under contract to deliver 121 converted airframes in five production lots through April 2021. FY21 funds procure 13 conversions, and a follow-on sixth lot contract for 13 airframes is expected in mid-FY21. ACC declared IOC with 15 operational aircraft in 2016. Ongoing efforts include developing EA pods/pod improvements and software to more accurately replicate adversary capabilities and tactics, ground-control modernization, and threat realism/countermeasure improvements. Boeing and USAF opened a second QF-16 conversion line at Davis Monthan to augment production at Cecil Field in Jacksonville, Fla., which delivered its first airframe in mid-2020.

Contractors: Lockheed Martin; Boeing (drone conversion).
First Flight: May 4, 2012.
Delivered: February 2015-present.
IOC: Sept. 23, 2016.
Production: 126 (planned).
Inventory: 7 (QF-16A); 36 (QF-16C).
Operator: ACC.
Aircraft Location: Tyndall AFB, Fla., Holloman AFB, N.M.
Active Variants:
- QF-16A. Converted from retired F-16A Block 15.
- QF-16C. Converted from retired F-16C Block 25 and Block 30.

Dimensions: Span 32.8 ft, length 49.3 ft, height 16.7 ft.
Weight: Max T-O 37,500 lb.
Power Plant: Pratt & Whitney F100-PW-200 turbofan, 23,830 lb thrust (Block 15); Pratt & Whitney F100-PW-220 turbofan, 23,830 lb thrust (Block 25); GE Aviation F110-GE-100 turbofan, 29,000 lb thrust (Block 30).
Performance: Speed Mach 2, ferry range 2,000+ miles.
Ceiling: 50,000 ft.
Defensive Systems: Chaff/flares; EA pods: ALQ-188, ALQ-167.
Accommodation: Safety pilot (optional) on ACES II zero/zero ejection seat.

RQ-4 GLOBAL HAWK

High-altitude reconnaissance

Brief: The Global Hawk is a strategic long-endurance, high-altitude, "deep look" ISR platform complementing satellite and manned ISR. It is capable of imagery, SIGINT, and ground moving target indication (GMTI), depending on variant. The system consists of the aircraft and sensors, launch and recovery element (LRE), mission control element (MCE), and comms/ mission planning cell. The pre-production Block 10 debuted in combat in 2001 and retired in 2011. Block 20 was initially equipped with the Enhanced Integrated Sensor Suite (EISS) for imagery intelligence (IMINT). Five were converted as EQ-4B Battlefield Airborne Communications Node (BACN) relays, and four are active following a loss replacement in 2018. Block 30 is a multi-intelligence platform equipped with EO/IR, SAR, and SIGINT sensors. It is also equipped with a universal payload adapter that enables (previously) U-2-unique payloads including the MS-117 and SYERS II EO sensors, and a wet-film Optical Bar Camera to be carried. The Airborne Signals Intelligence Payload (ASIP) was only installed on three of the 11 planned airframes. Block 40 is a ground-moving target surveillance platform equipped with the Multiplatform Radar Technology Insertion

Senior Airman Elora McCutcheon

Program (MP-RTIP). Its AESA and SAR simultaneously conduct moving target and cruise missile tracking, as well as stationary imagery collection. USAF announced plans to retire the EQ-4B and RQ-4B Block 30, retaining only the Block 40. FY21 funds shift to supporting and modernizing Block 40, including a design study aimed at integrating a modular ISR payload adapter. USAF conducted the first RQ-4 flight using the new, modernized ground control station in 2020.

Contractors: Northrop Grumman, Raytheon, L3Harris.
First Flight: Feb. 28, 1998.
Delivered: August 2003-present.
IOC: August 2011 (Block 30); August 2016 (Block 40).
Production: 45 (USAF).
Inventory: 33; four (Block 20); 19 (Block 30); 10 (Block 40).
Operator: ACC, AFMC.
Aircraft Location: Beale AFB, Calif. (Block 30); Edwards AFB, Calif.; Grand Forks AFB, N.D. (Block 20/40); forward operating locations: Ali Al Salem AB, Kuwait (EQ-4B); Andersen AFB, Guam; NAS Sigonella, Italy; Yokota AB, Japan.
Active Variants:
▪EQ-4B Block 20. Battlefield Airborne Communications Node (BACN) comm relay platform.
▪RQ-4B Block 30. Multi-intelligence platform equipped with EO/IR and SAR sensors.
▪RQ-4B Block 40. AESA and SAR equipped ground moving target indication (GMTI) and battlefield ISR platform.
Dimensions: Span 130.9 ft, length 47.6 ft, height 15.3 ft.
Weight: Max T-O 32,250 lb; max payload 3,000 lb.
Power Plant: One Rolls-Royce North American F137-RR-100 turbofan, 7,600 lb thrust.
Performance: Speed 356.5 mph, range 14,150 miles, endurance 32+ hrs (24 hrs on-station loiter at 1,200 miles).
Ceiling: 60,000 ft.
Accommodation: LRE Pilot, MCE pilot, MCE sensor operator (operating from LRE/MCE).

USAF

RQ-170 SENTINEL

Unmanned surveillance and reconnaissance

Brief: RQ-170 is an unmanned, stealthy, penetrating, day/night tactical ISR platform. Although the RQ-170 was still under development and test, USAF employed it in Southwest Asia for Enduring Freedom. The RPA was developed in response to DOD's call for additional RPA support for combatant commanders. USAF publicly acknowledged the aircraft after photos appeared in foreign news media of operations over Afghanistan in 2009. The type is operated by the 432nd Wing at Creech and the 30th Reconnaissance Squadron at Tonopah Test Range. In 2011, an RQ-170 was captured almost intact by Iranian forces. Iran allegedly reverse-engineered a copy of the aircraft, which the Israeli Air Force reported shooting down during an engagement inside Israeli territory on Feb. 10, 2018. The RQ-170 took part in a joint-exercise at Nellis in August 2020, testing its ability to accompany a B-2 on penetrating operations aided by SEAD F-35s.

Contractor: Lockheed Martin.
Operator: ACC.
GCS Location: Creech AFB, Nev.; Tonopah Test Range, Nev.
Aircraft Location: Tonopah Test Range, Nev.; deployed worldwide.
Known Active Variant:
▪RQ-170. No data available.
Dimensions: Span 65.6 ft, length 14.75 ft.

STRATEGIC WEAPONS

Tinker Air Force Base History Office

AGM-86 AIR-LAUNCHED CRUISE MISSILE (ALCM)

Strategic air-to-surface cruise missile

Brief: The AGM-86 is a low-level, penetrating nuclear strike weapon for use against strategic surface targets. ALCM's small radar signature and low-level flight capability enhance the missile's effectiveness. The nuclear AGM-86B was the first production version with a total of 1,715 delivered through 1986. USAF plans to cut the inventory from its current level to an eventual 528 ALCM. Some ALCMs were modified for conventional use with INS/GPS-guidance and a blast fragmentation warhead and redelivered in 1987 as the AGM-86C CALCM. CALCM was operationally employed for the first time in Desert Storm and widely used in subsequent operations. CALCM was capable of adverse weather, day/night, air-to-surface, accurate, standoff strike capability at ranges greater than 500 miles. The AGM-86D was CALCM's Block II penetrator version with AUP-3(M) warhead used for standoff strikes on hardened, deeply buried targets in Afghanistan. CALCM was retired in early 2019 and the inventory is stored at Barksdale awaiting disposal. ALCM is undergoing SLEP/component remanufacture to stretch its in-service life to 2030, allowing for replacement by the Long-Range Standoff (LRSO) missile. USAF awarded Lockheed Martin and Raytheon technology-maturation and risk-reduction contracts for the LRSO in 2017, with Raytheon's design emerging as the focus of USAF's continued development last year. Plans call for fielding the nuclear missile by the late 2020s, possibly followed by a conventional derivative thereafter.

Contractor: Boeing.
First Flight: June 1979 (full-scale development).
Delivered: 1981-1986.
IOC: December 1982 (B); January 1991 (C); November 2001 (D).
Production: 1,715.
Inventory: 536 (B), 186 (C), 34 (D).
Operator: AFGSC.
Unit Location: Barksdale AFB, La.; Minot AFB, N.D.
Active Variants:
▪AGM-86B. Nuclear ALCM variant.
Dimensions: Span 12 ft, length 20.8 ft, body diameter 2 ft.
Weight: 3,150 lb.
Power Plant: Williams/Teledyne CAE F107-WR-10 turbofan, 600 lb thrust.
Performance: Speed 550 mph, range 1,500+ miles (B).
Guidance: Inertial plus Terrain Contour Matching (B).
Warhead: W80-1 nuclear warhead (B).
Estimated Yield: W80-1 warhead: five-150 kilotons (preselectable).
Integration: B-52H.

Giancarlo Casem/USAF

AGM-183 AIR-LAUNCHED RAPID RESPONSE WEAPON (ARRW)

Hypersonic air-to-surface weapon

Brief: The AGM-183A is a developmental boost-glide hypersonic missile to provide future, nonnuclear strike against time-sensitive, heavily defended, high-value targets from standoff range. The missile is designed to accelerate to speeds well in excess of Mach 5 before releasing a non-powered glide vehicle which maneuvers to the intended target. USAF completed a series of seven captive flight-tests utilizing an instrumented test article on a B-52H at Edwards, culminating in an aborted boost-test in December 2020. The service now plans to conduct the first boost-test from a B-52 in early FY21, accelerating a dummy glide vehicle over the Point Mugu Test Range. The service is procuring eight prototype AGM-183s to support testing and a potential early-operational capability. AFGSC plans to operationally deploy the weapon on the B-52 and B-1 as early as 2022, with possible, later integration on the F-15E/EX.

Contractor: Lockheed Martin.
First Flight: N/A.
Delivered: N/A.
IOC: 2022 (planned).
Production: N/A.
Inventory: N/A.
Operator: AFMC, Planned: AFGSC.
Unit Location: Edwards AFB, Calif.
Active Variants:
▪AGM-183A. Developmental prototype hypersonic boost-glide weapon.
Dimensions: Unk.
Weight: Unk.
Propulsion: Solid fuel rocket.
Performance: Mach 5+, range approx. 1,000 miles.
Guidance: Unk.
Warhead: Boost-glide vehicle
Integration: Planned: B-1B, B-52H, F-15E.

National Nuclear Security Administration

B61 THERMONUCLEAR BOMB

Air-to-surface thermonuclear bomb

Brief: B61 is an air-dropped battlefield/tactical nuclear weapon. It is the B-2's primary strategic weapon equiping both the F-16 and F-15E in the forward-deployed, allied extended deterrent role, as well as the B-2. The weapon was first delivered in 1966, and the B61 Mod 11 introduced in 1997 adds a ground-penetrating capability, enhancing its effect against buried and hardened targets. The weapon incorporates several preselectable yield options tailored to mission requirements. Work is underway on the B61 Mod 12 Life Extension Program (LEP) begun in 2016 to consolidate the B61-3, -4, -7, and -10 into a single, standardized configuration. The LEP refurbishes the warhead to improve the safety, security, and reliability through 2040. B61-12 also adds a guided tail kit, making it the first precision guided weapon of its type, permitting higher effectiveness at lower yields. USAF and the National Nuclear Security Administration finished qualification flight-testing on June 9, 2018. The 31 inert test drops greatly exceeded performance requirements, validating nonnuclear components such as arming/fire control, guidance, spin-rocket motors, and software. B61-12 was approved for production and completed operational flight testing on the F-15E and B-2A in 2019. Operational testing included 15 drops, certifying the F-15E as the first aircraft capable of delivering the B61-12 on June 8, 2020. The Department of Energy conducted nine additional drops, culminating in a full-weapon system demo on the B-2A in July 2020. The F-35A dropped an inert B61-12 for the first time on Aug. 25, 2020, employing it in supersonic flight from its internal weapons bay. Delivery of the first production example has been delayed two years to 2022 due to technical issues. Future integration is planned on the F-16, and F-35A.

Contractors: Los Alamos National Laboratory (weapon); Boeing (B61-12 tail kit).
Delivered: 1966.
IOC: 1968.
Production: N/A.
Inventory: Approx. 500.
Operator: AFMC, USAFE.
Deployed locations: Aviano AB, Italy; Büchel AB, Germany; Ghedi AB, Italy; Incirlik AB, Turkey; Kleine Brogel AB, Belgium; Volkel AB, Netherlands.
Active Variant:
▪B61. Supersonic-droppable free-fall thermonuclear weapon.
Dimensions: Length 11 ft 8 in., diameter 1 ft 1 in.
Weight: 700 lb; 825 lb (B61-12).
Performance: N/A.
Guidance: None (B61 Mod 1 to 11); unk, likely INS (B61 Mod 12).
Warhead: One B61 -3, -4, -7, -10, or -11.
Estimated Yield: 0.3 kilotons, 1.5 kilotons, 10 kilotons, 50 kilotons (preselectable).
Integration: B-2A, F-15E, and F-16C/D; NATO: F-16A/B Mid-Life Upgrade (MLU), and Panavia Tornado IDS. Planned: B-21, F-35A.

Airman 1st Class Braydon Williams

LGM-30 MINUTEMAN III

Strategic surface-to-surface ballistic missile

Brief: Minuteman is a three-stage, solid-propellant nuclear deterrent ICBM housed in a survivable underground silo. Minuteman III became operational in 1970, providing improved range, rapid retargeting, and the capability to place up to three reentry vehicles on three targets with high accuracy. It is the sole remaining US land-based ICBM. Ongoing mods include updated warhead fuses, networking, and cryptography upgrades. FY18 began the Launch Control Center Block Upgrade (LCCBU), which replaces key hardware, software, comms, and environmental control systems in the crew capsule, as well as starting new missile site security and video situational awareness upgrades. Guidance and propulsion upgrades and modernized reentry vehicles extend service life to 2030. New efforts include developing a replacement to the current, obsolete airborne launch system fielded aboard the Navy's E-6B Mercury aircraft. AFGSC is also undertaking Launch Control Center AEHF integration to modernize and enhance comms redundancy. The command initially deployed 550 missiles, later reducing that number to 400 based at Malmstrom, Minot, and F.E. Warren. AFGSC reduced deployed ICBMs to a single-warhead configuration in 2014, under limits imposed by the New START agreement. USAF awarded Boeing and Northrop Grumman technology maturation and risk-reduction contracts to replace Minuteman with a future Ground-Based Strategic Deterrent (GBSD) in 2017. Boeing declined to bid on full development in 2019, leaving Northrop Grumman to develop GBSD. Minuteman III is already more than 40 years beyond its initially planned service life, and USAF expects the system will begin falling below readiness standards as early as 2026 if not replaced. Flight-testing of a

replacement fuze began in February 2019 and will culminate with the last of four test launches in 2024.

Contractors: Boeing; General Electric; Lockheed Martin; Northrop Grumman (formerly Orbital ATK)
First Flight: February 1961.
Delivered: 1962-1978.
IOC: December 1962, Malmstrom AFB, Mont.
Production: 1,800.
Inventory: 397 deployed; 261 non-deployed.
Operator: AFGSC.
Unit Location: F. E. Warren AFB, Wyo.; Malmstrom AFB, Mont.; Minot AFB, N.D.; Vandenberg SFB, Calif. (test location).
Active Variant:
▪LGM-30G. Current Minuteman III variant.
Dimensions: Length 59.9 ft, diameter 5.5 ft. Weight: 79,432 lb.
Propulsion: Stage 1: Orbital ATK refurbished M55 solid-propellant motor, 202,600 lb thrust; stage 2: Orbital ATK refurbished SR19 solid-propellant motor, 60,721 lb thrust; stage 3: Orbital ATK refurbished SR73 solid- propellant motor, 34,400 lb thrust.
Performance: Speed at burnout approx 15,000 mph, range 6,000+ miles.
Guidance: Inertial guidance system.
Re-entry Vehicle: One Mk 21 RV; one to three Mk 12/12A MIRVs.
Warhead: One W87 or up to three W78 enriched uranium thermonuclear weapons.

LONG-RANGE STANDOFF WEAPONS

Airman 1st Class Celeste Zuniga

ADM-160 MINIATURE AIR LAUNCHED DECOY (MALD)

Aircraft decoy; close-in radar jammer

Brief: MALD is a programmable, low-cost, modular, autonomous flight vehicle that mimics U.S. or allied aircraft to confuse enemy Integrated Air Defense Systems (IADS). MALD-J adds radar jamming capability to the basic decoy platform and can operate alone or in concert with other EW platforms. The jammer version is designed as an expendable, close-in jammer to degrade and deny an early warning or acquisition radar's ability to establish a track on strike aircraft. It also maintains the ability to fulfill the basic decoy mission. F-16 or B-52 are lead employment aircraft for MALD. USAF capped procurement in FY12, converting Lot 4 to the MALD-J variant. Plans call for 3,000, of which 2,400 are the jammer version. USAF demonstrated in-flight retargeting capabilities and is integrating GPS-Aided Inertial Navigation System (GAINS II) to improve navigational accuracy in GPS-denied environments. An upgraded Jammer variant dubbed "MALD-X" successfully demonstrated future, low-level flight capabilities, improved EW payloads, and enhanced data links in 2018. MALD-X aims to establish USAF's future baseline and serves as the basis of the Navy's developmental MALD-N variant. USAF awarded a MALD-J contract option for Lot 10 production in 2016 and a follow-on Lot 11 contract for 250 weapons in 2018.

Contractor: Raytheon.
First Flight: 1999 (MALD); 2009 (MALD-J).
Delivered: Sept. 6, 2012 (MALD-J).
IOC: 2015 (MALD-J).
Active Variants:
▪ADM-160B. MALD base decoy variant.
▪ADM-160C. MALD-J jammer/decoy variant.
Dimensions: Span 5.6 ft (extended), length 9.3 ft. Weight: Less than 300 lb.
Power Plant: Hamilton Sundstrand TJ-150 turbojet, 337 lb thrust.
Performance: Range up to 575 miles, endurance 90 minutes (50 minutes on-station loiter).
Guidance: GPS/INS.
Integration: B-52H, F-16C. Planned: B-1B.

USAF

AGM-154 JOINT STANDOFF WEAPON (JSOW)

Guided air-to-surface glide bomb

Brief: JSOW is a joint USAF-Navy family of medium-range, GPS/INS guided, standoff air-to-ground glide weapons. It is used to attack a variety of soft and armored area targets during day and night and adverse weather conditions. The baseline BLU-97 CEM variant is used against soft and area targets. The BLU-108 variant provides anti-armor capability. The AGM-154C incorporates an additional imaging IR seeker and is intended for use against hardened, stationary targets. The new AGM-154C-1 variant adds moving, maritime strike capability to the baseline C variant, which reached IOC with the Navy in 2016. The weapon completed operational flight testing on the F-35C in 2019, clearing the way for ongoing internal integration and testing on the F-35A.

Contractor: Raytheon.
First Flight: December 1994.
Delivered: 2000-05 (USAF).
IOC: 2000.
Active Variants:
▪AGM-154A. Baseline BLU-97 CEM variant for soft/area targets.
▪AGM-154B. The BLU-108 submunition variant for anti-armor.
▪AGM-154C. Imaging IR-guided variant for hardened tactical targets.
Dimensions: Length 13.3 ft, diameter 13 in.
Performance: Range 13.8 miles low altitude, 73 miles high altitude.
Guidance: GPS/INS.
Warhead: See variants above.
Integration: B-1, B-2, B-52, F-15E, and F-16. Planned: F-35A.

Tech. Sgt. David Scott-Gaughan

AGM-158 JOINT AIR-TO-SURFACE STANDOFF MISSILE (JASSM)

Air-to-surface cruise missile

Brief: JASSM is a joint USAF-Navy autonomous, precision cruise missile for use against heavily defended or high-value targets at standoff range. It can attack fixed, relocatable, and moderately hardened/buried targets. The base-variant is a stealthy, low-cost airframe equipped with GPS/INS guidance and imaging IR terminal seeker. The JASSM-Extended Range (JASSM-ER) version uses the same baseline body, but a new engine and fuel system that increases range to more than 500 miles. The ER was cleared for combat use on the B-1B in 2015, reached full operational capability on the F-15E in 2018, and planned for use on all fighter/bomber platforms. Full-rate production began in 2018, and production shifted to ER-only in FY16. Total planned production includes 2,034 JASSMs and 2,866 JASSM-ERs. Further development has resulted in the "extreme range" JASSM-XR, which is slated for future production. Lockheed Martin is also developing the Long-Range Anti-Ship Missile (LRASM) which reached early operational capability on the B-1B in December 2018, and is planned

for additional fielding on the B-52. The service is considering upping total procurement to as many as 10,000 JASSMs and 400 LRSAMs. FY21 funds support procurement of five LRASM and 400 JASSM-ER including initial procurement of 40 extreme-range variants deferred from FY20. USAF conducted a proof of concept employing palletized JASSM deployed from the ramp of a C-17 and MC-130 in September 2020, aimed at using mobility platforms for massed, stand-off attack.

Contractors: Lockheed Martin; Raytheon; Honeywell.
First Flight: April 8, 1999.
Delivered: 2001-present.
IOC: September 2003; December 2014 (ER variant); 2018 (LRASM).
Production: 7,200 JASSM (planned); 50 LRASM (planned).
Active Variants:
▪AGM-158A JASSM. Base-variant.
▪AGM-158B JASSM-ER. Extended-range variant.
▪AGM-158C LRASM. Long-Range Anti-Ship Missile, based on JASSM.
▪AGM-158D JASSM-XR. Future extreme-range variant of JASSM-ER.
Dimensions: Length 14 ft.
Power Plant: Teledyne Technologies J402 turbojet (JASSM); Williams Intl. F107-WR-105 turbofan (JASSM-ER).
Performance: Speed subsonic, range 200+ miles (baseline), 500+ miles (ER), approx. 1000 miles (XR).
Guidance: GPS/INS and imaging IR terminal seeker.
Warhead: 1,000-lb class penetrator (JASSM); 1,000-lb blast fragmentation (LRASM).
Integration: B-1B, B-2, B-52H, F-15E, and F-16 Block 40-52; planned: F-35A (JASSM). B-1B, B-2A, B-52H, F-15E F-16; planned: F-35A (JASSM-ER B1B; planned: B-52 (LRASM).

AIR-TO-AIR MISSILES

Airman 1st Class Cedrique Oldaker

AIM-9 SIDEWINDER

Air-to-air missile

Brief: Sidewinder is an IR-guided short-range, supersonic air-to-air missile. It was developed by the Navy for fleet air defense and adapted for USAF fighters. Early versions were used extensively in the Vietnam War. The AIM-9M is a joint Navy-USAF, all-altitude, all-aspect intercept missile. It has improved defense against IR countermeasures, background discrimination, and reduced-smoke rocket motor. AIM-9X is the newest jointly funded variant. It employs passive IR tracking, jet-vane steering for increased maneuverability, and Joint Helmet-Mounted Cueing System (JHMCS) compatibility for high, off-boresight targeting. The enhanced AIM-9X Block II was cleared for full-rate production in September 2015 and adds improved lock-after-launch and maneuverability, new data link for beyond-visual range engagement, enhanced anti-countermeasures, a new fuse, and safer ground-handling characteristics. AIM-9X production includes 67 converted AIM-9Ms, 1,289 Block I, and planned joint-service procurement of 11,635 Block II/II-plus (nearly double the number originally planned). FY21 funds procure a combined 331 AIM-9X Block II/II+ missiles.

Contractor: Raytheon; Northrop Grumman (propulsion).
First Flight: September 1953; July 1999 (AIM-9X); 2016 (AIM-9X Block II).
Delivered: AIM-9M 1983; AIM-9X from 2002-2011 (Block I); 2011-present (Block II); 2017-present (Block II+).
IOC: Circa 1983 (9M); 2003 (9X).
Production: 1,289 (Block I); 11,635 (Block II/Block II+) (planned).
Active Variants:
▪AIM-9M. Early variant.
▪AIM-9M-9. Expanded anti-countermeasure capability variant.
▪AIM-9X. Newest, highly maneuverable, JHMCS compatible variant.
Dimensions: Span 2.1 ft, length 9.4 ft, diameter 5 in.
Propulsion: Mk 36 Mod 11 (9M); Orbital ATK Mk 139 solid-propellant rocket motor (9X).
Performance: Speed Mach 2+, range 10+ miles.
Guidance: Passive IR homing guidance.
Warhead: HE annular blast fragmentation.
Integration: F-15C/D/E, F-16C/D, F-22A (AIM-9X). Planned: F-35A.

Master Sgt. Michael Jackson

AIM-120 ADVANCED MEDIUM-RANGE AIR-TO-AIR MISSILE (AMRAAM)

Air-to-air guided missile

Brief: AMRAAM is an active radar-guided, medium-range, supersonic air-to-air missile. It is a joint USAF-Navy follow-on to the AIM-7 Sparrow with launch-and-maneuver capability. The AIM-120B is an upgraded, reprogrammable variant of the original missile. The AIM-120C incorporates smaller control surfaces for internal carriage on F-22 and F-35 and a high-angle off-boresight (HOBS) launch capability. AIM-120D offers improved range, GPS-assisted guidance, updated data links, and jam resistance, in addition to greater lethality. Ongoing upgrades will further enhance weapon performance and electronic protection. The second phase of the AIM-120D System Improvement Program (SIP II) completed operational testing and will be fielded in 2020. Cybersecurity testing was concluded in mid-2019. FY20 funds procure 414 AIM-120D missiles. In 2019, USAF announced it is developing the AIM-260 Joint Air Tactical Missile (JATM) with the Navy to replace AMRAAM with a longer-range, more capable weapon to counter high-end threats.

Contractors: Raytheon; Northrop Grumman; Nammo Group (propulsion).
First Flight: December 1984.
Delivered: 1988-present.
IOC: September 1991; July 2015 (120D).
Active Variants:
▪AIM-120B. Upgraded, reprogrammable variant of AIM-120A.
▪AIM-120C. Production variant optimized for the F-22/F-35.
▪AIM-120D. Latest variant with GPS guidance, improved range, lethality, and jam-resistance.
Dimensions: Span 1.7 ft, length 12 ft, diameter 7 in.
Propulsion: Boost-sustain solid-propellant rocket motor.
Performance: Supersonic, range 20+ miles.
Guidance: Active radar terminal/inertial midcourse.
Warhead: HE blast-fragmentation.
Integration: F-15C/D/E, F-16C/D, F-22A, F-35A.

AIR-TO-GROUND MISSILES/ ROCKETS

ADVANCED PRECISION KILL WEAPON SYSTEM (APKWS)

Air-to-surface guided rocket

Brief: APKWS is a low-cost, semi-active laser-guidance system sized to fit the 2.75-in aerial rocket. It is optimized for precision, low-collateral-damage strike against moving or stationary light vehicle and personal targets. Illuminating and white phosphorous rounds are used for target marking by Forward Air Control aircraft. USAF acquired the system as an urgent operational requirement, and it was employed in combat for

Samuel King/Courtesy illustration

the first time by an F-16 in June 2016. The weapon employs a mid-body guidance package to convert the standard rocket into a guided weapon. APKWS was already in service with the three other services, and initial weapons were procured from Navy stocks. The rockets are launched from multi-round, reusable pods. FY20 funds procure 5,400 APKWS guidance kits. An F-16 successfully destroyed an airborne target using APKWS as part of an anti-cruise missile demo in 2019.

Contractor: BAE Systems.
First Flight: May 2013 (USAF).
Delivered: October 2012-present.
IOC: N/A.
Active Variant:
▪AGR-20A. Semi-active, laser-guided 2.75-in rocket, adapted for fixed-wing use.
Dimensions: Span 9.5 in, length 6.25 ft, diameter 2.75 in.
Propulsion: Solid-propellant rocket motor.
Performance: Subsonic, range 1.2 to 6.8 miles.
Guidance: Semi-active laser.
Warhead: HE, white phosphorous, or illuminating round.
Integration: AT-6, A-10, A-29, F-16.

Tech. Sgt. Matthew Doyle

AGM-65 MAVERICK

Air-to-surface guided missile

Brief: Maverick is a TV, imaging IR, or laser-guided standoff air-to-surface missile employed by fighter/attack aircraft against tanks, vehicles, and air defenses. It was first employed during the Vietnam War and was used extensively in Desert Storm and Iraqi Freedom. AGM-65B is a launch-and-leave, EO/TV guided missile, equipped with "scene magnification" allowing acquisition of small/distant targets. Fielded in 1986, AGM-65D employs an imaging IR seeker for all-weather day/night use. The AGM-65E is laser guided with a heavyweight penetrator warhead. The AGM-65G fielded in 1989 combines an imaging IR seeker, software to track larger targets, with a heavyweight penetrator warhead, digital autopilot, and a pneumatic actuation system. The AGM-65H is an upgraded B variant that recently completed tracker upgrades. The AGM-65K is a modified G variant, replacing IR guidance with EO TV guidance and is also undergoing a tracker upgrade. The AGM-65L is the newest EO TV/semiactive-laser seeker equipped "Laser Maverick" designed to strike high-speed moving targets. USAF is gradually modifying legacy missiles to Laser Maverick standards, but the FY21 budget does not include additional procurement.

Contractors: Raytheon (missile body); Northrop Grumman (propulsion).
First Flight: August 1969.
Delivered: August 1972.
IOC: February 1973.
Active Variants:
▪AGM-65B. A launch-and-leave EO TV seeker variant.
▪AGM-65D. Adverse weather B variant.
▪AGM-65E. Laser guided version heavyweight penetrator variant.
▪AGM-65G. Imaging IR seeker heavyweight penetrator variant.
▪AGM-65H. Upgraded B variant.
▪AGM-65K. Modified EO TV seeker G variant.
▪AGM-65L. Laser guided EO TV seeker variant for fast moving targets.
Dimensions: Span 2.3 ft, length 8.2 ft, diameter 12 in. Propulsion: Two-stage, solid-propellant rocket motor.
Performance: Supersonic, range 20 miles.
Guidance: EO TV guidance system (B/H/K); Imaging IR seeker (D/G); laser seeker (E).
Warhead: 125-lb cone-shaped (B/D/H); 300-lb delayed-fuse penetrator (E/G/K).
Integration: A-10C, F-15E, F-16C/D.

Staff Sgt. Scott Stewart

AGM-88 HIGH-SPEED ANTI-RADIATION MISSILE (HARM)

Air-to-surface anti-radiation missile

Brief: HARM is an anti-radiation, air-to-surface missile highly effective against enemy ground radar. AGM-88 is a joint USAF-Navy weapon, carried by SEAD-dedicated F-16CJs. AGM-88B is equipped with erasable and electronically programmable read-only memory, permitting in-field changes to missile memory. The AGM-88C is the current production model with a more lethal warhead. Raytheon began a HARM Control Section Mod (HCSM) in 2013 to convert current models to more precise AGM-88Fs incorporating improved GPS/INS guidance, anti-countermeasure performance, and reduced risk of collateral damage. The Navy is further retrofitting its missiles with advanced networking, digital homing, and terminal millimeter-wave radar seeker resulting in the AGM-88G Advanced Anti-Radiation Guided Missile (AARGM). USAF is pursuing the extended-range AARGM-ER as the basis for its next-generation Stand-in Attack Weapon (SiAW) to equip the F-35A with SEAD capability. The missile will additionally enable it to strike advanced threats including theater ballistic missile and land attack/anti-ship missile sites, GPS jammers, and anti-satellite systems. USAF aims to complete integration and fielding of SiAW on the F-35 by the mid-2020s.

Contractors: Raytheon (HARM); Northrop Grumman (AARGM).
First Flight: April 1979.
Delivered: 1982-98.
IOC: Circa 1984.
Active Variants:
▪AGM-88B. Early production variant.
▪AGM-88C. Current production variant.

▪AGM-88F. Upgraded variant with greater accuracy and precision.
▪Stand-In Attack Weapon. Next-generation anti-radiation missile based on the AARGM-ER.
Dimensions: Span 3.7 ft, length 13.7 ft, diameter 10 in.
Propulsion: Thiokol dual-thrust, solid-propellant rocket motor.
Performance: Supersonic, range 30+ miles.
Guidance: Proportional with fixed antenna and seeker head in missile nose.
Warhead: HE fragmentation.
Integration: F-16CJ (Block 50); planned: B-21, F-35A (SiAW).

Robert Brooks

AGM-114 HELLFIRE

Air-to-surface guided missile

Brief: Hellfire is a low-collateral damage, precision air-to-ground missile with semi-active laser guidance for use against light armor and personnel. Missiles are used on the MQ-9 Reaper. AFSOC dropped previous plans to integrate the weapons onto its AC-130W gunships in favor of the Small Glide Munition. Hellfire is procured through the Army, and numerous variants are utilized based on overseas contingency demands. An MQ-1 Predator employed Hellfire in combat for the first time in Afghanistan on Oct. 7, 2001. The latest AGM-114R replaces several types with a single, multitarget weapon, and USAF is also buying variable Height-of-Burst (HOB) kits to enhance lethality. The next-generation Joint Air-to-Ground Missile (JAGM) is also procured via the Army, and adds a new multimode guidance section to the AGM-114R. JAGM is used against high-value moving or stationary targets in all weather. FY21 funds 2,497 Hellfire/JAGM via a common production contract.

Contractors: Lockheed Martin (missile body); Northrop Grumman (propulsion).
First Flight: Feb. 16, 2000 (USAF).
Delivered: March 2016-present.
IOC: N/A.
Active Variants:
▪AGM-114. Numerous subvariants, depending on target and mission requirements.
▪AGM-169. JAGM, incorporating a multimode seeker on the advanced AGM-114R.
Dimensions: Span 28 in, length 5.33 ft, diameter 17 in.
Propulsion: Solid-propellant rocket motor.
Performance: Subsonic, range 5+ miles.
Guidance: EO TV guidance system (B/H/K); IIR seeker (D/G); laser seeker (E).
Warhead: Shaped charge and blast fragmentation.
Integration: MQ-9.

AGM-176 GRIFFIN

Air-to-surface guided missile

Brief: Griffin is a light, low-cost, multiservice air-launched weapon with GPS-aided inertial guidance and semi-active laser seeker. The weapon is used for high-precision, low-collateral damage attack against light surface targets. The AGM-176A forms part of the PSP employed on AFSOC's AC-130W Stinger II and AC-130J Ghostrider gunships. Both aircraft employ the aft-firing weapon from ramp-mounted common-launch tubes. The forward-firing AGB-176B is employable on RPAs. USAF issued Raytheon

Raytheon

a $105.2 million contract modification to supply additional Griffin missiles in 2018. FY21 SOCOM-wide funds support procurement of 226 AGM-176, including data links.

Contractor: Raytheon.
First Flight: Feb. 16, 2000 (USAF).
Delivered: September 2001.
IOC: N/A.
Active Variants:
▪AGM-176A. Aft-ejecting missile employed as part of the PSP.
▪AGM-176B. Forward-firing variant optimized for light aircraft/RPAs.
Dimensions: Length 43 in, diameter 5.5 in.
Propulsion: Solid-propellant rocket motor. Performance: Subsonic, range 12 + miles.
Guidance: GPS/INS/semi-active laser.
Warhead: Blast fragmentation.
Integration: AC-130J (A), AC-130W (A); MQ-9 (B).

Textron Systems

AREA WEAPONS

CBU-105 SENSOR FUZED WEAPON (SFW)

Wide-area munition

Brief: SFW is a tactical area weapon used against massed stationary or moving armor and ground vehicles. The munitions dispenser contains a payload of 10 BLU-108 submunitions, each containing four skeet-shaped copper disks totaling 40 lethal, target-seeking projectiles. The skeet's active laser and passive IR sensors can detect a vehicle's shape and IR signature; if no target is detected, the warhead detonates at a preset time. Primary targets are massed tanks, armored personnel carriers, and other self-propelled targets. SFW can be delivered from high altitude and in adverse weather. It debuted in combat in Iraq in 2003. DOD ceased cluster munition procurement in 2007 and has only employed the weapons in combat once since 2003. CBU-105 was the only standard USAF cluster munition that met the less-than-one-percent failure rate previously mandated by DOD for use beyond 2018. DOD has since reversed course, retaining existing weapons for deterrence on the Korean Peninsula. USAF is now testing the 2,000 lb-class Next Generation Area

Attack Weapons (NGAAW) which replaces explosive submunitions with a high-fragmentation warhead, reducing the risk of unexploded munitions injuring noncombatants.

Contractor: Textron Systems.
First Flight: Circa 1990.
IOC: 1997.
Active Variants:
▪CBU-105. CBU-97 casing with Wind-Corrected Munitions Dispenser (WCMD) tail kit.
Dimensions: Length 7.7 ft, diameter 15 in.
Performance: Delivers 40 lethal projectiles over an area of about 500 ft x 1,200 ft.
Guidance: IR targeting in each warhead; INS (via WCMD tail kit pre-dispersal) and GPS-data (via aircraft, prerelease).
Warhead: Shaped charge and blast fragmentation.
Integration: A-10C, B-1B, B-52H, F-15E; F-16C/D, (tested on MQ-9).

Tech Sgt. Marvin Lynchard

CBU-107 PASSIVE ATTACK WEAPON

Wide-area munition

Brief: Passive Attack Weapon is a nonexplosive, kinetic penetrating area weapon for use against sensitive targets. The CBU-107's penetrator rods limit collateral damage and do not scatter potentially contaminating debris when used against enemy WMD stockpiles. The weapon glides toward its target after release. Before impact, its inner chamber begins to rotate, and projectiles are ejected in rapid succession by centrifugal force, penetrating targets within a 200-ft radius. The weapon contains various-size, penetrating projectiles but no explosive. Full production was completed in six months. The weapon was used during Iraqi Freedom.

Contractors: General Dynamics (kinetic energy penetrator payload and canister); Lockheed Martin (WCMD); Textron (tactical munition dispenser kit).
First Flight: 2002.
IOC: December 2002.
Active Variant:
▪CBU-107A. Centrifugally dispersed, armor-penetrating weapon with Wind-Corrected Munitions Dispenser (WCMD) tail kit.
Dimensions: Length 7.7 ft, diameter 15 in.
Performance: Delivers a high-speed volley of nearly 4,000 metal projectiles in three sizes from a single canister; projectiles: 15-inch rods (350), 7-inch rods (1,000), and small-nail size (2,400).
Guidance: INS (via WCMD tail kit) and GPS-data (via aircraft) prerelease.
Warhead: Non-explosive projectiles.
Integration: B-52, F-15E, F-16C/D.

NEXT GENERATION AREA ATTACK WEAPON (NGAAW)

Wide-area munition

Brief: Next Generation Area Attack Weapon (NGAAW) is a blast-fragmentation area weapon designed as an alternative to cluster bomb munitions banned by DOD mandate beyond 2018. DOD ceased cluster munition procurement in 2007, and implemented a less-than-one-percent failure rate mandate on area weapons to prevent civilian casualties from unexploded ordnance. USAF awarded the $60 million NGAAW procurement contract for a compliant family of weapons in 2019. NGAAW is being developed in two increments, the 500-lb Improved Lethality Warhead (ILW) anti-personnel/materiel weapon based on the BLU-134B, followed by the more potent 2,000-lb high-fragmentation warhead. An F-16 conducted initial live developmental test drops of the 2,000-lb class BLU-136 at the Nellis range in July 2020. The 10-weapon series proved the effectiveness of the weapon against light vehicles, structures, and personnel in excess of a 225 ft radius. The 2,000-lb weapon is externally similar to the standard JDAM when fitted with the precision-guided tail kit requiring little adaptation to existing platforms for operational use. The NGAAW family of weapons will primarily be aimed at replacing the remaining CBU-105/107 stockpile, with potential to replace additional area weapons.

Contractors: Major Tool & Machine, Faxon Machining.
First Flight: 2020.
IOC: N/A.
Active Variant:
▪NGAAW Increment I. Optionally GPS/INS-guided Improved Lethality Warhead area weapon based on the 500-lb class BLU-134/B.
▪NGAAW Increment II. Optionally GPS/INS-guided 2,000-lb area weapon, based on the BLU-136/B.
Dimensions: Length approx. 12 ft (2,000-lb class with tail kit), diameter approx. 14.5 in.; length approx. 7.8 ft, diameter approx. 10.7 in. (500-lb class with tail kit).
Performance: Range up to 15 miles (based on JDAM guidance/ BLU-136 mass and form factor), 225+ ft effective radius (based on initial testing).
Guidance: GPS/INS.
Warhead: 2,000 lb high-fragmentation area-attack warhead with height-of-burst sensor (BLU-136/B); 500-lb fragmentation area-attack warhead (BLU-134/B).
Integration: N/A.

Airman 1st Class Jessi Monte

PRECISION GUIDED MUNITIONS

GBU-10/12/49 PAVEWAY II

Air-to-surface guided munition

Brief: Paveway II is a laser-guided, free-fall bomb for use against surface targets at short to standoff range. The kit is a folding-wing version of the earlier fixed-wing Paveway I with seeker and reliability improvements. The recent Paveway II Plus adds a modernized, more precise guidance package. GBU-10 is the Paveway II seeker and tail kit mounted on a 2,000-lb general-purpose bomb and primarily used against nonhardened targets. It is, however, capable of penetration. The GBU-12 uses a 500-lb bomb

body and is primarily used against stationary armored targets. GBU-49 is also a 500-lb body, but adds GPS guidance for all-weather precision delivery from 2,500 ft up to 40,000 ft. GBU-49 currently provides the F-35A an interim moving target capability until its Block 3F software is fully fielded. An F-35 dropped the weapon for the first time in a test at Eglin on Nov. 7, 2018, and operational testing is being conducted at Nellis.

Contractors: Lockheed Martin; Raytheon.
First Flight: Early 1970s.
IOC: 1976.
Active Variants:
- GBU-10. Laser/GPS guided 2,000-lb bomb.
- GBU-12. Laser guided 500-lb bomb.
- GBU-16. Laser guided 1,000-lb bomb.
- GBU-49. Laser/GPS guided 500-lb bomb.

Dimensions: Span 5.5 ft, length approx. 14.8 ft, diameter 18 in (GBU-10); span 4.4 ft, length 10.8 ft, diameter 11-18 in (GBU-12/49).
Performance: CEP 29.7 ft, range 9.2 miles (GBU-10); CEP 29.7 ft, range about six miles (GBU-12/49).
Guidance: Semi-active laser.
Warhead: Mk 84 bomb 2,000 lb (GBU-10); Mk 82 500-lb blast/fragmentation bomb (GBU-12/49).
Integration: A-10, B-1B, B-52, F-15E, F-16C/D, F-35 (GBU-49), MQ-9.

86th Fighter Weapons Squadron

GBU-24/28 PAVEWAY III

Air-to-surface penetrating glide bomb

Brief: Paveway III is a laser guided free-fall bomb for use against surface targets from medium standoff range. The third-generation laser guided seeker/tail kit package enables greater precision over Paveway II, and its high-lift airframe enables longer glide slopes for greater standoff employment. It can be dropped from low, medium, or high altitude and is effective against a broad range of high-value targets. GBU-24 is fitted to a 2,000-lb bomb body, with a BLU-109 penetrating warhead. GBU-28 variants are large 5,000-lb class air-to-ground penetrators initially developed for use against Iraq's deeply buried, hardened C2 facilities. The GBU-28B adds GPS/INS guidance to the existing laser seeker for all-weather targeting. It entered production in 1999. The GBU-28C adds a more powerful penetrating BLU-122 warhead in addition to the enhanced guidance package. It entered production in 2005, and quantities are purchased as needed to replenish and maintain stockpiles.

Contractor: Raytheon.
First Flight: Early-1980s (GBU-24); Feb. 24, 1991 (GBU-28).
IOC: 1986 (GBU-24); 1991 (GBU-28).
Active Variants:
- GBU-24. Laser guided 2,000-lb penetrating bomb.
- GBU-28B/B. Laser/GPS/INS guided 5,000-lb penetrating bomb.
- GBU-28C/B. Laser/GPS/INS guided 5,000-lb improved penetrating bomb.

Dimensions: Span 6.7 ft, length 14.4 ft, diameter 18 in (GBU-24); length approx. 20 ft, diameter 15 in (GBU-28).
Performance: Range more than 11 miles (GBU-24); range more than 5.75 miles (GBU-28).
Guidance: Semi-active laser.
Warhead: BLU-109 2,000-lb bomb (GBU-24); BLU-113 or BLU-122 5,000-lb bombs (GBU-28).
Integration: B-52, F-15E, F-16C/D (GBU-24); B-2A, B-52, F-15E (GBU-28).

Airman 1st Class Akeem Campbell

GBU-31/32/38 JOINT DIRECT ATTACK MUNITION (JDAM)

Air-to-surface guided bomb

Brief: JDAM is a GPS/INS-guided, autonomous, all-weather surface attack weapon. The joint USAF-Navy program upgrades the existing inventory of general-purpose bombs by adding a GPS/INS guidance kit for accurate all-weather attack from medium/high altitudes. The weapons acquire targeting information from the aircraft's avionics. After release, an inertial guidance kit directs the weapon, aided by periodic GPS updates. JDAM seeker/tail kits can be mounted on general-purpose or penetrating warheads in each weight class. JDAM can also utilize the 500-lb carbon fiber-cased Very Low Collateral Damage Weapon (VLCDW) for sensitive targets. A JDAM kit is under development for the 5,000-lb BLU-113 penetrating weapon, slated for integration and flight-testing on the F-15E. The Advanced 2,000-lb (A2K) BLU-137/B weapon is also being developed for integration onto the F-15E and B-2A. A2K will improve both precision and penetration to strike a wider variety of targets, eventually replacing the BLU-109 bunker buster. JDAM-class weapons are the most frequent air-to-ground munition expended in combat. FY21 procures 10,000 guidance kits to keep pace with current operations, following surge-production to replenished stocks depleted over Iraq and Syria. USAF is procuring an upgraded tail kit with anti-jam receiver for use in GPS degraded conditions under an Urgent Operational Requirement. The service is also seeking to develop a lighter-weight successor class of weapons incorporating IR/GPS guidance, maneuvering wings, stealth, and EW capabilities. Testers are currently working to integrate the GBU-38 for operational use on the F-35.

Contractors: Boeing, Textron, Honeywell.
First Flight: Oct. 22, 1996.
IOC: 1998.
Active Variants:
- GBU-31. GPS/INS guided 2,000-lb GP, or BLU-109 penetrating weapon.
- GBU-32. GPS/INS guided 1,000-lb GP, or BLU-110 penetrating weapon.
- GBU-38. GPS/INS guided 500-lb GP, or BLU-111 penetrating weapon.

Dimensions: Span 25 in (GBU-31), 19.6 in (GBU-32), 14 in (GBU-38); length (with JDAM and warhead) approx 12 ft (GBU-31), 10 ft (GBU-32), 7.8 ft (GBU-38).
Performance: Range up to 15 miles, CEP with GPS 16.4 ft, CEP with INS only 98 ft.
Guidance: GPS/INS.
Warhead: 2,000-lb Mk 84/BLU-109 (GBU-31); 1,000-lb Mk 83/BLU-110 (GBU- 32); 500-lb Mk 82/BLU-111 (GBU-38).
Integration: A-10C, B-52H, B-2A, B-1B, F-15E, F-16, F-22A, F-35A (GBU-31/32), and MQ-9.

GBU-39 SMALL DIAMETER BOMB I

Guided air-to-surface glide bomb

Brief: SDB is a low-yield, all-weather precision guided munition designed to limit collateral damage and strike targets from up to 46 miles away. Experimentation began in 2001, in response to an ACC requirement for a miniaturized, precision weapon. Boeing was selected to fully develop and produce the weapon in 2003, and low-rate initial production began in 2005. Its size allows it to be carried in fighter or bomber internal weapons bays or to increase overall loadout for more independent strikes per sortie. SDB I employs advanced anti-jam GPS/INS, and target coordinates

Alejandro Peña/USAF

are loaded on the ground or received from the aircraft before release. Several SDBs can be simultaneously released against multiple targets. The weapon was first employed by an F-15E over Iraq in 2006. USAF is continuing to replenish precision weapon stockpiles expended in combat, but at a lower level than production-maximized rate funded in FY20. FY21 funds procure a total of 2,462 weapons.

Contractor: Boeing.
First Flight: May 23, 2003.
IOC: Oct. 2, 2006.
Production: 24,000 (planned).
Active Variant:
▪GBU-39/B SDB I. GPS/INS guided 250-lb low-yield bomb.
Dimensions: Length 6 ft, width 7.5 in; BRU-61/A carriage (four bombs) length 12 ft, width 16 in, height 16 in.
Performance: Near-precision capability at standoff range up to 46 miles.
Guidance: GPS/INS.
Warhead: 250-lb class penetrating blast fragmentation munition.
Integration: AC-130W, F-15E, F-16, F-22; planned: A-10, AC-130J, B-1, B-52, F-35A, MQ-9.

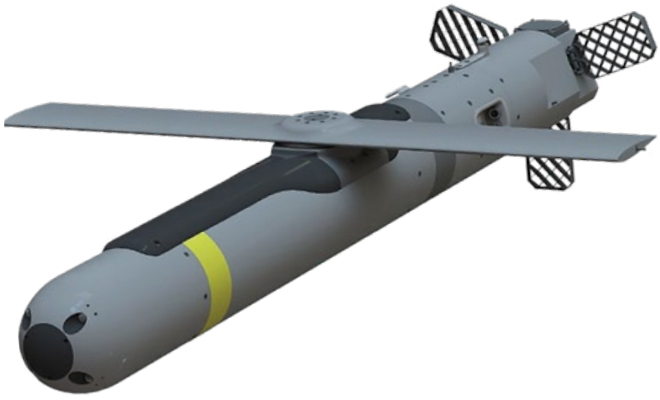
William Lewis/ISAF

GBU-53 STORMBREAKER (SMALL DIAMETER BOMB II)

Guided air-to-surface glide bomb

Brief: StormBreaker (formerly SDB II) is a joint USAF-Navy program to develop as a low-yield, precision guided munition capable of striking moving targets in all-weather from up to 46 miles away. Its size allows it to be carried in fighter or bomber internal weapons bays or to increase overall loadout to enable more independent strikes per sortie. Several Stormbreakers can be simultaneously released against multiple targets. SDB II adds a millimeter-wave radar, imaging IR, and semi-active laser packaged into a tri-mode seeker. The bomb is retargetable after release. Improvements include reduced susceptibility to countermeasures and network-enablement through Link 16/UHF data links. LRIP production began in 2015 and USAF awarded the current LRIP Lot 6 in October 2020. SDB II began operational testing in June 2018 and achieved initial fielding on the F-15E Sept. 23, 2020. The fielding decision paves the way for IOC a year later than anticipated, and testing is underway for follow-on fielding on the F-35 and Navy F-18E/F Super Hornet. FY21 funding supports production of up to 1,133 SDB IIs.

Contractor: Raytheon.
First Flight: 2012.
IOC: 2019 (planned).
Production: 12,000 (planned).
Active Variant:
▪GBU-53/B SDB II. Tri-mode guided 250-lb low-yield bomb.
Dimensions: Bomb: length 5.75 ft, wingspan 5.6 ft, diameter 7 in.
Performance: Near-precision capability at standoff range up to 46 miles.
Guidance: Tri-mode seeker millimeter-wave radar, uncooled IIR, and digital semi-active laser.
Warhead: 250-lb class penetrating blast fragmentation munition.
Integration: F-15E; Planned: A-10, AC-130W/J, B-1, B-2, B-52, F-16, F-22, F-35, MQ-9.



Dynetics

GBU-69 SMALL GLIDE MUNITION

Guided air-to-surface glide bomb

Brief: Small Glide Munition is a standoff, precision guided munition specifically tailored to SOF mission requirements. Internally carried GBU-69/B were integrated onto the next-generation AC-103J gunship as part of Block 20+ upgrades, following initial operational testing. USSOCOM is currently working to integrate the weapon onto RPA platforms including the MQ-9. The weapon is deployable from the AC-130J's ramp-mounted Common Launch Tubes or dropped conventionally. It is capable of quietly reaching targets from standoff range using its deployable wings to minimize risk to delivery platforms. The weapon utilizes semi-active laser and lattice-type control fins (similar to the GBU-57) for guidance and terminal stability, and is capable of receiving in-flight targeting updates via two-way data link. The weapon was jointly developed between Dynetics and USSOCOM. The company was awarded two contracts in FY18 totaling $104 million for delivery of approximately 1,000 weapons through 2022. FY21 SOF funds procure 478 SGMs.

Contractors: Dynetics.
First Flight: Feb. 16, 2000 (USAF).
Delivered: 2020-present.
IOC: N/A.
Active Variants:
▪GBU-69. Semi-active laser guided 36-lb low-yield bomb.
Dimensions: Span 28 in, length 3.5 ft, diameter 4.5 in.
Propulsion: None.
Performance: Near-precision capability at standoff range of 20+ miles.
Guidance: Semi-active laser.
Warhead: 36-lb blast fragmentation.
Integration: AC-130J; planned: MQ-9.

GBU-43 MASSIVE ORDNANCE AIR BLAST (MOAB) BOMB

Massive guided bomb

Brief: MOAB is the largest satellite-guided, air-delivered weapon ever employed. It is designed for use against large area targets, deeply buried targets, or targets in tunnels or caves. The conventional HE bomb is GPS guided, with fins and inertial gyro for pitch and roll. It was developed by the Air Force Research Laboratory Munitions Directorate at Eglin in only

USAF

nine weeks to be available for the 2003 Iraq campaign. The weapon was designated Massive Ordnance Air Blast (MOAB) but is unofficially known as "Mother of All Bombs." The weapon is designed for deployment from the ramp of an MC-130 without a parachute. A total of 18,700 lb of the weapon's 21,000-lb weight is attributed to BLU-120/B warhead. It was used operationally for the first time in April 2017 against an ISIS-occupied cave complex in Afghanistan.

Contractors: AFRL; Dynetics.
First Flight: March 11, 2003.
IOC: April 2003.
Active Variant:
▪GBU-43/B. GPS guided 21,000-lb bomb.
Guidance: GPS/INS.
Warhead: BLU-120/B 18,700-lb HE.
Dimensions: Length 30 ft, diameter 3.3 ft.
Integration: MC-130H.

Sgt. Chris Thornbury

GBU-54 LASER JOINT DIRECT ATTACK MUNITION (LJDAM)

Air-to-surface guided bomb

Brief: LJDAM is a GPS/INS guided, autonomous, all-weather attack weapon for use against fixed and moving targets. It is a joint USAF-Navy development that combines a laser guidance kit with the GPS/INS-based navigation of the existing GBU-38 JDAM. The current LJDAM is a dual-mode 500-lb guided weapon capable of attacking moving targets with precision. It was developed as an urgent operational need, and testing was completed in less than 17 months. It was first delivered in May 2008 and deployed in combat in Iraq three months later. Boeing is also developing GBU-31 (2,000-lb) and GBU-32 (1,000-lb) variants. The F-35 is currently undergoing tri-service testing to integrate the GBU-38/54 for operational use.

Contractor: Boeing.
First Flight: 2005.
IOC: 2008.
Active Variant:
▪GBU-54 Laser JDAM. Laser/GPS/INS guided 500-lb GP, or BLU-111 penetrating weapon.
▪GBU-56 Laser JDAM. Laser/GPS/INS guided 2,000-lb GP, or BLU-109 penetrating weapon.
Dimensions: Length (with JDAM and warhead) approx 8 ft.
Performance: Range up to 15 miles.
Guidance: GPS/INS with laser.
Warhead: Mk 82 500-lb munition.
Integration: F-15E, F-16. Planned: F-35, B-1B (GBU-56).

GBU-57 MASSIVE ORDNANCE PENETRATOR

Massive PGM

509th Bomb Wing

Brief: MOP is a GPS-guided, earth-penetrating strike weapon for use against hard and deeply buried targets. It was developed and tested through a USAF and Defense Threat Reduction Agency partnership in 2004, and is now managed by AFGSC. Flight testing was conducted from 2008 to 2010, when the program transitioned to USAF. A B-2 successfully test-dropped the GBU-57 in 2014, 2015, and 2016. Several B-2s completed a total of four test drops at White Sands Missile Range, N.M., in 2017 validating the effectiveness of mods made under the Enhanced Threat Response IV upgrade. MOP proved effective, clearing the way for potential early fielding, though the Air Force's recommendation is classified. The service is currently validating requirements to expand the weapon's capabilities further. USAF issued a $20.9 million contract in FY18 to procure an undisclosed number of additional GBU-57 for delivery through July 2020. No funds were requested in FY20-FY21.

Contractor: Boeing.
First Flight: Classified.
IOC: 2011.
Operator: AFGSC.
Active Variant:
▪GBU-57B. GPS-guided 30,000-lb penetrating weapon.
Guidance: GPS.
Warhead: 5,740-lb HE.
Dimensions: Length 20.5 ft, diameter 31.5 in.
Integration: B-2A (tests also conducted on the B-52).

SATELLITE SYSTEMS

USAF

ADVANCED EXTREMELY HIGH FREQUENCY (AEHF) SATELLITE SYSTEM

Communications

Brief: AEHF provides global, secure, protected, and jam-resistant military communications. It enhances the previous Milstar satellites and operates at a much higher capacity and data rate. It offers secure, anti-jam tactical and strategic communications around the world. AEHF uses cross-linked satellites, eliminating the need for ground relay stations. The program is a collaboration with Canada, the Netherlands, and the United Kingdom. Launch of SV-4 was originally slated for Oct. 17, 2017, but an issue with the system's power regulator prompted USAF to delay launch a year to

enable a hardware fix. SV-4 launched on Oct. 17, 2018, paved the way for full operational capability declared when the vehicle joined the constellation operationally on May 3, 2019. SV-5 launched Aug. 8, 2019, after a several-month delay due to its launch vehicle, and SV-6 launched from Cape Canaveral on March 26, 2020, marking the newly formed USSF's first launch. SV-6 became operational after completing on-orbit checks on Aug. 22, 2020, completing the constellation. USSF plans to begin replacing AEHF with the next-generation Evolved Strategic SATCOM (ESS) starting in the early 2030s.

Contractors: Lockheed Martin; Northrop Grumman.
Operator/Location: USSF SpOC; Schriever AFB, Colo.
First Launch: August 2010.
IOC: 2015.
Design Life: 14 yrs.
Launch Vehicle: Atlas V.
Constellation: Six.
Active Satellites:
- AEHF SV-1. Launched in 2010, on orbit and operational.
- AEHF SV-2. Launched in 2012, on orbit and operational.
- AEHF SV-3. Launched in 2013, on orbit and operational.
- AEHF SV-4. Launched in 2018, on orbit and operational.
- AEHF SV-5. Launched in 2019, on orbit and operational.
- AEHF SV-6. Launched in 2020, on orbit and operational.

Dimensions: Length 31 ft, width 98 ft (with full solar array extension).
Weight: 13,400 lb.
Performance: 24-hr low, medium, and extended data rate connectivity from 65 north to 65 south latitude worldwide.
Orbit Altitude: Geosynchronous at 22,000+ miles.
Power: Solar arrays generating 20,000 watts.

USAF

DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP)

Space and Earth environmental data collection

Brief: DMSP is tasked with environmental data collection for worldwide, military weather forecasting. It provides timely and high-quality weather information to strategic and tactical combat units worldwide. DMSP uses an operational line scan sensor to image cloud cover in visible and thermal IR and analyze cloud patterns. It is equipped with microwave imagers and sounders and a suite of space environment sensors that provide critical land, sea, and space environment data. Block 5D-3 improved spacecraft bus and sensors for longer and more capable missions. Six operational DMSP satellites now survey the entire Earth four times a day. The oldest operational satellite, DMSP-13, suffered an apparent electrical short and exploded, creating a cloud of debris in space in 2015. DMSP-19 most recently launched in 2014. The vehicle subsequently suffered a power failure in early 2016, rendering it uncontrollable. Data from the craft remains usable until its orbit decays. Congress canceled the DMSP program before the final spacecraft (DMSP-20) could be launched. DMSP-20 was stored, awaiting a launch decision to replace DMSP-19. DMSP-17 ultimately assumed the failed satellite's coverage, and DMSP-20 went on permanent display at Los Angeles AFB, Calif. USAF is considering requirements for a follow-on system. The service awarded Ball Aerospace a $255.4 million development contract for the Weather System Follow-On-Microwave (WSF-M) in November 2018, and the system is planned to replace DMSP starting in FY24. DMSP-14, the last operational Block 5D-2 satellite, was decommissioned Feb. 11, 2020, after 22 years of service.

Contractors: Lockheed Martin; Northrop Grumman.
Operator/Location: National Oceanic and Atmospheric Administration; NOAA Operations Facility, Suitland, Md.
First Launch: May 23, 1962.
IOC: 1965.
Design Life: Five yrs (Block 5D-3).
Launch Vehicle: Delta IV; Atlas V.
Constellation: Four low Earth orbit (LEO).
Active Satellites:
- Block 5D-3. Improved spacecraft bus and sensors for longer, more capable missions.

Dimensions: Length 25 ft (with array deployed), width 4 ft.
Weight: 2,545 lb, incl 772-lb sensor; 2,270 lb with 592-lb sensor payload.
Performance: Polar orbits; covers Earth in about 6 hr; primary sensor scans 1,800-mile-wide area.
Orbit Altitude: Approx 527 miles.
Power: Solar arrays generating 1,200-1,300 watts.

USAF

DEFENSE SATELLITE COMMUNICATIONS SYSTEM (DSCS)

Communications

Brief: DSCS provides high-priority wartime and strategic SHF communications between high-level leadership and deployed forces and ships worldwide. Satellites enable high-data rate, secure, nuclear-hardened, jam-resistant military comms. In addition to joint service command and control, interagency users include the National Command Authority, White House Communications Agency, and Diplomatic Telecommunications Service. The last of 14 DSCS IIIs launched in 2003. AFSPC inactivated its two oldest DSCS satellites, B-12 in July 2014 and DSCS-10 in June 2015, B-12 having exceeded its designed life span by 12 years. The final four DSCS satellites received SLEP before launch, providing higher-power amplifiers, more sensitive receivers, and increased antenna connection options. The satellites also carry a single channel transponder to disseminate emergency action and force direction messages to nuclear-capable forces. WGS began augmenting DSCS in 2007 and will gradually replace the constellation.

Contractor: Lockheed Martin.
Operator/Location: USSF SpOC; Schriever AFB, Colo.
First Launch: DSCS II 1971; DSCS III 1982; DSCS III/SLEP 2000.
IOC: Dec. 13, 1978 (DSCS II).
Design Life: 10 yr (III).
Launch Vehicle: Atlas II, NSSL, Space Shuttle Atlantis (two satellites, 1985).
Constellation: Six (III); 14 deployed/six operational.
Active Satellites:
- DSCS III. Current base on-orbit variant.
- DSCS III. SLEP. Upgrade configuration of last four satellites launched.

Dimensions: Rectangular body 6 x 6 x 7 ft, 38-ft span with solar arrays deployed.
Weight: 2,580 lb; 2,716 lb (SLEP).
Performance: Employs six independent SHF transponder channels for secure voice and high-rate data communications.
Orbit Altitude: 22,000+ miles in geosynchronous orbit.
Power: Solar arrays generating 1,269 watts, decreasing to 980 watts after 10 yr; 1,500 watts (SLEP).

DEFENSE SUPPORT PROGRAM (DSP)

Strategic and tactical launch detection

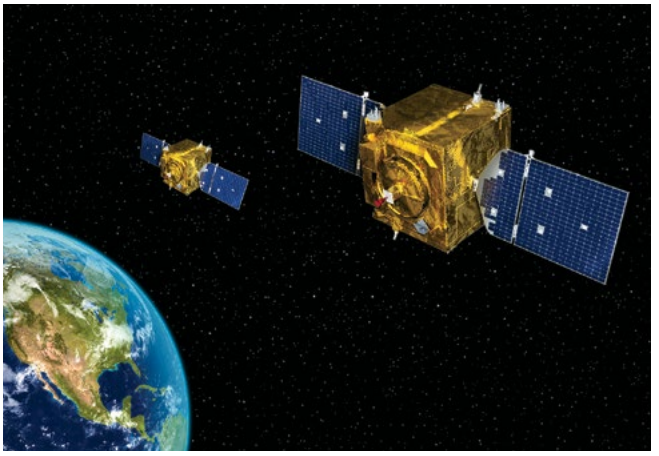
Brief: DSP provides ballistic missile early warning and is a key part of North American and theater early warning systems. It is capable of detecting missile launches and nuclear detonations and was initially meant to watch the Soviet military. It was used extensively in the 1991 Gulf War to detect Iraqi theater missile launches against coalition forces and allies in the region. The 23rd and final DSP satellite launched in December 2007

DOD

but malfunctioned and began drifting outside its intended orbit in 2008. Block 5 is the latest variant and is more survivable than predecessors. It includes a medium wavelength IR sensor for more mission utility and accommodates 6,000 detectors. Nine Block 5 satellites were deployed between 1989 and 2007. Control of the constellation was consolidated to the new Block 10 Mission Control Station at Buckley in early 2016. SBIRS is integrated with DSP, augments its role, and is designed to eventually replace the constellation on orbit. The constellations jointly enabled early detection of ballistic missiles launched by Iran against U.S. forces at Al Asad AB, Iraq, on Jan. 7, 2020, minimizing casualties.

Contractors: Northrop Grumman (formerly TRW); Aerojet.
Operator/Location: USSF SpOC; Buckley SFB, Colo.
First Launch: November 1970.
IOC: Circa 1972.
Design Life: Three-year requirement and five-year goal.
Launch Vehicle: Titan IV with inertial upper stage; Delta IV Heavy NSSL.
Constellation: 23 deployed/five operational.
Active Satellites:
- DSP-18. Launched in 1997, on orbit and operational.
- DSP-19. Launched in 1999, on orbit and operational.
- DSP-20. Launched in 2000, on orbit and operational.
- DSP-21. Launched in 2001, on orbit and operational.
- DSP-22. Launched in 2004, on orbit and operational.
- DSP-23. Launched in 2007, on orbit and non-operational.

Dimensions: Diameter 22 ft, height 32.8 ft, with paddles deployed.
Weight: Approx 5,200 lb.
Performance: Uses IR sensors to sense heat from missile and booster plumes against Earth's background.
Orbit Altitude: Geosynchronous at 22,000+ miles.
Power: Solar arrays generating 1,485 watts.



USAF

GEOSYNCHRONOUS SPACE SITUATIONAL AWARENESS PROGRAM (GSSAP)

Situational awareness/orbital tracking

Brief: GSSAP supplies space-based tracking and characterization of manmade objects in geosynchronous orbit, aiding safety and enabling avoidance. They are the "neighborhood watch" satellites augmenting the legacy Space Based Space Surveillance (SBSS) system. SBSS tracks and classifies manmade objects in low Earth orbit, and GSSAP extends this coverage to geosynchronous orbit. The satellites themselves operate in near-geosynchronous orbit to effectively monitor objects and aid in preventing collisions in space. GSSAP carries EO/IR sensors and are able to maneuver to observe objects at close range. They can track objects without the weather and atmospheric disruptions that affect ground-based systems. Two GSSAP satellites were launched in 2014 and attained IOC in 2015. Two more replenishment satellites launched Aug. 19, 2016, and became operational Sept. 12, 2017. USSF completed a significant overhaul and upgrade of the GSSAP ground system software to enhance the reliability, speed, and security of the system in February 2020. The upgrades also pave the way for future expansion of the constellation. The fifth and sixth sensors are slated for launch aboard the USSF-8 mission planned for launch from Cape Canaveral in mid-to late 2021.

Contractor: Northrop Grumman Space Systems (formerly Orbital ATK).
Operator/Location: USSF SpOC; Schriever AFB, Colo.
First Launch: July 28, 2014.
IOC: Sept. 29, 2015.
Launch Vehicle: Delta IV.
Constellation: Four spacecraft.
Active Satellites:
- GSSAP 1. Launched in 2014; on orbit, active.
- GSSAP 2. Launched in 2014, on orbit, active.
- GSSAP 3. Launched in 2016, on orbit, active.
- GSSAP 4. Launched in 2016, on orbit, active.

Orbit Altitude: 22,300 miles, above geosynchronous.
Power: Solar panels.

Courtesy

GLOBAL POSITIONING SYSTEM (GPS)

Worldwide navigation, timing, and velocity data

Brief: GPS supplies space-based military and civil radio-positioning for geolocation, navigation, and timing. It is a fundamental enabler of precision bombing, CSAR, mapping, and rendezvous. It provides accurate and uninterrupted 3D (latitude, longitude, and altitude) position, velocity, and time data. The last of the GPS Block IIA satellites, launched between 1990 and 1997 was decommissioned in 2020. GPS Block IIR and IIR-M (modernized) included 21 vehicles launched between 2005 and 2009. Modernization upgrades included two new signals, enhanced encryption, anti-jamming capabilities, and a second civil signal. GPS Block IIF is a follow-on to IIR-M. Upgrades include extended design life, faster processors, and improved anti-jam and accuracy, a new military signal, and a second and third dedicated civil signal. The GPS Block IIIA, first launched on Dec. 23, 2018, has improved accuracy, availability, integrity, and incorporates a steerable, high-power, anti-jam capability. Lockheed Martin is under contract to build the final Block IIIA vehicles (nine and 10) for launch in 2022 and was awarded a follow-on $7.2 billion contract for 22 Block IIF in 2018. Block IIIF adds a hosted search and rescue payload, as well as geographically targetable high-power military signal and FY21 funds procurement of the second and third vehicles. The third GPS III launch on June 30, 2020, marked the first GPS mission boosted by a SpaceX Falcon 9, and a fourth satellite successfully launched Nov. 5, 2020. Two GPS IIIA launches are slated for 2021 and the first IIIF is slated to be launch-ready by 2026.

Contractors: Boeing (IIF); Lockheed Martin (IIR, IIR-M, III/IIIF).
Operator/Location: USSF SpOC; Schriever AFB, Colo.
First Launch: Feb. 22, 1978.
IOC: Dec. 9, 1993.
Design Life: 7.5 yr (IIR/IIR-M); 12 yr (IIF); 15 yr (IIIA).
Launch Vehicle: Delta II, Delta IV, Falcon 9.

Constellation: 33 spacecraft (not including decommissioned or on-orbit spares).
Active Satellites:
- GPS Block IIR. Launched 1997 to 2004; eight active.
- GPS Block IIR-M. Launched in 2005 to 2009; seven active.
- GPS Block IIF. Launched in 2010 to 2016; 12 active.
- GPS Block IIIA/IIIF. New generation launched in 2018; three active.

Dimensions: (IIR/IIR-M) 5 x 6.3 x 6.25 ft, span incl solar panels 38 ft; (IIF) 9.6 x 6.5 x 12.9 ft, span incl solar panels 43.1 ft.
Weight: On orbit, 2,370 lb (IIR/IIR-M); 3,439 lb (IIF).
Performance: Orbits the Earth every 12 hr, emitting continuous signals, providing time to within one-millionth of a second, velocity within a fraction of a mile per hour, and location to within a few feet.
Orbit Altitude: 10,988 miles.
Power: Solar panels generating 1,136 watts (IIR/IIR-M); up to 2,900 watts (IIF).

USAF

MILSTAR SATELLITE COMMUNICATIONS SYSTEM (MILSTAR)

Communications

Brief: Milstar is the joint-service backbone of strategic/tactical DOD communications. It provides encrypted, secure, anti-jam communications around the world and uses cross-linked satellites, eliminating the need for ground relay stations. Block I satellites incorporate a low data rate payload capable of transmitting 75-2,400 bps over 192 EHF channels. Block II satellites carry both the low data rate payload and a medium data rate payload capable of transmitting 4,800 bps to 1.5 Mbps over 32 channels, allowing larger data to be passed more quickly. Interoperable terminals allow third-party land/sea-based units to upload data in real time to cruise missiles or other compatible weapons. Milstar provides continuous coverage between 65 degrees north and 65 degrees south latitude. The systems utilize multiple-redundant command and control for high survivability. The last of six satellites launched in 2003 and was augmented by the sixth and final AEHF satellite in 2020. AEHF now supplants Milstar as DOD's primary system in the combined, fully back-compatible AEHF-Milstar constellation.

Contractors: Lockheed Martin; Boeing; Northrop Grumman (formerly TRW).
Operator/Location: USSF SpOC; Schriever AFB, Colo.
First Launch: Feb. 7, 1994. IOC: July 1997 (Milstar I).
Design Life: 10 yr.
Launch Vehicle: Titan IV/Centaur.
Constellation: Five: two Milstar I; three Milstar II.
Active Satellites:
- Block I. Milstar I satellites launched 1994-95.
- Block II. Milstar II satellites launched 1999-2003.

Dimensions: Length 51 ft, width 116 ft with full solar array extension.
Weight: 10,000 lb.
Performance: Milstar I low data rate (LDR) payload transmitting 75 to 2,500 bps of data over 192 channels of EHF; Milstar II LDR and medium data rate (MDR) payloads, transmitting 4,800 bps to 1.5 Mbps over 32 channels.
Orbit Altitude: Geosynchronous at 22,000+ miles.
Power: Solar arrays generating 8,000 watts.

SPACE BASED INFRARED SYSTEM (SBIRS)

Space-based surveillance/missile warning

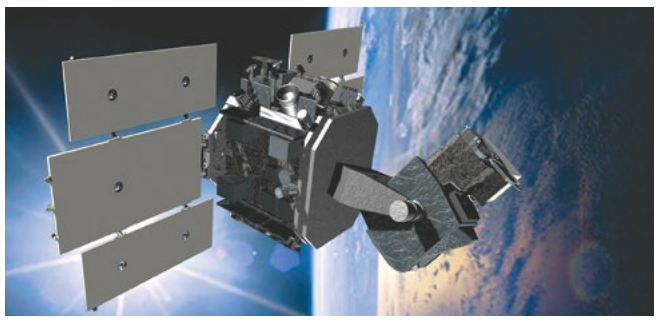
Brief: SBIRS provides advanced space surveillance and missile warning, battlespace characterization, and technical intelligence gathering. It is the follow-on to the Defense Support Program satellite. The system includes IR sensor payloads on host satellites in highly elliptical orbit (HEO), two IR sensors each on dedicated satellites in geosynchronous Earth orbit (GEO), and ground assets. The HEO sensor detects launch of submarine-launched ballistic missiles (SLBMs) from the North Pole region and can be tasked for other IR detection missions. GEO scanning IR sensor performs the strategic missile warning mission, global technical intelligence, and

Lockheed Martin

initial phase for the strategic missile defense mission, providing two times the revisit rate and three times the sensitivity of DSP. USAF announced plans to allow civil use of SBIRS data to aid weather prediction, Arctic ice monitoring, and wildfire tracking. GEO-3 launched into orbit Jan. 20, 2017, after delays to validate the performance of its liquid apogee engine. GEO-4 launched on Jan. 19, 2018. GEO-5 and GEO-6 will be based on a modernized spacecraft and will be launched earlier than planned, in 2021 and 2022 respectively. These satellites will replace the oldest two on orbit and begin migrating ground control to the next generation Enterprise Ground Service (EGS) aimed at consolidating control of multiple satellite systems. USSF also awarded Raytheon a $197 million contract in 2020 to modernize ground data processing. USAF canceled the final two GEO satellites and is shifting funds to develop the Next-Generation Overhead Persistent Infrared (OPIR) system. OPIR is the most ambitious satellite program, totaling $2.3 billion for FY21. The constellation will comprise three GEO satellites and two polar HEO sensors. Delivery of the first satellite is expected by 2027, with IOC planned for 2029. Lockheed Martin delivered the fifth GEO satellite (GEO-5) in late 2020 for launch on May 17.

Contractors: Lockheed Martin (prime contractor); Northrop Grumman (payload); Raytheon (data processing modernization).
Operator/Location: USSF SpOC; Buckley SFB, Colo.
First Launch: GEO 1, May 2011.
IOC: HEO 1, Dec. 5, 2008. (Increment 1, Dec. 8, 2001).
Launch Vehicle: Atlas V (GEO). Planned: Delta, Falcon 9.
Constellation: Four GEO sats, two HEO sensors and two HEO on-orbit reserve (hosted).
Active Satellites/Payloads:
- SBIRS HEO-1. Payload operational in 2008; on-orbit reserve.
- SBIRS HEO-2. Payload operational in 2009; on-orbit reserve.
- SBIRS HEO-3. Payload operational in 2015; active.
- SBIRS HEO-4. Payload operational in 2017; active.
- SBIRS GEO-1. Launched in 2011; active.
- SBIRS GEO-2. Launched in 2013; active.
- SBIRS GEO-3. Launched in 2017; active.
- SBIRS GEO-4. Launched in 2018; active.

Dimensions: 49 x 22 x 20 ft (GEO on orbit); 7 x 4 x 3 ft (HEO sensor).
Weight: 5,525 lb (GEO on orbit).
Orbit Altitude: Geosynchronous and high elliptical.
Power: Solar array, 2,435 watts (GEO), batteries.



Boeing

SPACE BASED SPACE SURVEILLANCE (SBSS)

Orbital surveillance and object identification

Brief: SBSS is designed to track, characterize, measure, and collect optical signatures of Earth-orbiting objects, including space vehicles

and debris. The Missile Defense Agency originally launched SBSS as a technology demonstrator to classify and track ballistic missiles in mid-course flight, before handing it over to AFSPC in 2011. SBSS primarily uses a trainable, ground-controlled Space-Based Visible Sensor to track targets without repositioning. Potential high-end and even kinetic space threats from China and Russia have pushed orbital domain awareness to the top of AFSPC's priority list. AFSPC worked to extend SBSS service life and tasked one of its experimental Operationally Responsive Space satellites to cover a four-year gap in coverage until the newly established Space Force can launch a follow-on spacecraft now targeted for 2022. ORS-5 launched Aug. 26, 2017, and is equipped with an optical sensor to provide rapid, continuous scanning to detect movement in geosynchronous orbit. The Space Force is seeking funds for a follow-on satellite to ORS-5 to enhance surveillance. SBSS works in concert with an array of networked, ground-based sensors including the Space Fence wide-area search and surveillance system recently commissioned on Kwajalein Atoll in the Marshall Islands. SBSS collision-warning data was made openly available to the public starting in 2020 with the aim of improving domain awareness and orbital safety.

Contractors: Boeing (system integration, ground segment, operations, and sustainment); Ball Aerospace (satellite); Orbital ATK (ORS-5).
Operator/Location: USSF SpOC; Schriever AFB, Colo.
First Launch: Sept. 25, 2010.
IOC: Aug. 17, 2012 (SBSS); May 31, 2018 (ORS-5).
Design Life: Seven yr.
Launch Vehicle: Minotaur IV.
Constellation: One LEO satellite; one LEO augmentation satellite.
Active Satellites:
▪SBSS Block 10. Launched in 2010; active.
▪ORS-5. Experimental satellite launched in 2017 to augment SBSS; active.
Dimensions: Height approx 49 ft; 22ft x 20 ft (SBSS on-orbit); 5 ft x 2.5 ft (ORS-5).
Weight: Approx 5,525 lb (SBSS on orbit); approx 250 lbs (ORS-5).
Orbit Altitude: 390 miles, sun-synchronous orbit (SBSS); 372 miles, geo-synchronous orbit (ORS-5).
Power: Solar arrays and batteries generating 750 watts (SBSS); solar array and batteries (ORS-5).

WIDEBAND GLOBAL SATCOM (WGS) SATELLITE

Communications

Courtesy

Brief: WGS provides worldwide, high-capacity communications for deployed air, land, and sea forces. The system is designed to augment and then replace DSCS X-band frequency service. It also augments the one-way Global Broadcast Service Joint Program Ka-band frequency capabilities and provides a new high-capacity, two-way Ka-band frequency service. Block I includes: SV-1 (Pacific region), SV-2 (Middle East), and SV-3 (Europe and Africa). Block II satellites are modified to better support the airborne ISR mission and include: SV-4 (Indian Ocean) and SV-5 and SV-6, purchased by Australia in 2013. The U.S. is partnering with Canada, Denmark, Luxembourg, the Netherlands, and New Zealand on Block II follow-on satellites SV-7 to SV-10. USAF recently contracted industry to develop anti-jamming capability for tactical users and approved Boeing's preliminary WGS-11+ design. Congress added funds beyond USAF's FY18 request to procure the 11th and 12th satellites. Due to cost, USSF instead opted for the single WGS-11+ platform which offers roughly twice the capability in addition to stronger, more reliable coverage. USSF is seeking to develop and field a WGS follow-on system and potentially lease commercial SATCOM in the interim.

Contractor: Boeing.
Operator/Location: USSF SpOC; Schriever AFB, Colo.
First Launch: October 2007.
IOC: April 16, 2008.
Design Life: 14 yr.
Launch Vehicle: Atlas V, Delta IV.
Constellation: 10 satellites.
Active Satellites:
▪SV-1. Block I, launched in 2007; active.
▪SV-2. Block I, launched in 2009; active.
▪SV-3. Block I, launched in 2009; active.
▪SV-4. Block II, launched in 2009; active.
▪SV-5. Block II, launched in 2013; active.
▪SV-6. Block II, launched in 2013; active.
▪SV-7. Block II follow-on, launched in 2015; active.
▪SV-8. Block II follow-on, launched in 2016; active.
▪SV-9. Block II follow-on, launched in 2017; active.
▪SV-10. Block II follow-on, launched in 2019; active.
Dimensions: Based on Boeing 702 Bus.
Weight: 13,000 lb at launch.
Performance: Approx 10 times the capability of a DSCS satellite.
Orbit Altitude: Geosynchronous at 22,000+ miles.
Power: Solar arrays generating 9,934 watts.

45th Space Wing

X-37B ORBITAL TEST VEHICLE

Orbital test

Brief: X-37B is an unmanned experimental Orbital Test Vehicle (OTV) aimed at developing and maturing a reusable space-launch capability and conducting classified, extended, on-orbit missions/experiments and/or launching small satellites. NASA launched the X-37 program in 1999, with the intention of building two demonstrators to validate technologies for both launch/on-orbit flight, and reentry/landing. Only the Approach and Landing Test Vehicle (ALTV) was built before NASA handed over the program to DARPA, which completed ALTV captive-carry/drop testing with the subscale X-40A in 2006. The X-37B is based on NASA's notional OTV and is boosted into low Earth orbit atop a standard Atlas V or SpaceX Falcon 9 launch vehicle for long-endurance space missions. The vehicle autonomously re-enters the atmosphere upon command from a ground control station, and it recovers conventionally to the runway. X-37 launches from Cape Canaveral and lands at either Cape Canaveral or Vandenberg. Development includes advanced guidance, navigation and controls, avionics, thermal-resistant materials, propulsion, and autonomous control systems. The program's two test vehicles have successfully completed five orbital missions. The first mission (OTV-1) launched in 2010 and remained on orbit 224 days. The OTV-2 and OTV-3 missions launched in 2011 and 2012, and remained on orbit 468 days and 674 days, respectively. The OTV-4 mission remained aloft for 718 days and landed at Cape Canaveral for the first time on March 25, 2017. The OTV-5 mission marked the type's first launch atop a SpaceX Falcon 9 on Sept. 7, 2017, setting a new record of 780 days on orbit when it touched down at Cape Canaveral on Oct. 27, 2019. USSF launched its inaugural X-37B mission, OTV-6 (USSF-7), on May 17, 2020.

Contractor: Boeing.
Operator: USSF.
First Launch: April 22, 2010.
IOC: N/A.
Launch Vehicle: Atlas V, Falcon 9.
Production: Two.
Inventory: Two.
Operational Location: Cape Canaveral SFS, Fla. (launch/landing); Vandenberg SFB, Calif. (landing).
Active Variant:
▪X-37B. DARPA/USAF-developed Orbital Test Vehicles.
Dimensions: Span 14 ft, length 29.25 ft, height 9.5 ft.
Weight: 11,000 lb at launch.
Propulsion: Single liquid-propellant rocket motor.
Endurance: 780+ days on orbit.
Orbit Altitude: Low Earth orbit (LEO) at 110-500 miles.
Power: Gallium arsenide solar cells with lithium-ion batteries.

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GLOSSARY OF ACRONYMS & ABBREVIATIONS

A non-exhaustive list of acronyms and abbreviations found in the 2021 Almanac.

A2/AD	Anti-access, area-denial
AA	Active associate: ANG/AFRC-owned aircraft
AAB	Army Air Base
AAF	Army Airfield
AATTC	Advanced Airlift Tactics Training Center
AB	Air Base
ABG	Air Base Group
ABW	Air Base Wing
ABMS	Advanced Battle Management System
ACC	Air Combat Command
ACG	Air Control Group
ACS	Air Control Squadron
ACTS	Air Combat Training Squadron
ACW	Air Control Wing
ADS-B	Automatic Dependent Surveillance-Broadcast
AE	aeromedical evacuation
AEHF	Advanced Extremely High Frequency
AESA	active electronically scanned array
AETC	Air Education and Training Command
AFB	Air Force Base
AFDW	Air Force District of Washington
AFGSC	Air Force Global Strike Command
AFLCMC	Air Force Life Cycle Management Center
AFMC	Air Force Materiel Command
AFNWC	Air Force Nuclear Weapons Center
AFRC	Air Force Reserve Command
AFRL	Air Force Research Laboratory
AFS	Air Force Station
AFSC	Air Force Specialty Code
AFSOC	Air Force Special Operations Command
AFSMO	Air Force Spectrum Management Office
AFSPC	Air Force Space Command
AFTC	Air Force Test Center
AG	Airlift Group
AGM	air-to-ground missile
AGOW	Air Ground Operations Wing
AGS	Air Guard Station
AGS	Alliance Ground Surveillance
AIM	Air intercept missile
ALC	Air Logistics Complex
ALCM	Air-Launched Cruise Missile
ALCF	Airlift Control Flight
ALTV	Approach and Landing Test Vehicle
AMC	Air Mobility Command
AMOG	Air Mobility Operations Group
AMOW	Air Mobility Operations Wing
AMRAAM	Advanced Medium-Range Air-to-Air Missile
AMS	Air Mobility Squadron
AMW	Air Mobility Wing
ANG	Air National Guard
ANGB	Air National Guard Base
ANGS	Air National Guard Station
APO AP	Army/Air Force Post Office Pacific
APO AE	Army/Air Force Post Office Europe
AOC/G/S	Air and Space Operations Center/Group/Squadron
APS	Aerial Port Squadron
ARB	Air Reserve Base
ARG	Air Refueling Group
Arpt.	Airport
ARS	1) Air Refueling Squadron 2) Reserve Station
ARW	Air Refueling Wing
AS	1) Air Station 2) Airlift Squadron
ASIP	Airborne Signals Intelligence Payload
ASOS/G	Air Support Operations Squadron/Group
ASTF	Aeromedical Staging Flight
ATCS	Air Traffic Control Squadron
ATKW	Attack Wing
ATP	advanced targeting pod
AW	Airlift Wing
AWACS	Airborne Warning and Control System
BACN	Battlefield Airborne Communications Node
BLOS	beyond line of sight
BLU	Bomb Live Unit
BM	battle management
BMEWS	Ballistic Missile Early Warning System
BW	Bomb Wing
C2	command and control
C3	command, control, and communications
C3I	command, control, communications and intelligence
C4	command, control, communications, and computers
CACS	Command and Control Squadron (Space)
CALCM	Conventional Air-Launched Cruise Missile
CAS	close air support
CBCS	Combat Communications Squadron
CBU	cluster bomb unit
CC	combat communications
CCG	Combat Communications Group
CCW	Command and Control Wing
CEF	civil engineering flight
CEM	combat effects munition
CEP	circular error probable
CENTCOM	U.S. Central Command
CFIN	combat flight inspection
CFAC	combined force air component commander
CFT	conformal fuel tank
CG	Communications Group
CNS/ATM	Communications, navigation, surveillance/air traffic management
COMINT	Communications intelligence
CSO	combat systems officer
CONUS	Continental U.S.
COS	Cyberspace Operations Squadron
CRF	Centralized repair facility
CRG	Contingency Response Group
CRTC	Combat Readiness Training Center
CRW	Contingency Response Wing
CSAR	combat search and rescue
CTOL	Conventional Takeoff and Landing
CTS	Combat Training Squadron
CW	1) Cyberspace Wing 2) Combat Weather
DAF	Department of the Air Force
DCGS	Distributed Common Ground System
DMOC	Distributed Mission Operations Center
DMSP	Defense Meteorological Satellite Program
DOD	Department of Defense
DSCS	Defense Satellite Communications System
DSP	Defense Support Program
DSRP	Defense Space Reconnaissance Program
DTOC	Distributed Training Operations Center
DV	distinguished visitors
EA	electronic attack
ECG	Electronic Combat Group
ECM	Electronic countermeasures
EELV	Evolved Expendable Launch Vehicle
EHF	extremely high frequency
EIS(G)	Engineering Installation Squadron/Group
EISS	Enhanced Integrated Sensor Suite
ELINT	Electronic intelligence
ENG	Engineering/Engineer
EO	electro optical
EOD	explosive ordnance disposal
ER	extended range
EW	electronic warfare
EWO	electronic warfare officer
FAB-T	Family of Advanced Beyond Line-of-Sight Terminals
FAC-A	forward air controller airborne
FG	Fighter Group
FLIR	forward-looking infrared
FLTS	Flight Test Squadron
FMV	full-motion video
FTG	Flying Training Group
FTU	Formal Training Unit
FTW	Flying Training Wing
FW	Fighter Wing
FY	fiscal year
GA	Guardian Angel (pararescuemen, combat rescue officers, and survival, evasion, resistance, and escape specialists)
GATM	Global Air Traffic Management
GBU	Guided Bomb Unit
GCS	ground control station
GEODSS	Ground-based Electro-Optical Deep Space Surveillance System
GPS	Global Positioning System
GSSAP	Geosynchronous Space Situational Awareness Program
HARM	High-speed Anti-Radiation Missile
HE	high explosive
HUD	head-up display
Helo	helicopter
IADS	integrated air defense system
IBS	Integrated Battle Station
ICBM	Intercontinental ballistic missile
IFF	identification, friend or foe
IIR	imaging infrared
INS	inertial navigation system
IOC	initial operational capability
IOF/S	Information Operations Flight/Squadron
IOW	Information Operations Wing
IR	infrared
IS	Intelligence Squadron
ISR/G/W	Intelligence, Surveillance, and Reconnaissance Group/Wing
IW	Intelligence Wing
IWS	Information Warfare Squadron
JADC2	Joint All-Domain Command and Control
JASSM	Joint Air-to-Surface Standoff Missile
JB	Joint Base
JBSA	Joint Base San Antonio
JDAM	Joint Direct Attack Munition
JMS	Joint Mission System
JNGB	Joint National Guard Base
JRB	Joint Reserve Base
JROTC	Junior Reserve Officers' Training Corps
JSOW	Joint Standoff Weapon
JSpOC	Joint Space Operations Center
JSTARS	Joint Surveillance Target Attack Radar System
JSUPT	Joint Specialized Undergraduate Pilot Training
JTIDS	Joint Tactical Information Distribution System
LAAR	Light Attack/Armed Reconnaissance
LANTIRN	Low-Altitude Navigation and Targeting Infrared for Night
LCD	liquid crystal display
LDM	Loadmaster
LGB	laser-guided bomb
LJDAM	Laser Joint Direct Attack Munition
LO	low observable
LOS	line of sight
LRASM	Long-Range Anti-Ship Missile
MAFFS	Modular Airborne FireFighting System
MALD	Miniature Air-Launched Decoy
MASINT	Measurement and signature intelligence
MCB	Marine Corps Base
MCE	mission control element
MDG	Medical Group
MDW	Medical Wing
MFD	Multifunction display
MILSATCOM	Military Satellite Communications
MISS	Mission/s
MOH	Medal of Honor
MSG	Mission Support Group
MW	Missile Wing
N/A	not available
NAF	Naval Air Facility
NAS	Naval Air Station
NAOC	National Airborne Operations Center
NAV	Navigation/Navigator
NGAAW	Next Generation Area Attack Weapons
NORTHCOM	U.S. Northern Command
NOSS	network operations security squadron
NSSL	National Security Space Launch
NVG	night vision goggles
O&M	Operations and Maintenance
OPS	Operations/Operators
OT&E	operational test and evaluation
PACAF	Pacific Air Forces
PACOM	U.S. Indo-Pacific Command
PAR	Presidential Aircraft Replacement
PARCS	Perimeter Acquisition Radar Attack Characterization System
PEO	Program Executive Officer
PGM	precision guided munition
PSP	Precision Strike Package
RAMP	Reliability, Availability, and Maintainability Program
RAOC	Regional Air Operations Center
RATO	Rocket-Assisted Take Off
R&D	research and development
RDT&E	research, development, test, and evaluation
RED HORSE	Rapid Engineer Deployable Heavy Operational RepairSquadron Engineers
RG	Reconnaissance Group
RPA	remotely piloted aircraft
RQG	Rescue Group
RQS	Rescue Squadron
RQW	Rescue Wing
ROTC	Reserve Officer's Training Corps
ROVER	Remotely Operated Video Enhanced Receiver
RS	Reconnaissance Squadron
RSC	Resource/s
RSG	Regional Support Group
RW	Reconnaissance Wing
RWR	radar warning receiver
SACU	Situational Awareness Capabilities Upgrade
SAR	synthetic aperture radar
SATCOM	satellite communications
SBIRS	Space-Based Infrared System
SCMS	Supply Chain Management Squadron
SCMG	Supply Chain Management Group
SCMW	Supply Chain Management Wing
SCOW	Supply Chain Operations Wing
SDB	Small Diameter Bomb
SEAD	suppression of enemy air defenses
SERE	survival, evasion, resistance, and escape
SHF	superhigh frequency
shp	shaft horsepower
SiAW	Stand-in Attack Weapon
SIGINT	signals intelligence
S-L	sea level
SLEP	Service Life Extension Program
SMC	Space and Missile Systems Center
SOCOM	U.S. Special Operations Command
SOF	Special Operations Forces
SOG	Special Operations Group
SOPS	Space Operations Squadron
SOW	Special Operations Wing
SPADOC	Space Defense Operations Center
SPC	Specialist
SPCS	Space Control Squadron
START	Strategic Arms Reduction Treaty
STOL	short takeoff and landing
STRATCOM	U.S. Strategic Command
STS	Special Tactics Squadron
SUPT	Superintendent
SW	Space Wing
SWS	Space Warning Squadron
SYS	System/s
T&E	test and evaluation
TACAN	tactical air navigation
TACC	Tanker Airlift Control Center
TACP	tactical air control party
TAI	total active inventory
TBD	to be determined
TF/TA	terrain-following/terrain-avoidance
TG	Test Group
T-O	takeoff
TRANSCOM	U.S. Transportation Command
TRG	Training Group
TRW	Training Wing
TTP	tactics, techniques, and procedures
TW	Test Wing
UAV	unmanned aerial vehicle
UHF	ultra-high frequency
USAFA	U.S. Air Force Academy
USAFE	U.S. Air Forces in Europe
USAG	U.S. Army Garrison
VHF	very high frequency
VLF	very low frequency
WCMD	Wind-Corrected Munitions Dispenser
WEG	Weapons Evaluation Group
WGS	Wideband Global SATCOM
WF	Weather Flight
WPS	Weapons Squadron
WSO	weapon systems officer
WXF	Weather Forecast/Weather Flight

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Cost-Effective Long-Range Strike

Illustration: Mike Tsukamoto/staff; USAF; Jonny Belvedere

The Army's initiative to generate long-range fires frays when stacked against conventional air and naval options.

A notional formation of Air Force B-21 bombers fires AGM-183A hypersonic missiles over the Pacific Ocean.

By Mark Gunzinger, Lukas Autenried, and **Bryan Clark**

The Department of Defense's strategic shift to great power conflict dramatically changed force structure requirements, in particular those needed for long-range strikes to defeat peer aggression. Today, there is broad consensus on the need to increase long-range strike capacity, but great debate over which investments will deliver the greatest return for America's warfighters.

The 2018 *National Defense Strategy* sees a Chinese or Russian campaign to seize and occupy the territory of a U.S. ally as the pacing challenge for sizing and shaping the U.S. military. Whether a Chinese invasion of Taiwan—which the U.S. Indo-Pacific Command has warned could occur this decade—or a Russian invasion of Ukraine or the Baltics along NATO's eastern front, the requirement to immediately engage enemy forces at the outset of an invasion is constant, requiring a combination of U.S. forces postured in the theater of conflict and long-range strikes from afar to prevent China or Russia from achieving their objectives.

All of the U.S. military services are investing in new long-range strike systems to meet this need:

■ The Army is investing in medium-range and very long-range surface-to-surface missiles to equip its newly formed Indo-Pacific and Europe Multi-Domain Task Forces (MDTF).

■ The Air Force, which has long provided DOD with the preponderance of its long-range strike capacity, is acquiring B-21 stealth bombers, next-generation cruise missiles, and other munitions that can be delivered by aircraft against targets in contested areas.

■ The Navy and Marine Corps are fielding new strike munitions for sea control and sea denial in the Indo-Pacific, including shipborne long-range hypersonic boost-glide land attack weapons and vehicle-mounted medium-range missiles capable of attacking ships in littoral areas.

The Navy and Air Force are also increasing the range, effectiveness, and capacity of the "kill chain" needed to find, fix, track, and attack targets over long ranges.

EUROPE VS. PACIFIC

The Army's plan to field long-range missiles to bolster NATO's defenses in Europe is in keeping with defense experts' view that batteries of ground-launched precision strike missiles prepositioned in Europe would improve deterrence and increase NATO's ability to block invading forces at a sustainable cost per target. The Army's planned mid-range missiles, at

about 1,500 kilometers, are sufficient to strike targets across Europe's more compact geography. Indeed, most of the Army's strikes would target locations within a few hundred kilometers of its missile launchers. For context, the city of Gdansk in northern Poland is only 60 km from the border of Russia's Kaliningrad enclave on the Baltic Sea.

The Indo-Pacific region, however, is another story. The tyranny of distance imposed by the region's vast expanses, the limited options for basing alternatives compared to Europe, and China's anti-access/area-denial (A2/AD) missile threats demand DOD greatly increase its capacity to launch precision strikes from thousands of kilometers away. Surface-to-surface missiles placed in Guam, for example, would require ranges of at least 2,900 km to reach China; positioning Army missiles along the Pacific's First Island Chain would require ranges of 800 km or more just to reach China's coastline, although shorter-ranged weapons could engage ships at sea.

Stealth aircraft, however, could penetrate China's airspace to attack targets from much shorter ranges and weapons launched by manned and unmanned ships could likewise maneuver closer to target areas. These options would not require the U.S. to obtain permission from Indo-Pacific allies to posture the Army's new missile batteries on their sovereign territory, nor require host nation approval—possibly on a salvo-by-salvo basis—before launching strikes.

To equip itself for long-range strike missions for the first time since 1947, when the Air Force became a separate service, the Army intends to procure not only new missiles, but the means to complete its own long-range kill chains: new air- and space-based surveillance, reconnaissance, communications, and fire-control systems. Many of these—including low-Earth orbit (LEO) satellites and fixed-wing aircraft equipped to detect moving targets—would be highly redundant with existing Navy, Space Force, and Air Force capabilities, running counter to well-established joint doctrine.

Spending billions to duplicate capabilities would reduce resources available to perform the core Army mission of defending U.S. forces and bases from Chinese attacks. As noted by the U.S. Indo-Pacific Command, failing to field such defenses threatens to severely erode America's ability to deter and defeat Chinese aggression.

THE ARMY'S PLAN

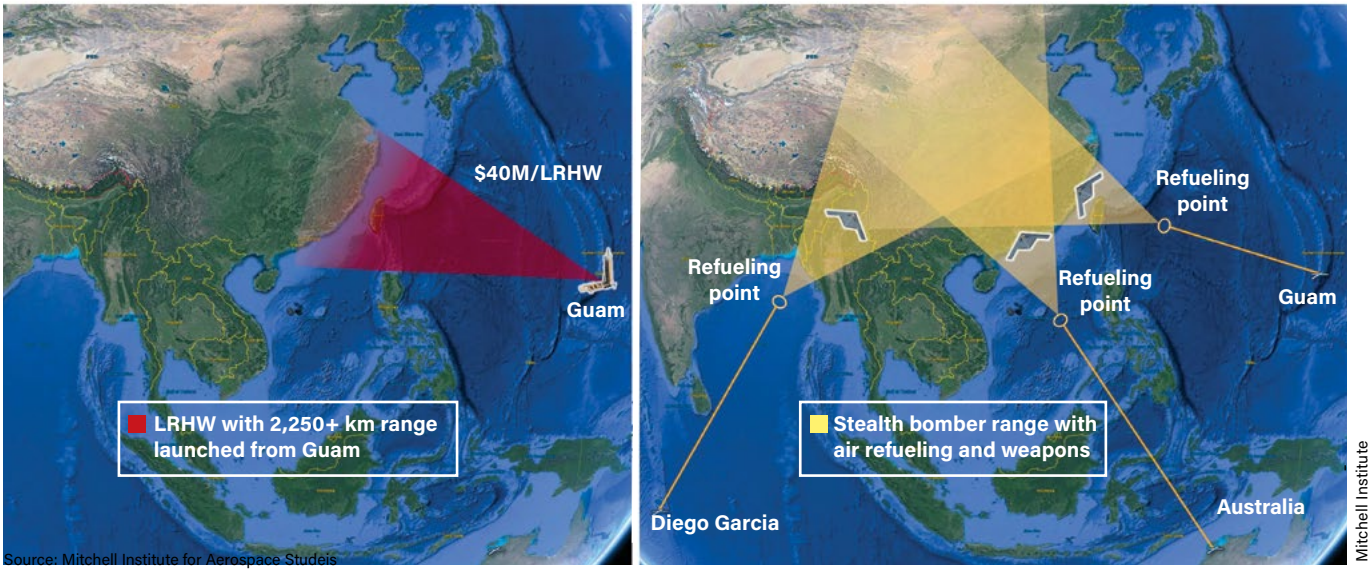
Long-range precision fires (LRPF) is one of the "big six" modernization initiatives the Army says are required to ensure its forces are capable of Multi-Domain Operations (MDO). The Army seeks to develop a trio of weapons that, together, will allow it to "penetrate and neutralize enemy A2/AD capabilities" that limit the U.S. military's freedom of action, according to Army Chief of Staff Gen. James C. McConville:

■ **Precision Strike Missile (PrSM).** The Army will soon begin to replace its legacy short-range MGM-140 Army Tactical Missile System (ATACMS) with PrSM (pronounced "prism") weapons, which will with a range of more than 500 km and carry a 200-pound blast/fragmentation warhead. Smaller than ATACMS rounds, not one but two PrSMs will fit into each launch pod mounted on the Army's M270A1 Multiple Launch Rocket System or M142 High Mobility Artillery Rocket System. PrSMs have a GPS/INS guidance system suitable for attacking stationary air defense threats, missile launchers, command and control (C2) centers, troop staging areas, and other non-armored "soft" targets. Early production PrSMs will cost approximately $1.2 million each.

■ **Mid-Range Capability (MRC).** The Army also intends to buy new weapons to attack targets from 500 to 1,500 km away. As an interim solution, the Army is procuring SM-6 Block I/IA dual-mode surface-to-air and surface-to-surface missiles, at a cost of about $4.3 million each, as well as Tomahawk Block V cruise missiles, which it would buy using existing Navy contract vehicles at a cost of about $1.5 million each. SM-6 Block I/IA missiles have a range of more than 420 km, while Tomahawk Block Vs have a range exceeding 1,600 km. Both can attack ships and targets ashore; with additional fire-control investments, the Army could also use its SM-6s against airborne threats. Upgrading the PrSM's booster engine to double or more its range is the Army's preferred mid-range solution

Deep Strike From Every Angle

If the Army deployed missiles batteries with its Long-Range Hypersonic Weapons to Guam, the U.S. territory closest to China, the $40 million missiles could reach the Eastern Coast of China. By contrast, penetrating stealth bombers based in Guam, Australia, Diego Garcia, aided by aerial refueling, could reach targets across most of China's territory.



Source: Mitchell Institute for Aerospace Studeis

Mitchell Institute

in the long run. The Army will also equip these PrSMs with a multi-mode seeker to attack "maritime targets in the Pacific and emitting [Integrated Air Defense Systems] in Europe." Extended-range PrSMs could cost $3 million each. DARPA is developing an intermediate-range hypersonic boost-glide weapon that could be another MRC candidate, but that would likely be more costly.

■ **Long-Range Hypersonic Weapon (LRHW).** The LRHW pairs a rocket booster with the Common Hypersonic Glide Body (C-HGB) jointly developed by the Navy and Army. The C-HGB will separate from its booster after reaching high altitudes and hypersonic speeds and then glide to its target using a dynamic, non-ballistic flight path. Some reports indicate LRHWs will have a range of at least 2,250 km. An LRHW battery could consist of a battery operations center and four transporter erector launchers (TEL), each with two weapons. Designed to attack high-payoff, time-sensitive A2/AD targets, such as missile TELs and surface-to-air missile (SAM) systems, a single LRHW missile could cost $40 million or more.

McConville says these systems will bring much-needed mass to a fight with China or Russia, but critics counter that the Army's new long-range missiles will be both more expensive than long-range airstrikes and also more limited, particularly against mobile or hardened targets.

The "mass" or number of warheads it can place on targets over long ranges will greatly depend on where it can forward posture its launchers and the range of its missiles after launch. The Army's capacity to conduct strikes will also depend on affordability and on theater logistics networks to support its batteries. Surface-to-surface weapons are larger than air-launched weapons of equivalent payload size and range, since they must use much larger boosters to attain the high altitude and speed needed to reach distant targets. Sustaining ground-based battery operations and resupplying them with missiles requires more airlift, sealift, and ground transportation capacity than needed to support air-launched weapon stocks in a theater.

Batteries of mid-range PrSMs permanently or rotationally deployed to Poland and other areas along NATO's eastern front would have more than enough range to attack Russian forces attempting to invade the Baltic States and would enjoy access to NATO's well-developed transportation networks, supply depots, and other infrastructure.

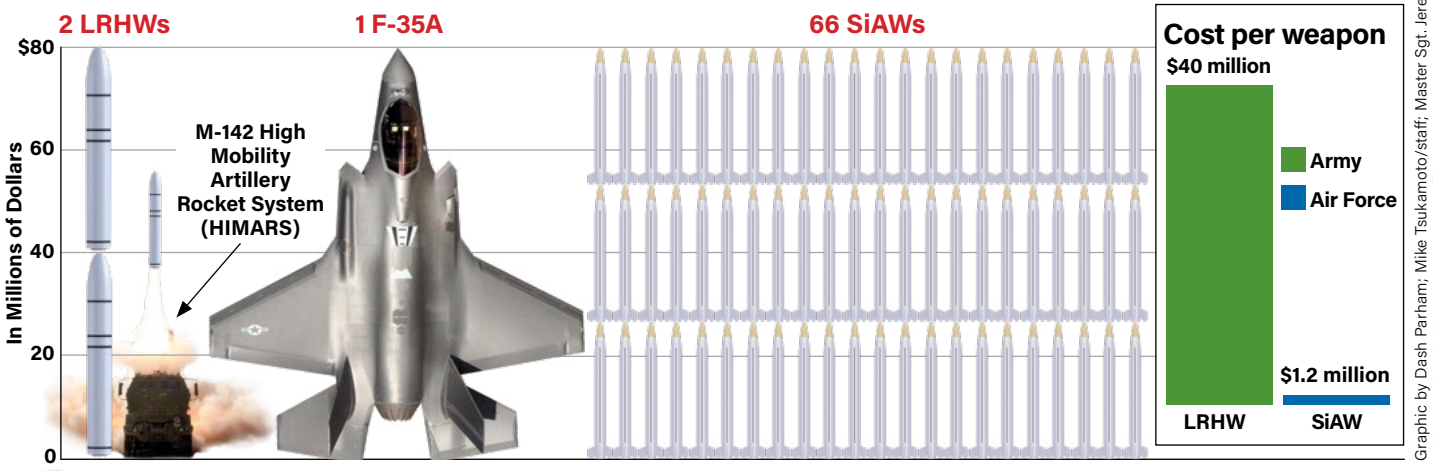
Army PrSM batteries postured in Japan, the Philippines, or elsewhere along the First Island Chain would be at best 800 km from China's coastline. PrSMs with a 500 km range will be sufficient for maritime missions alongside Marine Corps littoral strike units—assuming PrSMs have sensors to locate and track moving ships. Upgraded mid-range PrSMs could cover target areas along China's coastline, but at a cost of about $3 million each, would be pricey. To reach further into China and strike A2/AD targets, such as SAMs located along China's coastal areas, the Army would need its MRC and longer-range weapons.

In comparison, the long range, low observability, and other features of stealth bombers allow them to launch attacks from air bases along the Second Island Chain, northern Australia, Diego Garcia in the Indian Ocean, and even the United States. With ranges measured in the thousands of miles, and easily extended by aerial refueling, stealth aircraft can attack an enemy from multiple directions. Moreover, bombers can carry large payloads of shorter-range, smaller-sized, and substantially lower-cost weapons to strike multiple targets per sortie. A single B-2 Spirit bomber can deliver 80 small diameter bombs (SDB II) with a standoff range of 40 nm. At a cost $250,000 each, and all equipped with seekers to attack mobile or moving targets. If threats demand the bomber remain further from air defense systems inside China, that same B-2 could carry 16 JASSM-ERs that could reach targets anywhere in China.

A similar dynamic applies for shipborne and undersea-launched weapons. Navy surface combatants carry missiles, including Tomahawk and SM-6 Block I/Ia, but may not have sufficient defenses to operate inside the First Island Chain during a conflict; they would likely operate outside the most contested areas, and therefore focus their attacks on ships and islands in the East and South China Seas. Navy attack submarines with vertical launch systems (VLS) could operate inside the First Island Chain to strike maritime targets with missiles or torpedoes or use longer-range missiles like Tomahawk to increase the depth

More Bang for the Buck: What $80 Million Can Buy

The Army's Long-Range Hypersonic Weapon could cost $40 million per missile, half the price of a new F-35A Lightning II fighter, and 33 times the price of a Stand-in Attack Weapon. Here's what the Pentagon could acquire for the price of two LRHWs:



Graphic by Dash Parham; Mike Tsukamoto/staff; Master Sgt. Jeremy Wilson; White Sands Missile Range; USAF; Staff Sgt. Andrew Lee

Lockheed Martin

An Army precision strike missile fired in April tests at White Sands Missile Range, N.M., struck a target 85 kilometers away.

of their attacks into China.

COST COMPARISON

Three rules of thumb help explain the relationships between the range, size, and unit cost of missiles and other munitions. First, as range increases, so does a missile's size; more range, means more fuel for their engines, bigger boosters to extend flight, sophisticated guidance systems to maintain trajectory, and so on. All of these add cost. Second, surface-launched missiles are generally larger and more expensive than air-launched missiles with similar ranges and payloads, because they must have larger boosters to propel them from the ground into airborne trajectories to reach distant targets. Third, the faster a weapon flies, the more costly it is.

Long-Range Hypersonic Weapons could give Army batteries located in Guam and other U.S. territories the ability to attack targets in China, but at a cost that could reach $40 million to $50 million each. The cost of LRHW could quickly exceed the cost to buy, operate, and support additional stealth bombers over a 30-year period, including the cost to acquire next-generation Stand-in Attack Weapon (SiAW) missiles. Bombers, moreover, are reusable assets, while an LHRW is expended just once. Similarly, a non-stealth B-52 bomber could launch airbreathing (scramjet) hypersonic cruise missiles costing $4 million to $5 million each, a fraction of the cost of LRHWs and their launch battery.

The effectiveness of different weapons against challenging targets such as mobile or relocatable missile launchers, hardened or deeply buried facilities or targets located deep in an adversary's interior, is also a factor. The longer it takes a weapon to reach its designated aimpoint, the less effective it will be. Depending on its speed and trajectory, an Army ballistic missile launched from Japan could take 10 to 15 minutes to reach a mobile threat in China, such as an HQ-9 SAM. Still more time might be needed to complete all the Army's operations in the kill chain, such as relaying target data from a remote sensor to a joint command and control center, assessing the data, deconflicting airspace for a missile launch, and then commanding a launch. HQ-9s are designed to employ "shoot-and-scoot" tactics, which means they can begin to relocate within about 5 minutes of a launch. That means an Army missile might successfully strike its aimpoint, buy do so after the HQ-9 has already departed the location. Stealth bombers and fighters, however, offer a shorter response time and can be ready to engage fleeting targets by penetrating contested airspace and attacking from shorter ranges. B-2s, F-22s, and F-35s—and future B-21s—can also use onboard systems to find, fix, track, target, and engage targets without outside support, further reducing latency in their kill chains.

Of course, munitions can be equipped with active sensors such as a millimeter wave radar (like the SDB II) and passive infrared or optical sensors capable of adapting to a moving target; these can help find and characterize the mobile target, and then guide the weapon to a new point of impact. While this can greatly improve weapon effectiveness, weapons must also be able to change their trajectories to reach their new aimpoints, which may not be possible for ballistic missiles in their final stage of flight. Unlike cruise missiles that can loiter in a target area while waiting to find and attack mobile/relocatable targets, ballistic missiles that trade speed for range over long trajectories may not have enough kinetic energy and steering ability from their small control surfaces to make major course corrections.

In general, long-range stand-off weapons also cannot carry large enough warheads to kill targets that are structurally hardened or deeply buried, as is common in China, Russia, Iran, North Korea, and elsewhere. PrSMs with 200-pound class warheads would be ineffective against such targets. Penetrating bombers, on the other hand, can deliver 5,000-pound "bunker buster" weapons and even the 30,000-pound GBU-57A/B Massive Ordnance Penetrator. It is unrealistic for such heavy weapons to self- launch and fly very long ranges.

MORE OPERATIONAL ISSUES

PrSMs upgraded with sensors needed to attack moving ships could contribute to sea denial operations for parts of the East China Sea and South China Sea, depending on where the Army postures its PrSM launchers. However, this maritime strike capability would duplicate the Marine Corps' anti-ship initiatives and would require the Army to develop new infrastructure to support expeditionary operations, possibly in austere locations.

The willingness of allied nations to host the Army's new weapons is also an issue. McConville has said basing these weapons is "a political decision ... up to the policymakers and the diplomats." Yet MRC missiles would need to be postured in western Japan and other First Island Chain locations, posing significant challenges:

■ Host nation permission is required to station new U.S. land-based, long-range strike batteries on their sovereign territory. Convincing any nation along the First Island Chain to host launchers aimed at Chinese targets, even on a rotational basis, will be a tough sell. In South Korea, domestic opposition was fierce and the diplomatic pressure from China was strong after South Korea agreed to host a U.S. Terminal High Altitude Area Defense (THAAD) battery. THAAD is purely defensive; hosting offensive systems will be significantly harder. Noted retired Army Lt. Gen. Thomas Spoehr, "Today, there is probably not one of our regional

Seventh Air Force/Courtesy

An Air Force C-17 delivers U.S. Army Terminal High Altitude Area Defense Missile Batteries to South Korea in 2020, but permanent placement of the defensive weapons are not yet final, raising questions about whether U.S. allies would ever agree to host long-range offensive strike weapons on their soil.

partners in the First Island Chain that would be willing to base Army—or any other service's—long-range strike missiles in their country."

■ Second, even if the United States can find regional partners willing to host the Army's missile launchers, problems remain. In a crisis, a host nation could deny launch permission for a wide range of reasons, including a desire not to risk retaliation by China. Or permission could be granted on a case-by-case basis or even a weapon-by-weapon basis.

In contrast, basing requirements for combat aircraft are more flexible. Bases can be chosen based on aircraft's range and the availability of aerial refueling. Bombers stationed in the United States, Guam or other U.S. territories, Diego Garcia, and elsewhere can attack targets throughout China and do so from multiple aspects. This also gives commanders options in the event of political opposition within a given allied country. Ships at sea also offer the ability to operate independent of host nation concerns.

DUPLICATING SENSORS AND NETWORKS

To help target its medium-range and long-range fires, the Army is developing new air and space sensor platforms, communications networks, and decision support tools, some of which have been demonstrated through the service's Project Convergence.

The Army's Terrestrial Layer System-Large (TLS-Large) is a vehicle-based electronic intelligence and electromagnetic warfare (EW) system intended to support brigade-level units conducting electromagnetic spectrum operations (EMSO) that combine EW with spectrum management and electromagnetic battle management (EMBM). TLS-Large is needed to counter the Russian Armed Forces' EW systems. The Army has two MQ-1 Grey Eagle UAVs that can carry TLS aerial systems, and it is developing helicopter-launched small UAVs for over-the-horizon surveillance and targeting.

To enable medium-range sensing and targeting in a theater like INDOPACOM, the Army is developing the Airborne Reconnaissance and Targeting Multi-mission Intelligence System (ARTEMIS). ARTEMIS would be able to operate at around 40,000 feet, enabling it to identify targets more than 400 km away. ARTEMIS, however, duplicates existing Navy and Air Force high-altitude, long-endurance (HALE) UAVs such as the MQ-4 Global Hawk and Triton. It will also be more vulnerable than these aircraft, which can fly at higher altitudes, enabling longer standoff distances from air defense threats.

To provide targeting for long-range fires, the Army is pursuing space-based sensing systems, like the Gunsmoke-J satellite. Like ARTEMIS, these small satellites duplicate multiple existing space-based sensing systems, as well as the growing array of commercial and military satellites in low Earth orbit (LEO), among them the Missile Defense Agency's Hypersonic and Ballistic Tracking and Surveillance System (HBTSS), DARPA's Blackjack, and HawkEye360's signals intelligence system.

The merits of the Army's plan must be weighed against the opportunity costs of forgone investments that might provide greater overall value to joint combatant commands. Of particular note, U.S. military forces and installations throughout the Indo-Pacific remain nearly undefended against Chinese air and missile attacks—this is USINDOPACOM's top unfunded priority. It is also an Army core mission that the 2019 National Defense Authorization Act noted is being left unfulfilled: "In too many respects, the Army Missile Defense (AMD) forces fielded today fall considerably short of being an effective foundation for the kind of conflict envisioned by the National Defense Strategy."

The problem is so great that today, the threat of massive air and missile attacks on U.S. and allied air bases in Japan, Guam, and elsewhere could pose the greatest threat to the joint force's ability to generate combat power under stress. The Army has yet to demonstrate how its long-range fires would mitigate this risk. DOD should compare the net gain in the number of targets it can strike with the addition of Army long-range missiles against the number of targets left vulnerable to attack if undefended against Chinese air and missile attacks. The addition of high-energy lasers and high-power microwave systems with the potential to kill incoming cruise missiles and armed drones for pennies per shot, along with hyper-velocity projectiles that cost $65,000 to $85,000 each fired by Army howitzers, could provide a robust theater air base defense.

Chinese missile attacks pose a threat not only to forward air and naval bases, but also the Army's long-range strike batteries. Even if the Army's mobile launchers prove difficult

for the Chinese to target, they will not be immune from attack. If the Army can strike China's mobile targets, China probably can reciprocate. Moreover, the Army's caches of missile reloads must be stored in easily targeted depots, which likewise will demand theater defenses of their own.

RECOMMENDATIONS

Reshaping the U.S. military to meet challenges in a renewed era of great power competition will require DOD to invest in fundamentally different capabilities from what it fielded for counter-terror and counterinsurgency operations over the past two decades. DOD should seek the best, most cost-effective solutions to solving its challenges. Allowing excessive redundancy in long-range strike systems would reduce, rather than increase, its ability to meet emerging threats.

To ensure development of a diverse mix of long-range strike capabilities, DOD should:

■ **Direct a comprehensive cost-effectiveness assessment.** This study should determine the mix of capabilities that would maximize future long-range strike capacity as a whole, instead of enable a "stove-piped" service-by-service approach. This assessment should compare the cost-effectiveness of air-to-surface and surface-to-surface weapons, long-range strike alternatives, and the optimal mix theater commanders need to ensure multiple options.

■ **Assess the opportunity costs of the Army's planned long-range strike investments.** The study should determine if some resources could be better directed to increase the Army's capacity to perform the core mission of defending U.S. forces and theater installations against Russian or Chinese missiles.

■ **Ensure the Army's long-range strike batteries can be postured in forward locations.** This is not just a political question, but also a warfighter issue; it cannot simply be left to "the policymakers and the diplomats." DOD should address Indo-Pacific host nation issues for Army long-range strike batteries, along with rules of engagement for their use in a crisis, before committing to substantial investments for that theater. The Army should continue to develop and procure mid-range weapons to defend NATO allies and deter Russian aggression, however, given the greater opportunities to posture Army batteries in at-risk allied countries, such as Poland and the Baltic States.

■ **Integrate Army and Marine Corps counter-maritime strike.** Army mid-range strike batteries might have some benefit in the Indo-Pacific if they are able to deploy and sustain their operations alongside Marine units for counter-maritime operations. The Army and Marine Corps should cooperatively develop operating concepts, tactics, techniques, and procedures that would integrate their littoral counter-maritime strikes in the Indo-Pacific to complement Air Force and Navy capabilities.

The 2018 National Defense Strategy rightfully shifted DOD's planning and resource priorities toward preparing for great power competition and conflict. These priorities include fielding new strike systems that will provide theater commanders with the precision, long ranges, and mass they will need to defeat peer aggression. A mix of surface-launched, long-range missiles including shipborne capabilities, bombers, and next-generation penetrating fighter equipped with long-range weapons will create multiple options with which to attack China and Russia and complicate their ability to counter U.S. attacks. However, expending resources on overly duplicative capabilities could decrease, not increase, the long-range strike capacity available to theater commanders. DOD's overriding objective for long-range strike and its other investments should be to ensure integrated cost-effective joint force operations to optimize impact against peer adversaries. ✪

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USAF

A U.S. Army hyper velocity gun weapon system, cued by a remote air force aircraft, destroyed an airborne target during and advanced battle management system on-ramp exercise in September 2020. The Army projectiles cost $65,000 to $85,000 each.

By John T. Correll

BALLOON BUSTER

Frank Luke shot down 18 enemy aircraft in his 18-day combat run in World War I.

The Air Force has never seen anything, before or since, to match the relentless offensive of Frank Luke, who shot down 14 German balloons and four German airplanes in 18 days in September 1918.

He was the first Airman ever awarded the Medal of Honor and the second-ranking US ace of World War I. Eddie Rickenbacker, the leading ace, declared Luke to be "the most daring aviator and greatest fighter pilot of the entire war."

Luke did not live to see the armistice, which brought the war to an end three months after his final mission on Sept. 29, 1918, from which he did not return. Nothing was known of his whereabouts for months and conjecture surrounds what happened on that last day.

He did not fit the mold of U.S. air heroes, typically team players, supportive, and modest about their own achievements. Luke, 21, was arrogant, boastful, self-centered, and undisciplined. He made few friends.

His fearlessness was not "courage, exactly," said Lt. Jerry Vasconcells, who served with him. "He can't imagine anything happening to him. He thinks he's invincible," and "he may be almost as good as he thinks he is."

USAF

Lt. Frank Luke, called the most spectacular air fighter of World War I, shot town 18 airplanes and balloons in his short military career. Luke was killed in action on Sept. 29, 1918. He was awarded the Medal of Honor for his actions.

In August 1918, his unit, the 27th Aero Squadron, redeployed to Rembercourt near Verdun to be closer to the fighting in France. It was equipped with the Spad XIII, the best Allied fighter of the war and a match for the best German fighter, the Fokker D. VII.

Luke shot down a German observation balloon, his first aerial victory, on Sept. 12. The big sausage-shaped Drachen were used to correct artillery fire. Attacking them may sound like shooting fish in a barrel but it was more difficult and dangerous than attacking airplanes. The balloons were strongly defended by anti-aircraft cannons, machine guns, and infantry small arms.

Col. Billy Mitchell, commander of Air Service combat forces, ordered pursuit squadrons to destroy the balloons if they could. Luke was determined to roll up his score, and do it his way—which meant flying with or without orders, often without filing a flight plan. On five occasions, Luke returned with so much battle damage that he had to use a new airplane for the next mission.

Luke's biggest day was Sept. 18, when he had five victories: two balloons, two Fokkers, and a German observation plane. With 13 confirmed victories, he became front-page news in The New York Times and even more difficult for his squadron commander to control. Nobody wanted to diminish the reputation of a new celebrity who was delivering on Mitchell's directive.

On Sept. 29, Luke took off around 6 p.m., alone and without permission, for what would be his last mission. As he passed over Avocourt, he dropped a message, weighted with a piece of metal, saying, "Watch for burning balloons." Nothing further was heard from him, and he was declared missing in action.

In January 1919, a Graves Registration Unit found Luke's remains at Murvaux, a small town east of the Meuse. A U.S. Army officer, who spoke no French, understood local residents to say Luke had shot down another balloon, then was shot down himself, after which he used two pistols to kill seven German soldiers before being killed himself. He was awarded the Medal of Honor in May.

The story was embellished over time. One version had Luke killing 11 Germans in an epic gun battle. An article in Air Force Magazine in 1955 claimed that Luke had been attacked by 10 Fokkers, which he fought "for a full five minutes," shooting down two of them.

A credible version of the final flight did not emerge until historian Stephen Skinner reported in 2008 on his deep research into contemporary records and other original sources.

It was still daylight when Luke approached Murvaux, which lay in a valley. A high hill on the north side bristled with German machine guns. Luke came in from the north, using the hill as a screen, but when he turned up the valley to attack the balloons, the guns opened up on him from above.

He was hit and mortally wounded in the air. He landed his Spad in the valley, climbed out, and collapsed 221 yards from the airplane. He had one sidearm, a 1911 Colt semiautomatic with seven rounds left in the clip. He probably fired three shots. It is possible, but not likely, that the Germans returned fire.

Luke's advantage in his two-and-a-half-week combat run was his special combination of courage and flying ability. That was enough to put him in a class by himself as a fighting Airman. ✪

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