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Air Force & Space Force ALMANAC 2020

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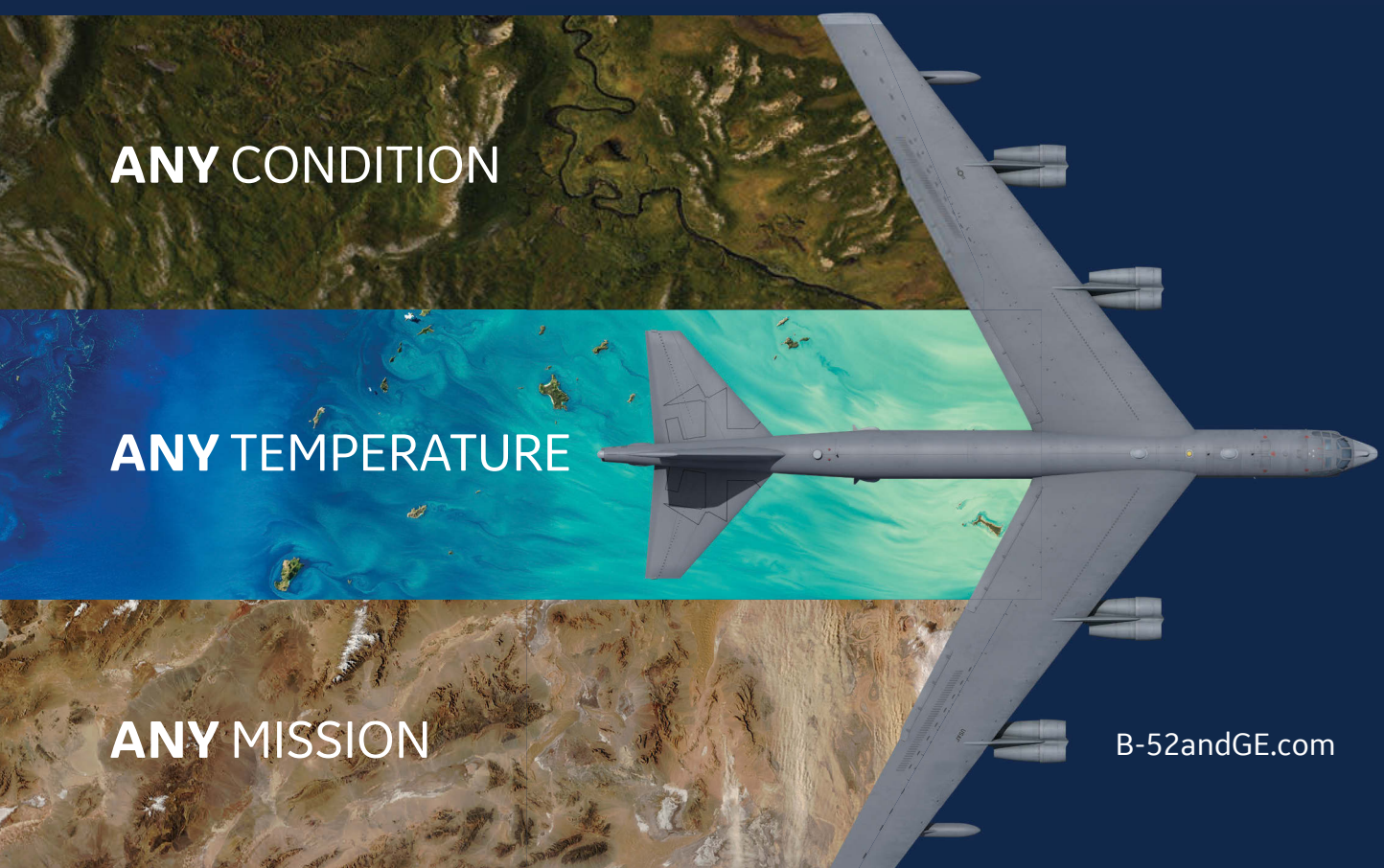

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AIR FORCE

June 2020, Vol. 103, No. 6

Airman 1st Class Erin Baxter

DEPARTMENTS

An F-22 Raptor. See "Almanac: Equipment," p. 63.

ON THE COVER

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Traditionally, the Almanac cover features a single eagle. Now that the Space Force is a separate service, two eagles fly in parallel. See "Air Force & Space Force Almanac 2020," p. 40. Two eagles prepare to land on a rocky outcrop. See "Air Force & Space Force Almanac 2020," p. 40.

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By Tobias Naegele

By the Numbers

Facts matter. Facts in context matter more. They tell a story, deliver meaning, prompt action. The numbers in this issue, by themselves, are reference points. It's what you do with them that counts.

Journalists are not typically numbers people. There's an old joke that blames the plague of math-phobic journalists on universities. The punchline suggests that journalists chose their major because there was no math requirement. The joke ends up on them, of course. Numbers figure in almost any story of substance. Numbers are essential for context, to quantify a problem or concern. How many is frequently just as important and often more so than who, what, when, where, and why.

The annual Almanac edition of Air Force Magazine presents myriad facts and figures that can help tell the Air Force story. The charts reveal trends and turning points and, through examination, insights. More important, they provide the community with factual answers to questions, historic data, and the ammunition to make effective arguments when seeking policy changes or more effective use of taxpayers' treasure.

The numbers in this issue are reference points. It's what you do with them that matters.

Here are some numbers that seem especially noteworthy at this juncture in Air Force history:

158: The number of bombers in the Air Force inventory on Sept. 30, 2019. Air Force leaders cite a need for 220 or more bombers to meet the National Security Strategy, yet the Air Force plans to retire 17 B-1Bs next year to help pay for future capabilities. The bomber gap will therefore grow before it shrinks, and the lessons of the past two decades suggest the planned-for number of B-21s intended to close that gap may never be built. Under current plans, the Air Force will enter 2022 with just 141 bombers, or less than a third of its bomber force in 1990. Today's bombers are better. But so are adversaries' air defenses. This is a security risk.

■ **29.18:** The average age of USAF fighter jets. The good news is that the average USAF fighter is still more than a decade younger than its bombers, which are now more than 42 years old (41.98 at the end of the last fiscal year). The bad news is that new planes are not joining the fleet fast enough to slow down the aging process. The Air Force needs 72 new fighters a year to put a dent in those advancing years. Yet, the President's 2021 budget request once again sought just 60 new fighters. It will be up to Congress to add another dozen to the order.

■ **70.27:** The mission capable rate for the Air Force fleet. Air Force leaders may argue whether MC rates are effective measures of readiness, but until there's something better, this is it. This overall number hides the sore points: Among F-22s, the Air Force's premier fighter attack jets, the MC rate was just 50.57 percent at the end of 2019; its B-1Bs were so beaten down last fall that the rate fell to just 46.42 percent; some older C-130 variants have rates in the 20s, 30s, and 40s. On the plus side: The overall rate is propped up by the stellar 89 percent MC rate for MQ-9s. MC rates change continuously, so any given rate is just a snapshot in time. Still, when the numbers of available aircraft are few and the MC rates are low, the gaps in our national security strategy are exacerbated. This should be a cause of national concern.

■ **$38.19 billion, or 5.4 percent:** The portion of the Department of the Air Force 2021 budget request that never will be touched by the Air Force or Space Force. This figure dwarfs the $15 billion request to fund a whole new military service and distorts our understanding of how defense funds are invested, but this silent fraud on the American taxpayer persists. The issue is not whether the nation gets value for those billions, but what effect hiding intelligence funding inside the Air Force budget has on the larger debate on national security investment. When intelligence funding is understated and Air Force spending is overstated, the picture is distorted for multiple congressional committees and federal agencies, not to mention the taxpaying public. This benefits no one, but it actually harms the Air Force and Space Force, perpetuating a myth that the Air Force is equally funded to the Army and Navy. It is not. Without the pass-through and Space Force, the Army's 2021 budget request is 15.8 percent greater than the Air Force's; the Navy's request is 4.8 percent greater. There is no rule that these must be equal, but policymakers and legislators owe it to the public to be transparent about their priorities.

■ **0.5 percent:** The net increase in the 2021 budget request for combined Air Force and Space Force funding. That works out to $856 million or just $2,565.18 per Active-duty member. This figure will have to grow substantially in future years if the new Space Force is to become a mature, independent, and effective military service, and not just a piece of a disjointed Air Force. Without large increases, the separation will diminish both services' capacity and capability to fund a new bureaucracy.

■ **6.16:** The percentage of the USAF officer corps identified as African American. This data takes on new meaning and a sense of urgency in the wake of the killing of George Floyd in Minneapolis, the public protests that followed, and Chief Master Sergeant of the Air Force Kaleth Wright's pointed commentary on these issues that sparked service-wide discussions about race and fairness in the Air Force (read more, p. 30). By contrast, African Americans make up 16.78 percent of the enlisted force. Among general officers, the number falls to just 4.8 percent, with only 13 of 266 GOs identified as African American. No one set out to make this so. But awareness of disparities is the first step toward a collective commitment to leveling the playing field for future generations. As the Air Force prepares to welcome its first African American chief—indeed, the first African American to lead any U.S. military service—the inescapable truth is that it should not have taken this long. America is better than that. ✪

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LETTERS

Offense Is the Best Defense

John Tirpak's article was concise and provided a lot of good information about these new Russian strategic missiles, but on the question of "what are they for," there was one key factor that seemed to be missing ["Strategy and Policy: What are Putin's Five New Nukes For?" April, p. 16].

Like us, though for different reasons, Russia's strategic nuclear deterrent is facing across-the-board obsolescence of Cold War-era weapons, and many of their weapons are believed to be near or past their planned retirements. Russian weapons traditionally are designed to have shorter service lives to make them cheaper to build and require less maintenance and overhaul, which their force structure and industrial base are ill-equipped to do. There is little reason for Russia to put 1970s-80s weapons back into production when there are newer designs that promise to be a more credible deterrent and, if necessary, more effective against U.S. or PRC strategic defenses.

The Atlantic Council is partly wrong in their assessment of how the U.S. should respond. "Confidence-building" will fall on deaf ears in Beijing and Moscow—they've felt too much pressure from the U.S. and too much interference in their "near abroads." Building up U.S. strategic defenses has merit, but in the strategic game, defense is both more complex and costlier to implement than deterrent offense. We must emphasize the deterrent sword, while not neglecting incremental improvements in the defensive shield.

Maj. Steve Daskal,
USAF (Ret.)
Virginia Beach, Va.

WRITE TO US

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

Job Descriptions

In "Verbatim" [April, p. 5] Air Force Chief of Staff Gen. David Goldfein is quoted as saying, "My job is to know where the holes are, get in, and hold targets at risk at the time and place of the Commander in Chief's choosing." While I recognize that testimony in Congress can lead to hyperbole on occasion, with all due respect, it is not his job to "hold targets at risk" for the Commander in Chief. That job belongs to combatant commanders, in this case U.S. Indo-Pacific Command and U.S. Strategic Command. The good general's job is organizing, training, and equipping the force.

Col. Douglas K. Mang,
USAF (Ret.)
Omaha, Neb.

Look a Boomer in the Eye

I'll add to Colonel Romero's letter"OK, Boomer" [April, p. 4]. I flew 105 combat missions in the F-105. Forty-six of them to Pak VI-A [Route Pack 6A] required two hookups going in (fueling and top-off) and one coming out; my other missions each required at least one refueling. I had over 200 hookups from a boomer looking at me from his station in the rear underbelly of a KC-135. Some of the rendezvous took place in weather, and refueling in and out of clouds was a regular occurrence. The KC-135 pilots and boomers were so smooth that I have come out of clouds in a 30-degree bank I never felt! If I found myself reaching full throttle, I could give a lifting motion with my hand and the boomers gave me a bit of lift

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with the flying planes. More than once a boomer saved a Thud and its pilot as an F-105 flamed out approaching the tanker. Facing down and backward, a boomer instructed his pilot into a dive below and in front of the falling fighter to effect a hook-up. Not probable or possible, sitting up front with a TV screen. Either add a boomer pod from which our professionals can do the job properly or scrap the KC-46!

Lt. Col. John F. Piowaty,
USAF (Ret.)
Cape Canaveral, Fla.

I spent most of my civilian career in DOD procurement and I cannot fathom why we are still accepting a product that does not meet a basic requirement. I'm referring to the problems with [the KC-46] in-flight refueling system. There were many times in my career where I rejected hardware offered by a contractor because the item did not meet spec. In some cases, I referred the issue to the buying office for their decision. Yes, most of my products were manufactured parts for anything from aircraft to tanks and everything in between. However, I was also working in large contractor plants making large systems for the B-2 and C-17. And yes, one time I refused a large request for accepting a major non-conformance and that went to the buying command. They made the decision.

The Air Force withheld funds from Boeing for the tanker for some time, but finally turned it loose. Yes, Boeing has major issues across the board, but that is their problem, not the Air Force's! Don't sign the DD250 until you have a fully acceptable aircraft.

Maj. Dan Mathys,
USAF (Ret.)
Arlington, Texas

I read that the Air Force is releasing funds being held from Boeing. This makes no sense. They have not provided an aircraft that meets contract specifications. I guess it helps to have friends in high places and be able to spend millions of dollars on lobbying efforts. I'm also hearing that due to the lack of refueling capabilities, the Air Force is considering outsourcing this function. If that happens, I think Boeing should bear the total cost until the KC-46 is fully operational and mission capable.

Col. Thom Weddle,
USAF (Ret.)
Minneapolis

Total Force in Korea

John Correll is correct when he says that U.S. air power stopped the North Korean invasion and controlled the air over North Korea ["The Difference in Korea," April, p. 56]. However, he only writes about the fighters and bombers, but ignores all the rest of the air power—the unarmed cargo, liaison, and spotter planes, without which the ground war would have been much harder.

I flew with the 21st Troop Carrier Squadron, Det. 2 under Maj. [Harry] Aderholt from September 1950 through July 1951. Our C-47s evacuated over 4,000 Marines and Army troops from the Chosin Reservoir (I made five flights into the short strip). The 21st was awarded the first Distinguished Unit Citation during the Korean War for that operation. In addition to the regular troop carrier missions, our detachment specialized in unconventional missions. We flew leaflet drops and loudspeaker broadcasts over the North Koreans or Chinese troops during the day and low-level night missions dropping agents by parachute into North Korea (one man was dropped 30 miles from the Soviet border). Much of the intelligence about Communist units came from these agents after they walked back from the north.

The reserve unit C-46s and C-119s were not suited for the hastily built front line airstrips, so were used mainly for long hauls from Japan to Pusan, Taegu, or Seoul. C-47s carried supplies and replacements to the front lines and evacuated casualties, even landing, at low tide, on the beaches of two islands off the coast of North Korea.

I don't know much about the roles of T-6 "Mosquito" spotter planes or the smaller liaison planes, but they were all part of air power in Korea.

Maj. John W. MacDonald,
USAF (Ret.)
Missoula, Mont.

Russian Energy

I must disagree with General Brown's statement that, "The Russians aren't economically entwined with a lot of things that are going on in Europe." ["Q&A: What's on the Mind of Gen. C. Q. Brown?" April, p. 8].

Rather, the Russians began years ago making Europe energy-dependent on their gas pipelines, which run to Czech, Ukranian, Turkish, baltic states, Finnish, and German terminal points. All these countries depend on

Russian gas for critical energy needs. Beyond that, gas-derived byproducts produced in those areas are just as dependent. The Russians have in the past withheld that gas when it was advantageous to them. Just the right "stick" to use to keep those states in their thrall. As has been shown before, they won't need a formal military attack: their first wave will be to cut off your heat, light, and industry. Good strategic theory for the Russians; poor protection for our allies.

Norman E. Gaines Jr.
Hartsdale, N.Y.

Minutemen and Service People

I wish to take issue with one of Col. [Omar] Colbert's remarks pertaining to Global Strike Command's actions ["Missile Testing in the GBSD Era," April, p. 36].

These days, Colbert said, "Global Strike is targeting engineers, scientists, and others with backgrounds that are well-suited to the nuclear mission instead of trying to turn anyone into a missileer or maintainer; whether they had an inherent interest or not. It's a very competent and capable range of folks that we are getting in now."

Not many people are familiar with the Minuteman program as it came into being in 1962. I happen to still have—on some very poor Thermofax paper—the original AFIT (Air Force institute of Technology) flyer dated July 1962, which announced that late in 1961, SAC (Strategic Air Command) had requested Air University and AFIT to plan an educational program at Minuteman missile sites. Due to short lead time, information was disseminated to the field in an all-commands message in April 1962.

I can go into greater detail of this program if requested, but the essence of it was that each Minuteman missile base would be as stated: "The AFIT Minuteman On-Site School Program will permit an officer to serve in an extremely important ICBM operational unit and simultaneously further his career by qualifying for an academic degree." The program at Malmstrom Air Force Base, Mont., was an on-site extension of AFIT's School of Engineering involving half-time graduate study for three or more years, followed by 10 weeks in residence at AFIT, leading to a master's degree in engineering.

Wing II at Ellsworth Air Force Base, S.D., to which I was assigned when I volunteered, was a graduate program leading to a master's degree in business administration with options in management. Ohio State was contracted to administer this program on-site for the entire period of four years. My eventual degree was in industrial management, as I already had a bachelor's degree in business administration. All of the missileers in this program had business admin or equivalent degrees. The other four Minuteman bases had a variety of educational opportunities administered by different schools.

My point is to not limit your missile officers to only engineers and scientists. Many of the officers who served at Ellsworth and received their master's degrees in business went on to successful careers as Air Force managers. The purpose of any program should be to train Air Force managers of the future. The [Ground-Based Strategic Deterrent] may want to consider a similar education program to draw in applicants. The Air Force thought the Minuteman was going to be a trouble-free missile and duty would be boring for the crew member. As it turned out, like any new program, the missile system was anything but trouble free, and it took several years to get it running smoothly. Nineteen years of my 20-year Air Force career were spent in various parts of the Minuteman missile system and, I have to say, I loved every minute of it. The Minuteman Education Program is something that worked once and perhaps should be considered again.

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

When the Minuteman system was envisioned, many thought (or perhaps hoped) that it could be automated and eventually not require a human crew. Looking at an "algorithm" to reduce the crew force sounds very hopeful, yet very similar.

Over the life of the Minuteman system, it was discovered time and time again that a well-trained and responsive crew, rather than automation, was often a critical component in the overall system's effectiveness. Even the importance of the crew was recognized by no less the "God-like" figure of Gen. [Curtis] LeMay (SAC commander), who selected the first crew members from experienced aircrew members—captains and majors. He even gave spot promotions to those early missile crews who achieved "S" (Select) status.

Soon, the monotony and apparent simplicity caused boredom in the crew force—it's not fun like flying. Aircrew members soon returned to the cockpits, never more to burrow underground in missile launch capsules. Soon, the critical crew function would be performed not by experienced officers, but by newly commissioned lieutenants. The difference between those lieutenants and those more senior aircrew members they replaced was maturity. Maturity, by definition, takes time.

What are the problems? They are well-known, as recounted in the article, "... scandals involving drug use, a test-cheating scandal, mental health issues, and low morale." Automation will not solve basic leadership/maturity problems!

Air Force leadership has failed time and time again to align what they say with what they do. The fact that nuclear duty is a critical portion of our strategic defense and important is contradicted by giving the "tip of the spear" jobs to newly commissioned junior officers. Providing meaningful and predictable career progression is essential; however, many promising missile crew members who "survive" their four-year tours end up filling meaningless administrative positions with no real way of significant advancement to the senior ranks. After all, they all lack the single most important qualification—they don't have the essential "universal management badge" wings. And, we all know, with few exceptions, the only real officers are those wearing wings.

I believe the current (and over the past 40 or more years) model of starting missile officers in the launch control center is a critical error (in missile parlance, an error which causes the failure of an evaluation). Crew members should learn the basics of officership and leadership by starting in areas like maintenance (aircraft and missile), wing and higher headquarters, airborne command and control, and many other jobs commonly given as "rewards" for four years in the hole.

Once these officers have "grown" and developed into more mature officers, then they should be "selected" for mis-

sile crew duty. The selection process should help to screen out problems involving drug use, integrity issues, mental health issue, and low morale—it should be a reward based on the critical nature of the task. While on crew, a friend of mine applied to work with the San Bernardino County, Calif., Sheriff's Department. Before they offered him a position, he was subjected to three days of testing. He became a missile officer by default like the rest of us by just passing a Class II flight physical.

Future advancement should then be based on their performance while serving on missile crew.

The fatal flaw with my solution? Getting those promising officers to stay for a career, or at least beyond their initial four-year commitment. The military has experience with "carrots" to tempt. Those carrots include financial (flight pay bonus and monthly payment), peer-recognized (awards/decorations), and professional (selection for assignments/prestigious schooling) incentives. Very few of those carrots have been used since the passing of LeMay as commander of SAC.

Unless and until the Air Force develops clear career progression and aligns its words with its actions, automation will simply kick the can down the road a little further.

Lt. Col. David J. Wallace,
USAF
New Albany, Ohio

Really Fast Bones

In the April 2020 "Letters to the Editor: Speed Limits," [p. 4] Cmdr. John Hall writes to correct what he perceives as two errors regarding the B-1 in the January/February article "The Bone is Back," p. 34. Well, I have to say, Commander Hall himself is in error on the two points that he makes.

First, the Bone is in fact supersonic. Even though the B-1B design was optimized for Mach 0.9 at 200 ft. AGL (above ground level) terrain-following, it is more than capable for supersonic flight up to 1.25 Mach, and not only at high altitude. In fact, the B-1B doesn't even fly at "very" high altitudes as he states—it's optimized for low-and mid-altitude ops.

The second error is the claim that the Bone's "variable intake ramps were removed for cost reasons." That isn't the reason that they were dropped from the B model. The variable ramps on the B-1A were needed for the Mach 2.4 speeds of that model. But, the B-1B, as stated above, was optimized for high-subsonic terrain-following, and the variable ramps were not required for that. Plus, and this is a big plus, the B-1B inlets have vanes to shield the face of the engines from radar which help to greatly reduce its radar cross section. They would not have been compatible with variable ramps.

Two other points to note: The B-1B was redesigned as a result of B-1A testing and a change of mission, from high-altitude to low-altitude terrain-following. This redesign resulted in an 8,000 pound increase in basic airframe weight that enabled an increase in max gross weight from 395,000 pounds to 477,000 pounds—more fuel and more payload. The other point that is often overlooked is that the 100-aircraft B-1B program was completed ahead of schedule and under budget.

I have flown both the FB-111A (referenced by Commander Hall) and the B-1B and can state with certainty that the B-1 is in fact a supersonic strategic bomber, even though it is now used for close air support.

Addison Thompson,
Chief Test Pilot B-1 (Ret.)
Santa Barbara, Calif.

USSF

Netflix

Let Art Imitate Life ...

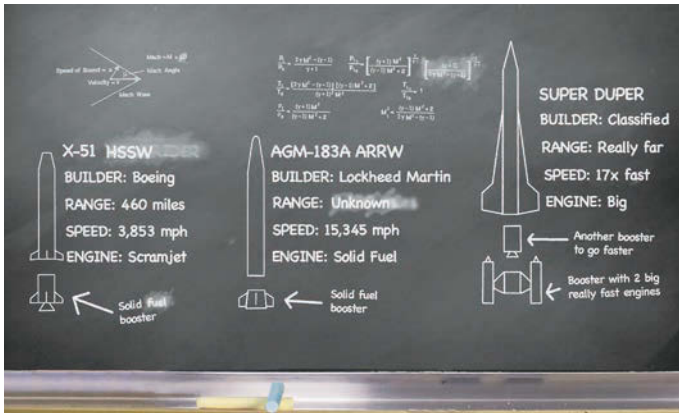
"The one piece of advice that I would give to Steve Carell is to get a haircut. He's looking a little too shaggy if he wants to play the Space Force Chief."

Gen. Jay Ramond, U.S. Space Force Chief of Space Operations, on the new Netflix show "Space Force," starring actor Steve Carell as the new Space Chief [May 6].

Let Life Imitate Art ...

"We need you all to make us invisible, enhance our senses, help us see through walls, across domains and from every perspective. ... Give us the tools to detect, engage, and destroy any threat—physical or virtual—blind our enemy and deny them any lead advantage or safe haven. ... We need to think big and take risks, and we need to turn science fiction into science fact."

Lt. Gen. Francis Beaudette, commander of U.S. Army Special Operations Command, at the Virtual Special Operations Forces Industry Conference [May 13].



Mike Tsukamoto/staff

World's Fastest

"We're building, right now, incredible military equipment at a level that nobody has ever seen before. We have no choice. We have to do it—with the adversaries we have out there. We have a—I call it the 'super-duper missile.' ... Take the fastest missile we have right now—you've heard Russia has five times [faster than the fastest U.S. weapon today], and China is working on five or six times. We have one 17 times. And it's just gotten the go-ahead."

President Donald Trump during the presentation of the U.S. Space Flag in the Oval Office with Space Force leaders announcing a new weapon [May 15].

5G vs GPS

"I do not think it is a good idea to place at risk the GPS signals that enable our national and economic security for the benefit of one company and its investors. This is about much more than risking our military readiness and capabilities. Interfering with GPS will hurt the entire American economy."

Sen. James Inhofe (R-Okla.) disputing the Federal Communications Commission's decision to allow Ligado Networks to deploy a nationwide GPS frequency-adjacent spectrum [May 6].

Time Machine

Senior Airman Peter Reft

"It's time to dust off those Ability to Survive and Operate manuals. Many of us grew up in the age of Apple Orchards, MOPP levels, operations with PPE, aircraft decontamination procedures, etc. While we have not required it in recent years given our focus on the Middle East, the ability to survive and operate in a CBRNE environment is in our DNA."

Air Force Chief of Staff **Gen. David Goldfein,** in an April 28 letter to commanders on the long-term reality of the COVID-19 operating environment.

Mike Tsukamoto/staff

"The Taiwan question is China's core interest and the bottom line of China that cannot be challenged. The U.S. deliberately stepping on the line is nothing else but playing with fire. China has never compromised on the issue of territorial sovereignty. If the U.S. does not have a clear understanding of this, and repeatedly probes and even breaks through China's bottom line, it will eventually bring fire to itself."

Gao Peining, writing in the Chinese People's Liberation Army's China Military Online [May 5].

In It to Win It

"Over the past decade, in U.S. war games against China, the United States has a nearly perfect record: We have lost almost every single time."

Christian Brose, former staff director of the Senate Armed Services Committee, in his new book, "The Kill Chain: Defending America in the Future of High-Tech Warfare."

Illustration: Mike Tsukamoto/staff; Photo: Ray Shrewsberry/Pixabay

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Munitions and Platforms Evolution

Gen. James "Mike" Holmes has headed Air Combat Command since March 2017, after a career commanding at every level and on the staffs of Headquarters, Air Force; European Command; and Pacific Air Forces. He spoke with Editorial Director John Tirpak on April 20 about ACC's response to the COVID-19 pandemic, future plans and weapons, and interservice coordination. This conversation has been edited for length and clarity.

Q. How is the COVID-19 situation different than the 2013 sequester, when the Air Force had to stop flying?

A. We want to be really careful about giving up things that we can't make up, because of limited capacity. An example is our Weapons School. If we don't graduate a Weapons School class, we don't have the capacity to double up in the future. That's a class of advanced, expert tacticians that we would never get back.

Master Sgt. Joshua Allmaras/ANG

Gen. James "Mike" Holmes, Air Combat Command boss.

So, we took all the things that the Joint Force depends on us to provide, and we've tried to find ways to keep them going, within the constraints of the [Centers for Disease Control] and [Office of the Secretary of Defense]-directed social-distancing measures. So far, I think we've been successful.

Q. Are you continuing a fairly normal flying program?

A. We're continuing to fly. We set some priorities; again, focusing on making sure we kept the critical things that we do for combatant commanders. Some of them are nonflying: cyber, ISR [intelligence, surveillance, reconnaissance], things we're doing in the [remotely piloted aircraft] world. We kept our upgrades and things we can't make up, and continue to do daily readiness preparation flying. There's been some impact, but I'm pretty comfortable with where we are.

Q. Have U.S. adversaries been trying to exploit the COVID situation?

A. Certainly in cyber. We've also seen messaging, from Russia and China and Iran, coming together around some common themes designed to further their interests. We see disinformation out there, some of it just designed to create confusion, and some of it—we think—designed to try to split alliances and pit people against each other in the United States.

Beyond that, there's been a rash of incidents with Russia doing what we call unsafe and unprofessional intercepts, against aircraft. We've seen China take provocative actions in the economic sphere, in the South China Sea, oilfields, and some of those places. We saw Iran put their small boats around Navy ships in [mid-April]. We've seen North Korea firing ballistic missiles out into the ocean. So, our adversaries are trying to poke and prod to find out if we're still ready and still prepared to counter them.

Q. But no very large changes in their military posture?

A. I think all our potential adversaries are also dealing with the virus, which puts some limits on it. But generally, no large posture changes.

Q. Have you moved to fix any fundamental vulnerabilities revealed by COVID about how the Air Force operates?

A. We want to "inoculate" our people with safe procedures and practices, and so far I think we've been very successful with that. We want to build workplaces, procedures, and rule sets that keep them safe.

We weren't prepared for this much teleworking; we didn't have enough bandwidth and capacity to send this many people home to telework. And I'm proud of the work that 16th Air Force and ACC A6 and the [Headquarters Air Force] and the Department of Defense staffs have made in increasing that bandwidth on short notice and providing some new tools to help people collaborate and continue to work from home.

Q. The Advanced Battle Management Systems is on a quarterly schedule of experiments and demonstrations. Have you learned anything you can apply right away?

A. In these early stages, we are thinking about this as an "internet of military things." With the fielding of CloudONE, which brings all that data together and makes it accessible to everybody on the network, we certainly see some immediate gains in our ability to store and share information.

It's a really important and crucial first step to tie together what we have now.

Q. You've had some conversations with Will Roper, Air Force acquisition chief, about the evolving definition of a "fighter." How will it change?

A. The flexibility of fighter platforms is still really important to us, because they can accomplish multiple missions. For example, you can send an F-35 out to do counter-air work, suppression of enemy air defenses, direct attack, battlefield air interdiction, or close air support.

You could make a case that the range and payload equation of fighters works better in a European environment—where the bases are closer to the battlefields—than it does in the Pacific. But the future fight is both inside and outside [enemy air defense zones]. If you're going to project power from long ranges, we have to rethink the requirement for the future. A fighter doesn't fit in quite as well with fighting a war from Guam in the Pacific, for example.

We're trying to think through how our traditional Fighter Roadmap can evolve into a Capabilities Roadmap that looks at how we'll do the things we've done with fighters in the next five to 15 years, and what new capabilities need to be added alongside them.

We're building-in decision points so that, if the experiments we're doing in low-cost, attritable aircraft are ready to turn into a program, we might buy into them. Or, as we look at long-

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range platforms, if some of those might supplant some of our fighter capabilities.

Q. Will a future fighter in the Pacific theater look more like a B-21 than an F-35?

A. It probably looks different than the fighters we've [had], but we still want to have that flexibility that a fighter has to do multiple things. What you need in the Pacific is systems that efficiently combine range and payload with avionics fusion and connectivity.

We are working hard on that problem. We've got some good ideas, but we're not ready to share those in public.

Q. Gen. Timothy Ray, head of Air Force Global Strike Command, recently told us he thinks the "arsenal plane" might be a clean-sheet design. Is that something ACC and AFGSC can work on together?

A. What ACC is interested in is making sure that everything connects together, making sure that we can get weapons across the target by having the right sensors and communication, and being able to find and fix those targets in space. We'll be interested in whatever GSC comes up with for that "arsenal" platform or a large standoff platform.

Q. What's the distinction between "attritable" airframes and remotely piloted aircraft?

A. I'm often asked if the future of air combat is manned or unmanned, and my answer is usually, "yes." I think the future of air combat is going to be increasingly about autonomy, about systems that are able to make decisions on their own.

We'll continue to use a mix of platforms that have a person on board, so they can react to the changing threats around them. But we'll also move toward more autonomous, unmanned systems. The term itself—"remotely piloted aircraft"—implies there's a person making the decisions for those airplanes. But when you're operating deep in enemy territory, you have to think about the vulnerability of the communication links that make that possible. The low-cost, attritable aircraft we've been looking at will be more autonomous than the RPAs we fly now. We'll give it goals, and we'll tell it about its operating environment, we'll prioritize targets and actions for it, and, through machine learning, we'll teach it to make more decisions on its own.

Q. Roper says his Digital Century Series idea could yield a new system in five years or less. Are you confident you'll get something in time, or should we expect a major F-22 extension and a bigger buy of F-35s?

A. I'm very comfortable with the acquisition strategy and the development we're working with Dr. Roper and Air Force acquisition toward developing that new family of capabilities. I think they have a great approach to it, and I think it's going well.

Because of the numbers involved and the scope of the threat, we're going to continue to rely on the F-22 and the F-35 for years to come. We'll continue to look at that mix between new things and things we're already buying, and try to make sure we keep up with the threat and put our money in the right places. But yes, we're on a good path; I think industry and the Air Force are partnering very well on our Next-Generation Air Dominance family of systems.

Q. There was some debate between ACC and AFGSC about the right initial hypersonic weapon. How has that been resolved?

A. The Air Force and the Department of Defense have decided that we will go forward with ARRW [the Air-Launched Rapid Response Weapon]. I think it's good to have different things competing with each other across [DOD]. In the Air Force, we like ARRW because it's a little smaller, and we can fit more of them on our platforms and hit more targets. It's a unique design, it diversifies the flight bodies that are being looked at across the Department, so it's kind of a win for everybody.

Q. The Army and Navy are also looking at long-range fires, and the targets they say they want to address have traditionally been within the Air Force's roles and missions. Is there a debate going on about that?

A. The Navy has always brought a capable long-range strike capability to the joint force, built around the Tomahawk Land Attack Missile. I'm not surprised they're looking to improve their capability. And I'm not surprised that the Army, as they look at the lessons learned from Russia and the Ukrainian forces, is concerned about competing with Russia in that long-range, surface-to-surface fires environment.

What I would like to see us focus on is making sure we invest in command and control that lets all of us reach out and use all those capabilities. And I think in this budget environment ... we're going to have to be careful [about] how much redundant capability we build.

Q. It sounds like you're concerned that there's some duplication already.

A. We all naturally want to build weapons that are designed exquisitely for our mission. But we're going to have to work together to make sure that whatever we field, we can control and bring together in coordinated joint fires and in support of the joint commander.

Q. In the early days of debate about U. S. Space Force, there was the question of whether it needs its own aircraft to attack satellite ground stations and other terrestrial targets. Has that been worked out?

A. We're proud of our partnership with the U.S. Space Force and the capabilities that we bring to bear in support of each other. I think the key thing is, yes, they will need to have access to both kinetic and nonkinetic strike capabilities. A lot of the threats to our space assets are launched or delivered from the ground or from the air.

Q. When you say, "have access to," do you mean simply being able to task Air Force assets, or have their own?

A. To task or coordinate. I don't think it would be an efficient use for them to have their own.

Q. The Air Force is reducing its high-altitude reconnaissance aircraft fleet. Are you shifting to an all-space-oriented ISR capability?

A. The A2/6 [ISR and cyber division] have put together an ISR flight plan. It concluded that we'll continue to need a mix of sensors on air-breathing platforms and on space platforms—sensors that can find things in networks—and from publicly available information. We do a variety of things with our sensors, we do preparation of the battlefield in peacetime, we do support for wartime information. So at least for the short- to medium-term, we're still going to need a mix. ✪

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THE ART OF EXCELLENCE™

By John A. Tirpak

A New Bomber Vision

Lockheed Martin illustration

The AGM-183A Air-launched Rapid Response Weapon (ARRW) in this illustration shows the hypersonic missile after launching from a B-52 bomber. ARRW is encapsulated in a rocket that accelerates the weapon to hypersonic speed.

The Air Force is slowly revealing a new blueprint for its bomber force, offering revised ideas regarding how many it wants, how and where they will be deployed, and how they will be armed.

The 16-year-old "continuous bomber presence" mission at Guam is gone, replaced with "dynamic force employment," in which bombers will pop up unexpectedly around the world to demonstrate a perpetual ability to project power.

The Air Force's stance on how many new, stealthy B-21 bombers it needs is changing. Instead of "at least 100," the number appears to be 145. Air Force leaders don't actually quote that number, but they're now comfortable saying they need 220 bombers overall to fulfill the National Defense Strategy (NDS), and that 75 of those will be re-engined B-52s. That leaves 145 other aircraft, after the B-1 and B-2 retire.

Gen. Timothy Ray, whose Air Force Global Strike Command (AFGSC) flies those bombers, used that 220 figure throughout a media blitz this spring. It amounts to five squadrons more than the old figure of 175, which he told defense writers in April was "programmatically derived," rather than a practical answer to NDS requirements.

Today's bomber fleet includes just 158 airplanes: 7 B-52s, 20 B-2s and 62 B-1s, and would shrink by another 17 B-1s if the Air Force's 2021 budget request is approved. Giving up its most maintenance-hungry B-1s would leave the B-1 fleet at 45, but Ray said he'll retain the same number of crews and maintainers to keep the jets more ready for action. Once available, they will receive hypersonic ARRW (Air-launched Rapid Response Weapon) missiles mounted on external hardpoints. The B-2s would remain the sole "penetrating" bomber until the B-21 comes along, but with only a down-scoped version of the planned Defensive Management system upgrade.

Air Force Deputy Chief of Staff for Plans and Programs Lt. Gen. David Nahom said the longer-term goal is a "two-bomber fleet." Speaking at a Mitchell Institute for Aerospace Studies "Aerospace Nation" event, Nahom said the B-1 will stay in the inventory just long enough to "shake hands" with the B-21—circa 2032.

"I know the reality of developing new programs," Nahom said. The B-21 is certain to experience "bumps along the way," which could require extended service from the B-1 and B-2. The B-21 is "just starting production" now and will soon enter the test phase, Nahom said, adding the Air Force plans to accelerate production once the planes start flying.

That forecast is what happens "in a perfect world," Nahom said. "And in a very perfect world, we'll get to 220."

Even 220 bombers may not be the ceiling, though.

"Right now, we know the requirement for long-range bombers is north of 220," Ray said. The B-1's readiness is far better now than it's been in a long time, he said, with the "Bones" able to fly "more sorties in a month than we've seen in the last three or four years." B-1s logged 100 sorties in March alone, he noted, thanks to "a significantly larger number of mission-ready crews" and "good momentum."

Ray said in addition to fitting the B-1s with up to six ARRW hypersonic missiles, the Air Force is also still thinking about fielding a derivative of the Hypersonic Air-breathing Weapon

Concept, or HAWC, a joint USAF-Defense Advanced Research Projects Agency program.

"We think we've got a good game plan" on hypersonics, Ray said. "We think an air-breathing missile in the long run would also be something to consider, but we're very comfortable with where the Air Force is going in their selection" of ARRW.

With more emphasis on the near-peer mission, Ray also signaled the end of using B-52s and B-1s for close air support in Afghanistan and, more recently, in Syria and Iraq. That mission was tough on the aircraft, requiring them to fly outside their design profile.

The National Defense Strategy "by necessity … focuses us to increase our long-range strike regardless of the platform," Ray said.

A future "arsenal plane" could help with that requirement. Ray envisions it as a new design, rather than a converted B-52, and imagines it could be developed using the Air Force's "Digital Century Series" model. Lower-cost "attritable" platforms, such as the Air Force's "Skyborg" airframe, or short-lived platforms intended to remain in service only until newer technology emerges, are both options. Under Air Force acquisition chief Will Roper's "Digital Century Series" concept, new designs would be rapidly developed, built, fielded, and upgraded—then retire after 10 or so years of service. Shorter life spans would translate to lower costs.

"The arsenal plane concept is probably better described as more of a clean-sheet approach," Ray said, that could "go down more innovative paths."

Meanwhile, to ensure bombers get the needed focus on readiness and modernization, Air Force Materiel Command (AFMC) is creating a separate Program Executive Officer (PEO) to oversee bombers, naming Brig. Gen. John Newberry, previously the PEO for tankers, to the post. USAF's Rapid Capabilities Office will continue to run the B-21 program, but Newberry will have the primary train and equip duty for personnel working on the B-21 at AFMC's Life Cycle Management Center.

OPERATIONALLY UNPREDICTABLE

To go with all the bomber programmatics, the Air Force surprised many with the April announcement that it's ending its continuous bomber presence mission at Andersen AFB, Guam. Bombers have been at Andersen almost without interruption since 2004, a highly visible reminder to friends and adversaries that the Air Force was ready and active in the Pacific theater. Instead, Global Strike Command will emphasize a new concept where bombers will operate without a predictable schedule in an effort to make the U.S., as the NDS states, "strategically predictable, operationally unpredictable."

USAF mounted an "elephant walk" in Guam just days before the announcement, lining up on the Andersen runway with bombers, tankers, reconnaissance drones, and helicopters. Such demonstrations show that a base can fuel, arm, and prepare to launch a large number of aircraft rapidly—though they stop short of actually launching the airplanes.

More demonstrations followed. A B-1 from Ellsworth Air Force Base, S.D., made a 30-hour training flight to form up over Japan with Air Force F-16s and Japanese Air Self-Defense Force F-2s; Pacific Air Forces commander—and the next Air Force Chief of Staff—Gen. Charles Q. Brown Jr. said the solo bomber mission "showcases our unwavering commitment to the security and stability" of the Indo-Pacific region.

On May 1, two B-1s deployed to Guam and flew over the South China Sea "to support [PACAF]'s training efforts and strategic deterrence missions to enforce the rules-based international order" of the region, PACAF said. On May 7, two B-2s from Whiteman AFB, Mo., and two B-52s each from Barksdale AFB, La., and Minot AFB, N.D., launched for training missions in Europe.

Polish Air Force photo

A B-1B Lancer, top, flies with a Polish F-16 during a long-range, long-duration training mission for Bomber Task Force Europe, May 11.

Less than two weeks later, on May 11, B-1s flew from Ellsworth to Eastern Europe, overflying Denmark, Latvia, Lithuania, and Poland alongside Danish and Polish F-16s and Polish MiG-29s. U.S. Air Forces Europe commander Gen. Jeffrey Harrigian said the exercise was meant to put adversaries and allies, alike, on notice that "we are ready, able, and willing to deter and defend when called upon." The B-1s exercised with Canadian CF-18s on the way home.

"We can come and go anytime they need us," Ray said. "We don't need to be there, physically."

"Dynamic force employment" acknowledges that USAF must be more agile and flexible in deploying air power, particularly in the Pacific. Leaders expect combat units to be more expeditionary than ever, deploying with just a C-130 or two of support gear, and with multiskilled Airmen able to handle a wider array of duties. Brown has said he wants the Air Force to develop more mobile airbase defenses and suggests some roles and missions should be shuffled to make that possible. The threat posed by longer-ranged Chinese missiles makes this essential, Brown stated.

Pulling back to the U.S. from the South Pacific, however, will still be a challenge. From Guam, bombers could reach the most chronic areas of conflict in a few hours, without tanker support. From anyplace else, they'll be at least 12 hours away, requiring extensive tanking to get to and from their destinations. Support gear and crews will also have to deploy to whatever Pacific base USAF will use to generate bomber sorties, taxing limited mobility assets.

ESPER ENDORSEMENT

Air Force leaders came under fire for offering to trade those older B-1s for better readiness and future joint all-domain command and control capabilities. Bomber advocates warned the existing force is already too small to carry out the National Defense Strategy, and members of Congress worried that giving up airframes would cost jobs at bomber bases.

But Defense Secretary Mark Esper stated in May that modernization—not current capacity—is his priority. When asked what his budget priorities would be if COVID-19-related expenses put pressure on the Pentagon's budget, he said he would "pull out more of the legacy programs" rather than risk modernization. Without naming specifics, Esper said there are "dozens" of legacy programs that ought to be halted across the armed services.

DOD should "invest those dollars in the future," he said. Despite "near-term risk," China and Russia are modernizing too rapidly not to keep up. ✪

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ROLLS ROYCE

The COVID-19 pandemic put a damper on celebrations of the 75th anniversary of the Allied victory in Europe, but Ella Craig did her part on May 6, V.E. Day, from home in Liberty Village at RAF Lakenheath, U.K. The U.S. Embassy and consulates in the U.K. offered poster designs to print, color, and display to commemorate the unconditional surrender of Nazi Germany in 1945, marking the end of World War II in Europe.

Airman 1st Class Rhonda Smith

B-1B Lancer mechanics from the 9th Expeditionary Bomb Squadron take photos as a B-1B flies overhead at Andersen Air Force Base, Guam, May 21. April marked the end of the 16-year-long Continuous Bomber Presence mission on Guam. In its place will be less-predictable deployments and show-of-force missions designed with a similar intent: Demonstrating capability to ensure security and stability and deter aggression in the Indo-Pacific region.

Senior Airman River Bruce

An Airman with the 609th Air Operations Center, deployed to Al Udeid Air Base, Qatar, April 20, 2020, donned a mask for protection against COVID-19. Qatar has had more than 63,000 confirmed cases. Despite masks and other inconveniences, missions continue unabated—in this case, completing the daily Air Tasking Order for the Combined Forces Air Component Commander and the 18 coalition partners supporting CENTCOM operations.

Staff Sgt. Joseph Pick

The Next CSAF Lays Out Top Priorities

Staff Sgt. Hailey Haux

Gen. Charles Q. Brown Jr., confirmed June 9 to be USAF Chief of Staff, during a virtual Change of Command Ceremony for Lt. Gen. David A. Krumm on Joint Base Pearl Harbor-Hickam, Hawaii, and Joint Base Elmendorf-Richardson, Alaska, on April 20.

By Amy McCullough

Gen. Charles Q. Brown Jr., the next Chief of Staff of the Air Force, laid out his top priorities during his May confirmation hearing before the Senate Armed Services Committee. Brown, who currently leads Pacific Air Forces, will replace Gen. David L. Goldfein as the service's top uniformed officer, becoming the 22nd CSAF and the first black person to hold the job.

Here are six things that have his attention as he prepares for his new role.

1. Joint All-Domain Command and Control

Brown agrees that connecting the Joint Force is critical to winning future wars, and he wants to continue pursuing what Goldfein laid out as his top priority (then known as multi-domain command and control) at the Air Force Association's 2016 Air, Space & Cyber Conference. "The United States needs an Air Force that can fly, fight, and win in the air domain as a member of the joint team. In recent years, faced with lesser adversaries, we have taken air superiority for granted, and it is easy to forget that the Joint Force loses without access to the air and the ability to deny that access to our enemies," Brown wrote.

2. Working with Industry

The Air Force needs to get better at interacting with and incentivizing industry as it looks to find ways to be more innovative. He praised Air Force acquisition chief Will Roper, who has championed out-of-the-box thinking such as topic-specific pitch days, where the Air Force awards contracts on the spot to smaller companies that might typically struggle with navigating Pentagon bureaucracy. Brown said Roper "is leading us to think differently about our relationship with industry, especially beyond our traditional partners, and I hope to be part of that effort."

"We must develop a culture where commanders build confidence to make decisions in the dynamic situations expected in future fights."
—Gen. Charles Q. Brown Jr., the next Chief of Staff of the Air Force

3. Developing Airmen

New Airmen are smart, tech savvy, and ready to learn, but USAF's classroom model has some catching up to do. "That's why I'm excited about the initiatives like [the] Pilot Training NEXT experiment," an Air Education and Training Command initiative that takes advantage of emerging technology to teach Airmen the way they learn best. "It is showing us how to move from a classroom-centered to a learner-centered model of training, and I think it has far-reaching implications," Brown said.

4. Empowering Commanders

Empowering commanders was part of Goldfein's push to revitalize squadrons. Brown wants to continue that effort, saying its critical the Air Force protects its most valuable assets—Airmen. "We must develop a culture where commanders build confidence to make decisions in the dynamic situations expected in future fights," he wrote in answers to the committee's advanced policy questions. "This starts with decision-making in daily operations. Too often, decisions that could easily, and appropriately, be made at the lower

Brown Vows New Measures to Boost USAF Readiness

By Rachel S. Cohen

The Air Force Inspector General (IG) is conducting a sweeping review of the service's readiness assessments and reporting, a year after a Pentagon-wide order directed the armed forces to improve the state of key fighter fleets, according to the service's next Chief of Staff.

Air Force department leadership told the inspector general in mid-March to begin the classified review, future Air Force Chief of Staff Gen. Charles Q. Brown Jr. said to the Senate Armed Services Committee ahead of his May 7 confirmation hearing. The review's findings will shape the service's path forward as it looks for more comprehensive metrics for whether it can spring into action.

In 2018, then-Defense Secretary Jim Mattis challenged the services to ensure that 80 percent of their F-16, F/A-18, F-22, and F-35 fleets could fly on any given day by the end of fiscal 2019. No Air Force fighter platforms hit the mark.

"The F-16 mission-capable rate reached a high of 75 percent in June 2019, the F-22 mission-capable rate achieved a high of 68 percent in April 2019, and the F-35 mission capability rate climbed to a high of 74 percent in September 2019," Brown wrote.

He added that overall readiness increased 16 percent from April 2018 to February 2020. In that same time, the 200 or so unnamed "pacing units," required for the first 30 days of a war plan, improved readiness by 35 percent.

DOD opted not to continue the 80 percent goal in fiscal 2020. Instead, the Air Force is returning to letting commanders in charge of combat and mobility forces decide whether their aircraft are up to par. They are using a new strategic sustainment framework aimed at shrinking supply chain costs over the long run, shifting how aircraft are repaired, adopting predictive maintenance practices, and more.

"The Air Force has made improvements in the readiness of its units. However, the continued high demand for Air Force capabilities continues to impact recovery," Brown wrote. "If confirmed, I will continue the effort [Chief of Staff] Gen. [David] Goldfein has put on readiness recovery with a focus on recruiting, training, and retaining high-quality Airmen, driving down the average age of our aircraft fleets through modernization, and working with our combatant commanders on balancing current operations tempo with time for our Airmen to train for full-spectrum combat operations."

He added that the Air Force has yet to see the full extent of how the coronavirus pandemic will negatively affect readiness, saying it's unclear how long it will take to recover from lost training time.

Last year, Goldfein argued there are better ways to measure readiness than tracking mission-capable rates. He pointed to the amount of time it takes to get people and aircraft ready to deploy, and how many elements of the force are ready to go at once.

Training, flying-hour funding, range improvements, sustainment, and time in the air are more holistic metrics of whether the Air Force can execute its missions, Goldfein said.

The Heritage Foundation recently suggested that lawmakers should include a provision in the fiscal 2021 defense policy bill to "re-establish standing operational readiness inspection teams trained to evaluate the ability of units to rapidly mobilize, generate, and fly combat sorties."

"These teams should be formed immediately to assess wing combat readiness on a recurring two-year cycle," the conservative think tank said. "Individual squadron-readiness assessments throughout the Air Force are now conducted by the unit's squadron commanders themselves, based on the additive metrics of aircraft mission-capable rates, aircrew and maintenance personnel qualifications, spare parts, and other readiness factors. While those metrics certainly measure what units possess, they in no way convey how ready those squadrons are to fight—and few commanders are willing to step beyond those metrics to declare that their own squadrons are not ready for a peer-level conflict."

Put another way: "A Formula One racing group may possess the personnel, cars, parts, and pieces required to be a team, but that in no way means that this 'team' could effectively compete against another that has repeatedly executed the building block subtasks and then tested them all together on a track for time," Heritage wrote.

But Brown believes legislation to create independent inspection teams would be premature.

Commanders are getting new software to log their unit's capability and readiness, in line with a FY2019 National Defense Authorization Act requirement, Brown said. He also cited a "readiness pathfinder initiative" to gather and analyze more data to better prepare for combat.

"Over the last year, many IG measures have been implemented to further enhance the rigor and accuracy of our readiness assessments and reporting, and these measures are starting to produce the intended results," he wrote. ✪

level are elevated unnecessarily high. If confirmed, I will empower my commanders and leaders to make decisions at the lowest capable and competent levels."

5. Ensuring Space Superiority

Brown acknowledged that "a great deal" of the department's "near-term innovation and development" will be in the space domain, and he told the committee he is committed to working closely with Gen. Jay Raymond, the Space Force's first Chief of Space Operations. "As capabilities such as hypersonics and directed energy evolve, we see the distinctions between space and air fading. I have known General Raymond for a number of years, and I know we will continue to work well together," Brown said. "It is up to both of us to ensure our commitment to collaboration and cooperation will be replicated throughout our organizations as we stand up the Space Force staff to support him and adjust the Air Force accordingly."

6. Establishing Flexible Logistics

The Air Force's fiscal 2021 budget requests funds to ensure the service is capable of conducting "logistics under attack," something USAF considers key to success in a highly contested environment. Brown wants to invest in pre-positioned logistics, something PACAF already is doing, and said he supports "initiatives focused on more agile, resilient, and survivable energy logistics—from bulk strategic supplies to deliveries at the tactical edge." He also supports the idea of "expeditionary logistics under attack," saying the service needs to provide "agile and survivable forward communications" to defend against an attack in cyberspace. ✪

Q&A: Chief Master Sgt. Roger Towberman, Space Force Senior Enlisted Adviser

Chief Master Sgt. Roger A. Towberman is the first enlisted member of the new U.S. Space Force and responsible for forming a new enlisted force. He spoke with Air Force Magazine Senior Editor Rachel S. Cohen about Space Force planning. This conversation has been edited for length and clarity.

Q. How are you working to build a unique culture for the Space Force?

A. What I want to believe is that I don't need to build anything. What we need for warfighting in the future, what we need as a service in the future, is already kind of ubiquitous in American young culture today. … I look at it more like unleashing the culture that they already have. When we talk about agility, we talk about speed, we talk about the first digital service … those things are present. I don't need to build them, I need to kind of get out of the way.

With [Chief Master Sergeant of the Air Force Kaleth Wright's] help and the Air Force Chief's Group on the enlisted side, we've been able to really handpick some Air Force talent. That team is already being challenged to think holistically about talent management. I don't believe you can change a promotion system without it impacting other parts of career development. I don't think you can change the way that you assess without changing the way you retire. Rather than me coming up with ideas and then having someone in the staff here try to champion those ideas up through the layers of others, I want them to come up with the ideas and then let me champion those ideas from the top down. I think that will help us move more quickly and see blind spots and second- and third-order effects to our individual decisions better than any way that I've seen done in the past.

Q. Space Force Vice Commander Lt. Gen. David Thompson mentioned interviewing potential Space Force employees because turnover will be so low that you can afford to be pickier. What might that look like?

A. On the enlisted side, we already do that. Recruiters sit down and interview every enlisted service member anyway, so it's not a huge change for us, although we are going to be hopefully a little more deliberate. Just this morning, I sent an email to some of the recruiting planners to say, 'Hey, … we're small enough that we should be able to capitalize, through conversations and hopefully through artificial intelligence, machine learning, etc., to really start finding talent in America that maybe doesn't even know their talent yet.' To me, that's the desired end state. If I can find greatness where you, as a young person, don't even see that greatness in yourself yet, but I can see that it's there and I can cut a deal with you that says, we're going to develop that and we're going to make you a better human being, better citizen, better Space Force professional than you even think you can be. To me, that's a powerful recruiting message.

Q. How could the roles of enlisted Airmen change as part of the Space Force?

A. Initially, it's going to be pretty much the same. Once you've been through an official school and we can put a patch on your shoulder, it changes your maneuver space as a warfighter. It improves your capability, but it also really improves your credibility at first glance. I think that will give us options to use NCOs and senior NCOs, in particular in the Joint Force, in different ways than we've used them in the past.

Eric Dietrich/USSF

Chief Master Sgt. Roger Towberman on building a new culture: 'I mean to get out of the way.'

Q. Are you considering any new enlisted specialty codes in the Space Force?

A. We haven't talked through that nuance too much yet. It seems counterintuitive that we would have Air Force specialties in the Space Force, right? I think there will have to be some new nomenclature. Some of this stuff in the human resource world is gonna change slower than we maybe would prefer, just because we're beholden to current technologies. It's trickier than one might guess to just say, 'oh, don't call them this anymore, call them something else.' That may have impacts that reverberate through different systems. We're being very careful, very deliberate about what we change and what we don't change. Man, what a mistake it would be to change someone's [Air Force Specialty Code] and have it all of a sudden cancel their reenlistment bonus because of some system that was connected to a code.

Q. Will enlisted personnel need to restart their service commitments if they join the Space Force?

A. [Currently], if you've got a promotion line number, we're going to delay the start of your transfer until that takes effect, for instance, to keep those lines clean. If you have three years or four years left to serve on your current contract, then you will continue to serve that and we'll transfer you over and that time will come with you. If [you have] less than two years, then we will ask you to take on that two-year Active-duty service commitment. … They've got the plan for each one of those individual circumstances, and for the most part, it might be unfair to say cosmetic, but for the most part, people won't notice much of a change in their service.

Q. What policies like leave, fitness standards, etc., are you considering now? Anything different from what CMSAF Wright is doing in the Air Force?

A. I'm not looking at anything specific right now. It seems a little premature to do that, when we don't even have another enlisted person in the service at this point except for me. We're kind of letting the Air Force work through those, [but] I'm listening, I'm watching, and we have the best of both worlds. If there's something they're considering in the Air Force that we like, we'll say, yeah, we'll do that with you. If there's something they're considering that we think we're maybe not ready for, we'll be able to opt out. ✪

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SpaceX's Crew Dragon Offers Clues About the Future of Space Force

NASA

The Expedition 63 crew expanded to five members with the arrival of the SpaceX Crew Dragon. (From left) Russian cosmonauts Anatoly Ivanishin and Ivan Vagner, NASA astronauts Chris Cassidy, USAF Col. Bob Behnken, and retired Marine Col. Doug Hurley.

By Rachel S. Cohen

Some space watchers say NASA's return to launching astronauts from U.S. soil could shape the far future of military manned spaceflight, though others say the new Space Force doesn't need to aim for "boots on the Moon."

SpaceX's Crew Dragon spacecraft carried NASA astronauts Robert Behnken and Douglas Hurley to the International Space Station on May 30 using a Falcon 9 rocket, marking the first time since 2011 that the U.S. has not relied on Russia's Soyuz program to take people to space.

After the launch, Maj. Gen. John Shaw, the Space Force's space operations commander, noted several significant differences from the space shuttle era.

The U.S. began its major overhaul of military space bureaucracy in 2019, he noted. The Pentagon stood up both the Space Force—a military service that offers people and weapon systems for U.S. commanders around the world to use—and U.S. Space Command, the organization that fights and defends space assets using the Space Force's resources. That change put Gen. Jay Raymond, who runs both the Space Force and SPACECOM, in charge of military support for human spaceflight, Shaw said.

As Crew Dragon rocketed into orbit, a team of USAF aircraft circled the airspace to ensure it was safe and rescue crews stood alert in case something went wrong. A KC-135 from MacDill Air Force Base, Fla., refueled F-15s from the Guard's 125th Fighter Wing for the launch. The tanker and fighters patrolled the airspace for the original launch date on May 27, which was scrubbed due to poor weather, and returned for the successful launch three days later.

The KC-135, call sign NATION02, orbited off the coast of Florida for about four hours on May 30, topping off the F-15s to ensure the airspace was clear. At the same time, Airmen with the 45th Operations Group-Detachment 3 stood alert in an operations center at Patrick Air Force Base, Fla.; along with Airmen and aircraft standing by at Joint Base Charleston, S.C.; and Joint Base Pearl Harbor-Hickam, Hawaii. The detachment's pararescuemen, combat rescue officers, aircrew flight equipment specialists, and HH-60 Pave Hawks, HC-130Js, and C-17s were ready if the astronauts needed to be rescued.

The Airmen could launch immediately, and airdrop into the open ocean with equipment—such as jet skies and scuba gear—to extract the astronauts from the Dragon capsule in the sea. For this mission, the crew stayed on alert until the Dragon docked with the International Space Station on May 31.

The team spent the "past couple years" developing new tactics, including working on a specially made Dragon capsule, to ensure they were ready if the astronauts needed help, said Maj. Marcus Merris, the rescue division chief with the detachment.

While the Department of the Air Force handled the bulk of space operations before, a new organizational chart means certain decisions will go through different channels. It also opens up the possibility of helping NASA in new ways, Shaw said.

"We've been supporting human spaceflight for decades, even during the shuttle era, and ... during the post-shuttle era by providing space domain awareness to the International Space Station," Shaw said during a June 1 event hosted by SpaceNews. "If there's a piece of debris on orbit that might be coming close to the [ISS] ... we will notify NASA, and occasionally they will make a decision to make an adjustment to the orbit."

Shaw added that the military offered satellite communi-

cations networks so rescue forces could talk more easily, if needed, to help the astronauts. The United Kingdom also helped the U.S. ensure the Dragon spacecraft had a clear path to the ISS, working under a growing slate of international space ops agreements.

NASA manages space exploration and often chooses military members to be part of its civilian astronaut corps. Behnken is an Air Force colonel; Hurley retired from the Marine Corps as a colonel. The Space Force operates systems such as orbiting satellites and runs the launch ranges used for military and commercial missions, but NASA's Commercial Crew Program, for which Crew Dragon is the first manned mission, could still spur ripple effects for military space.

The Space Force was created in part to support NASA as it looks to set up permanent facilities on the Moon, as well as privately owned companies pursuing internet service and more from low Earth orbit. But, supporting NASA's commercial crew program isn't as simple as reverting to how things worked during the space shuttle era.

"We're not using a shuttle, we're using a capsule again," Shaw said of the Dragon spacecraft. "So, we really have to go back to 1975 to remember when we were last supporting [a] capsule for personnel recovery operations."

Capsules require different planning because they can land almost anywhere, creating multiple potential scenarios for military rescue crews, he added. And instead of learning how to recover various capsules over time, from the Mercury program to Gemini to Apollo, service members are now learning about three capsules at once: SpaceX's Dragon, Boeing's Starliner, and NASA's Orion.

Technology is evolving as well. GPS didn't exist when Airmen were rescuing astronauts in the 1970s, and communications networks are more robust than in previous decades. The Air Force now also owns the C-17, which offers new pararescue options not seen in 1975.

"We're in a new era of support to human spaceflight," Shaw said. "We're very proud to be part of that team supporting NASA."

What about the Space Force's own recruitment ads, which show images of people in spacesuits? Don't get excited about the military getting its own astronauts, Shaw said.

"The United States Space Force is not going to be sending humans into space for national security purposes anytime soon. Maybe a long time from now, we'll be doing that, but not anytime soon," he said. "Any images you see in those commercials are meant to evoke an event horizon that transcends any of the boundaries we're dealing with today, to really inspire our next generation."

It's plausible that the Space Force and other military branches could establish a presence on the Moon that accompanies NASA's Artemis program, which aims to set up shop on the Moon as a jumping-off point for travel to Mars.

Does that require a Space Force astronaut corps to mirror NASA's? Maybe someday, said James Vedda, a senior policy analyst at Aerospace Corp.'s Center for Space Policy and Strategy.

Others aren't so keen on the idea, at least for the foreseeable future. Todd Harrison, director of the Aerospace Security Project at the Center for Strategic and International Studies, believes military space missions are better done without humans in orbit. Former Air Force Secretary Heather Wilson argues that protecting the national security enterprise's approximately 120 satellites doesn't require putting people in space.

"There is no manned military flight and no need for it—certainly in the next 10 to 20 years," Wilson said. "Some people talk about protecting space commerce. That is pretty far away and [it is] not clear that manned operations would be the best way to do that."

Just as the military and industry both have multiple ways to move around on land, in the air, and at sea, space may eventually be the same. But humans still have a long way to go to be adept at flying in orbit.

Jon Cowart, systems director for Aerospace Corp.'s human spaceflight activities at Kennedy Space Center, believes scientists could head to orbit before service members. Sending scientists to space with their experiments may be the first routine application of military manned spaceflight before uniformed personnel arrive, he said.

MITRE Corp. Space Systems Director Scott Kordella said he can imagine military members going to space to collect imagery, a responsibility currently left to satellites and their operators on the ground. He envisions service members could perform missions in low Earth orbit and provide greater space situational awareness to NASA missions.

Other mission areas could likely overlap. The Space Force can prevent and help NASA avoid on-orbit collisions, and deconflict intentional or unintentional interference with civilian and military space operations, Harrison said. Space tracking, communications, and navigation technologies will be even more important. The return of American human spaceflight can also drive a greater need for data analytics, energy research, space-related health care, cybersecurity, and more, some of which the military might handle, Space Foundation Chief Operating Officer Shelli Brunswick said.

SpaceX's launch will help prove the concept of commercially led spaceflight, further shifting away from the government as the sole entity putting people in orbit and making access to space more widely available. That, in turn, poses the question of who should handle space operations if something goes wrong.

The Space Force's creation is a first step toward blurring the line between civilian and military space, particularly as it could take on the search-and-rescue role, Brunswick said.

Vedda likened the Space Force to an orbit-focused version of the Coast Guard, which occupies a unique role as an armed force that falls under the Department of Homeland Security. From that perspective, the Space Force could handle its main mission of commanding military space assets under the Defense Department, but someday take on civilian rescue missions and other law enforcement work as commercial and NASA operations evolve.

Restarting domestic human spaceflight will affect the U.S.-Russian relationship as well. America is already moving away from the Russian-made RD-180 engine for its rockets, and less reliance on the Soyuz will shrink a major source of revenue for Russia's space industry. Weaning the U.S. off both the RD-180 and the Soyuz program will create financial problems for Russian suppliers, Harrison said.

It's possible that U.S. lawmakers and the executive branch could eventually reverse their plan to ditch Russian systems, but there are enough backup options available to power American rockets to avoid returning to the RD-180, which powers United Launch Alliance's Atlas V rocket, he added.

Space Force leaders lauded the Crew Dragon mission as the astronauts suited up and worked through their pre-launch checklist.

"The crew is settled in," Chief of Space Operations Gen. Jay Raymond said. "Get the jalapeno popcorn ready." ✪

Pentagon Editor Brian W. Everstine contributed to this report.

Wright, Race, and USAF's Demons

Weeks Before Retirement, CMSAF Speaks Out, Shakes Up Status Quo

By Tobias Naegele, with Brian W. Everstine and Jennifer-Leigh Oprihory

Photo illustration: Airman Dennis Spain

CMSAF Kaleth Wright's passionate post on his personal Facebook page sparked a new call for open discussion of race issues in the Air Force.

JUNE 6, 2020—

It was a lightning bolt that exploded across the Air Force and resonated throughout the Armed Forces: Chief Master Sergeant of the Air Force Kaleth Wright's emotionally charged response to the killing of George Floyd, a black man whose death while in police custody in Minneapolis on May 25 set off a wave of protests and violence across the country.

"I am outraged at watching another black man die on television before our very eyes," Wright wrote. "I hope you realize that racism/discrimination/exclusion does not care much about position, titles, or stature, … so yes, it could happen to you, or one of your friends, or your Airmen, or your NCOIC, your flight chief, your squadron commander, or even your wing commander. This, my friends, is my greatest fear, not that I will be killed by a white police officer … but that I will wake up to a report that one of our black Airmen has died at the hands of a white police officer."

Wright then opened a debate about "the Air Force's own demons," including "racial disparities in military justice and discipline among our youngest black male Airmen, and the clear lack of diversity in our senior officer ranks"—challenging topics not usually broached in public by military leaders, let alone by an enlisted member. In the days that followed, Wright and Chief of Staff Gen. David Goldfein engaged in a sometimes uncomfortable video conversation and a Facebook virtual town hall.

Wright's open letter, in which he wrote of "plotting, planning, strategizing, organizing, and mobilizing" 25 white, black, Asian, enlisted, officer, and civilian friends and trying to move "beyond the rage," had a stunning and immediate impact. Joined by Goldfein, the topic took center stage at a virtual Corona gathering of the service's top officers, with detailed briefings from the Top Judge Advocate General, Lt. Gen. Jeffrey Rockwell, and the service's personnel chief, Lt. Gen. Brian Kelly.

Among the facts shared at that briefing, according to a June 3 memo from Rockwell to all JAG Corps staff, were three slides showing disciplinary and legal actions. "The statistics show that black male Airmen under the age of 25 and with less than five years of service receive [non-judicial punishment] and courts-martial actions at a higher rate than similarly situated white male Airmen," Rockwell wrote.

Goldfein said the Air Force needs to sustain the "uncomfortable, but important" discussion about how different life experiences lead to very different understandings about the world we live in. In the two-hour virtual town hall June 3, he and Wright took a range of questions about racial bias in the service and the nation, even as protesters continued to march and police and National Guard troops girded for violence in cities all across the country.

"We've got to have the difficult conversations that produce a greater understanding of each other inside our Air Force, where we are a profession of arms, where everybody matters, everybody's valued, and everybody's background is important," Goldfein said. He related a story about his early days as a squadron commander where a senior NCO took him aside to ask if he could point out why many Airmen are bothered by a standard box of bandages. Presented with the box, Goldfein recalled, he couldn't fathom what the issue was, until the NCO pointed to a description on its cover: "flesh-colored."

"I just didn't see it," he said—until it was pointed out.

Goldfein promised in a letter to the force that the service "will not shy away" from racial discussions, saying that the same challenges that plague civilian society also affect the Air Force. "Sometimes it's explicit, sometimes it's subtle, but we are not immune to the spectrum of racial prejudice, systemic discrimination, or unconscious bias," he wrote. He cited "apparent inequity in our application of military justice" and said the Air Force Office of Special Investigations will conduct a review of the military justice system.

But the central message of the entire discussion was the need to ensure that commanders create an environment where Airmen are comfortable talking about such differences and the raw emotions that can be unleashed when they do. "Prepare for anger, some sadness, some rage," Wright said. "Don't be thrown off by the emotions that this might dig up, that you may not see coming. Allow people to express themselves."

Airmen called in to ask about resources, recruiting, and how to deal with colleagues who do not appear open to their points of view. "For some, this won't be enough to change their opinion," Wright said. "But I think with constant education and persevering through it and having some grace, people can change."

Goldfein emphasized the need for a deeper, more extensive commitment to change as opposed to quick fixes. "If we tried doing one or two things, and think we're going to get better, I don't think we're taking this seriously," he said. "This is a commitment to a campaign, a long-term focused effort on better understanding each other, a better understanding of what some of our teammates have been living with their entire lives, and ensuring that we make the meaningful change that we have to as a profession of arms."

Space Force Chief of Space Operations Gen. Jay Raymond and Senior Enlisted Adviser Chief Master Sgt. Roger Towberman also sent a letter to members of the Space Force on June 2, saying that Floyd's death is a "stark reminder that racism and unequal treatment is a reality for many and a travesty for all."

Because the Space Force is new, they wrote, there is "an opportunity to get this right from the beginning," by making diversity and inclusion "one of the bedrock strengths" of the Space Force. "Racism is an enemy," they said. "It is an enemy of everything we

know that is fair, right, and just. It is an enemy of our service; it is an enemy of our readiness; it is an enemy of our core values; it is an enemy of our most precious resource, America's sons and daughters; and it is an enemy that we must defeat."

Wings and commands across the Air Force held their own discussions. Addressing Floyd's death in a June 3 virtual town hall, the commander of the 52nd Fighter Wing at Spangdahlem AB, Germany, Col. David Epperson, called the situation sad and maddening. "Each one of us is going to deal with and process this in a different way," he said, promising to hold small-group working sessions "throughout the wing" to "work toward a better culture of inclusion and equality."

As of June 4, there were about 32,000 Guardsmen, mostly Army National Guard but including some 2,400 ANG, in 32 states and Washington, D.C., deployed to assist law enforcement with the civil unrest. National Guard Bureau Chief USAF Gen. Joseph Lengyel, in a June 3 letter titled "We Must Do Better," urged members to "listen," "learn," and "be better."

Lengyel acknowledged the "anger and outrage" that is "spilling out into the streets all across America," but said "everyone who wears the uniform of our country takes an oath to uphold the Constitution and everything for which it stands. If we are to fulfill our obligation as service members, as Americans, and as decent human beings, we have to take our oath seriously."

Gen. Charles Q. Brown Jr., the incoming Chief of Staff and the first-ever African American officer to lead a military service branch, added his voice to the mix with a video address to Airmen. "Here's what I'm thinking about," he said, his intensity rising as he spoke. "I'm thinking about protests in 'my country 'tis of thee, sweet land of liberty,' the equality expressed in our Declaration of Independence, and the Constitution that I've sworn my adult life to protect and defend. I'm thinking about a history of racial issues, and my own experiences that didn't always sing of liberty and equality. I'm thinking about living in two worlds, each with their own perspectives and views."

Brown described his experience trying to fit in as one of the only African Americans in his grade school, and later in his Air Force career, "where I was often the only African American in my squadron, or as a senior officer, the only African American in the room." He talked about "wearing the same flight suit with the same wings on my chest as my peers," but then being asked by another military member: 'Are you a pilot?'"

Brown, a command pilot with more than 2,900 flying hours, said he had felt pressure over the course of his career "to perform error free, especially for supervisors that I perceived expected less of me as an African American," and about the challenge of making those who don't see racism as a problem "because it hasn't happened to them" understand it.

He acknowledged that his historic nomination provides hope, but also a weighty burden. "I can't fix centuries of racism in our country, nor can I fix decades of discrimination that may have affected members of our Air Force" alone, he said. "I'm thinking about how to make improvements, personally, professionally, and institutionally so that all Airmen, both today and tomorrow, appreciate the value of diversity and can serve in an environment where they can reach their full potential. ... Without clear-cut answers, I just want to have the wisdom and knowledge to lead during difficult times like these ... to participate in necessary conversations on racism, diversity, and inclusion," Brown said. "I want the wisdom and knowledge to lead those willing to stay committed and sustain action to make our Air Force better."

The Air Force Association also issued a statement decrying racial injustice. "Racial injustice remains wrong for our military and our society—a source of daunting leadership challenges for every Airman and Space Force professional," said AFA President Lt. Gen. (Ret.) Bruce "Orville" Wright. "We stand with Air Force and Space Force leaders in support of their efforts to rid the services of every trace of racist behavior. The time is right for a thorough review of the military legal system and for careful self-examination to ensure the fairness of this great meritocracy. There is no room for division in the world's best and most effective fighting forces."

AFA Chairman CMSAF (Ret.) Gerald Murray, one of Wright's predecessors as the Air Force's top enlisted leader, agreed. "In the 72 years since President Truman desegregated our Armed Forces, America has made great strides," he said, adding that USAF still has far to go. "Chief Master Sergeant of the Air Force Kaleth Wright has helped force a critical reckoning," he said. "Discrimination and injustice undermine good order and discipline as well as combat effectiveness. It must be stamped out." ✪

Air Force Halts T-38 Formation Landings

By Brian W. Everstine

The Air Force no longer requires T-38 student pilots to complete formation landings—part of military aviation training for decades—following a fatal 2019 crash at Vance Air Force Base, Okla. The family of 2nd Lt. Travis Wilkie, the student pilot killed in the crash, praised the March decision, but said USAF should have halted the "archaic and dangerous requirement" before "it took the life of our son Travis and his instructor pilot."

On Nov. 21, 2019, Wilkie and instructor pilot Col. John "Matt" Kincade took off alongside another T-38 for a local student formation training mission. Wilkie had progressed through his training and had met course requirements. Kincade had an "impeccable reputation" and was one of the most experienced T-38 instructors at the base.

At the time, student pilots were required to complete two formation landings—when more than one aircraft land at the same time—with an "unsatisfactory" mark still meeting requirements. Two years before the crash, USAF had reduced the requirement from five formation landings, with at least three at a "fair level," to two at an "unsatisfactory" level, prompting many instructor pilots to question why they were even necessary. The Combat Air Force, which the pilots enter after graduation, has almost completely ended the practice of formation landings, and that, combined with the reduced requirement in the syllabus, meant instructor pilots are no longer as proficient in the maneuver, officials told investigators.

After the crash, the Air Force reviewed its requirements and suspended the practice of student pilots conducting formation landings.

"On March 5, 2020, the United States Air Force directed the suspension of formation landing training in undergraduate pilot training," AETC said in a statement.

Wilkie's parents Carlene and Don, in a statement, said they were notified on May 11 of the March change. The decision to halt the formation landings "substantiates the failure of Air Force leadership to discontinue an archaic and dangerous training requirement, in a tired 58-year-old plane, before it

took the life of our son Travis and his instructor pilot."

During the formation landing, when they touched down, the T-38 on the left of the formation bounced into the air and rolled to the right, touching down again in a right bank, skidding across the runway toward the other Talon. It lifted off the runway again, striking the other jet with its landing gear. The impact caused the aircraft to roll and crash. Both pilots were killed instantly.

The investigation found that Kincade, the instructor, did not take control of the aircraft as a "precarious situation" developed. Subsequently, Wilkie made incorrect flight control inputs, prematurely initiating an aerodynamic braking maneuver immediately after touching down. This caused the aircraft to jump back into the air, and Wilkie applied and held right rudder to avoid the edge of the runway. The combination caused the aircraft to roll and yaw, putting it on a "collision course" with the other plane.

Wilkie's family objected, noting it did not mention the reduced requirement for formation landings.

"Because formation landings are no longer used by front-line combat aircraft, they should have been removed from the T-38 training syllabus years ago," they said in a statement.

Rep. Scott Peters (D-Calif.) conveyed the family's concerns in a letter to AETC boss Lt. Gen. Brad Webb, and called on the Air Force to ground all T-38C flights and to stop formation landing training.

"We all acknowledge the inherent dangers involved in being an Air Force pilot," Peters said in a statement. "But if these planes are too old to be safe, then let's get safer ones."

While AETC has adjusted the syllabus, the command maintains the T-38 fleet is healthy and ready for current pilot training. The T-38C, the model involved in the mishap, has had 14 Class A mishaps, resulting in eight fatalities since 1998. ✪

USAF's Scramble to Telework

The Air Force's IT enterprise is tested during the COVID-19 pandemic.

By Rachel S. Cohen

The coronavirus pandemic has shocked global economies, sent nations into lockdown, and overwhelmed hospitals in some of the largest American cities. As the U.S. workforce adjusts to the new reality of working from home, the virus's spread is forcing the IT (information technology) that supports millions of military and civilian personnel to sink or swim.

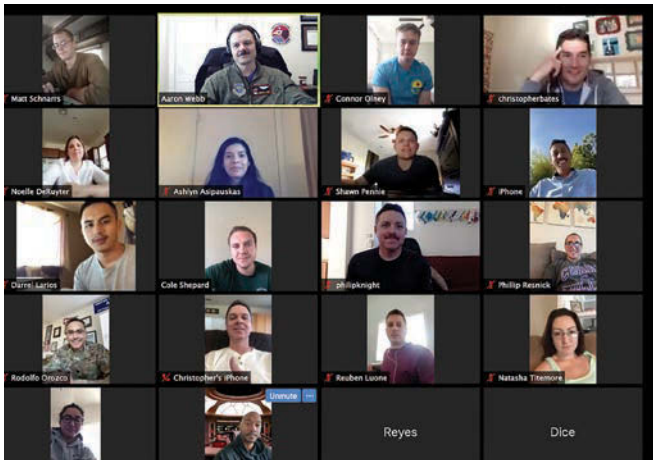
Building on incremental changes that were already in progress, Air Force officials are trying to turn what they call "20th-century IT for a 21st-century service" into an enterprise that keeps their air, cyber, and space missions going uninterrupted. If they succeed, this urgent recognition of IT as a top priority could reverberate far into the future for a better connected, digitally savvy force.

As many as 4 million DOD employees are now teleworking, Air Force Lt. Gen. B.J. Shwedo, the Joint Staff's chief information officer and its director for command, control, communications, computers, and cyber, said April 13. That includes 60 percent of staff at the Pentagon in Virginia, and a significant portion of the Air Force's workforce.

"This has really been done at a pace, speed, and scale that has not been seen before," said A.G. Hatcher, who oversees the Air Force's $17 billion IT and cyber portfolio as acting deputy chief information officer. "These [network upgrades] are things that normally take weeks and months—in some cases, probably years—to get done."

Air Force IT frustrates Airmen to the point of being a retention issue. IT has suffered from taking a backseat to other service priorities as officials valued security over utility, and ended up years behind the private sector. For all the talk of rapid acquisition, IT upgrades are woefully slow: The service is now rolling out Microsoft Office 365, the workplace software suite that launched in 2011.

The COVID-era IT response aims to change that. Starting in late February, the Air Force began offering improved virtual private networks so employees can remotely stay in contact with their offices, connecting users to a suite of collaboration tools like chat and videoconferencing. It is also handing out secure laptops, alongside about 20 other technology solutions.



Tech. Sgt. David Carbajal

Members of the 571st Mobility Support Advisory Squadron conduct a virtual flight commander sync on April 3 near Travis Air Force Base, Calif.

At the beginning of the year, the Air Staff did not have the teleworking tools, capability, or capacity it needed to do the work of the Air Force's Secretary and Chiefs, according to Staff Director Lt. Gen. Timothy Fay.

"The first few days on our virtual private networks (VPN) … I will liken it to, probably, driving on [I-395] pre-COVID," Fay said. "Full-contact sport, very difficult bumper-to-bumper traffic where you would come to a standstill quite frequently."

Things aren't perfect, but they have improved. Task forces are troubleshooting complaints and building up bandwidth in hot spots with subpar connectivity. In late March, USAF said it was fixing a problem that requires users to enter their PIN multiple times. One consultant who spoke to Air Force Magazine has run into the PIN issue, and said he's cut back on his Air Force projects while teleworking because of system glitches.

Before the pandemic, the Air Force averaged 4,500 VPN sessions a day, with a maximum capacity of around 9,000 sessions. That has jumped to 93,000 sessions per day and a maximum capacity of 240,000. By the end of May, users at overseas bases should have the capacity for another 200,000 connections through a partnership with the Defense Information Systems Agency.

For Air National Guard and Air Force Reserve members, daily connectivity has grown from about 800 sessions to around 7,000.

"The first week was rough. If you weren't logged on early, you weren't getting on until ... afternoon. ... Now, I rarely have an issue getting on. It's slower during the morning peak, but still functional," said an Air Force officer who requested anonymity to speak candidly. "You have to have a DOD-issued laptop. ... Most people don't have one, which limits their access because a lot of DOD websites require VPN access."

VPNs let Air Force employees access Office 365 through a program known as Cloud Hosted Enterprise Services, or CHES. It opened to 600,000 users in October, and is expanding this year to add 110,000 users in the Air National Guard and the D.C. area.

While CHES is permanent, it's not mobile-friendly and is available only to people with a certain ID card. Users can't record audio or video meetings, and CHES limits interaction between Pentagon agencies. So the Pentagon came up with a temporary solution for the entire DOD known as Commercial Virtual Remote (CVR), which launched March 27.

"CVR provides users with a temporary Microsoft [Office 365] collaboration suite solution, consisting of tools such as Teams, SharePoint, Word, Excel, PowerPoint, and Microsoft OneDrive cloud storage capability," according to an Air Force document explaining the differences between CVR and CHES.

CVR can be accessed from any device, without a VPN connection or a service member ID, and offers voice, video chat, file sharing, and more. It's now available to 740,000 Air Force accounts.

Fay said CVR let him host a "seamless" tabletop exercise with more than 100 people around the globe using video conferencing with breakout rooms. Others are using teleworking software for everything from change-of-command ceremonies to industry days to digital happy hours.

But, there's a hitch: CVR expires in September.

"This service will only be accessible for the length of the COVID-19 crisis (six months). The licenses will expire on 15 Sept. 2020, at which time all teams, chats, channels, and files saved in the CVR environment will be erased and sanitized," the document said. "There will be NO enterprise mass migration of data—users will be responsible for data migration and will receive an email at least two weeks prior to termination of the CVR environment to do so."

That prospect is dissuading some Airmen from embracing software that could make their lives easier in the short-term.

"At this point, if it's going to be only a temporary thing, I won't use it," the Air Force officer said. "Not worth the effort to transition to something that's going to disappear in a couple months."

Brig. Gen. Chad Raduege, Air Combat Command's chief information officer and director of cyberspace and information dominance, calls that feeling "app fatigue." CVR is unifying the armed forces, he said, and the Air Force owes it to its Airmen to continue CVR past the pandemic and stop jumping from software to software.

ACC has communicated that message to Air Force leaders, and Hatcher said the Pentagon is reevaluating its plan for CVR.

Hardware solutions are also in the mix. Air Force acquisition boss Will Roper wants to provide as many as 4,000 DeviceONE-enabled laptops that connect to classified DOD networks and Air Force cloud storage. DeviceONE is part of the Air Force's networking vision known as the Advanced Battle Management System.

The Air Force Research Laboratory (AFRL) developed DeviceONE through its SecureView classified networking program, which has been deployed to more than 12,000 users across the U.S. government since 2011. The jump kits are a combination of a virtual desktop that stores classified information, a network that lets users access the data from almost anywhere, and a commercial laptop. Materials cost less than $2,500 per person, according to AFRL.

Roper said key leaders would be among the first to receive a DeviceONE unit, which ideally would let users work from home rather than go into an office to handle secret-level information on specialized computers or in a Sensitive Compartmented Information Facility. Other units would be spread among USAF program offices.

"We've ordered 50 and have plans to order 400. We would like to order 4,000," Roper told reporters in April. "We need funding to do that, and there are a lot of things that need funding."

As Air Force networks get more crowded, they also become more vulnerable to attack. Shwedo said DOD has seen a rise in "spear phishing," or attempts to steal sensitive information by getting people to click on malicious links. The department is getting better at understanding how those phishing attempts work and where they come from, Shwedo said.

Sixteenth Air Force, home to the service's cyber offensive and defensive units, is keeping an eye out for disinformation and stressing the need for cyber hygiene to avoid getting hacked at home.

Over the past few years, the Air Force has begun outsourcing IT services at bases across the country to companies such as Microsoft, AT&T, and Accenture, so those Airmen could instead focus on cyber defense. Hatcher did not answer whether the Air Force could need to grow its cybersecurity workforce to accommodate future remote work, but noted that the service wants to find people who are digitally savvy in general.

Looking ahead, some officials believe the current crisis will spur a greater focus and higher spending on IT. Roper believes spending more on IT will make the Air Force more efficient and ultimately help save money, telling reporters IT "will not be that side gig for us anymore."

Lessons learned from the pandemic can accelerate the Air Force's Enterprise IT-as-a-Service (EITaaS) effort to bring commercial companies in to manage IT at more bases, as well as its "Bring Your Own Approved Device" effort to work from any mobile device, anywhere. Now that they are getting a better sense of what works and what doesn't, leaders are identifying how certain aspects of telework can be improved and made permanent.

Equally important is the culture that a good teleworking enterprise creates. Working from home means having to constantly split time between a job, taking care of family and pets, and managing a healthy work-life balance. The Air Force wants to build a culture that says it's OK to stop working at 5 p.m., that it understands your kids need you, and not to worry if your cat hops into a teleconference.

"It gives us an opportunity to give some more autonomy to our people, to be a symbol of empowerment and trust, to help people balance their working lives with their personal lives, and mix those in a way that I think is attractive to a lot of the generation of people that we are trying to keep and stay in the Air Force," Hinote said. ✪

Lawmakers Grill DOD Officials on Ligado, GPS Fight

By Rachel S. Cohen

Two of the most important technologies in the current digital era are pitted against each other in a perplexing debate about the future of high-speed wireless technologies.

On one side is the Space Force's constellation of Global Positioning System satellites. On the other is the future of 5G—or fifth-generation—wireless technology. In the middle is a thin band of spectrum that the Defense Department believes is vital to the accuracy and reliability of GPS timing and positioning data and that the Federal Communications Commission has agreed should be available for 5G transmission.

The FCC ruled in April in favor of allowing Ligado Networks to build ground terminals for a broadband Internet network in the electromagnetic spectrum's L-band, near the spectrum occupied by GPS signals.

Weeks later, Defense Department officials spoke to the Senate Armed Services Committee on May 6 in a last-ditch attempt to get the Federal Communications Commission (FCC) to change its mind. They argue the risks to disruption of GPS signals used for everything from banking transactions to driving directions to pinpointing the location of 911 callers—not to mention military uses—is too great to consider the Ligado plan. They say relatively weak GPS signals could easily be disrupted.

Ligado counters that its low-power signals will not have any appreciable impact on GPS.

That's prompted numerous lawmakers and federal agency leaders, including the secretaries of Defense, Commerce, and Transportation, to seek to overturn the FCC ruling. The Pentagon petitioned the National Telecommunications and Information Administration (NTIA), which in turn formally asked the FCC to reconsider on May 22.

"We think this is the first time ever where the FCC has taken an arbitrary and independent decision where it was … unambiguously opposed by multiple federal agencies," testified DOD Chief Information Officer Dana Deasy.

The FCC has so far held firm. In responding to Pentagon complaints, the agency said in a statement: Nothing "changes the basic facts that the metric used by the Department of Defense to measure harmful interference does not, in fact, measure harmful interference, and that the testing on which they are relying took place at dramatically higher power levels than the FCC approved."

Deasy was accompanied by Undersecretary of Defense for Research and Engineering Mike Griffin; National Space-Based Positioning, Navigation, and Timing Advisory Board Chairman Thad Allen; and Chief of Space Operations Gen. Jay Raymond at the Senate hearing.

The FCC approved Ligado's proposal with conditions attached to lower the risk of interference. The company must leave 23 megahertz of spectrum space vacant and lower base station power levels by 99.3 percent to a maximum 9.8 decibel watts.

In explaining its ruling, the FCC wrote in April: "The order also requires Ligado to protect adjacent band incumbents by reporting its base station locations and technical operating parameters to potentially affected government and industry stakeholders prior to commencing operations, continuously monitoring the transmit power of its base station sites, and complying with procedures and actions for responding to credible reports of interference, including rapid shutdown of operations where warranted."

Mike Tsukamoto/staff; GPS satellite /USAF

An artist illustration of a GPS III satellite orbiting above Earth.

Military officials contend that the FCC's expectations are unreasonable and would drive "unprecedented accelerated test, modification, and integration of new GPS receivers on existing platforms" to protect the enterprise and "significantly degrade national security."

Multiple lawmakers appeared skeptical of DOD's argument and asked why the FCC would issue an unusual, unanimous vote if there was risk to products and services that rely on GPS. Some see the squabble as a breakdown in inter-agency communication and cooperation.

"This process has exposed a fault line in spectrum decision-making," FCC Commissioners Jessica Rosenworcel and Geoffrey Starks wrote in a joint statement. "As we move to the next generation of wireless service, it is imperative that we have an improved interagency system and a stronger whole-of-government approach to our 5G effort."

The outcome remains uncertain. Lawmakers could include language in the fiscal 2021 defense policy bill to protect the GPS enterprise, the FCC could revise its ruling, or the ruling could stand. While Defense officials objected to the ruling, they stopped short of calling for specific legislative relief. Jurisdictional issues in Congress mean the defense committees do not have sole authority over the matter. The Commerce Committee could take up the matter in a separate bill.

As for the FCC, it has remained steadfast, saying in a statement that the agency "will not be dissuaded by baseless fear-mongering."

Samuel Robert Johnson, 1930-2020

By John A. Tirpak

Samuel Robert Johnson, who represented Texas in the House of Representatives for 28 years, was the last Korean War veteran to serve in Congress, and was a Prisoner of War in North Vietnam for seven years, died May 27 at age 89.

Johnson was born in San Antonio and grew up in Dallas. While at Southern Methodist University, he joined the ROTC. Activated for Korea, he earned his wings shortly after earning his business degree in 1951.

He flew F-86s out of Suwon, Korea, achieving one kill—a MiG-15—over the Yalu River in May 1953. Nearly out of gas, he glided some 80 miles to Kimpo Air Base, landing just before flaming out. He flew 62 total missions in Korea, and was also credited with one probable MiG kill and one damaged.

Johnson ranks among the few members of Congress to have fought in combat. During 29 years in the Air Force, he flew combat missions in both the Korean and Vietnam Wars, receiving two Silver Stars and one Bronze Star Medal with Valor, among numerous other awards. He endured nearly seven years as a POW in Hanoi.

Following the Korean War, Johnson was an instructor at Nellis Air Force Base, Nev., and was selected to fly with the Thunderbirds. He flew F-100s with the team for two years, as solo and then slot, performing demonstrations around the world. In a 2013 oral history, Johnson said he frequently created a sonic boom to open the show, but was ordered to stop when he once "broke every window" on the Mississippi coast, and it "cost the Air Force about $100,000."

He was assigned fighter duties in France and the U.K., and returned to Nellis as director of operations and training, where he wrote gunnery manuals with John Boyd. During the Cuban Missile Crisis, he was detached for a potential invasion of Cuba, after completing jump training at the Army's airborne school. Johnson's assignment was to parachute into Cuba and stand up a captured air base. The invasion did not proceed.

During the Vietnam War, Johnson flew the F-4 Phantom II out of Thailand. On April 16, 1966, during his 25th mission in theater, Johnson was tasked to hit an anti-aircraft battery and truck park. After several low-level runs, Johnson's jet was hit by enemy flak and he was forced to eject.

Captured by the North Vietnamese, he was a Prisoner of War for seven years; half that time in solitary confinement. He sustained a broken back, broken arm, and dislocated shoulder when he ejected. His wounds were never properly treated by his captors, and he endured lasting debilitation. Johnson was tortured by the North Vietnamese, put in leg irons every night, and endured starvation. His defiance earned him extra harsh treatment and isolation from other prisoners.

He communicated with them at Hoa Lo Prison—better known as the "Hanoi Hilton"—by tapping on walls with a tin cup.

In 1969, throughout the Apollo 11 mission to the moon, Buzz Aldrin—a fellow classmate of Johnson's and lifelong friend—wore a silver POW bracelet with Johnson's name on it. Aldrin later said that he saw Southeast Asia on the return to Earth and prayed for Johnson, who was unaware of the moon landing.

In 1971 Johnson, learned of the "Son Tay Raid"—an attempt to rescue POWs from a nearby camp—from a tiny roll of microfilm embedded in a lollipop the North Vietnamese had allowed through in a parcel from home. It was a New York Times account explaining that the rescue had not succeeded because the POWs there had been unexpectedly moved. The story drew world attention to the POWs' plight and the North Vietnamese eased conditions for some, explaining the parcels. Johnson later recounted, "We knew then that our country had not forgotten us." He was released with other POWs on Feb. 12, 1973.

Johnson on the wing of an F-86 in Korea. He flew 62 missions in the Korean War and was a POW for seven years during the Vietnam War.

AFA photo

He returned to USAF service, and in 1974 earned a Master's degree from George Washington University. In 1979, he retired from the Air Force.

Johnson then went into business as a home builder. In 1984, he was elected to the Texas legislature, serving seven years.

He won the first of seven elections to the U.S. House of Representatives in 1991. In 1998, he formed the House Air Force Caucus, along with Reps. Cliff Stearns (R-Fla.) and Joseph Pitts (R-Pa.), promoting a larger and more robust Air Force. He helped pass the 2003 Military Family Tax Relief Act, which reduced the taxes of service members and increased benefits to survivors of those killed on Active duty.

The conservative Johnson championed lower taxes and sponsored legislation to delay Social Security benefits by two years. He also promoted deregulation of the oil industry. He served on the Ways and Means Committee, was chairman of the Social Security subcommittee, and also sat on the Joint Committee on Taxation. He was a member of caucuses for immigration reform, pension reform, and sportsmen.

In 2015, Johnson came to the defense of Sen. John McCain—a 19-month cellmate at the Hanoi Hilton, after Donald Trump said McCain wasn't a hero just because he had been captured.

Johnson said, "Diminishing the courage and patriotism it takes to leave your family, face the enemy, and even—God forbid—endure wartime torture has no place in a post-Vietnam America. Every single faithful veteran—whether they are alive, no longer with us, a POW, or MIA—deserves our utmost respect and support."

Though he pledged to stay only 12 years in Congress, Johnson wound up serving more than twice that long. Days after winning his 13th full term in 2016, Johnson announced he would not seek re-election. At his retirement, he was the last Korean War vet and last Vietnam POW to serve in Congress. He was also the oldest member of the House.

His autobiography, published in 1992, was titled "Captive Warriors: A Vietnam POW's Story."

In 2013, AFA recognized Johnson with its Lifetime Achievement Award. In 2018, he donated some of his prisoner-of-war relics, including the tin cup, to the Smithsonian.

AFA President Lt. Gen. (Ret.) Bruce Wright said Johnson "left us with an incredible example for leadership, character, and courage in the most daunting of lifetime challenges—from combat fighter pilot to Hanoi POW to Capitol Hill." ✪

The Search for Faster, Longer-Range, Air-to-Air Missiles

By John A. Tirpak

The Air Force is looking for "novel" approaches to a new class of faster and longer-range air-to-air missiles, according to a request for information released May 5, but it's not clear how these new weapons would complement several existing new dogfight missile programs.

The solicitation, released by Air Force Materiel Command's Air Force Research Laboratory, at the Eglin weapons directorate, seeks industry ideas for technologies applicable to new dogfight missiles, which presumably would improve or replace the current generation of AIM-120 AMRAAM and AIM-9X Sidewinder, and complement the secretive AIM-260 Joint Advanced Tactical Missile. The AFRL wants companies to indicate their interest to work on the project by June 18.

The new missiles must fit inside the weapon bays of fifth-generation fighters and not exceed 156 inches, according to the notice. AFRL is willing to consider single or multi-stage rocket motors, or an air-breathing system, but is keenly interested in "multi-pulse solid rocket motors" that can be throttled, along with innovative "propellants, grain configurations, cases, and liners." The Air Force wants a missile faster than the ones it has already, with "compact design" warheads having "high single-shot probability of kill." It wants "novel" airframes and compact control systems, advanced battery technology, and ultra-capacitors in the power system.

Tech. Sgt. John Raven

Members of a Maintenance Group Weapons Standardization team prepare a AIM-9X Sidewinder missile that will be used during a live-fire test at Holloman Air Force Base, N.M.

The Air Force will also consider "novel carriage and release concepts," and wants "advanced power delivery" and "advanced data transmission."

Key considerations for the new weapons, include technical feasibility, performance, resource availability, cost, and manufacturability. ✪

Thousands of Airmen Volunteer to Join Space Force

By Rachel S. Cohen

More than 8,500 Airmen applied to formally transfer into the Space Force in May and Space Force officials expect to select about 6,000 of them—satellite operators, intelligence analysts, cyber professionals, and others—to join the service for initial two-year terms, the service announced. Applicants will hear back in July about selection boards and other next steps.

"I am incredibly proud of the men and women who made the bold decision to volunteer to join the U.S. Space Force and defend the ultimate high ground," said Gen. Jay Raymond, the Chief of Space Operations.

The Space Force expects to grow to about 15,000 service members.

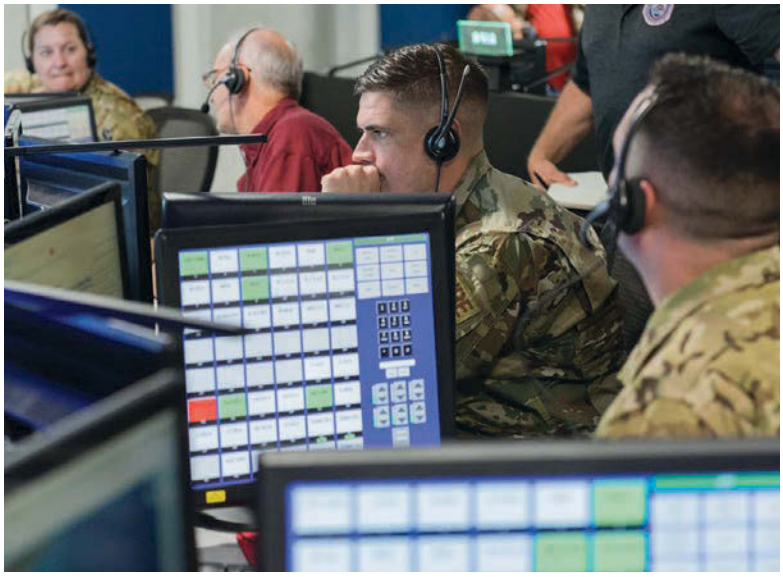
The initial transfer period opened May 1 to allow Active-duty Air Force officers, as well as enlisted members in existing space careers and certain other jobs, to formally join the Space Force.

Those selected will take their oaths in phases, starting with space operators in September.

Other career fields must wait until February 2021 to join, and members of the Army or Air Force space community may have to wait until 2022. A limited number may be allowed in sooner. An internal Army survey found most Active-duty Army space officers would switch into the Space Force, SpaceNews reported.

Still unclear is the potential for a future Space Reserve or Guard force. The Pentagon has not yet decided whether to pursue a reserve component for space. "Air Guard and Air Force Reserve units executing space missions are currently aligned to the Space Force, and will continue supporting Space Force missions in this status while the future of the reserve component for the Space Force is determined," the Space Force said June 9.

As for civilian employees, their status is unchanged. ✪



Joshua Conti/USAF

Members of the 45th Operations Group, 45th Space Wing, Detachment 3, participate in an exercise on Nov. 20, 2019, in the Support Operations Center at Patrick Air Force Base, Fla.

USAF Launches Search for 'Skyborg' Drones

By Rachel S. Cohen

The service began soliciting aircraft in May and plans to award contracts to the winning designs by the end of the summer, Advanced Aircraft Program Executive Officer Col. Dale White told Air Force Magazine. Chosen drones will then head into experiments to show off what they can do. White did not say how many airframes the service plans to buy.

Officials envision Skyborg as an unmanned aircraft that would take direction from fighter jets and its own artificial intelligence in combat. Skyborg could fly ahead for reconnaissance or carry out airstrikes without endangering the manned aircraft, and it could ferry around a box that allows planes with different communications systems to talk to each other.

1st Lt. Randolph Abaya/courtesy

The XQ-58A Valkyrie during a test flight on June 11, 2019. The experimental unmanned airplane is a top contender to become USAF's Skyborg.

Skyborg should also be able to autonomously avoid other aircraft, terrain, obstacles, and hazardous weather, and take off and land on its own, the service said in March 2019.

The Air Force hopes Skyborg's manned-unmanned teaming will give it an edge over other advanced militaries, even if USAF misses its goal of growing to 386 squadrons. The next Air Force Chief of Staff Gen. C.Q. Brown Jr. recently told senators the Valkyrie will offer pilots greater situational awareness and strike capability.

While the Air Force says it has not settled on a single aircraft that will become Skyborg, it often touts Kratos Defense's XQ-58A Valkyrie as a top contender. Valkyrie is a joint venture between the Air Force Research Laboratory and Kratos to develop comparatively cheaper drones that can assist more advanced aircraft and are easily replaceable if lost. The XQ-58A finished its fourth flight test in January, and is slated to fly in the Air Force's next Advanced Battle Management System experiment later this year.

USAF may also look into designs such as the "loyal wingman" combat drone Boeing created for the Royal Australian Air Force. A Lockheed Martin spokeswoman told Air Force Magazine the company plans to submit a bid "leveraging the leading-edge approaches Skunk Works is known for." MQ-9 Reaper manufacturer General Atomics declined to comment.

Skyborg is one of three AFRL "vanguard" initiatives that are trying to speed the time it takes to go from research to operational use. The Air Force is asking for $157.6 million across its three vanguard programs in fiscal 2021, and seeks a $25 million plus-up for Skyborg through the unfunded priorities list.

The service has said it wants Skyborg ready for operations by the end of 2023. ✪

USAF'S Shadowy X-37B Spaceplane Heads Back to Orbit

Boeing/courtesy

Encapsulated X-37B Orbital Test Vehicle for United States Space Force-7 mission at an undisclosed location May 6.

By Rachel S. Cohen

The X-37B spaceplane embarked on its sixth mission from Cape Canaveral Air Force Station, Fla., on May 17.

The secretive, unmanned orbital test vehicle, which will launch on a United Launch Alliance Atlas V rocket, is notching new milestones as it matures. Its fifth mission was its longest to date, ending Oct. 27, 2019, after 780 days on orbit. Now, it will take a new approach to bringing experiments to space.

"This sixth mission is a big step for the X-37B program," said Randy Walden, who runs the Air Force Rapid Capabilities Office. "This will be the first X-37B mission to use a service module to host experiments. The incorporation of a service module on this mission enables us to continue to expand the capabilities of the spacecraft and host more experiments than any of the previous missions."

Aiding this slate of experiments is the FalconSAT-8, a small satellite provided by the U.S. Air Force Academy (USAFA) and Air Force Research Laboratory. FalconSAT-8 is carrying five payloads that USAFA will operate while in space, the Air Force said.

Experimental payloads include an ion thruster propulsion system known as the MEP; an antenna made of synthetic materials that offer more power in a smaller package; a carbon nanotube experiment that looks at radio frequency performance under varying stress in orbit; an attitude control and energy storage experiment; and another to vet a low-cost star camera for the Air Force Institute of Technology.

Once the dishwasher-size satellite separates from the spaceplane, cadets will monitor its performance in orbit and track how the experiments are faring. Running each FalconSAT over the course of a system's lifetime gives students a peek into a possible future job as a satellite operator in the Space Force.

"In addition, two National Aeronautics and Space Administration experiments will be included to study the results of radiation and other space effects on a materials sample plate and seeds used to grow food," the Air Force said. "Finally, the U.S. Naval Research Laboratory will transform solar power into radio frequency microwave energy, which could then be transmitted to the ground."

These experiments are also notable because they are unclassified, indicating the public may learn more about the

X-37B as space operations and research are increasingly in the spotlight. The spaceplane is unique because it brings experiments back to Earth and redeploys with more, instead of leaving them on orbit.

An X-37B landing was featured in the Space Force's first recruitment ad that was released May 6, shortly after the new service began accepting formal transfer applications from Airmen.

The spaceplane has spent seven years and 10 months on orbit in total, and about three times as long in space during the past two missions as it was designed for. The Air Force is evaluating whether to replace the two vehicles. ✪

Highest Number of USAF Sexual Assault Reports in 14 Years

By Amy McCullough

The number of sexual assault reports in the Air Force increased 9 percent in fiscal 2019 from the year before—the "greatest number of reports" received since the service's Sexual Assault Prevention and Response Program launched 14 years ago.

Overall, the military services saw a 3 percent increase in reports, with the Department of Defense receiving a total of 7,825 reports in 2019 compared to 7,623 reports in 2018, according to the 2019 Department of Defense Annual Report on Sexual Assault in the Military. The Air Force received a total of 1,683 total reports in 2019, including 1,161 unrestricted and 522 restricted reports.

"The Air Force Sexual Assault Prevention and Response Program continuously seeks to reduce sexual assault and increase victim reporting, thereby narrowing the gap between the prevalence rate and the number of incidences reported," John Fedrigo, the service's principal deputy assistant secretary for manpower and reserve affairs, wrote in the report. "While the latest prevalence survey [conducted in 2018] ... showed that sexual assault increased from previous survey iterations, the Air Force remains confident that the increase in victim reporting between FY18 and FY19 demonstrates the positive impact of our Sexual Assault and Response Program."

The 2019 report includes reporting information, feedback from focus groups, climate surveys, and updates to DOD's overall efforts to eliminate sexual assaults. It indicates that military culture is slowly heading in the right direction, according to the report, but it does not indicate an increase in prevalence, which is only measured in even numbered years.

The DOD report says the Air Force has made "significant progress toward sexual assault prevention," and it praised leadership and efforts to develop a prevention workforce. ✪

AFCENT Stops Releasing Airstrike Details as Taliban Talks Continue

By Brian W. Everstine

For the first time since the early days of the war in Afghanistan, Air Forces Central Command (AFCENT) is not providing a regular update on the number of airstrikes in that theater, or from ongoing operations in Iraq and Syria.

AFCENT said it is not posting the monthly airpower summaries because they could "adversely impact ongoing discussions with the Taliban regarding Afghanistan peace talks."

Since at least 2012, the command has posted monthly updates online with the tally of the number of weapons released, as well as the number of mobility and intelligence, surveillance, and reconnaissance sorties. At one time, the command posted more detailed summaries daily.

Since Operation Inherent Resolve began in 2014, AFCENT added monthly sortie and strike totals for coalition aircraft in Iraq and Syria.

The last summary, which was posted in February—the same month as U.S. and Taliban officials announced a deal to end the war—showed a high operational tempo in the country. U.S. aircraft in Afghanistan that month released 360 weapons, the second highest February total in at least 11 years.

Despite the deal, Pentagon officials say the pace of violence remains high in Afghanistan. Defense Secretary Mark Esper said May 4, there "has not been a reduction in violence from the Taliban side," though the attacks have solely been on Afghan forces and not U.S. troops. Pentagon spokesman Jonathan Hoffman said May 1 the U.S. will continue to conduct defensive attacks to help Afghan partners. ✪

Two Airmen Shot Dead at Grand Forks Air Force Base

By Amy McCullough

Two Active-duty Airmen assigned to the 319th Reconnaissance Wing at Grand Forks Air Force Base, N.D., are dead following an early morning shooting June 1 at the base, according to an Air Force statement. They were identified as Airman 1st Class Natasha Raye Aposhian, 21, and Airman 1st Class Julian Carlos Torres, 20. Aposhian's parents told Stars and Stripes their daughter was a victim of domestic violence.

"Our community has been through a lot in recent days, and weeks, and months. We'd like to ask for your continued patience and understanding as we work through the next of kin notifications," 319th Reconnaissance Wing Commander Col. Cameron Pringle said during a press conference. "We will care for our Airmen, their families, and our community. We will get the mission done, because we are the warriors of the North, and we will get through this together."

The shooting, which is believed to be an isolated incident, occurred around 4:30 a.m. on June 1. "Let me be clear, our installation is safe," Pringle added.

The Air Force Office of Special Investigations is conducting an investigation and mental health experts are on scene "to care for those impacted," the service said. ✪

■ The War on Terrorism

Casualties:

As of June 1, 2020, 93 Americans had died in Operation Freedom's Sentinel in Afghanistan, and 97 Americans had died in Operation Inherent Resolve in Iraq, Syria, and other locations.

The total includes 186 troops and four Defense Department civilians. Of these deaths, 87 were killed in action with the enemy, while 103 died in noncombat incidents.

There have been 570 troops wounded in action during OFS and 230 troops in OIR.

FACES OF THE FORCE

2nd Lt. Rachael Parks

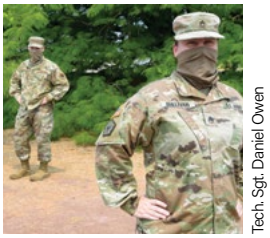
One Airman's grassroots initiative to lift up Air Force basic trainees during an unprecedented moment in history has grown into a global movement. **Airman 1st Class Cailey Brislin**, who works in the 434th Squadron Aviation Resource Management at Laughlin Air Force Base, Texas, was inspired to start the "Letters to Lackland" initiative in April after rediscovering encouraging notes she'd received while completing Basic Military Training at JBSA-Lackland, Texas. Brislin hoped to help these trainees feel less alone at a time when the ongoing COVID-19 pandemic has them going through 14-day Restrictions of Movement, practicing social distancing, and even spending time living in an on-base tent city. Since the effort kicked off last month, more than 50 Airmen in the U.S. and abroad have agreed to pen paper-based pep talks to these potential future Airmen. Chief Master Sergeant of the Air Force Kaleth Wright even endorsed the effort on Twitter, creating a #LettersToLackland hashtag.

Tech. Sgt. David W. Carbajal

Airmen from Travis Air Force Base's **621st Contingency Response Wing** delivered nearly a ton of food to a Head Start Center in Mariposa, Calif., through a food drive during the new coronavirus pandemic. "It's wonderful to make a difference in people's lives," said 921st Contingency Response Squadron Aerial Porter Tech. Sgt. Steve Rogers. "We are always ready at a moment's notice to answer our nation's call, and this time that call is coming from our local community."

Airman 1st Class Jayden Ford

On April 22, Nigerien air force **Capt. Ouma Laouali**—the service's first female pilot—finished her C-130 Hercules pilot training at Little Rock Air Force Base, Ark. The experience marked her first time training on a stateside base. "The most important part was that there were other female pilots here. I felt like I could talk to these women and we could share and learn from our experiences," she said. Laouali has spent a decade in uniform and has accumulated 2,600 flying hours.



Tech. Sgt. Daniel Owen

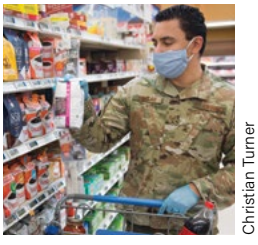
Senior Airman Reid Cook and his mom, **Army Staff Sgt. Brandi Sullivan**—the inspiration behind his enlistment—are sharing a deployment to Soto Cano Air Base, Honduras. Cook was very interested in serving in Central and South America, but after his mom was stationed at Soto Cano, he put it at the top of his deployment wish list. Sullivan said the deployment changed the way she sees her son. "It's just been the biggest eye-opener for me, and it makes me extremely proud."

Lt. Col. Bruce Simpson

After New York City's morgues were overwhelmed by pandemic fatalities, **Lt. Col. Bruce Simpson** deployed there in a civilian capacity as part of an HHS Disaster Mortuary Operational Response Team to help identify victims, provide backup for mortuary services, and help prep National Guard combat engineers for the mission. "They didn't have any experience with this type of situation, so I ... prepped them with pre-incident stress talks," Simpson said.

Army & Air Force Exchange Service/courtesy

After **Spangdahlem High School students** who work at the installation's AAFES had their prom canceled due to COVID-19, their bosses decided they deserved some normalcy. On April 25, they went to work in their formal finest, took photos, and participated in socially distant activities—even dancing—between shifts and on breaks. "Being able to do that on the same day they would have gone to prom was very meaningful to them," said Food Court Manager Michelle Hetcher.

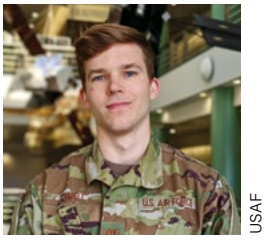


Christian Turner

Airmen from the 412th Test Wing, including 412th Maintenance Logistics Test Squadron **Tech. Sgt. Justin Aguilar**, are making commissary runs and delivering groceries to members of the Edwards Air Force Base, Calif., community amid the pandemic. The service, launched April 20, helps individuals who can't shop for themselves because they're high-risk or are in quarantine or self-isolation. The service also supports deployed families, a wing release said.

Courtesy

Felicia Harlow, a senior security research engineer with AFRL's Sensors Directorate, won the 2020 Institute of Electrical and Electronics Engineers Dayton Section Women in Engineering Award. The award recognized her contributions. Harlow also founded an affinity group. "Felicia has always set a great example here," said AFRL Sensors Directorate Integration and Operations Division Chief Neeraj Pujara, who nominated Harlow for the award.



USAF

Capt. Benjamin Vowell, a 2014 U.S. Air Force Academy graduate, received the inaugural Space Force-level Col. James Jabara Award for Airmanship. The award, given out by USAFA, recognizes notable alumni contributions to airmanship. Among other achievements, Vowell helped his team defeat a year-long acceleration challenge issued by Air Force acquisition chief Will Roper. He's now in the running for the Department of the Air Force-level honor.

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

Air Force & Space Force
ALMANAC 2020

This comprehensive look at the Air Force and Space Force draws data and insights from a range of sources principally compiled by Amanda Miller and Arie M. U. Church with the assistance of Air Force Magazine *staff and invaluable help from the Secretary of the Air Force Office of Public Affairs, USAF Major Commands, and the Reserve Components.*

Shutterstock

DEPARTMENT OF THE AIR FORCE

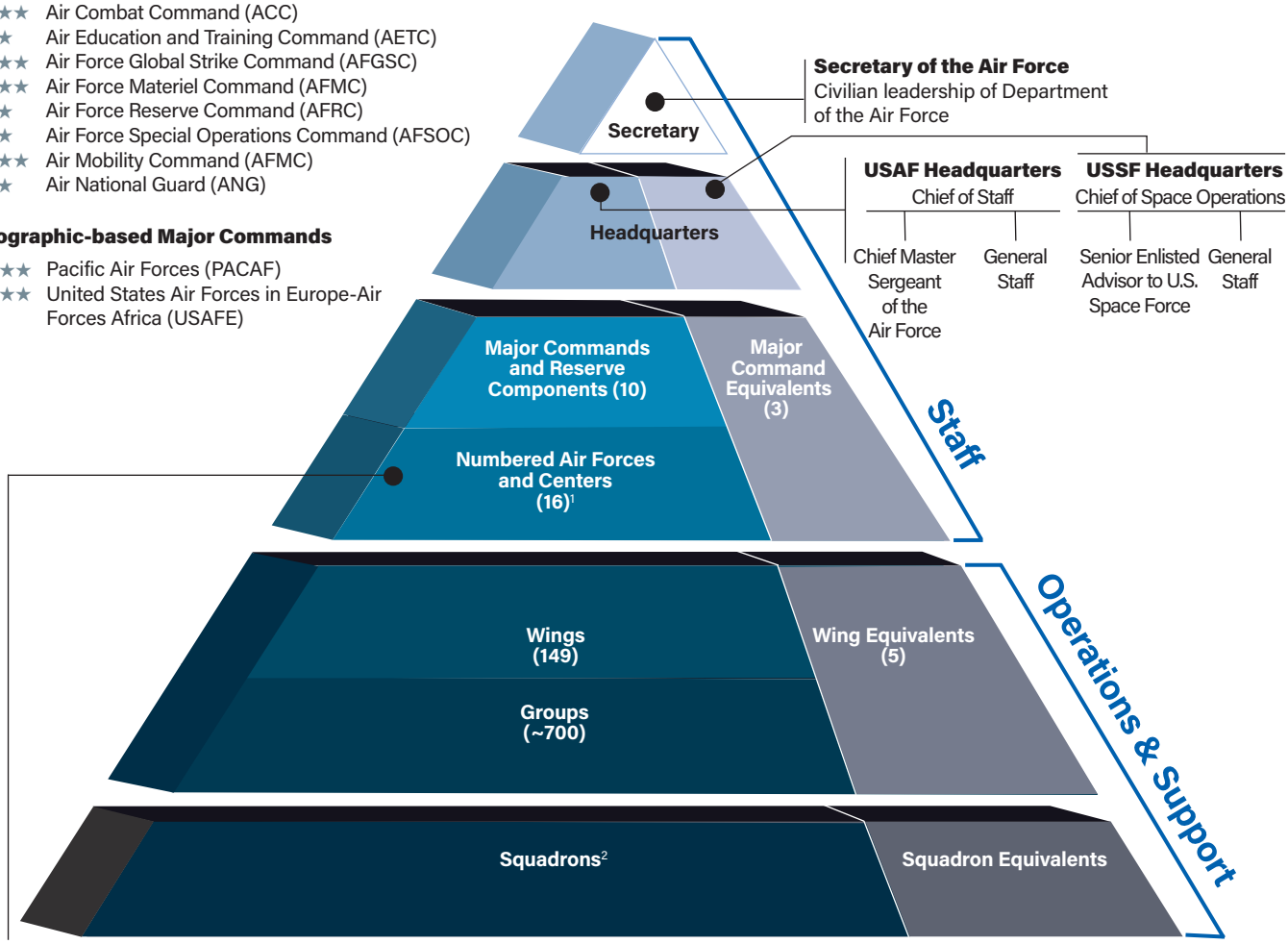
The U.S. Air Force and U.S. Space Force are distinct military services contained within a single Department. Each service is headed by a Chief of Staff/Chief of Space Operations, who is responsible for manning, training, and equipping the force. The two services can be viewed as parts of the same pyramid, with each echelon of each service falling in parallel under a single Department Secretary at the top. Details about the long-term makeup of the Space Force had not yet been decided at press time. How the Department and its two services stack up:

Function-based Major Commands and Reserve Components

- ★★★★ Air Combat Command (ACC)
- ★★★ Air Education and Training Command (AETC)
- ★★★★ Air Force Global Strike Command (AFGSC)
- ★★★★ Air Force Materiel Command (AFMC)
- ★★★ Air Force Reserve Command (AFRC)
- ★★★ Air Force Special Operations Command (AFSOC)
- ★★★★ Air Mobility Command (AFMC)
- ★★★ Air National Guard (ANG)

Geographic-based Major Commands

- ★★★★ Pacific Air Forces (PACAF)
- ★★★★ United States Air Forces in Europe-Air Forces Africa (USAFE)



Numbered Air Forces

Numbered Air Forces (NAFs) are subordinate to major commands. Those 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

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**—Designed to be a deployable, operational-level 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

(★) Stars indicate commander's rank.

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

PEOPLE

USAF TOTAL FORCE END STRENGTH

(As of Sept. 30, 2019)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Air Force Active Duty									Enacted	Requested
Officers	64,932	64,806	62,349	61,004	60,961	61,597	62,640	63,902	64,412	64,640
Enlisted	263,964	261,976	250,104	246,322	252,762	256,983	258,978	263,976	265,410	265,060
Cadets	4,022	3,912	3,879	4,031	4,160	4,207	4,262	4,223	4,000	4,000
Total Air Force Active Duty	**332,918**	**330,694**	**316,332**	**311,357**	**317,883**	**322,787**	**325,880**	**332,101**	**333,822**	**333,700**
Civilian Personnel										
Direct Hire (excluding technicians)	142,047	141,496	129,120	129,985	131,965	140,116	135,879	139,536	142,549	149,797
Air National Guard Technicians	22,859	22,568	22,225	23,448	23,044	22,542	21,705	17,502	13,343	10,790
Air Force Reserve Command Technicians	10,366	9,277	10,429	8,501	8,384	7,872	7,648	7,714	8,938	7,947
Total Direct Hire	**175,272**	**173,341**	**161,774**	**161,934**	**163,393**	**170,530**	**165,232**	**164,752**	**164,830**	**168,534**
Indirect Hire	6,714	6,501	4,823	4,090	3,704	4,570	4,202	4,190	3,973	3,975
Total Civilian Personnel	**181,986**	**179,842**	**166,597**	**166,024**	**167,097**	**175,100**	**169,434**	**168,942**	**168,803**	**172,509**
Air National Guard										
Selected Reserve Officers	14,598	14,731	15,024	15,084	14,593	15,257	15,401	15,495	14,986	15,146
Selected Reserve Enlisted	90,791	90,977	91,356	90,644	90,907	90,413	92,068	91,702	92,714	92,954
Total ANG	**105,389**	**105,708**	**106,380**	**105,728**	**105,500**	**105,670**	**107,469**	**107,197**	**107,700**	**108,100**
Air Force Reserve Command										
Selected Reserve Officers	14,303	14,060	13,817	13,937	14,896	13,672	13,716	14,042	14,783	14,826
Selected Reserve Enlisted	57,125	56,853	55,967	54,557	54,304	55,126	54,987	55,347	55,317	55,474
Total AFRC Selected Reserve	**71,428**	**70,913**	**69,784**	**68,494**	**69,200**	**68,798**	**68,703**	**69,389**	**70,100**	**70,300**
Individual Ready Reserve Officers	11,222	11,222	11,222	7,302	7,492	7,492	6,593	7,631	7,631	7,631
IRR Enlisted	24,271	24,271	24,271	29,449	29,359	29,359	21,801	20,683	20,683	20,683
Total AFRC IRR	**35,493**	**35,493**	**35,493**	**36,751**	**36,851**	**36,851**	**28,394**	**28,314**	**28,314**	**28,314**
Total AFRC	**106,921**	**106,406**	**105,277**	**105,245**	**106,051**	**105,649**	**97,097**	**97,703**	**98,414**	**98,614**
Total Ready Reserve	**212,310**	**212,114**	**211,657**	**210,973**	**211,551**	**211,319**	**204,566**	**204,900**	**206,114**	**206,714**

U.S. MILITARY TOTAL FORCE END STRENGTH

(In thousands, as of Sept. 30, 2019)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Active-Duty Military										Estimate
Air Force	333	331	316	311	317	323	326	328	333	334
Army	550	532	508	491	475	476	476	484	480	486
Marine Corps	198	196	188	184	184	185	186	186	186	184
Navy	318	324	326	328	325	324	330	337	341	348
Space Force										6
Full-time Guard and Reserve	77	77	77	76	76	75	79	83	87	90
Total	**1,476**	**1,460**	**1,415**	**1,390**	**1,378**	**1,382**	**1,397**	**1,422**	**1,427**	**1,442**
Guard and Reserve (Selected Reserve)										
Air National Guard	105	106	105	106	106	106	107	107	108	108
Air Force Reserve	71	71	67	68	69	69	69	69	70	70
Army National Guard	358	358	354	350	342	344	335	336	336	337
Army Reserve	201	198	195	199	198	194	189	191	190	190
Marine Corps Reserve	40	40	39	39	38	39	39	38	39	39
Navy Reserve	65	62	59	57	58	58	59	60	59	59
Total	**846**	**835**	**819**	**819**	**812**	**802**	**797**	**801**	**801**	**802**
Appropriated-fund civilian (full-time equivalents)										
Air Force	178	178	180	167	166	167	170	172	174	173
Army	275	256	207	206	195	191	248	251	192	198
Navy/Marine Corps	213	208	193	199	204	206	209	218	219	221
Defense Agencies	134	129	189	187	189	191	193	216	221	214
Total	**800**	**773**	**756**	**758**	**755**	**756**	**761**	**796**	**807**	**806**

Totals may not add up due to rounding
Sources: Defense Manpower Data Center: Number of Military and DOD Appropriated Fund (APF) Civilian Personnel Permanently Assigned; Office of the Under Secretary of Defense (Comptroller): National Defense Budget Estimates for 2021

ARMED FORCES ACTIVE-DUTY OFFICER/ENLISTED

(As of Sept. 30, 2019)

Service	Total	%
Air Force	**68,137**	**20.78%**
Officer	13,932	21.80%
Enlisted	54,205	20.53%
Army	**73,317**	**15.26%**
Officer	16,543	17.90%
Enlisted	56,774	14.67%
Marine Corps	**16,621**	**8.94%**
Officer	1,764	8.23%
Enlisted	14,857	9.03%
Navy	**66,637**	**20.04%**
Officer	10,713	19.43%
Enlisted	55,924	20.16%
Total Active Duty	**224,712**	**16.95%**
Officer	42,952	18.44%
Enlisted	181,760	16.63%

Source: Air Force Personnel Center

ACTIVE-DUTY AIRMEN BY RANK

(As of Sept. 30, 2019)

RANK	MALE	FEMALE	TOTAL
Officers			
General	11	1	12
Lieutenant General	39	3	42
Major General	84	5	89
Brigadier General	128	16	144
Colonel	2,821	515	3,336
Lieutenant Colonel	8,165	1,612	9,777
Major	11,171	2,869	14,040
Captain	15,578	5,088	20,666
First Lieutenant	5,842	1,879	7,721
Second Lieutenant	6,131	1,944	8,075
Total	**49,970**	**13,932**	**63,902**
Enlisted			
Chief Master Sergeant	2,151	462	2,613
Senior Master Sergeant	4,246	1,133	5,379
Master Sergeant	21,044	5,447	26,491
Technical Sergeant	32,602	7,093	39,695
Staff Sergeant	50,174	11,370	61,544
Senior Airman	43,238	11,312	54,550
Airman First Class	41,980	13,186	55,166
Airman First Class	5,774	1,794	7,568
Airman Basic	8,562	2,408	10,970
Total	**209,771**	**54,205**	**263,976**
Academy Cadets	3,047	1,176	4,223
Total Personnel	**262,788**	**69,313**	**332,101**

Sources: Defense Manpower Data Center: Table of Active Duty Females by Rank/Grade and Service (September 2019, amended March 18, 2020);
Active Duty Military Personnel by Rank/Grade (Sept. 30, 2019).

Monthly rates for assigned duty at the most populous Air Force bases, by total force, in each of the five states with the most Active-duty Airmen.

Sources: Analysis of data from the Defense Travel Management Office and the Defense Manpower Data Center.

ACTIVE-DUTY AIRMEN MALE/FEMALE

(As of Sept. 30, 2019)

	1950	1960	1970	1980	1990	2000	2010	2017	2018	2019
Officers										
Male	55,474	126,014	125,136	89,156	86,714	57,204	53,838	48,676	49,344	49,970
Percentage	97.30%	97.20%	96.40%	91.30%	86.70%	82.90%	81.30%	79.00%	78.80%	78.20%
Female	1,532	3,675	4,667	8,493	13,331	11,819	12,363	12,921	13,296	13,932
Percentage	2.70%	2.80%	3.60%	8.70%	13.30%	17.10%	18.70%	21.00%	21.20%	21.80%
Total Officers	**57,006**	**129,689**	**129,803**	**97,649**	**100,045**	**69,023**	**66,201**	**61,597**	**62,640**	**63,902**
Enlisted										
Male	350,489	679,412	652,559	399,517	374,385	231,620	212,491	206,896	207,198	209,771
Percentage	98.90%	99.20%	98.60%	86.80%	86.00%	80.80%	80.70%	80.50%	80.00%	79.45%
Female	3,782	5,651	8,987	60,803	60,803	55,011	50,946	50,087	51,780	54,205
Percentage	1.10%	0.80%	1.40%	13.20%	14.00%	19.20%	19.30%	19.50%	20.00%	20.53%
Total Enlisted	**354,271**	**685,063**	**661,546**	**460,320**	**435,188**	**286,631**	**263,437**	**256,983**	**258,978**	**263,976**
Cadets										
Male	0	1,949	4,144	3,907	3,817	3,617	3,592	3,103	3,110	3,047
Percentage	0.00%	100.00%	100.00%	88.60%	87.30%	84.60%	78.80%	73.80%	73.00%	72.15%
Female	0	0	0	504	553	658	966	1,104	1,155	1,176
Percentage	0.00%	0.00%	0.00%	11.40%	12.70%	15.40%	21.20%	26.20%	27.00%	27.85%
Total	**0**	**1,949**	**4,144**	**4,411**	**4,370**	**4,275**	**4,558**	**4,207**	**4,262**	**4,223**

Sources: Defense Manpower Data Center: Table of Active Duty Females by Rank/Grade and Service (September 2019, amended March 18, 2020); Active Duty Military Personnel by Rank/Grade (Sept. 30, 2019).
May not add due to rounding.

ACTIVE-DUTY AIRMEN BY REGION

(As of Sept. 30, 2019)

REGIONS	1970	1980	1990	2000	2010	2017	2018	2019
US and its Territories	565,098	445,886	418,027	291,260	277,123	253,741	270,503	276,090
Europe	72,937	76,788	69,296	32,901	30,963	27,073	27,085	27,649
East Asia, Pacific	139,666	32,263	33,558	22,030	12,649	19,748	20,372	20,698
Africa, Mideast, S. Asia	608	674	376	8,972	891	14,417	450	2,076
Western Hemisphere	5,348	2,211	2,356	345	339	337	2,119	440
Other	7,692	147	11,620	146	12,231	7,471	1,138	1,096
Total	**791,349**	**557,969**	**535,233**	**355,654**	**334,196**	**322,787**	**321,667**	**328,049**

Data based on permanent assignments. Airmen deployed for operations in Afghanistan, Syria, and Iraq are included in U.S. (transients) and Other totals.

Kemberly Groue/USAF

Military training instructors lead graduating Airmen onto the drill pad during a basic military training graduation ceremony at Keesler Air Force Base, Miss., May 15.

ACTIVE-DUTY PERSONNEL BY COMMAND

(As of Sept. 30, 2019)

	MILITARY
Active Duty Major Commands	
Air Combat Command	78,246
Air Education and Training Command	61,755
Air Force Global Strike Command	28,345
Air Force Materiel Command	16,718
Air Force Space Command*	9,947
Air Force Special Operations Command	15,352
Air Mobility Command	41,281
Pacific Air Forces	29,203
US Air Forces Europe-AFA	23,074
Field Operating Agencies (FOAs)	
Air Force Agency for Modeling and Simulation	7
Air Force Audit Agency	0
Air Force Cost Analysis Agency	11
Air Force Flight Standards Agency	114
Air Force Historical Research Agency	0
Air Force Inspection Agency	92
Air Force Legal Operations Agency	582
Air Force Manpower Analysis Agency	64
Air Force Medical Readiness Agency	156
Air Force Mortuary Affairs Operations	20
Air Force Office of Special Investigations	121
Air Force Operations Group	40
Air Force Personnel Center	687
Air Force Public Affairs Agency	62
Air Force Review Boards Agency	28
Air Force Safety Center	48
Air National Guard Readiness Center	33
Direct Reporting Units (DRUs)	
Direct Reporting Units (DRUs)	134
Air Force Operational Test and Evaulation Center	337
Air Force Reserve Command	61
U.S. Air Force Academy	241
Other	**25,342**
Total Strength	**306,759**

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

ACTIVE-DUTY END STRENGTH

(As of Sept. 30, 2019)

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	325,880
		2019	332,101
		[1]2020	333,822
		[2]2021	333,700

From 1907-1946, these Airmen were part of the U.S. Army. See p. 88 on organizational history.

[1] Enacted
[2] Requested

MONTHLY MILITARY BASIC PAY

(Effective Jan. 1, 2020)

	PAY GRADE	YEARS OF SERVICE < 2	2	3	4	6	8	10	12	14	16	18	20	22	24	26
COMMISSIONED OFFICERS	O-10												16,442	16,442	16,442	16,442
	O-9												15,546	15,771	16,094	16,442
	O-8	11,000	11,360	11,600	11,666	11,965	12,463	12,579	13,052	13,188	13,596	14,186	14,730	15,093	15,093	15,093
	O-7	9,140	9,565	9,761	9,917	10,200	10,480	10,803	11,125	11,448	12,463	13,320	13,320	13,320	13,320	13,388
	O-6	6,931	7,615	8,114	8,114	8,145	8,495	8,541	8,541	9,026	9,884	10,388	10,891	11,177	11,468	12,030
	O-5	5,778	6,509	6,959	7,044	7,326	7,494	7,864	8,135	8,486	9,023	9,278	9,530	9,817	9,817	9,817
	O-4	4,985	5,771	6,156	6,242	6,599	6,983	7,460	7,832	8,090	8,238	8,324	8,324	8,324	8,324	8,324
	O-3	4,383	4,969	5,363	5,847	6,128	6,435	6,634	6,961	7,131	7,131	7,131	7,131	7,131	7,131	7,131
	O-2	3,788	4,313	4,968	5,136	5,241	5,241	5,241	5,241	5,241	5,241	5,241	5,241	5,241	5,241	5,241
	O-1	3,287	3,422	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136	4,136
	O-3E				5,847	6,128	6,435	6,634	6,961	7,236	7,395	7,611	7,611	7,611	7,611	7,611
	O-2E				5,136	5,241	5,408	5,690	5,908	6,070	6,070	6,070	6,070	6,070	6,070	6,070
	O-1E				4,136	4,417	4,580	4,747	4,911	5,136	5,136	5,136	5,136	5,136	5,136	5,136
ENLISTED MEMBERS	E-9[1]							5,473	5,597	5,753	5,937	6,123	6,419	6,671	6,935	7,340
	E-8						4,480	4,678	4,801	4,948	5,107	5,395	5,540	5,788	5,926	6,264
	E-7	3,114	3,399	3,530	3,701	3,836	4,067	4,198	4,429	4,622	4,753	4,892	4,946	5,129	5,226	5,597
	E-6	2,694	2,964	3,095	3,222	3,355	3,653	3,770	3,995	4,064	4,114	4,172	4,172	4,172	4,172	4,172
	E-5	2,468	2,634	2,761	2,891	3,095	3,306	3,481	3,502	3,502	3,502	3,502	3,502	3,502	3,502	3,502
	E-4	2,263	2,378	2,507	2,635	2,747	2,747	2,747	2,747	2,747	2,747	2,747	2,747	2,747	2,747	2,747
	E-3	2,043	2,171	2,303	2,303	2,303	2,303	2,303	2,303	2,303	2,303	2,303	2,303	2,303	2,303	2,303
	E-2	1,943	1,943	1,943	1,943	1,943	1,943	1,943	1,943	1,943	1,943	1,943	1,943	1,943	1,943	1,943
	E-1	1,733	1,733	1,733	1,733	1,733	1,733	1,733	1,733	1,733	1,733	1,733	1,733	1,733	1,733	1,733

Amounts have been rounded to the nearest dollar.
Basic pay for pay grades O-7 through O-10 is limited to $16,442. Basic pay for grades O-6 and below is limited to $13,341.60.
Grades O-1E to O-3E are commissioned officers with more than four years of Active-duty service as an enlisted member.
[1]Basic pay for the Chief Master Sergeant of the Air Force is $8,844.30.
Source: USAF

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
800	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

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
O-3	175
O-2	150
O-1	150

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

Amounts have been rounded to the nearest dollar.

Source: Defense Finance and Accounting Service

SUBSISTENCE ALLOWANCE

(Effective Jan. 1, 2020)

Officers	Enlisted Members
$256.68/month	$372.71/month

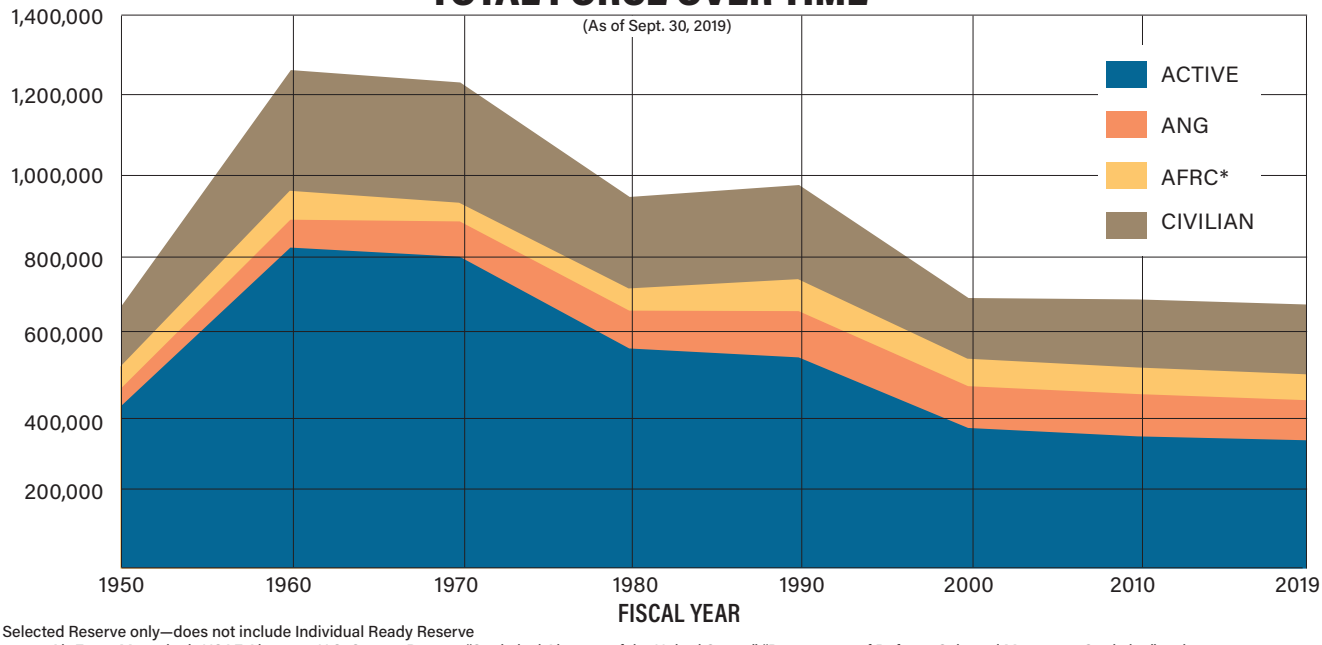
ANNUAL PAY FOR FEDERAL CIVILIANS

(Effective Jan. 1, 2020)

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	$19,543	$20,198	$20,848	$21,494	$22,144	$22,524	$23,166	$23,814	$23,840	$24,448
GS-2	21,974	22,497	23,225	23,840	24,108	24,817	25,526	26,235	26,944	27,653
GS-3	23,976	24,775	25,574	26,373	27,172	27,971	28,770	29,569	30,368	31,167
GS-4	26,915	27,812	28,709	29,606	30,503	31,400	32,297	33,194	34,091	34,988
GS-5	30,113	31,117	32,121	33,125	34,129	35,133	36,137	37,141	38,145	39,149
GS-6	33,567	34,686	35,805	36,924	38,043	39,162	40,281	41,400	42,519	43,638
GS-7	37,301	38,544	39,787	41,030	42,273	43,516	44,759	46,002	47,245	48,488
GS-8	41,310	42,687	44,064	45,441	46,818	48,195	49,572	50,949	52,326	53,703
GS-9	45,627	47,148	48,669	50,190	51,711	53,232	54,753	56,274	57,795	59,316
GS-10	50,246	51,921	53,596	55,271	56,946	58,621	60,296	61,971	63,646	65,321
GS-11	55,204	57,044	58,884	60,724	62,564	64,404	66,244	68,084	69,924	71,764
GS-12	66,167	68,373	70,579	72,785	74,991	77,197	79,403	81,609	83,815	86,021
GS-13	78,681	81,304	83,927	86,550	89,173	91,796	94,419	97,042	99,665	102,288
GS-14	92,977	96,076	99,175	102,274	105,373	108,472	111,571	114,670	117,769	120,868
GS-15	109,366	113,012	116,658	120,304	123,950	127,596	131,242	134,888	138,534	142,180

Does not include locality pay assigned by geographic area.
Source: Office of Personnel Management

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.

ACTIVE DUTY AIRMEN BY BASE, 2010 vs. 2019

(Percentage change Sept. 30, 2010 to Sept. 30, 2019)

BASE	2010	2019	#CHANGE	%CHANGE
JBSA-Lackland, Texas	17,302	19,631	2,329	13.46
Shaw AFB, S.C.	5,937	6,978	1,041	17.69
Cannon AFB, N.M.	3,695	4,628	933	25.25
Hurlburt Field, Fla.	8,136	8,883	747	9.18
JB Pearl Harbor-Hickam, Hawaii	4,733	5,424	691	14.60
Nellis AFB, Nev.	9,495	10,178	683	7.19
Fort Meade, Md.	2,646	3,309	663	25.06
Eglin AFB, Fla.	5,693	6,320	627	11.01
Robins AFB, Ga.	3,996	3,372	624	-1.95
Holloman AFB, N.M.	3,900	4,517	615	15.82
Goodfellow AFB, Texas	3,865	4,450	585	15.14
Whiteman AFB, Mo.	3,466	3,955	489	14.11
Beale AFB, Calif.	3,493	3,913	420	12.02
Fairchild AFB, Wash.	2,791	3,135	344	12.33
RAF Mildenhall, U.K.	3,955	4,278	322	8.17
JB McGuire-Dix-Lakehurst, N.J.	4,876	5,173	297	6.09
Maxwell AFB, Ala.	2,847	3,118	271	9.52
Minot AFB, N.D.	5,341	5,612	271	5.07
Ellsworth AFB, S.D.	3,581	3,328	253	-7.07
Buckley AFB, Colo.	1,430	1,682	252	17.62
Yokota AB, Japan	2,943	3,179	236	8.02
Edwards AFB, Calif.	2,507	2,715	208	8.30
Sheppard AFB, Texas	6,425	6,630	205	3.19
Luke AFB, Ariz.	4,536	4,727	191	4.21
Aviano AB, Italy	4,340	4,502	162	3.73
MacDill AFB, Fla.	3,596	3,755	159	4.42
Wright-Patterson AFB, Ohio	5,563	5,714	151	2.71
Offutt AFB, Neb.	5,509	5,650	141	2.56
Vance AFB, Okla.	1,233	1,330	97	7.87
Grand Forks AFB, N.D.	1,613	1,701	88	5.46
Hill AFB, Utah	4,210	4,297	87	2.07
McConnell AFB, Kan.	2,910	2,986	76	2.61
Kadena AB, Japan	6,604	6,677	73	1.11
Eielson AFB, Alaska	1,924	1,993	69	3.59
Schriever AFB, Colo.	1,685	1,621	64	-3.80
Los Angeles AFB, Calif.	1,172	1,211	39	3.33
F.E. Warren AFB, Wyo.	3,118	3,092	26	-0.83
Incirlik AB, Turkey	1,470	1,485	15	1.02
Columbus AFB, Miss.	1,649	1,649	0	0.00
Andersen AFB, Guam	2,036	2,028	-8	-0.39
Altus AFB, Okla.	1,364	1,350	-14	-1.03
Moody AFB, Ga.	4,770	4,747	-23	-0.48
Malmstrom AFB, Mont.	3,273	3,240	-33	-1.01
Travis AFB, Calif.	6,677	6,635	-42	-0.63
Patrick AFB, Fla.	1,838	1,792	-46	-2.50
Kirtland AFB, N.M.	3,302	3,245	-57	-1.73
Osan AB, South Korea	5,425	5,338	-87	-1.60
U.S. Air Force Academy, Colo.	2,363	2,248	-115	-4.87
Hanscom AFB, Mass.	1,607	1,488	-119	-7.41
JB Langley-Eustis, Va.	7,959	7,839	-120	-1.51
RAF Lakenheath, U.K.	4,515	4,393	-122	-2.70
Seymour Johnson AFB, N.C.	4,786	4,660	-126	-2.63
Ramstein AB, Germany	9,515	9,377	-138	-1.45
Kunsan AB, South Korea	2,581	2,435	-146	-5.66
JB Charleston, S.C.	3,744	3,589	-155	-4.14
Dover AFB, Del.	3,578	3,421	-157	-4.39
Misawa AB, Japan	2,928	2,717	-210	-7.21
Laughlin AFB, Texas	1,595	1,384	-211	-13.23
Peterson AFB, Fla.	3,826	3,557	-269	-7.03
Vandenberg AFB, Calif.	2,789	2,511	-278	-9.97
JBSA-Randolph, Texas	3,299	2,994	-305	-9.25
JB Elmendorf-Richardson, Alaska	5,792	5,447	-345	-5.96
Dyess AFB, Texas	5,173	4,790	-383	-7.40
Mountain Home AFB, Idaho	3,797	3,414	-383	-10.09
Scott AFB, Ill.	5,252	4,866	-386	-7.35
JB Lewis-McChord, Wash.	3,620	3,206	-414	-11.44
Barksdale AFB, La.	5,783	5,316	-467	-8.08
USAG Stuttgart, Germany	1,352	859	-493	-36.46
Davis-Monthan AFB, Ariz.	6,742	6,171	-571	-8.47
JB Andrews, Md.	6,490	5,877	-613	-9.45
Pope Field, N.C.	3,225	2,505	-720	-22.33
Keesler AFB, Miss.	5,448	4,641	-807	-14.81
Bolling AFB, D.C.	3,199	2,246	-953	-29.79
Pentagon, Va.	5,197	4,128	-1,069	-20.57
Spangdahlem AB, Germany	5,150	3,981	-1,169	-22.70
Tinker AFB, Okla.	5,915	4,644	-1,271	-21.49
Tyndall AFB, Fla.	3,311	1,591	-1,720	-51.95
Little Rock AFB, Ark.	5,139	3,363	-1,776	-34.56
Brooks City-Base, Texas [1]	454	0	n/a	n/a
JBSA-Fort Sam Houston, Texas	0	1,684	n/a	n/a
Lajes Field, Portugal	643	0	n/a	n/a
MCB Quantico, Va.	0	1,534	n/a	n/a
Total	**329,638**	**328,049**	**-1,589**	**-0.48**

[1]Closed in 2012.

SENIOR EXECUTIVE SERVICE PAY

(Effective Jan. 1, 2020)

SES Pay System Structure	Minimum	Maximum
Certified SES performance appraisal system	$131,239	$197,300
Noncertified SES performance appraisal system	$131,239	$181,500

The pay scale does not include locality pay.

Airman 1st Class Rustie Kramer

Members of Joint Base Andrews, Md., Family Child Care march in a purple parade to celebrate National Purple Up Day at Liberty Park Housing Office, April 15, 2016.

SAMPLE HOUSING ALLOWANCES

(Effective Jan. 1, 2020)

	NO DEPENDENTS	DEPENDENTS
JB San Antonio		
O-7 to O-10	$1,824	$2,211
O-6	1,791	2,193
O-5	1,785	2,175
O-4	1,770	2,022
O-3	1,719	1,806
O-2	1,647	1,758
O-1	1,575	1,674
E-9	1,707	1,863
E-8	1,683	1,794
E-7	1,617	1,776
E-6	1,578	1,761
E-5	1,452	1,656
E-4 to E-1	1,227	1,617
Eglin AFB (Niceville-Valparalso, Fla.)		
O-7 to O-10	$2,097	$2,418
O-6	2,058	2,394
O-5	1,905	2,376
O-4	1,809	2,250
O-3	1,602	2,064
O-2	1,551	1,647
O-1	1,530	1,551
E-9	1,590	2,121
E-8	1,560	1,968
E-7	1,548	1,800
E-6	1,533	1,650
E-5	1,470	1,536
E-4 to E-1	1,371	1,533
Travis AFB (Fairfield, Calif.)		
O-7 to O-10	$2,793	$2,955
O-6	2,775	2,928
O-5	2,772	2,904
O-4	2,766	2,844
O-3	2,757	2,781
O-2	2,658	2,748
O-1	2,244	2,745
E-9	2,751	2,787
E-8	2,745	2,775
E-7	2,502	2,766
E-6	2,271	2,751
E-5	2,166	2,736
E-4 to E-1	2,034	2,493
JB Langley-Eustis (Hampton, Va.)		
O-7 to O-10	$1,809	$2,226
O-6	1,776	2,205
O-5	1,761	2,187
O-4	1,746	2,022
O-3	1,659	1,788
O-2	1,524	1,725
O-1	1,413	1,569
E-9	1,635	1,854
E-8	1,584	1,776
E-7	1,479	1,749
E-6	1,416	1,728
E-5	1,335	1,542
E-4 to E-1	1,203	1,479
Kirtland AFB (Albuquerque, N.M.)		
O-7 to O-10	$1,497	$1,911
O-6	1,473	1,893
O-5	1,455	1,878
O-4	1,437	1,716
O-3	1,425	1,485
O-2	1,368	1,422
O-1	1,173	1,413
E-9	1,419	1,548
E-8	1,413	1,470
E-7	1,290	1,440
E-6	1,182	1,425
E-5	1,125	1,404
E-4 to E-1	1,056	1,290

ACTIVE-DUTY END STRENGTH BY RANK AND RACE

(As of Sept. 30, 2019)

	American Indian/ Native Alaskan	Asian	Black or African American	Declined to Respond	Identified More Than One Race	Native Hawaiian/ Other Pacific Islander	White	Total
E-1	117	329	2,051	45	534	166	7,727	10,969
	1.07%	3.00%	18.70%	0.41%	4.87%	1.51%	70.44%	
E-2	63	343	1,218	13	341	104	5,486	7,568
	0.83%	4.53%	16.09%	0.17%	4.51%	1.37%	72.49%	
E-3	480	2,453	9,876	213	2,791	712	38,695	55,220
	0.87%	4.44%	17.88%	0.39%	5.05%	1.29%	70.07%	
E-4	419	2,530	10,058	795	2,864	648	37,355	54,669
	0.77%	4.63%	18.40%	1.45%	5.24%	1.19%	68.33%	
E-5	404	2,261	9,649	1,853	3,128	773	43,476	61,544
	0.66%	3.67%	15.68%	3.01%	5.08%	1.26%	70.64%	
E-6	294	1,299	5,957	2,093	1,651	685	27,712	39,691
	0.74%	3.27%	15.01%	5.27%	4.16%	1.73%	69.82%	
E-7	175	789	4,164	2,107	794	395	18,067	26,491
	0.66%	2.98%	15.72%	7.95%	3.00%	1.49%	68.20%	
E-8	25	116	940	499	122	60	3,617	5,379
	0.46%	2.16%	17.48%	9.28%	2.27%	1.12%	67.24%	
E-9	13	40	423	175	46	5	1,911	2,613
	0.50%	1.53%	16.19%	6.70%	1.86%	0.19%	73.13%	
Total Enlisted	**1,990**	**10,160**	**44,336**	**7,793**	**12,271**	**3,548**	**184,046**	**264,144**
	0.75%	**3.85%**	**16.78%**	**2.95%**	**4.65%**	**1.34%**	**69.68%**	
O-1	44	504	521	527	397	52	6,029	8,074
	0.54%	6.24%	6.45%	6.53%	4.92%	0.64%	74.67%	
O-2	34	454	505	389	352	40	5,947	7,721
	0.44%	5.88%	6.54%	5.04%	4.56%	0.52%	77.02%	
O-3	107	1,198	1,341	1,390	680	117	15,833	20,666
	0.52%	5.80%	6.49%	6.73%	3.29%	0.57%	76.61%	
O-4	70	715	799	1,009	300	72	11,075	14,040
	0.50%	5.09%	5.69%	7.19%	2.14%	0.51%	78.88%	
O-5	47	351	559	633	170	36	7,981	9,777
	0.48%	3.60%	5.72%	6.47%	1.74%	0.37%	81.63%	
O-6	16	106	201	131	42	4	2,836	3,336
	0.48%	3.18%	6.03%	3.93%	1.26%	0.12%	85.01%	
O-7	0	1	6	5	0	0	132	144
	0%	0.69%	4.17%	3.47%	0%	0%	91.67%	
O-8	0	0	4	1	0	0	84	89
	0%	0%	4.50%	1.12%	0%	0%	94.38%	
O-9	0	0	2	0	0	1	39	42
	0%	0%	4.76%	0%	0%	2.38%	92.86%	
O-10	0	0	1	0	0	0	11	12
	0%	0%	8.34%	0%	0%	0%	91.67%	
Total Officer	**318**	**3,329**	**3,939**	**4,085**	**1,941**	**322**	**49,967**	**63,901**
	0.50%	**5.21%**	**6.16%**	**6.39%**	**3.04%**	**0.50%**	**78.19%**	

Senior Airman River Bruce

Senior Airman Jae Sajonas, 9th Expeditionary Bomb Squadron B-1B Lancer assistant crew chief, helps align an MB-2 Tow Tractor on the flight line at Andersen Air Force Base, Guam, May 14. Tow tractors are used to bring aircraft to their parking locations.

USAF HIGHEST EDUCATIONAL ACHIEVEMENT—OFFICERS

(As of Sept. 30, 2019)

	BA/BS	MA/MS	PROFESSIONAL DEGREE	PH.D.	UNKNOWN	TOTAL
RANK						
O-1	6,724	332	32	7	979	8,074
	83.28%	4.11%	0.4%	0.09%	12.13%	
O-2	6,352	850	49	4	466	7,721
	82.27%	11.01%	0.63%	0.05%	6.04%	
O-3	11,089	6,081	2,576	248	672	20,666
	53.66%	29.43%	12.46%	1.2%	3.25%	
O-4	2,345	9,226	1,891	462	116	14,040
	16.70%	65.71	13.47	3.29	0.83%	
O-5	158	7,883	1,230	483	23	9,777
	1.62%	80.63%	12.57%	4.9%	0.24%	
O-6	1	2,497	645	190	3	3,336
	0.03%	74.85%	19.33%	5.7%	0.09%	
O-7	1	130	7	6	0	144
	0.70%	90.28%	4.86%	4.17%	0%	
O-8	0	84	5	1	0	90
	0%	93.33%	5.56%	1.11%	0%	
O-9	0	41	1	0	0	42
	0%	97.62%	2.38%	0%	0%	
O-10	0	12	0	0	0	12
	0%	100%	0%	0%	0%	
Total	**26,670**	**27,136**	**6,436**	**1,401**	**2,259**	**63,902**
	41.74%	**42.47%**	**10.07%**	**2.19%**	**3.54%**	
FEMALE/MALE						
Female	5,496	5,188	2,090	412	746	13,932
	39.5%	37.24%	15.00%	2.96%	5.35%	
Male	21,174	21,947	4346	989	1,513	49,969
	42.37%	43.9%	8.7%	2.0%	3.0%	
Total	**26,670**	**27,135***	**6,436**	**1,401**	**2,259**	**63,901***
	41.74%	**42.47%**	**10.07%**	**2.19%**	**3.54%**	
ETHNICITY						
Declined to Respond	4,889	3,323	1,431	176	286	10,105
	48.38%	32.88%	14.16%	1.74%	2.83%	
Hispanic or Latino	2,305	1,835	276	70	231	4,717
	48.87%	38.9%	5.85%	1.48%	4.9%	
Not Hispanic or Latino	19,476	21,978	4,729	1,155	1,742	49,080
	39.68%	44.78%	9.64%	2.35%	3.55%	
Total	**26,670**	**27,136**	**6,436**	**1,401**	**2,259**	**63,902**
	41.74%	**42.47%**	**10.07%**	**2.19%**	**3.54%**	
RACE						
American Indian/Native Alaskan	140	143	18	5	12	318
	44.03%	44.97%	5.66%	1.57%	3.77%	
Asian	1,470	1,160	478	50	171	3,329
	44.16%	34.85%	14.36%	1.5%	5.14%	
Black or African American	1,515	1,818	343	88	175	3,939
	38.46%	46.15%	8.71%	2.23%	4.44%	
Declined to Respond	1,448	1,585	785	58	209	4,085
	35.45%	38.8%	19.22%	1.42%	5.12%	
Identified More Than One Race	1,091	639	104	29	78	1,941
	56.21%	32.92%	5.36%	1.5%	4.02%	
Native Hawaiian/Other Pacific Islander	169	117	20	4	12	322
	52.48%	36.34%	6.21%	1.24%	3.73%	
White	20,837	21,673	4,688	1,167	1,602	49,967
	41.70%	43.37%	9.38%	2.34%	3.21%	
Total	**26,670**	**27,135***	**6,436**	**1,401**	**2,259**	**63,901***
	41.74%	**42.47%**	**10.07%**	**2.19%**	**3.54%**	

Source: Defense Manpower Data Center. *Errors amounted to fewer than four records across all personnel.

Kemberly Groue/USAF

Maj. Joshua Radel, 81st Diagnostic and Therapeutics Squadron clinic pharmacist, salutes during the POW/MIA retreat ceremony at Keesler Air Force Base, Miss.

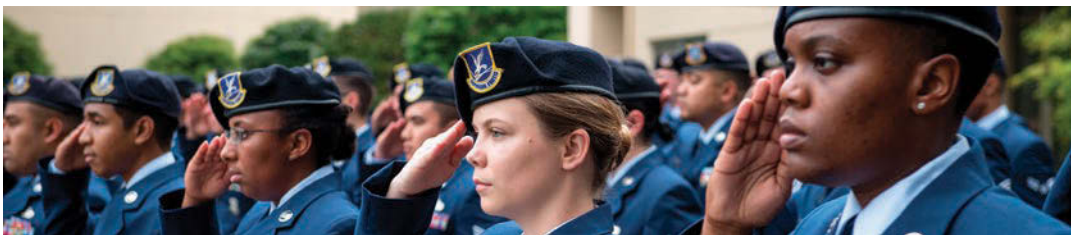
USAF HIGHEST EDUCATIONAL ACHIEVEMENT—ENLISTED

(As of Sept. 30, 2019)

	No diploma	HS diploma or equivalent	Some College	Assoc.	BA/BS	MA/MS	Professional degree	Ph.D.	Unknown	Total
RANK										
E-1	5	8,287	2,129	33	7	0	0	0	508	10,969
	0.05%	75.55%	19.41%	0.3%	0.06%	0%	0%	0%	4.63%	
E-2	3	1,320	6,101	6	8	1	0	0	129	7,568
	0.04%	17.44%	80.62%	0.08%	0.11%	0.01%	0%	0%	1.7%	
E-3	18	4,317	47,969	549	642	51	0	4	1,670	55,220
	0.03%	7.82%	86.87%	0.99%	1.16%	0.09%	0%	0.01%	3.02%	
E-4	0	283	48,284	4,215	1,738	109	2	6	32	54,669
	0%	0.52%	88.32%	7.71%	3.18%	0.2%	0[1]	0.01%	0.06%	
E-5	0	19	36991	19978	4,205	333	2	3	13	61,544
	0%	0.03%	60.1%	32.46%	6.83%	0.54%	*	*	0.02%	
E-6	0	7	11,375	21,581	5,914	795	3	4	12	39,691
	0%	0.02%	28.66%	54.37%	14.9%	2%	0.01%	0.01%	0.03%	
E-7	0	0	2,059	15,180	7,383	1,849	7	12	1	26,491
	0%	0%	7.77%	57.3%	27.87%	6.98%	0.03%	0.05%	0[1]	
E-8	0	0	0	1,828	2,414	1,114	16	7	0	5,379
	0%	0%	0%	33.98%	44.88%	20.71%	0.3%	0.13%	0%	
E-9	0	0	0	547	1,217	843	2	4	0	2,613
	0%	0%	0%	20.93%	46.57%	32.26%	0.08%	0.15%	0%	
Total	**26**	**14,233**	**154,908**	**63,917**	**23,528**	**5,095**	**32**	**40**	**2,365**	**264,144**
	0.01%	**5.39%**	**58.65%**	**24.20%**	**8.91%**	**1.93%**	**0.01%**	**0.02%**	**0.90%**	
FEMALE/MALE										
Female	2	3,470	28,477	13,737	6,268	1,514	3	15	753	54,239
	*	6.40%	52.5%	25.33%	11.56%	2.79%	0.01%	0.03%	1.39%	
Male	24	10,763	126,431	50,180	17,260	3,581	29	25	1,612	209,905
	0.01%	5.13%	60.23%	23.91%	8.22%	1.71%	0.01%	0.01%	0.77%	
Total	**26**	**14,233**	**154,908**	**63,917**	**23,528**	**5,095**	**32**	**40**	**2,365**	**264,144**
	0.01%	**5.39%**	**58.65%**	**24.20%**	**8.91%**	**1.93%**	**0.01%**	**0.02%**	**0.90%**	
ETHNICITY										
Declined to Respond	0	63	1,543	1,436	571	140	1	0	7	3,761
	0%	1.68%	41.03%	38.18%	15.18%	3.72%	0.03%	0%	0.19%	
Hispanic or Latino	2	2,809	27,781	9,766	3,173	557	1	1	455	44,545
	*	6.31%	62.37%	21.92%	7.12%	1.25%	*	*	1.02%	
Not Hispanic or Latino	24	11,361	125,584	52,715	19,784	4,398	30	39	1,903	215,838
	0.01%	5.26%	58.18%	24.42%	9.17%	2.04%	0.01%	0.02%	0.88%	
Total	**26**	**14,233**	**154,908**	**63,917**	**23,528**	**5,095**	**32**	**40**	**2,365**	**264,144**
	0.01%	**5.39%**	**58.65%**	**24.20%**	**8.91%**	**1.93%**	**0.01%**	**0.02%**	**0.9%**	
RACE										
American Indian/ Native Alaskan	0	133	1,229	446	125	32	0	0	25	1,990
	0%	6.68%	61.76%	22.41%	6.28%	1.61%	0%	0%	1.26%	
Asian	2	474	6,052	2,273	1,036	150	17	5	151	10,160
	0.02%	4.67%	59.57%	22.37%	10.20%	1.48%	0.17%	0.05%	1.49%	
Black or African American	5	2,628	26,010	9,566	4,488	1,237	4	7	391	44,336
	0.01%	5.93%	58.67%	21.58%	10.12%	2.79%	0.01%	0.02%	0.88%	
Declined to Respond	0	60	2,636	3,361	1,358	373	1	0	4	7,793
	0%	0.77%	33.83%	43.13%	17.43%	4.79%	0.01%	0%	0.05%	
Identified More Than One Race	1	684	7770	2661	895	152	1	0	107	12,271
	0.01%	5.57%	63.32%	21.69%	7.29%	1.24%	0.01%	0%	0.87%	
Native Hawaiian/ Other Pacific Islander	1	226	2,040	908	297	40	0	0	36	3,548
	0.03%	6.37%	57.5%	25.59%	8.37%	1.13%	0%	0%	1.01%	
White	17	10,028	109,171	44,702	15,329	3,111	9	28	1,651	184,046
	0.01%	5.45%	59.32%	24.29%	8.33%	1.70%	*	0.02%	0.90%	
Total	**26**	**14,233**	**154,908**	**63,917**	**23,528**	**5,095**	**32**	**40**	**2,365**	**264,144**
	0.01%	**5.39%**	**58.65%**	**24.20%**	**8.91%**	**1.93%**	**0.01%**	**0.02%**	**0.90%**	

Source: Air Force Personnel Center

[1]Less than 0.01%



Airman 1st Class Juan Torres

Airmen from the 374th Security Forces Squadron salute during a Police Week Memorial Ceremony at Yokota Air Base, Japan.

TOTAL FORCE AIRMEN BY AIR FORCE SPECIALTY CODE (AFSC)

(As of Sept. 30, 2019)

ENLISTED

AFSC	TOTAL	
1A0	In-Flight Refueling Spc	1,669
1A1	Flight Eng	1,331
1A2	Aircraft Ldm	4,288
1A3	Airborne Mission Sys Spc	1,962
1A6	Flight Attendant	317
1A8	Airborne ISR	2,383
1A9	Spc Mission Aviator	1,354
1B4	CW Ops	1,685
1C0	Aviation Rsc Mgmt	2,990
1C1	Air Traffic Control	3,315
1C2	Combat Control	760
1C3	C2 Ops	2,829
1C4	TACP	2,008
1C5	C2 Battle Mgmt Ops	2,200
1C6	Space Sys Ops	1,614
1C7	Airfield Mgmt	1,148
1C8	Radar, Airfield, and Weather Sys	1,962
1N0	Intelligence	5,709
1N1	Geospatial Intelligence	3,694
1N2	SIGINT	2,338
1N3	Cryptologic Language Analyst	3,551
1N4	Fusion Analysis Supt	637
1N4	Fusion Analyst	3,710
1N7	HUMINT Spc	131
1N8	Targeting Analyst	656
1P0	Aircrew Flight Equip	4,068
1S0	Safety	786
1T0	SERE Specialist	617
1T2	Pararescue	849
1U0	Sensor Ops	2,091
1U1	RPA pilot	67
1W0	Weather	2,967
1Z1	Pararescue	135
1Z3	TACP	1
1Z4	Special Recon	114
2A0	Avionics	1,669
2A2	SOF/PR Integrated Comm/Nav/Mission Sys	1,835
2A3	Fighter/RPA Maint	19,646
2A5	Airlift/Special Mission Aircraft Maint	21,064
2A6	Aircraft Sys	27,880
2A7	Aircraft Fabrication	8,771
2A8	Mobility AF Integrated Comms/Nav/Mission Sys	4,605
2A9	Bomber/Spc Integrated Comms/Nav/Mission Sys	2,561
2F0	Fuels	4,636
2G0	Logistics Plans	1,568
2M0	Missile and Space Sys Maint	1,780
2P0	Precision Measurement Equipment Lab	764
2R0	Maint Mgmt	1,175
2R1	Maint Mgmt Prod	1,295
2S0	Materiel Mgmt	10,015
2T0	Traffic Mgmt	2,708
2T1	Ground Trans	3,236
2T2	Air Trans	11,187
2T3	Vehicle Mgmt	5,236
2W0	Munitions Sys	9,370
2W1	Aircraft Armament Sys	9,740
2W2	Nuclear Weapons	710
3D0	Cyberspace Ops	10,782
3D1	Client Sys	20,195
3E0	Facility Sys	4,998
3E1	HVAC, Refrigeration	2,478
3E2	Heavy Repair	3,163
3E3	Structural	2,677
3E4	Infrastructure Sys	2,917
3E5	Engineering	1,616
3E6	Ops Mgmt	1,175
3E7	Fire Protection	5,685
3E8	Explosive Ordnance Disposal	1,773
3E9	Emergency Mgmt	1,751
3F0	Personnel	10,020
3F1	Services	7,495
3F2	Education and Training	2,557
3F3	Manpower	486
3F4	Equal Opportunity	395
3F5	Administration	6,143
3H0	Historian	17
3N0	Public Affairs	1,902
3N1	Regional Band	572
3N2	Premier Band - The USAF Band	173
3P0	Security Forces	37,872
4A0	Health Services Mgmt	4,310
4A1	Medical Materiel	1,471
4A2	Biomedical Equip	683
4B0	Bioenvironmental Eng	1,254
4C0	Mental Health Svc	970
4D0	Diet Therapy	240
4E0	Public Health	1,539
4H0	Cardiopulmonary Lab	453
4J0	Physical Medicine	282
4M0	Aerospace and Ops Physiology	265
4N0	Aerospace Medical Svc	11,601
4N1	Surgical Svc	681
4P0	Pharmacy	820
4R0	Diagnostic Imaging	895
4T0	Medical Lab	1,361
4V0	Ophthalmic	406
4Y0	Dental	2,893
5J0	Paralegal	1,329
5R0	Religious Affairs	839
6C0	Contracting	1,693
6F0	Financial Mgmt and Comptroller	3,343
7S0	Special Investigations	1,216
8A1	Career Assistance Advisor	274
8A2	Enlisted Aide	68
8A3	Protocol	54
8B0	Military Training Instructor	728
8B1	Military Training Leader	411
8B2	Academy Military Training NCO	97
8C0	Amn and Family Readiness Center NCO	224
8D1	Language and Culture Advisor	4
8F0	First Sergeant	2,499
8G0	USAF Honor Guard	317
8G1	USAF Installation Honor Guard Prgm Mgr	73
8H0	Amn Dorm Leader	278
8I0	Supt, IG	304
8I1	Inspections Coordinator	172
8I2	Supt, Complaints and Resolutions	2
8L7	Enl Combat Aviation Advisor (SOF)	26
8P0	Courier	89
8P1	Defense Attache	148
8R0	Enlisted Accessions Recruiter	1,694
8R2	Second-Tier Recruiter	862
8R3	Third-Tier Recruiter	495
8S0	Missile Facility Mgr	176
8T0	PME Instructor	613
8T1	Enl PME Instructional Sys Designer	15
8U0	Unit Deployment Mgr	246
9A0	Enl Amn, Disqualified for Reasons Beyond Ctrl	177
9A1	Enl Amn, Disqualified for Reasons Within Ctrl	68
9A2	Enl Airman Awaiting Discharge, Separation, or Ret for Reasons Within Ctrl	42
9A3	Enl Awaiting Dis, Sep, or Ret for Reasons Beyond Ctrl	31
9A5	Enl Amn Temp Ineligible for Retraining, Disqualified for Reasons Beyond Ctrl	34
9C0	Chief Master Sergeant of the Air Force	1
9D1	Key Developmental Senior Enlisted Positions	18
9E0	Command Chief Master Sergeant	381
9E1	Command Chief Executive Assistant	14
9E2	Individual Mobilization Augmentee to CCMS	13
9G1	Group Supt	764
9H0	Academic Faculty Inst	1
9J0	Prisoner	12
9L0	Interpreter/Translator	65
9L1	Enl Engagement Mgr/Int'l Affairs	1
9M4	Chief, Medical Enl Force	16
9N0	SECAF Enl Legislative Fellows	1
9S1	Scientific Applications Spc	547
9T0	Basic Enl Amn	14,204
9T1	Officer Trainee	245
9T2	Pre-Cadet Assigned	262
9T4	AF Institute of Tech or Ed With Industry Enl Students	4
	Unknown	1,168

Sources: Air Force Personnel Center, Air Force Reserve Command, Air National Guard

OFFICER

AFSC		TOTAL
10C	Ops Cmdr	634
11B	Bomber Pilot	621
11E	Experimental Test Pilot	154
11F	Fighter Pilot	3,664
11G	Generalist Pilot	452
11H	Helicopter Pilot	883
11K	Trainer Pilot	1,679
11M	Mobility Pilot	7,699
11R	Recon/Surveillance/EW Pilot	938
11S	Spc Ops Pilot	1,493
11U	RPA Pilot	339
12B	Bomber Combat Systems Officer (CSO)	688
12E	Experimental Test CSO	23
12F	Fighter CSO	430
12G	Generalist CSO	118
12H	Rescue CSO	101
12K	Trainer CSO	154
12M	Mobiity CSO	533
12R	Recon/Surveillance/EW CSO	871
12S	Spc Ops CSO	637
12U	RPA	57
13A	Astronaut	5
13B	Air Battle Mgr	1,692
13C	Spc Tactics	139
13D	Combat Rescue Officer	189
13L	Air Liaison Officer	371
13M	Airfield Ops	320
13N	Nuclear and Missile Ops	1,113
13S	Space Ops	1,971
14F	Info Ops	102
14N	Intelligence	5,274
15W	Weather and Environmental Svcs	526
16F	Foreign Affair Officer	367
16G	AF Ops Staff Officer	753
16P	Political-Military Affairs Strategist	314
16R	Planning and Programming	728
17C	Cyberspace Warfare Ops Cmdr	20
17D	Warfighter Comms Ops	3,003
17S	Cyberspace Effects Ops	1,013
18A	Attack RPA Pilot	1,407
18E	Experimental Test RPA Pilot	8
18G	Generalist RPA Pilot	91
18R	Reconn RPA Pilot	329
18S	Special Ops RPA Pilot	227
20C	Logistics Cmdr	382
21A	Aircraft Maint	2,063
21M	Munitions and Missile Maint	298
21R	Logistics Readiness	2,216
30C	Support Cmdr	517
31P	Security Forces	922
32E	Civil Eng	1,852
35B	Band	22
35P	Public Affairs	618
38F	Force Support Officer	2,264
40C	Medical Cmdr	243
41A	Health Services Admin	1,803
42B	Physical Therapist	168
42E	Optometrist	286
42F	Podiatric Surgeon	15
42G	Physician Asst	691
42N	Audiology/Speech Pathologist	31
42P	Clinical Psychologist	293
42S	Clinical Social Worker	271
42T	Occupational Therapist	21
43A	Aerospace and Operational Physiologist	89
43B	Biomedical Scientist	125
43D	Dietitian	39
43E	Bioenvironmental Eng	413
43H	Public Health Officer	276
43P	Pharmacist	311
43T	Biomedical Lab	149
44A	Chief, Hospital/Clinic Svcs	74
44B	Preventive Medicine	22
44D	Pathologist	72
44E	ER Services Physician	290
44F	Family Physician	580
44G	General Practice Physician	107
44J	Clinical Geneticist	3
44K	Pediatrician	365
44M	Internist	495
44N	Neurologist	34
44O	Physician	16
44P	Psychiatrist	134
44R	Diagnostic Radiologist	143
44S	Dermatologist	39
44T	Radiotherapist	9
44U	Occupational Medicine	17
44Y	Critical Care Medicine	44
44Z	Allergist	21
45A	Anesthesiologist	161
45B	Orthopedic Surgeon	116
45E	Ophthalmologist	49
45G	Obstetrician and Gynecologist	161
45N	Otorhinolaryngologist	56
45S	Surgeon	300
45U	Urologist	30
46A	Nursing Admin	210
46F	Flight Nurse	960
46N	Clinical Nurse	3,155
46P	Mental Health Nurse	74
46S	Operating Room Nurse	229
46Y	Adv Practice RN	701
47B	Orthodontist	37
47D	Oral and Maxillofacial Pathologist	5
47E	Endodontist	31
47G	Dentist	997
47H	Periodontist	47
47K	Pediatric Dentist	17
47P	Prosthodontist	55
47S	Oral and Maxillofacial Surgeon	67
48A	Aerospace Medicine Physician Spc	154
48G	General Med Officer, Flight Surgeon	241
48R	Residency Trained Flight Surgeon	844
48V	Pilot-Physician	3
51J	Judge Advocate	2,322
52R	Chaplain	1,154
60C	Sr Materiel Leader-Upper Echelon	18
61A	Ops Research Analyst	438
61C	Chemist/Nuclear Chemist	69
61D	Physicist/Nuclear Eng	176
62E	Development Eng	2,368
62S	Materiel Leader	11
63A	Acquisition Mgr	2,670
63G	Sr Materiel Leader-Lower Echelon	87
63S	Materiel Leader	157
64P	Contracting	821
65F	Financial Mgmt	745
65W	Cost Analysis	68
71S	Spc Investigations	425
80C	Cmdr, Cadet Squadron, USAF Academy	48
81C	Instructor, Officer Training School	104
81T	Instructor	857
82A	Academic Program Mgr	81
83R	Recruiting Svc	161
84H	Historian	12
85G	USAF Honor Guard	5
86M	Ops Mgmt	266
86P	C2	93
87G	Wing IG	238
87I	Director, Wing Inspections	139
87Q	Director, Complaints Resolution	106
88A	Aide-de-camp	43
89G	Officer Combat Aviation Advisor	31
90G	General Officer	600
91C	Cmdr	329
91W	Wing Cmdr	449
92J	Non-Designated Lawyer	7
92M	Health Prof Scholarship Prgm Med Student	282
92P	Physician Assistant Student	5
92R	Chaplain Candidate	1
92S	Student Officer Authorization	2,000
92T	Pilot Trainee	2,481
93P	Patient	11
95A	Non-extended Active Duty USAFR Academy Liaison Officer or CAP Reserve Asst Prgm Officer	15
96A	Disq Officer, Reasons Beyond Control	2
96B	Disq Officer, Reasons Within Control	3
96D	Officer N/A for Use in Awarded AFSC for Cause	13
97E	Executive Officer	709
99G	Gold Bar Diversity Recruiter	10
	Unknown/other	3,107
	Total	**504,121**

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

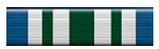

Purple Heart


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

Airmen prepare a 555th Fighter Squadron F-16 Fighting Falcon for takeoff from Aviano Air Base, Italy, on Oct. 28, 2019. The 555th FS deployed in support of U.S. Air Forces Central Command.

Airman 1st Class Caleb House

Budget refers to the amounts that Congress authorized a department to spend in a fiscal year (for 2020, **enacted**) or that a department has requested in the President's Budget Request **(requested**). **Outlays** are how much was actually spent. **Base budget** doesn't include war costs or other supplemental funding, such as for emergencies. The Air Force and Navy **military departments** include multiple **service components** each: the Air Force and, as of fiscal 2020, Space Force; and the Navy and Marine Corps. **Current dollars** have not been adjusted for inflation, while **constant dollars** have been. **Non-blue pass-through** spending is part of the Department of the Air Force's budget that only passes through the department but is never under its control.

DEFENSE, ENTITLEMENTS & DEFICIT, 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

Source: White House Office of Management and Budget

FEDERAL BUDGET AS A PERCENTAGE OF GDP

FISCAL YEAR	TOTAL OUTLAYS %	DEFENSE %	ENTITLEMENTS %	OTHER %
1975	20.7	5.5	10.3	6.8
1976	20.8	5.0	10.3	5.0
1977	20.2	4.8	9.7	4.9
1978	20.2	4.6	9.7	5.7
1979	19.6	4.6	9.3	5.3
1980	21.2	4.8	10.1	7.3
1981	21.6	5.0	10.5	6.7
1982	22.5	5.6	10.9	7.0
1983	22.9	5.9	11.3	6.4
1984	21.6	5.8	10.0	4.4
1985	22.2	5.9	10.2	6.4
1986	21.9	6.0	9.9	5.8
1987	21.1	5.9	9.7	5.2
1988	20.7	5.7	9.6	5.1
1989	20.6	5.5	9.5	5.3
1990	21.2	5.1	10.3	6.2
1991	21.7	5.2	10.4	6.3
1992	21.5	4.7	10.7	5.9
1993	20.8	4.3	10.5	5.4
1994	20.4	3.9	10.5	5.6
1995	20.0	3.6	10.4	5.6
1996	19.6	3.3	10.4	5.6
1997	18.9	3.2	10.2	5.2
1998	18.5	3.0	10.2	5.1
1999	18.0	2.9	9.9	4.8
2000	17.7	2.9	9.8	4.9
2001	17.7	2.9	10.0	5
2002	18.6	3.2	10.6	5.7
2003	19.1	3.6	11.0	5.3
2004	19.1	3.8	10.8	4.5
2005	19.3	3.8	10.8	4.7
2006	19.5	3.8	10.9	4.9
2007	19.1	3.8	10.7	4.4
2008	20.2	4.2	11.4	5.7
2009	24.4	4.6	15.1	8.8
2010	23.3	4.6	13.5	3.6
2011	23.4	4.5	13.7	5.3
2012	22.0	4.2	13.3	3.8
2013	20.8	3.8	12.8	4.2
2014	20.2	3.4	12.6	4.2
2015	20.4	3.2	13.3	3.9
2016	20.8	3.2	13.6	4
2017	20.6	3.1	13.5	4
2018	20.2	3.1	12.9	4.2
2019	21.0	3.2	13.4	4.4

Source: White House Office of Budget and Management

DEFENSE BUDGET AUTHORITY

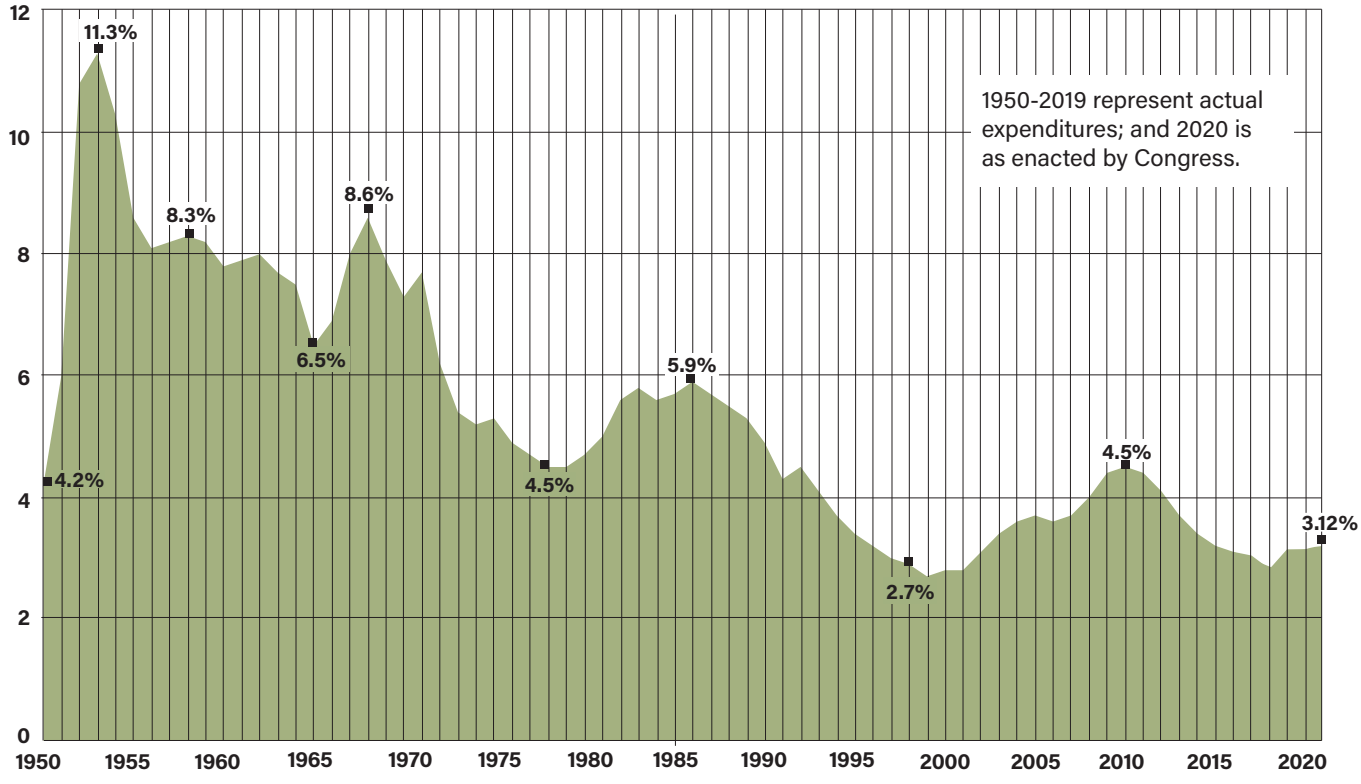
($ billions)

	2015	2016	2017	2018	2019	2020	2021 (Requested)
Base Budget (discretionary)	$497.3	$521.4	$523.5	$599.6	$616.6	$633.3	$636.4
No War Costs, Current Dollars (discretionary)	560.4	580.3	606.0	670.6	687.8	712.6	705.4
With War Costs and Supplements (discretionary and mandatory)	570.8	595.7	626.2	694.5	712.5	721.5	716.2

Source: National Defense Budget Estimates for FY21

DEFENSE OUTLAYS AS PERCENTAGE OF GDP

Percent by Fiscal Year



Source: White House Office of Budget and Management

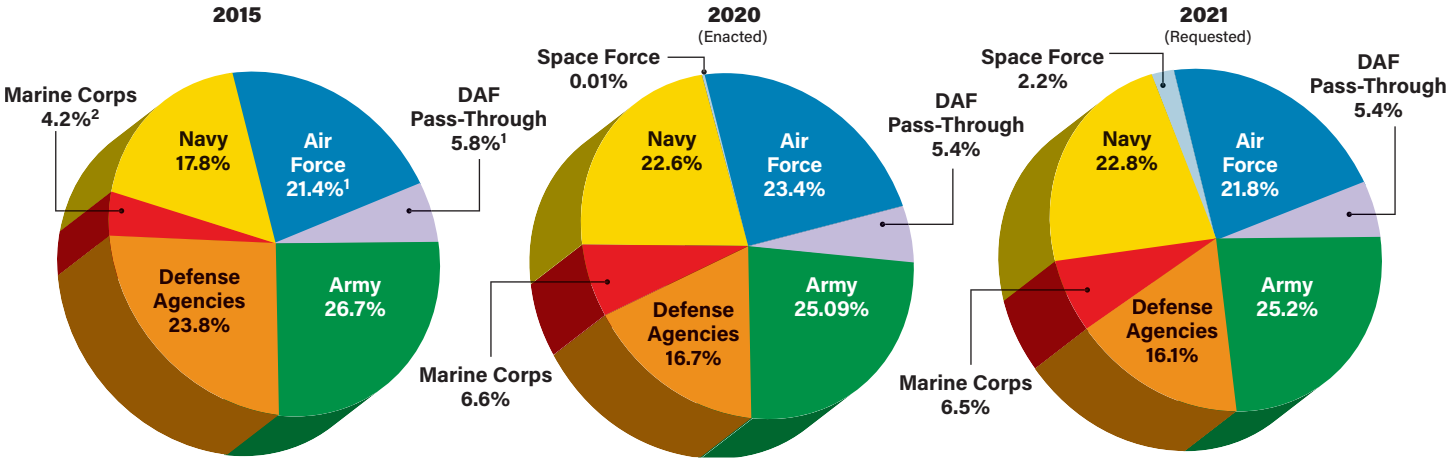
DOD BUDGET BY SERVICE, INCLUDING PASS-THROUGH

($ billions)

	2015	(Enacted) 2020	(% Enacted) 2020	(Requested) 2021	(% Requested) 2021
Army	$150.9	$180,090	25.09	$177,925	25.2
Navy	$134.8	$162,560	22.65	$161,038	22.8
Marine Corps	$23.9	$47,465	6.61	$46,035	6.5
Dept. of the Air Force (DAF)		**$207,169**		**$207,168**	
Air Force	$120.8	$168,082	23.42	$153,596	21.8
DAF Pass-Through	$32.8	$39,047	5.44	$38,190	5.41
Space Force		$40.0	0.01	$15,382	2.2
Defense Agencies	$100.4	$120,539	16.79	$113,336	16.1
Total	**$565.4**	**$717,823**	**100.01**	**$705,502**	**100**

Includes war funding.
May not add up to precise totals because of rounding.
Sources: Department of the Air Force FY21 Budget Overview, National Defense Budget Estimates for FY21

DOD BUDGET SHARES: 2015 vs. 2020 vs. 2021



May not add up to precise totals because of rounding.

Sources: National Defense Budget Estimates for FY21; Department of the Air Force FY21 Budget Overview; Highlights of the Department of the Navy Budget for FY17 and FY21; and the Department of the Air Force

DOD BUDGET BY SPENDING CATEGORY

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

	2015	2016	2017	2018	2019	2020	(Requested) 2021
Military Personnel	$139.0	$138.3	$139.0	$136.0	$144.7	$150.2	$158.9
O&M	$248.2	$247.8	$258.1	$199.7	$231.4	$234.9	$230.4
Procurement	$104.0	$119.9	$126.0	$107.1	$133.8	$131.7	$131.8
RDT&E	$64.1	$70.6	$74.8	$71.8	$94.1	$103.5	$106.2
Military Construction	$6.4	$7.6	$7.6	$6.4	$8.8	$9.9	$6.5
Family Housing	$1.3	$1.5	$1.4	$1.2	$1.6	$1.5	$1.4
Revolving Funds	$2.3	$2.3	$2.3	$1.5	$1.9	$1.6	$1.3
Total	**$565.3**	**$588.0**	**$609.2**	**$523.7**	**$616.4**	**$633.3**	**$636.5**

Source: Department of Defense National Defense Budget Estimates for FY21

DOD BUDGET SHARES BY MILITARY DEPARTMENT

($ millions)

CURRENT DOLLARS	2013	2014	2015	2016	2017	2018	2019	2020	(Requested) 2021
Air Force[1]	$146,263	$152,392	$153,567	$164,009	$171,457	$190,359	$196,066	$207,169[2]	$207,168[2]
	24.99%	26.22%	27.16%	27.89%	28.14%	28.29%	28.29%	28.86%	29.36%
Army	176,535	162,246	150,887	151,296	159,018	178,260	181,166	180,090	177,925
	30.16%	27.92%	26.69%	25.73%	26.10%	26.49%	26.14%	25.09%	25.22%
Navy/Marine Corps	163,140	164,397	160,512	170,325	174,058	190,489	197,778	210,025	207,073
	27.87%	28.29%	28.39%	28.97%	28.57%	28.31%	28.54%	29.26%	29.35%
Defense Agencies	99,455	102,153	100,437	102,348	104,754	113,853	117,991	120,539	113,336
	16.99%	17.58%	17.76%	17.41%	17.19%	16.92%	17.03%	16.79%	16.06%
Total	**$585,393**	**$581,188**	**$565,403**	**$587,978**	**$609,287**	**$672,960**	**$693,001**	**$717,823**	**$705,502**

[1]Includes DAF Pass-Through

[2]Includes Space Force

Source: Department of Defense National Defense Budget Estimates for FY21

DEPARTMENT OF THE AIR FORCE BUDGET BY SPENDING CATEGORY

($ millions; excludes war funding)

CURRENT DOLLARS	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Military Personnel	$35,131	$34,704	$35,103	$33,617	$34,026	$34,570	$34,697	$37,413	$39,223	$41,709
O&M	$47,007	$42,550	$43,196	$44,596	$44,442	$45,920	$50,189	$51,242	$53,126	$47,690
Procurement	$36,020	$30,341	$31,259	$33,914	$40,939	$38,102	$41,736	$43,177	$44,061	$47,043
RDT&E	$26,113	$22,766	$23,655	$23,568	$24,458	$27,339	$28,954	$40,551	$45,304	$47,719
Military Construction	$1,468	$482	$1,291	$1,045	$1,654	$1,989	$2,181	$1,951	$2,404	$964
Family Housing	$490	$520	$465	$328	$492	$336	$336	$396	$430	$414
Revolving & Management	$65	$45	$150	$67	$63	$64	$67	$78	$92	$96
Total	**$146,295**	**$131,408**	**$135,120**	**$137,134**	**$146,075**	**$148,320**	**$171,691**	**$174,807**	**$184,639**	**$185,635**

PERCENTAGE CHANGE	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Military Personnel	0.70%	-2.60%	-0.30%	-4.30%	1.22%	1.60%	0.37%	7.83%	4.84%	6.34%
O&M	0.70%	-10.70%	0.00%	3.10%	-0.35%	3.33%	9.30%	2.10%	3.68%	-10.23%
Procurement	-2.60%	-16.90%	1.50%	8.40%	20.71%	-6.93%	9.54%	3.45%	2.05%	6.77%
RDT&E	-5.00%	-14.00%	2.40%	-0.50%	3.78%	11.78%	5.91%	40.05%	11.72%	5.33%
Military Construction	1.70%	-67.60%	163.90%	-19.10%	58.28%	20.25%	9.65%	-10.55%	23.22%	-59.90%
Family Housing	-18.60%	4.70%	-11.90%	-29.50%	50.00%	-31.71%	0.00%	17.86%	8.59%	-3.72%
Revolving & Management	-4.80%	-31.70%	228.50%	-55.40%	-5.97%	1.59%	4.69%	16.42%	17.95%	4.35%
Total	**-1.20%**	**-11.40%**	**1.30%**	**1.40%**	**6.52%**	**1.54%**	**15.76%**	**1.81%**	**5.62%**	**0.54%**

CONSTANT DOLLARS	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Military Personnel	$41,151	$40,009	$39,981	$37,861	$37,933	$37,773	$37,077	$39,082	$40,044	$41,709
O&M	$55,062	$49,055	$49,198	$50,226	$49,545	$50,175	$53,632	$53,528	$54,238	$47,690
Procurement	$42,193	$34,979	$35,603	$38,196	$45,640	$41,632	$44,599	$45,102	$44,983	$47,043
RDT&E	$30,588	$26,246	$26,942	$26,544	$27,266	$29,872	$30,940	$42,360	$46,252	$47,719
Military Construction	$1,720	$556	$1,470	$1,177	$1,844	$2,173	$2,331	$2,038	$2,454	$964
Family Housing	$574	$599	$530	$369	$548	$367	$359	$414	$439	$414
Revolving & Management	$76	$52	$171	$75	$70	$70	$72	$81	$94	$96
Total	**$171,364**	**$151,496**	**$153,895**	**$154,448**	**$162,846**	**$162,062**	**$169,010**	**$182,604**	**$188,504**	**$185,635**

Source: National Defense Budget Estimates for FY21

DEPARTMENT OF THE AIR FORCE vs. DAF PASS-THROUGH SPENDING

(Total Obligation Authorit; $ billions)

	2011	2012	2013	2014	2015	2016	2017	2018	2019 (Enacted)	2020
DAF	133.3	128.9	116.4	120.8	120.8	129.8	136.6	151.5	156.8	168.1
DAF Pass-Through	33.2	33.1	29.8	31.3	31.7	33.1	34.3	37.2	37.8	39.0
Total	**166.5**	**162.0**	**146.2**	**152.1**	**152.5**	**162.9**	**170.9**	**188.7**	**194.6**	**207.1**
Pass-Through %	**19.94%**	**20.43%**	**20.38%**	**20.58%**	**20.79%**	**20.32%**	**20.07%**	**19.71%**	**19.42%**	**18.82%**

Source: USAF

Nicholas Pilch/USAF

Staff Sgt. Mitchell Halbleib, 60th Maintenance Squadron, ensures the proper operation of elevator systems on the tail of a C-17 Globemaster III at Travis Air Force Base, Calif.

MAJOR USAF PROGRAMS

(For Major Space Force Programs, see p. 67)

		RDT&E (Current $ millions)			PROCUREMENT (Current $ millions)		
	PROGRAM	2019	2020	2021	2019	2020	2021
BOMBER	B-1B	58.2	1	15.8	39.7	18.9	21.8
	B-2A	591.1	593.4	187.4	60.3	9.5	31.5
	B-21	2,189.9	2,982.5	2,848.4	CLASS	CLASS	CLASS
	B-52	290.1	323.6	520	117.2	47.9	53.9
	B-52 CERP	59.7	175.4	299.4			
FIGHTER/ATTACK	A-10	25.5	31.9	24.5	168.1	125.8	135.8
	F-15C/D/E	196.1	684.2	298.9	440.9	474.1	349.3
	EPAWSS	133.4	47.3	170.7	214.9	125.4	31.9
	F-15EX	0	0	159.8	0	621.1	1,403.3
	F-16	182.2	193.1	223.4	303.4	281.5	615.8
	F-22	563.6	546.3	665.1	321.5	323.6	387.9
	F-35	490.3	99.4	132.3	5,267.1	6,059.6	5,177.8
	NGAD	413.9	905.1	1,044.1	-	-	-
	F-35 BLK 4 C2D2	-	642.4	785.3	-	14	41
	F-35 MODS				237.3	329.6	322.2
HELO	HH-60G/U	0	0	0	92	26.7	44.538
	HH-60W	446	247	63.169	850.535	973.473	1,147,473
	UH1 REPLACEMENT	258	171	44.464	12	3.8	194.016
ICBM	MINUTEMAN III SQUADRONS	185.6	104.2	116.6		N/A	N/A
	GROUND-BASED STRATEGIC DETERRENT	401.2	557.5	1,524.80		N/A	N/A
	MM III FUZE MODERNIZATION	124.5	161.2	167.1		13.9	19.5
	MINUTEMAN III MODIFICATIONS	N/A	N/A	N/A	100.3	59.7	85.3
ISR/BM/C3	AIR AND SPACE OPERATIONS	98.9	114.8	51.2	38.6	33.2	25
	DCGS	52.4	25	14.20	398	116.1	140.2
	CRC	6.2	8.1	16	7.3	0	13.4
	E-3	108.8	68	138.3	48.4	112.1	172.1
	E-3 BLOCK 40/45	N/A	N/A	N/A	69.3	32.8	53.3
	E-8	N/A	N/A	N/A	37.8	48.8	11
	ABMS	0	143.6	302.3	N/A	N/A	N/A
	E-4B	55.7	60.2	3.5	67.9	58.5	58.8
	EC-130H	43.5	31.9	15.9	172.3	110.8	206.2
	MQ-9	105.1	127.3	162.1	401.6	376.4	171.9
	RQ-4	221.7	191.7	134.6	123.7	1.7	40.5
	RC-135[1]	64.8	45.2	59.8	394.5	227.7	191.3
	U-2	87.6	36.4	18.7	67.4	58.6	120.2
MOBILITY	C-5	25.1	10.2	32.59	68	57.937	62.108
	C-17	48.3	25.1	9.991	77	60.244	66.798
	C-32	7.9	9.9	9.9	4.5	11.5	2.947
	C-130J	15.4	8.6	10.674	674.10	742.16	37.131
	KC-10	6.6	0.2	0	11	2	2,108
	KC-135	2.692	0	4.591	91.4	113.351	88.25
	KC-46	80.2	59.6	0	2,290.90	2,139.71	2,850.15
	PAR/VC-25	657.9	757.9	800.889	27.2	48.6	-
MUNITION	AIM-9	29	10.3	19.4	118.3	155.3	164.8
	AIM-120	50.7	55.4	51.8	307.5	311.7	453.2
	JASSM	40.9	78.5	70.8	602.8	483.4	505.9
	SDB1	N/A	N/A	N/A	209.3	273.3	95.8
	SDB2	75.5	45.2	17.3	100.9	183.3	273.3
	JDAM	0	0	7.9	922.7	1034.2	444.7
	SIAW	14.5	162.8	160.4	-	-	-
	AGM-65	-	0.3	0.3	-	-	-
	LRASM	-	-	-	54.4	0	19.8
	AGM-114	-	-	-	265.8	299.6	183.6
SOF	CV-22B	38.8	17.9	18.419	92.9	82.6	-
	HC-130/MC-130	16.2	17.2	24.705	125.7	51.5	
TRAINERS	T-6	1.7	1.2	1.8	53.2	11.8	26.8
	T-7A	236.8	340.4	248.7	-	-	-
	T-38	8.5	0.6	6.1	70.6	37.3	36.8
	T-1	N/A	N/A	N/A	21.8	26.8	4.5

Source: Air Force FY21 Budget Request

[1]RC-135 funding is a combination of program lines

EQUIPMENT

AIRCRAFT TOTAL ACTIVE INVENTORY (TAI)

(As of Sept. 30, 2019)

	ACTIVE	ANG	AFRC	TOTAL FORCE	AVG. AGE
Bomber					
B-1B Lancer	62	0	0	62	32.42
B-2A Spirit	20	0	0	20	24.35
B-52H Stratofortress	58	0	18	76	57.80
Total	**140**	**0**	**18**	**158**	**41.98**
Fighter/Attack					
A-10C Thunderbolt II	141	85	55	281	36.84
F-15C Eagle	88	123	0	211	35.44
F-15D Eagle	9	14	0	23	34.94
F-15E Strike Eagle	218	0	0	218	27.42
F-16C Fighting Falcon	443	288	52	783	28.70
F-16D Fighting Falcon	104	45	2	151	29.43
F-22A Raptor	166	20	0	186	13.19
F-35A Lightning II	201	2	0	203	3.69
Total	**1,370**	**577**	**109**	**2,056**	**29.18**
Special Operations Forces					
AC-130J Ghostrider	15	0	0	15	3.11
AC-130U Spooky	7	0	0	7	28.94
AC-130W Stinger II	10	0	0	10	30.19
CV-22B Osprey	50	0	0	50	9.53
MC-130H Combat Talon II	16	0	0	16	31.03
MC-130J Commando II	46	0	0	46	4.75
Total	**144**	**0**	**0**	**144**	**11.89**
ISR/BM/C3					
E-3B Sentry (AWACS)	10	0	0	10	41.19
E-3C Sentry (AWACS)	1	0	0	1	37.0
E-3G Sentry (AWACS)	20	0	0	20	39.37
E-4B NAOC	4	0	0	4	45.38
E-8C JSTARS	0	16	0	16	18.8
TE-8A JSTARS (trainer)	0	1	0	1	28.7
E-9A	27	0	0	27	27.00
E-11A BACN	4	0	0	4	7.73
EC-130H Compass Call	11	0	0	11	45.09
EC-130J Commando Solo	0	7	0	7	19.27
MQ-1B Predator	7	0	0	7	13.02
MQ-9A Reaper	245	24	0	269	5.47
NC-135W (test bed)	1	0	0	1	57.5
OC-135B Open Skies	2	0	0	2	57.4
RC-26B Condor	0	11	0	11	25.4
RC-135S Cobra Ball	3	0	0	3	57.47
RC-135U Combat Sent	2	0	0	2	54.65
RC-135V Rivet Joint	8	0	0	8	54.84
RC-135W Rivet Joint	12	0	0	12	56.66
RQ-4B Global Hawk	35	0	0	35	9.48
TC-135W (trainer)	3	0	0	3	57.3
TU-2S Dragon Lady (trainer)	4	0	0	4	34.92
U-2S Dragon Lady	27	0	0	27	36.69
WC-130J Hercules	0	0	10	10	18.45
WC-135C Constant Phoenix	1	0	0	1	55.3
WC-135W Constant Phoenix	1	0	0	1	57.4
Total	**428**	**59**	**10**	**497**	**16.91**

	ACTIVE	ANG	AFRC	TOTAL FORCE	AVG. AGE
Tanker					
HC-130J Combat King II	19	12	0	31	4.01
HC-130N King	0	3	0	3	24.50
KC-10A Extender	59	0	0	59	34.72
KC-46A	19	2	0	21	0.1
KC-135R Stratotanker	116	140	74	330	57.88
KC-135T Stratotanker	25	24	0	49	59.59
Total	**238**	**181**	**74**	**493**	**49.23**
Transport					
C-5M Super Galaxy	36	0	16	52	32.39
C-12C Huron	16	0	0	16	43.17
C-12D Huron	6	0	0	6	35.43
C-12F Huron	3	0	0	3	34.6
C-12J Huron	4	0	0	4	31.72
C-17A Globemaster III	146	50	26	222	17.03
C-20H	1	0	0	1	25.0
C-21A Learjet	19	0	0	19	34.86
C-32A Air Force Two	4	0	0	4	21
C-32B Air Force Two	0	2	0	2	16.25
C-37A Gulfstream V	9	0	0	9	18.72
C-37B Gulfstream V	3	0	0	3	9.67
C-40A	4	0	0	4	15.56
C-40C Clipper	0	3	4	7	13.39
C-130H Hercules	2	127	42	171	29.36
C-130J Super Hercules	106	16	10	132	9.27
LC-130H Hercules	0	10	0	10	34.05
VC-25A Air Force One	2	0	0	2	28.95
Total	**361**	**208**	**98**	**667**	**21.27**
Helicopter					
HH-60G Pave Hawk	60	23	15	98	27.44
HH-60U Pave Hawk	3	0	0	3	8.37
TH-1H Iroquois (trainer)	28	0	0	28	38.53
UH-1N Iroquois	63	0	0	63	48.7
Total	**154**	**23**	**15**	**192**	**31.85**
Trainer					
T-1A Jayhawk	178	0	0	178	24.9
T-6A Texan II	443	0	0	443	13.98
T-38A Talon	53	0	0	53	52.91
(A)T-38B Talon	6	0	0	6	56.12
T-38C Talon	442	0	0	442	52.17
T-41D Mescalero	4	0	0	4	50.01
T-51A Cessna	3	0	0	3	14.2
T-53A Kadet II	24	0	0	24	7.66
UV-18B Twin Otter	3	0	0	3	35.53
Gliders	24	0	0	24	9.4
Total	**1,180**	**0**	**0**	**1,180**	**31.85**
GRAND TOTAL	**4,015**	**1,048**	**324**	**5,387**	**28.60**

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, 2019)

TYPE OF SYSTEM	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Minuteman III	450	450	450	450	450	450	406	400	400	400
Total ICBMs	**450**	**450**	**450**	**450**	**450**	**450**	**406**	**400**	**400**	**400**

TOTAL NUMBER OF ACTIVE DUTY AIRCRAFT IN SERVICE OVER TIME

(As of Sept. 30, 2019)

ACTIVE	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Bomber	150	144	144	141	141	140	140	139	139	140
Fighter/Attack	1,256	1,287	1,289	1,287	1,273	1,312	1,282	1,297	1,332	1,370
Special Ops Forces	98	105	117	122	124	144	132	138	135	144
ISR/BM/C3	362	381	413	394	444	437	434	441	432	428
Tanker	263	247	246	243	244	239	236	234	215	238
Transport	458	429	425	413	410	381	384	363	356	361
Helicopter	160	151	170	138	137	157	160	131	154	154
Trainer	1,000	1,190	1,213	1,189	1,195	1,187	1,194	1,211	1,181	1,180
Total Active Duty	**3,747**	**3,934**	**4,017**	**3,927**	**3,968**	**3,997**	**3,962**	**3,954**	**3,944**	**4,015**
ANG										
Bomber	0	0	0	0	0	0	0	0	0	0
Fighter/Attack	614	639	635	630	585	611	577	575	575	577
Special Ops Forces	4	4	4	4	4	4	4	4	1	000
ISR/BM/C3	80	80	87	86	88	91	89	93	78	59
Tanker	179	189	189	187	185	184	181	181	185	181
Transport	240	242	232	223	207	207	212	210	208	208
Helicopter	17	17	17	17	17	17	17	17	17	23
Total ANG	**1,134**	**1,171**	**1,164**	**1,147**	**1,086**	**1,114**	**1,080**	**1.080**	**1,064**	**1,048**
AFRC										
Bomber	9	18	18	18	18	18	18	18	18	18
Fighter/Attack	97	100	101	95	104	111	111	109	109	109
Special Ops Forces	10	10	5	4	0	0	0	0	0	00
ISR/BM/C3	14	12	11	11	10	10	10	10	10	10
Tanker	69	72	72	71	68	68	72	72	72	74
Transport	149	152	148	147	145	139	101	91	96	98
Helicopter	15	15	15	15	15	15	15	15	15	15
Total AFRC	**363**	**379**	**370**	**361**	**360**	**361**	**327**	**315**	**320**	**324**
TOTAL FORCE	**5,244**	**5,484**	**5,551**	**5,435**	**5,414**	**5,472**	**5,369**	**5,349**	**5,328**	**5,387**

F-15C Eagles conduct aerial operations in support of Bomber Task Force Europe 20-2 over the North Sea on March 17.

Staff Sgt. Daniel Snider

2019 AIRCRAFT MISSION CAPABLE RATES

(As of Sept. 30, 2019)

MDS	12-HOUR FIX RATE %	BREAK RATE %	MC RATE %
A-10C	66.03	9.76	71.20
AC-130J	74.00	4.65	86.12
AC-130U	75.00	13.30	85.62
AC-130W	60.00	8.28	80.22
AT-38B	60.00	6.72	74.62
B-1B	32.45	27.92	46.42
B-2A	55.27	21.72	60.47
B-52H	36.57	43.20	65.73
C-12C	0.00	0.00	99.05
C-12D	0.00	0.00	100.00
C-12F	0.00	0.00	92.40
C-12J	0.00	0.00	100.00
C-130H	35.26	7.08	65.51
C-130J	59.09	2.49	77.02
C-17A	58.10	2.60	82.23
C-21A	0.00	0.00	100.00
C-32A	66.67	0.48	90.24
C-37A	20.00	0.27	93.85
C-37B	33.33	0.36	86.47
C-40B	40.00	0.62	89.48
C-40C	100.00	0.09	85.90
C-5M	49.52	10.08	63.16
CV-22B	42.26	31.73	53.45
E-3B	65.76	36.51	74.41
E-3C	36.00	30.12	73.19
E-3G	61.19	37.34	74.36
E-4B	15.38	2.98	64.75
E-8C	42.51	24.36	67.36
EC-130H	72.33	23.43	73.19
EC-130J	22.22	4.75	57.38
F-15C	61.48	15.03	70.05
F-15D	65.69	13.06	72.45
F-15E	65.61	15.70	71.29
F-16C	59.49	9.87	72.97
F-16D	63.16	9.26	70.37
F-22A	62.39	10.26	50.57
F-35A	N/A	N/A	61.60
HC-130J	56.54	8.40	79.81
HC-130N	10.71	11.97	68.13
HC-130P	0.00	14.71	61.52
HH-60G	62.66	13.58	66.20
KC-10A	51.64	3.69	79.37
KC-135R	52.78	10.86	72.50
KC-135T	58.19	12.85	71.11
KC-46A	33.33	2.67	63.11
LC-130H	25.41	17.00	40.28
MC-12W	0.00	0.00	100.00
MC-130H	54.65	11.86	68.65
MC-130J	56.47	9.49	77.54
MC-130P	50.00	50.00	28.07
MQ-1B	35.00	8.70	99.52
MQ-9A	65.47	3.86	89.32
OC-135B	35.71	24.78	82.46
RC-135S	35.71	7.14	90.39
RC-135U	52.00	13.23	91.07
RC135V	46.31	29.13	74.10
RC-135W	39.76	22.99	69.49
RQ-4B	62.56	15.31	75.75
T-1A	57.33	8.85	60.51
T-38A	70.14	6.67	74.48
T-38C	55.58	7.12	63.05
T-6A	69.26	5.29	63.29
TC-130H	40.00	31.25	26.32
TC-135W	75.00	13.53	84.80
TE-8A	55.56	5.96	73.42
TH-1H	52.28	6.69	74.63
TU-2S	56.00	16.82	74.96
U-2S	68.33	14.32	78.39
UH-1N	56.30	6.33	82.42
VC-25A	0.00	0.00	92.86
WC-130J	38.18	10.13	56.20
WC-135C	17.65	42.50	63.05
WC-135W	29.41	27.42	80.14
TOTAL	**59.09**	**8.01**	**70.27**

U.S. Air Force RC-135 Rivet Joint refuels over an undisclosed location in Southwest Asia.

Master Sgt. Russell Scalf

U.S. SPACE FORCE

The U.S. Space Force was created by an act of Congress and signed into law by President Donald J. Trump 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.

An Atlas V rocket lofts the AEHF-6 satellite from Cape Canaveral Air Force Station, Fla., supported by the 45th Space Wing on March 26.

Joshua Conti/USAF

■ **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.** A combination of uniformed military personnel and Department of the Air Force civilians will make up the force, with a focus on space warfighting capabilities. DOD estimates the Space Force will eventually comprise 15,000-16,000 personnel. The Space Force will leverage common support functions and infrastructure from the Air Force, such as lawyers, doctors, civil engineers, logisticians, and financial managers. All personnel assigned to the former Air Force Space Command were reassigned to the Space Force based on duty location or alignment of duty. To become members of the Space Force, those with the requisite skills must formally resign their commission or terminate their enlistment with their current armed service and recommission or reenlist into the Space Force. Air Force member transfers begin in fiscal 2020 and conclude in 2021, while Army and Navy member transfers are anticipated to begin in fiscal 2022.

■ **Functions of the Office of the Chief of Space Operations.** The CSO leads the Space Force, synchronizing space doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy. The CSO also independently develops and advocates for space domain-specific priorities, develops domain-specific strategy, concepts, and doctrine, and executes policy, guidance, oversight, and prioritization of foundational, operational, and tactical intelligence activities necessary to ensure long-term space superiority. The CSO must also conduct strategic planning, research, and development for next-generation capabilities and architectures and develop and approve operational requirements to ensure critical space/joint warfighter capabilities are fielded and available globally as needed. The CSO will also centralize the development, acquisition, test, and sustainment of space capabilities and systems, including the prioritization of science and technology activities.

■ **Recruiting, Accession, and Initial Training.** The Air Force currently handles recruitment for space missions and units that were previously part of AFSPC. The Space Force will work closely with Air Force Headquarters and the Air Force Recruiting Service (AFRS) to identify specific recruiting quotas and monitor, assess, and adjust goals and quotas so that recruiting needs are met with continued levels of satisfaction. Space Force members may be embedded into existing AFRS organizations once manpower levels allow. The Space Force will access officers through Officer Training School, Reserve Officer Training Corps, or U.S. military academies. Enlisted professionals will be accessed through the Air Force's existing Basic Military Training (BMT) structure.

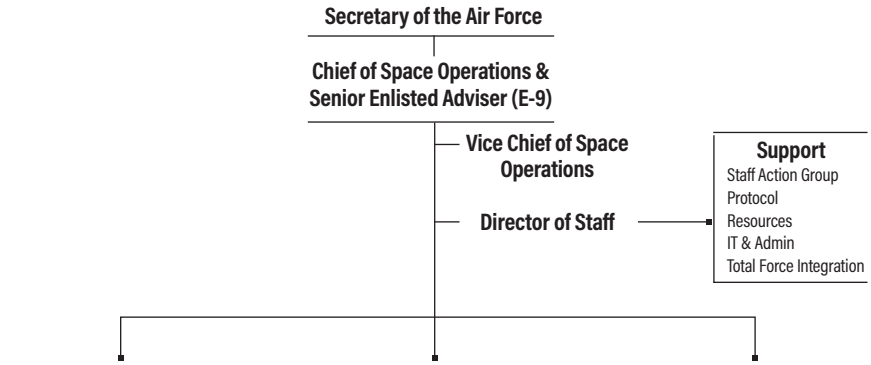
USAF

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

USAF

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

Headquarters: Peterson AFB, Colo. (provisional)
Date of current designation: Dec. 20, 2019



PERSONNEL
Active Duty
9,947*

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
21st Space Wing (SW)	Peterson AFB, Colo.	Space control/warning
30th SW	Vandenberg AFB, Calif.	Space launch, ICBM test, launch range operations
45th SW	Patrick AFB, Fla.	Space launch, launch range operations
50th SW	Schriever AFB, Colo.	C2 space operations
460th SW	Buckley AFB, Colo.	Space surveillance/warning
614th Air Operations Center	Vandenberg AFB, Calif.	Theater and global space operations

*Active-duty personnel assigned to Air Force Space Command as of Sept. 30, 2019. Personnel were assigned to USSF, but not necessarily members of USSF.

SPACECRAFT IN SERVICE OVER TIME

(As of Sept. 30, 2019)

TYPE OF SYSTEM	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
AEHF	1	1	2	2	3	3	3	3	4	5
ATRR	0	0	1	1	0	0	0	1	1	1
DMSP	6	6	4	4	6	6	6	5	5	4
DSCS	8	8	8	8	7	6	6	6	6	6
DSP (classified)									5	5
GPS	36	34	30	31	38	41	37	35	31	29
GSSAP	0	0	0	0	2	2	4	4	4	4
Milstar	5	5	5	5	5	5	5	5	5	5
SBIRS		1	1	2	2	2	2	3	7	6
SBSS	1	1	1	1	1	1	1	1	2	2
WGS	3	3	3	4	6	7	7	9	7	10
Total Satellites	**60**	**59**	**55**	**58**	**70**	**73**	**71**	**72**	**77**	**77**

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

Source: TAI as of Sept. 30, 2019.

MAJOR SPACE PROGRAMS

(Current $ Millions)

		RDT&E			PROCUREMENT		
	PROGRAM	2019	2020	2021	2019	2020	2021
SPACE	AEHF	144.8	117.3	138.3	29.8	21.9	14.8
	COUNTERSPACE SYSTEMS	20.2	27	54.70	1.1	5.7	65.5
	NSSL	443	432	561	954.6	1,237.6	1,043.2
	GPS III	141.4	42.4	10.8	69.4	31.5	20.1
	NEXT-GEN OPIR	643.1	1,470.30	2,318.90	N/A	N/A	N/A
	SPACE FENCE	19.4	0	N/A	46.4	57.8	11.3
	WEATHER SYSTEM FOLLOW-ON	138.1	207.9	2.5	N/A	N/A	N/A
	GPS III FOLLOW-ON	426.9	447.9	263.5	0	394.6	627.8
	PROTECTED TACTICAL SERVICE	29.6	163.7	205.2	N/A	N/A	N/A
	PROTECTED TACTICAL ENTERPRISE SERVICE	46.4	105	114.4	N/A	N/A	N/A
	SPACE TEST PROGRAM	25.6	26.1	26.5	N/A	N/A	N/A
	SPACE C2*	70.4	75.8	149.7	N/A	N/A	N/A
	POLAR MILSATCOM	26.4	412.4	190.2	N/A	N/A	N/A
	WIDEBAND GLOBAL SATCOM	4	1.9	0	12.1	0	0
	GPS III OPERATIONAL CONTROL SEGMENT	491.6	445.3	482	N/A	N/A	N/A

*2019 Space C2 funding fell under JSPoC Mission System

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

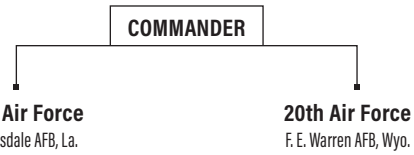
Air Force Global Strike Command

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



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

PERSONNEL	
Active Duty	
28,345	

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

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
595th Command and Control Group	Offutt AFB, Neb.	Command and control, E-4B

Source: TAI as of Sept. 30, 2019.

ACC

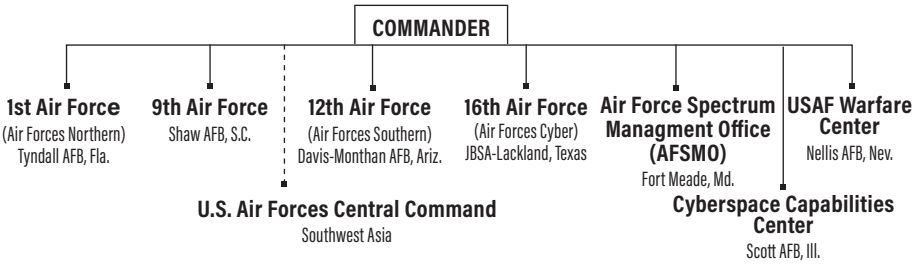
Air Combat Command

Headquarters: JB Langley-Eustis, Va.
Date of current designation: June 1, 1992
Commander: Gen. James M. "Mike" Holmes

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	
78,246	

EQUIPMENT (TAI)	
Fighter/Attack	688
Helicopter	39
ISR/BM/C3	344
Trainer	48

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-1, 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 support
319th Reconnaissance Wing	Grand Forks AFB, N.D.	Base support
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
624th 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
Air Force Rescue Coordination Center	Tyndall AFB, Fla.	National search and rescue coordination
Air Force Technical Applications Center	Patrick AFB, Fla.	Nuclear treaty monitoring, nuclear event detection

ACC AIRCRAFT BY TYPE

A-10	116	F-16C	152	RC-135U	2
AT-38	6	F-16D	19	RC-135V	8
E-11	4	F-22A	115	RC-135W	9
E-3B	7	F-35A	107	RQ-4B	33
E-3G	20	HC-130J	16	T-38A	39
EC-130	11	HH-60G	39	TC-135W	3
F-15C	18	MQ-1	7	TU-2S	4
F-15D	3	MQ-9	178		
F-15E	158	RC-135S	3		

Source: TAI as of Sept. 30, 2019.

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
61,755

EQUIPMENT (TAI)	
Fighter/Attack	226
Helicopter	22
Tanker	19
Trainer	1.131
Transport	46

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 Center
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
314th Air Mobility Wing	Little Rock AFB, Ark.	C-130J
502nd ABW	JBSA-Fort Sam Houston, Texas	JBSA facilities support
Air Force Profession of Arms Center of Excellence	JBSA-Randolph, Texas	Professional training
Air Force 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 Center	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	19	TG-15A	2
C-17A	17	MC-130J	4	TG-15B	3
CV-22B	8	T-1A	178	TG-16A	19
F-16C	83	T-6A	443	TH-1H	28
F-16D	51	T-38C	427	UH-1N	10
F-35A	92	T-41D	4	UV-18B	3
HC-130J	3	T-51A	3		
HH-60G	12	T-53A	24		

Source: TAI as of Sept. 30, 2019.

AFMC

Air Force Materiel Command

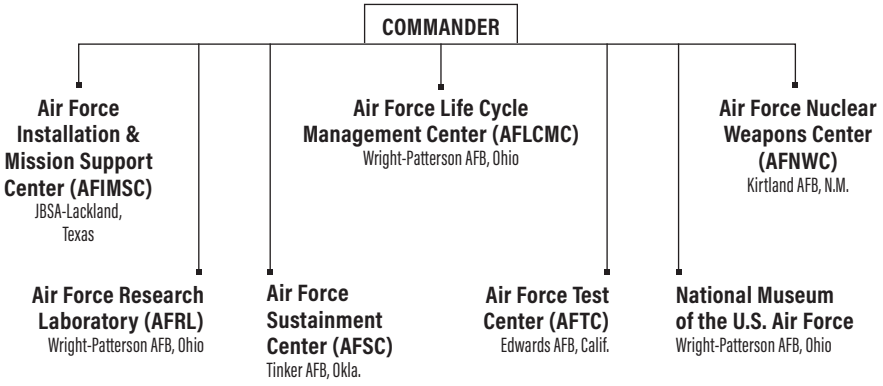
Headquarters: Wright-Patterson AFB, Ohio
Date of current designation: July 1, 1992
Commander: Gen. Arnold W. Bunch Jr.

Primary Mission

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

PERSONNEL	
Active Duty	
16,718	
EQUIPMENT (TAI)	
Bomber	5
Fighter/Attack	48
Helicopter	5
ISR/BM/C3	19
Tanker	1
Trainer	15
Transport	24

AFMC Structure



	MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
AFIMSC	Air Force Civil Engineer Center	JBSA-Lackland, Texas	Installation support (civil engineering)
	Air Force Financial Management Center of Expertise	Buckley AFB, Colo.	Installation support (financial analysis)
	Air Force Financial Services Center	Ellsworth AFB, S.D.	Installation support (payment processing)
	Air Force Installation Contracting Agency	Wright-Patterson AFB, Ohio	Enterprise contracting support
	Air Force Security Forces Center	JBSA-Lackland, Texas	Installation support (security forces programs)
	Air Force Services Activity	JBSA-Lackland, Texas	Installation support (lodging, recreation)
AFLCMC	Air Force Program Executive Officer–Agile Combat Support	Wright-Patterson AFB, Ohio	Systems acquisition
	AFPEO–Armament	Eglin AFB, Fla.	Systems acquisition
	AFPEO–Battle Management	Hanscom AFB, Mass.	Systems acquisition
	AFPEO–Business and Enterprise Systems	Maxwell AFB-Gunter Annex, Ala.	Systems acquisition
	AFPEO–C3I and Networks	Hanscom AFB, Mass.	Systems acquisition
	AFPEO–Fighters and Bombers	Wright-Patterson AFB, Ohio	Systems acquisition
	AFPEO–ISR and Special Operations Forces	Wright-Patterson AFB, Ohio	Systems acquisition
	AFPEO–Mobility	Wright-Patterson AFB, Ohio	Systems acquisition
	AFPEO-Presidential Aircraft Recapitalization	Wright-Patterson AFB, Ohio	Systems acquisition
	AFPEO–Tanker	Wright-Patterson AFB, Ohio	Systems acquisition
	88th Air Base Wing (ABW)	Wright-Patterson AFB, Ohio	Base support
AFNWC	AFPEO–Nuclear Command, Control, and Communications	Hanscom AFB, Mass.	Systems acquisition
	AFPEO–Strategic Systems	Kirtland AFB, N.M.	Systems acquisition
AFRL	Aerospace Systems	Wright-Patterson AFB, Ohio	Research and development (R&D)
	Air Force Office of Scientific Research	Arlington, Va.	Research
	Air Force 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 research and education
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

Source: TAI as of Sept. 30, 2019.

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

COMMANDER

- **4th Air Force** — March ARB, Calif.
- **10th Air Force** — NAS Fort Worth JRB, Texas
- **22nd Air Force** — Dobbins ARB, Ga.
- **AFRC Recruiting Service** — Robins AFB, Ga.
- **Air Reserve Personnel Center** — Buckley AFB, Colo.
- **Force Generation Center** — Robins AFB, Ga.
- **Individual Reservist Readiness & Integration Organization** — Buckley AFB, Colo.

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	15
C-17A	26	KC-135R	74
C-40	4	WC-130J	10

EQUIPMENT (TAI)	
Bomber	18
Fighter/Attack	109
Helicopter	15
ISR/BM/C3	10
Tanker	74
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
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 AFB, Fla.	HC-130N/P, 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, 2019.

AFSOC

Air Force Special Operations Command

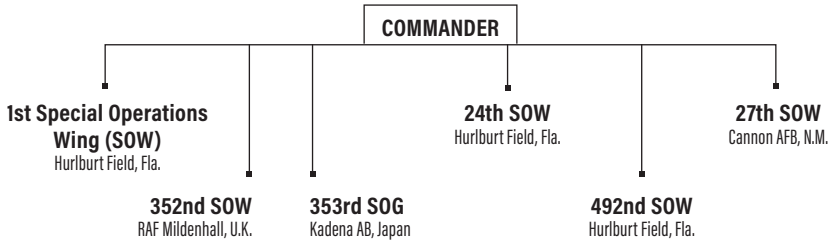
Headquarters: Hurlburt Field, Fla.
Date of current designation: May 22, 1990
Commander: Lt. Gen. James C. "Jim" Slife

Primary Mission

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

AFSOC AIRCRAFT BY TYPE	
AC-130J	15
AC-130U	7
AC-130W	10
C-130H	2
CV-22B	42
MC-130H	16
MC-130J	42
MQ-9A	51

AFSOC Structure



PERSONNEL
Active Duty
15,352

EQUIPMENT (TAI)	
ISR/BM/C3	58
Special Operations Forces	127

MAJOR UNITS	LOCATION	AIRCRAFT/MISSION/WEAPON
1st Special Operations Group (SOG)	Hurlburt Field, Fla.	AC-130J/U, CV-22, MC-130 H/P, 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

Source: TAI as of Sept. 30, 2019.

Senior Airman Gage Daniel

Brian Grady tests the power mechanism of a simulated improvised explosive device at Cannon Air Force Base, N.M.

AMC

Air Mobility Command

Headquarters: Scott AFB, Ill.
Date of current designation: June 1, 1992
Commander: Gen. Maryanne Miller

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.
- **U.S. Air Force Expeditionary Center** JB McGuire-Dix-Lakehurst, N.J.

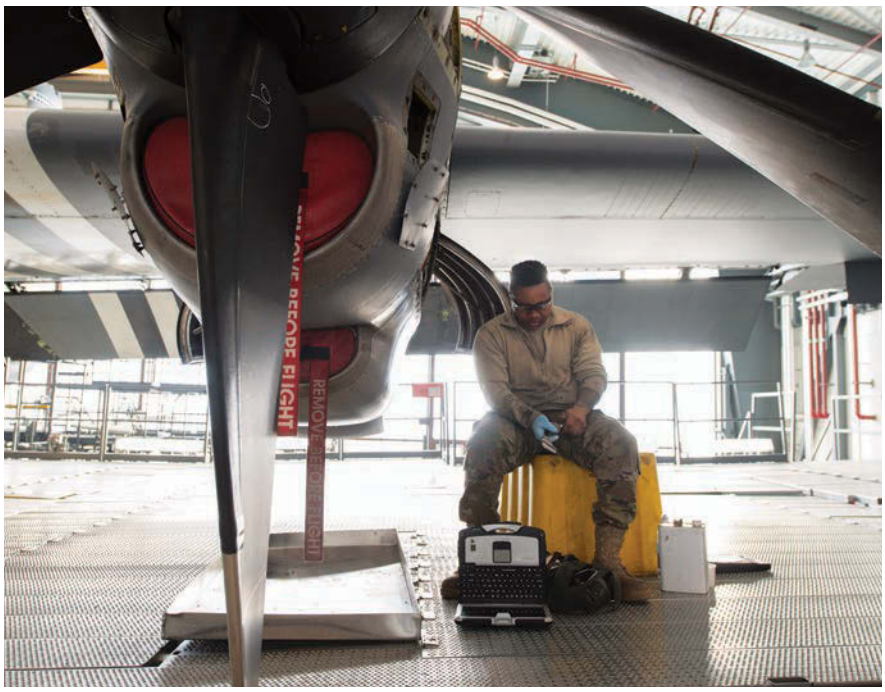
PERSONNEL
Active Duty
41,281

EQUIPMENT (TAI)	
Tanker	169
Transport	252

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	3
C-40A	4
C-5M	36
KC-10	59
KC-135R	85
KC-135T	25
VC-25A	2

Source: TAI as of Sept. 30, 2019.



Airman 1st Class Taylor Slater

Senior Airman Sheldrick Long, 86th Maintenance Squadron, polishes a C-130J Super Hercules aircraft part at Ramstein Air Base, Germany.

PACAF

Pacific Air Forces

Headquarters: JB Pearl Harbor-Hickam, Hawaii
Date of current designation: July 1, 1957
Commander: Gen. Charles Q. Brown Jr.*

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
- **7th Air Force** — Osan AB, South Korea
- **11th Air Force** — JB Elmendorf-Richardson, Alaska

PERSONNEL
Active Duty
29,203

EQUIPMENT (TAI)	
Fighter/Attack	257
Helicopter	13
ISR/BM/C3	4
Tanker	11
Transport	29

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	11
C-130J	14	F-15D	4	UH-1	4
C-17A	9	F-16C	121		
C-37A	1	F-16D	12		

Source: TAI as of Sept. 30, 2019.

Senior Airman John Linzmeier/ANG

F-22 Raptors, a KC-135 Stratotanker, and a C-17 Globemaster III taxi on the runway at Honolulu International Airport, Hawaii.

*Confirmed to be USAF Chief of Staff on June 9, 2020.

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 Structure

COMMANDER

- **3rd Air Force** — Ramstein AB, Germany
- **Hq. USAFE-AFAFRICA** — Ramstein AB, Germany

PERSONNEL
Active Duty
23,074

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-16C/D
86th Airlift Wing	Ramstein AB, Germany	C-21, C-37A, C-40B, C-130J
100th Air Refueling Wing	RAF Mildenhall, U.K.	CV-22, KC-135R, 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	13
C-37A	3	F-16C	75	KC-135T	2
F-15C	19	F-16D	4		

Source: TAI as of Sept. 30, 2019.

Airman 1st Class Spencer Hartung, 52nd Logistics Readiness Squadron, positions a fuel line during an F-16 "hot pit" refuel at Spangdahlem Air Base, Germany.

Staff Sgt. Preston Cherry

ANG

Air National Guard

Headquarters: Washington, D.C.
Date of current designation: Sept. 18, 1947
Director: Lt. Gen. L. Scott Rice

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
105,637

EQUIPMENT (TAI)			
Fighter/Attack	577	Tanker	164
Helicopter	23	Transport	209
ISR/BM/C3	84		

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.)	MC-130P, HH-60G, GA
130th AW (W.Va.)	C-130H, RC-26B
131st Bomb Wing (Mo.)	B-2 (CA*)
132nd Wing (Iowa)	MQ-9, RC-26B, 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, RC-26B, WXF
145th AW (N.C.)	C-130H, CEF, MAFFS
146th AW (Calif.)	C-130J, ALCF, MAFFS, WXF
147th Reconnaissance Wing (Texas)	MQ-1B, RC-26, TACP, EIS, WXF
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
158th FW (Vt.)	F-16C, 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 ARW (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-1, cyber, MCE, ISR
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 FW (Va.)	F-22 (CA*), cyber, DCGS
193rd SOW (Pa.)	EC-130J, AOS, CC, cyber, TACP
194th Regional Support Wing (Wash.)	CC, CW
195th Wing (Calif.)	DCGS, intel

*Classic associate
Source: TAI as of Sept. 30, 2019.

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:** 7

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: 11

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:** 134

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: 114

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: 92

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:** 582

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:** 64

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:** 156

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:** 20

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:** 121

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:** 337

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:** 40

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:** 687

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: 62

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:** 28

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:** 33

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:** 241 **Cadets:** 4,223

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:** 64,801

AIR FORCE WINGS

There are 137 wings in the U.S. Air Force, and—so far—five in the U.S. Space 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

SPACE FORCE WINGS

Five wings transferred from the U.S. Air Force to the U.S. Space Force on May 1, 2020.

21st Space Wing
Peterson AFB, Colo.
Space control/missile warning, GEODSS sensors

30th Space Wing
Vandenberg AFB, Calif.
Space and missile testing, launch, surveillance

45th Space Wing
Patrick AFB, Fla.
Operations and support, manned/unmanned space programs

50th Space Wing
Schriever AFB, Colo.
Operations/Support, DOD satellites, GPS, DSCS, AEHF, SBSS, SATCOM, MILSTAR, AEHF

460th Space Wing
Buckley AFB, Colo.
Space operations, surveilliance, warning

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.
ACC
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

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

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

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

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

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 AFB, 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

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 AFB, Colo.
CT 103rd AW (ANG), Bradley ANGB, Conn.
D 100th ARW (USAFE), RAF Mildenhall, UK
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 AFB, 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, UK
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 AND SPACE 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 (Kept same title three months into absorption by Air Service)	May 20, 1918	August 1918
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 Sept. 18, 1947			
Chief of Staff	Gen. Carl A. Spaatz	Sept. 26, 1947	April 29, 1948
UNITED STATES SPACE FORCE Jan. 14, 2020			
Chief of Space Operations	Gen. John W. Raymond	Jan. 14, 2020	
Vice Commander of Space Operations	Lt. Gen. David D. Thompson	Jan. 14, 2020	
Senior Enlisted Adviser of the U.S. Space Force	CMSgt. Roger A. Towberman	April 3, 2020	

[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.

HEADQUARTERS USAF 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	

*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	

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	

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	

*Gen. Charles Q. Brown Jr. was confirmed to be USAF Chief of Staff on June 9, 2020.

HEADQUARTERS USSF LEADERS

CHIEF OF SPACE OPERATIONS	
Gen. John W. Raymond	Jan. 14, 2020

VICE COMMANDER OF SPACE OPERATIONS	
Lt. Gen. David D. Thompson	Jan. 14, 2020

SENIOR ENLISTED ADVISER OF THE U.S. SPACE FORCE	
CMSgt. Roger A. Towberman	April 3, 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	

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 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	Dec. 20, 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 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	

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

MAJOR COMMAND AND ANG LEADERS (continued)

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	

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	

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	

*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.

Senior Airman Caleb Nunez

Gen. Maryanne Miller, Air Mobility Command commander, molds a piece of metal at MacDill Air Force Base, Fla.

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
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	

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	

Staff Sgt. Austin Thomas

Chairman of the Joints Chiefs Inauguration 2017. Seated from left to right: Adm. Paul F. Zukunft (Commandant of the Coast Guard), Adm. John M. Richardson (Chief of Naval Operations), Gen. Mark A. Milley (Chief of Staff of the Army), Gen. Joseph F. Dunford, Jr. (Chairman of the Joint Chiefs of Staff), Gen. Robert B. Neller (Commandant of the Marine Corps), Gen. David L. Goldfein (Chief of Staff of the Air Force), and Gen. Joseph L. Lengyel (Chief of the National Guard Bureau).

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
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	

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
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
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	

USAF

NORAD Commander Gen. Terrence O'Shaughnessy provides a COVID-19 response briefing to the Secretary of the Air Force and Chief of Staff of the Air Force on April 18.

UNIFIED COMMAND, NATIONAL GUARD BUREAU, AND NORAD LEADERS (continued)

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	No.v 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	

*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	

2020 ALMANAC

USAF & USSF INSTALLATIONS

Tech. Sgt. Joe Harwood

C-130s at Mansfield Lahm Air National Guard Base, Mansfield, Ohio.

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. 109.

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:*** 1,236. ***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:*** 334-667-0625. ***Acres:*** 21. ***Total Force:*** 287. ***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:*** 6,828. ***Active-duty Air Force:*** 3,118. ***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:*** 1,624. ***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.

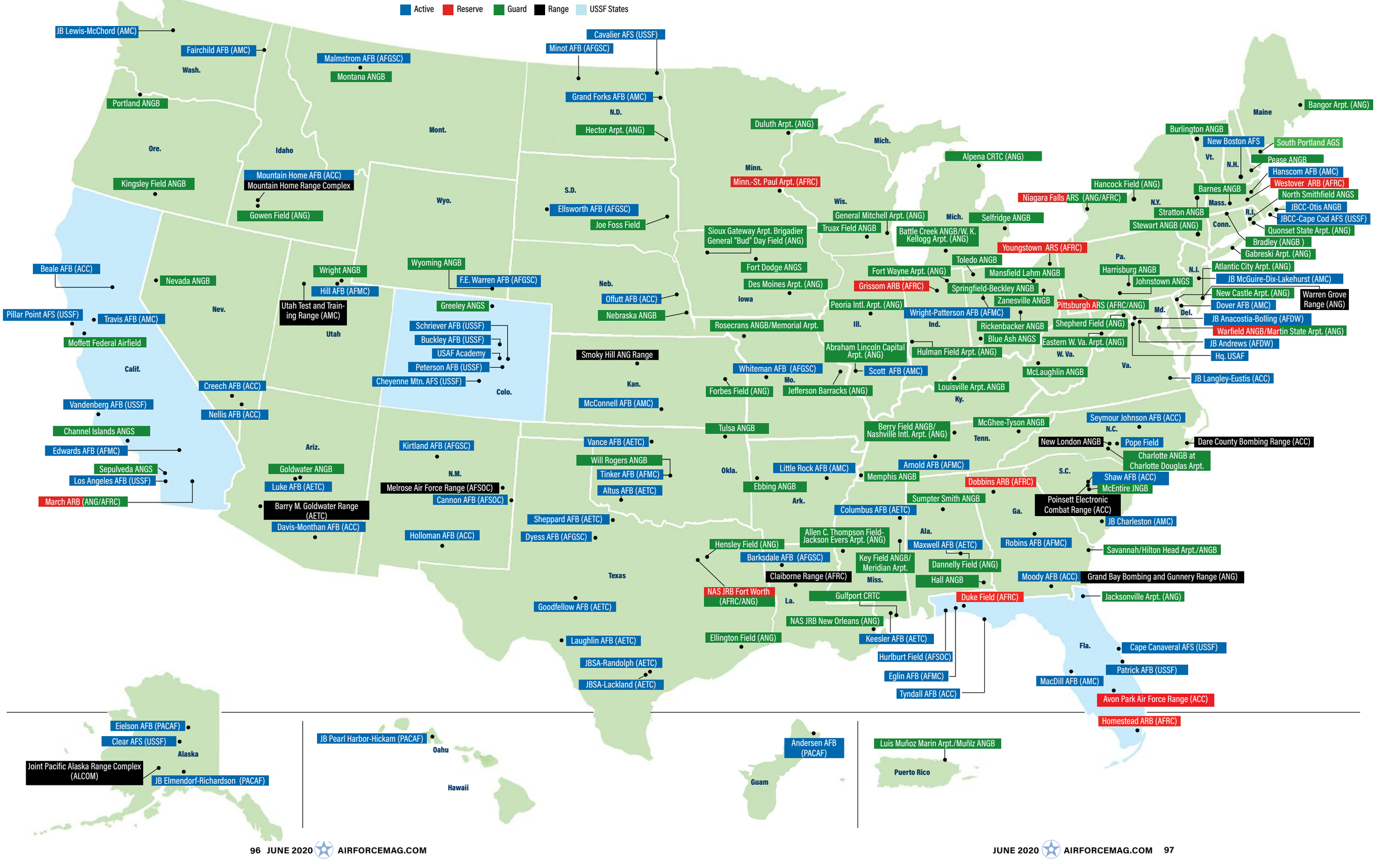
ALASKA

Clear AFS, Alaska 99704. ***Nearest city:*** Fairbanks. ***Phone:*** 907-585-6110. ***Acres:*** 11,438. ***Total Force:*** 122. ***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:*** 3,257. ***Active-duty Air Force:*** 1,993. ***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:*** 14,485. ***Active-duty Air Force:*** 5,447. ***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. ***History:*** 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

DEPARTMENT OF THE AIR FORCE BASES IN THE U.S.



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:*** 9,150. ***Active-duty Air Force:*** 6,171. ***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 (ACC), 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:*** 821. ***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:*** 8,257. ***Active-duty Air Force:*** 4,727. ***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:*** 1,826. ***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:*** 926. ***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:*** 5,602. ***Active-duty Air Force:*** 3,363. ***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:*** 6,204. ***Active-duty Air Force:*** 3,913. ***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:*** 1,865. ***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:*** 4,697. ***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:*** 5,709. ***Active-duty Air Force:*** 2,715. ***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:*** 2,873. ***Active-duty Air Force:*** 1,211. ***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:*** 6,811. ***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:*** 1,579. ***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:*** 194. ***Component:*** ANG. ***Unit/ mission:*** 261st Combat Communications Squadron, ground support combat communications.

Travis AFB, Calif. 94535. ***Nearest city:*** Fairfield. ***Phone:*** 707-424-1110. ***Acres:*** 6,446. ***Total Force:*** 11,145. ***Active-duty Air Force:*** 6,635. ***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 AFB, Calif. 93437. ***Nearest city:*** Lompoc. ***Phone:*** 805-606-1110. ***Acres:*** 118,312. ***Total Force:*** 4,030. ***Active-duty Air Force:*** 2,511. ***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. ***His- tory:*** 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 AFB, Colo. 80011. ***Nearest city:*** Aurora. ***Phone:*** 720-847-9431. ***Acres:*** 4,234. ***Total Force:*** 7,463. ***Active-duty Air Force:*** 1,682. ***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. 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 (NORAD). ***Acres:*** 567. ***Total Force:*** part of Peterson AFB. ***Owning command:*** USSF. ***Unit/ mission:*** 721st MSG (USSF), support; NORAD/ NORTHCOM Alternate Command Center, Inte-

grated 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:*** 380. ***Component:*** ANG. ***Unit/mission:*** 137th SWS, mobile missile warning. ***History:*** Activated January 1996.

Peterson AFB, Colo. 80914. ***Nearest city:*** Colorado Springs. ***Phone:*** 719-556-7321. ***Acres:*** 1,442. ***Total Force:*** 9,321. ***Active-duty Air Force:*** 3,557. ***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. ***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:*** 2,509. ***Active-duty Air Force:*** 1,621. ***Owning command:*** USSF. ***Unit/mission:*** 50th SW (USSF), 310th SW (AFRC), space operations; U.S. Air Force Warfare Center-Space (ACC/USSF), R&D. ***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:*** 52,266. ***Total Force:*** 3,581. ***Active-duty Air Force:*** 2,248. ***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:*** 234. ***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:*** 4,976. ***Active-duty Air Force:*** 3,421. ***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:*** 1,958. ***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:*** 5,168. ***Active-duty Air Force:*** 2,246. ***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:*** 105. ***Owning command:*** ACC. ***Unit/mission:*** 598th Range Squadron, training.

Cape Canaveral AFS, Fla. 32920. ***Nearest city:*** Cocoa Beach. ***Phone:*** 321-494-5933. ***Acres:*** 16,239. ***Total Force:*** 872. ***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:*** 15,816. ***Active-duty Air Force:*** 6,320. ***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:*** 2,855. ***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:*** 10,710. ***Active-duty Air Force:*** 8,883. ***Owning command:*** AFSOC. ***Unit/mission:*** 1st SOW (AF- SOC), 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:*** 1,055. ***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:*** 8,457. ***Active-duty Air Force:*** 3,755. ***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 AFB, Fla. 32925. ***Nearest city:*** Cocoa Beach. ***Phone:*** 321-494-1110. ***Acres:*** 2,324. ***Total Force:*** 4,614. ***Active-duty Air Force:*** 1,792. ***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:*** 850-283-1113. ***Acres:*** 28,891. ***Total Force:*** 4,836. ***Active-duty Air Force:*** 1,591. ***Owning command:*** ACC. ***Unit/mission:*** 53rd WEG (ACC), T&E; 101st AOG (ANG), C2 operations; 325th FW (ACC), 325th FW associate unit (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:*** 145. ***Component:*** ANG. ***Unit/mission:*** 224th Joint Communications Support Squadron, combat communications.

Dobbins ARB, Ga. 30069. ***Nearest city:*** Marietta. ***Phone:*** 678-655-5055. ***Acres:*** 1,913. ***Total Force:*** 1,885. ***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:***

Staff Sgt. Ridge Shan

Special Tactics operators watch a C-17 Globemaster III land during an exercise at JB Lewis-McChord, Wash.

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:*** 4,806. ***Active-duty Air Force:*** 4,717. ***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:*** 20,655. ***Active-duty Air Force:*** 3,372. ***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:*** 1,052. ***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:*** 3,158. ***Active-duty Air Force:*** 2,028. ***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:*** 18,813. ***Active-duty Air Force:*** 5,424. ***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:*** 2,122. ***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:*** 4,057. ***Active-duty Air Force:*** 3,414. ***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 (366th FW Public Affairs). ***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:*** 893. ***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:*** 2,022. ***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:*** 11,061. ***Active-duty Air Force:*** 4,866. ***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:*** 1,310. ***Component:*** ANG. ***Unit/mission:*** 122nd FW, fighter operations.

Grissom ARB, Ind. 46971. ***Nearest city:*** Kokomo. ***Phone:*** 765-688-5211. Acres: 1,719. ***Total Force:*** 2,312. ***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:*** 1,028. ***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:*** 957. ***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:*** 274. ***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:*** 1,109. ***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.

KANSAS

Forbes Field ANGB, Kan. 66619. ***Nearest city:*** Topeka. ***Phone:*** 785-862-1234. ***Acres:*** 215. ***Total Force:*** 1,924. ***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:*** 4,787. ***Active-Duty Air Force:*** 2,986. ***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:*** 1,263. ***Component:*** ANG. ***Unit/mission:*** 123rd AW, air mobility, bare base, special tactics operations.

Senior Airman Alexi Bosarge

Airman 1st Class Jeremiah Epps works at McConnell Air Force Base, Kan.

LOUISIANA

Barksdale AFB, La. 71110. ***Nearest city:*** Bossier City. ***Phone:*** 318-456-1110. ***Acres:*** 22,504. ***Total Force:*** 7,875. ***Active-duty Air Force:*** 5,316. ***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:*** 502-413-4400. ***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:*** 504-391-8600. ***Acres:*** 5,299 (ANG: 89). ***Total Force:*** 3,116. ***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:*** 202-404-7700 ***Acres:*** 281. ***Total Force:*** 1,849. ***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:*** 472. ***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:*** 10,488. ***Active-duty Air Force:*** 5,877. ***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:*** 1,616. ***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:*** 1,580. ***Component:*** ANG. ***Unit/mission:*** 104th FW, fighter operations.

Hanscom AFB, Mass. 01731. ***Nearest city:*** Boston. ***Phone:*** 781-225-1110. ***Acres:*** 846. ***Total Force:*** 4,021. ***Active-duty Air Force:*** 1,488. ***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:*** 2,745. ***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:*** part of JB Cape Cod. ***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:*** 3,649. ***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:*** 989-751-62593. ***Acres:*** 657. ***Total Force:*** 125. ***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:*** 1,356. ***Component:*** ANG. ***Unit/mission:*** 110th Wing, MQ-9 Reaper, C2, cyber, agile combat support.

Selfridge ANGB, Mich. 48045. ***Nearest city:*** Mount Clemens. ***Phone:*** 586-239-5576. ***Acres:*** 3,603. ***Total Force:*** 3,367. ***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:*** 1,461. ***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:*** 876. ***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:*** 1,536. ***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:*** 2,150. ***Active-duty Air Force:*** 1,649. ***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:*** 228-214-6070. ***Acres:*** 277. ***Total Force:*** 4,465. ***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:*** 7,951. ***Active-duty Air Force:*** 4,641. ***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:*** 1,210. ***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.

MISSOURI

Jefferson Barracks ANGB, Mo. 63125. ***Nearest city:*** St. Louis. ***Phone:*** 314-527-8000. ***Acres:*** 135. ***Total Force:*** 1,423. ***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:*** 1,107. ***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:*** 6,965. ***Active-duty Air Force:*** 3,955. ***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:*** 3,973. ***Active-duty Air Force:*** 3,240. ***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:*** 803. ***Component:*** ANG. ***Unit/mission:*** 120th AW, air mobility operations, RED HORSE.

NEBRASKA

Nebraska ANGB, Lincoln Airport., Neb. 68524. ***Nearest city:*** Lincoln. ***Phone:*** 402-309-1234. ***Acres:*** 129. ***Total Force:*** 1,722 ***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:*** 9,359. ***Active-duty Air Force:*** 5,650. ***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.

NEVADA

Creech AFB, Nev. 89018. ***Nearest city:*** Indian Springs. ***Phone:*** 702-652-1110. ***Acres:*** 2,318. ***Total Force:*** 3,069. ***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:** 10,031. ***Active-duty Air Force:*** 10,178. ***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:*** 1,154. ***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. ***Acres:*** 2,873. ***Total Force:*** 39. ***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

Airman 1st Class Jacob Thompson

2nd Lt. Clay Barnard and 2nd Lt. Joseph Stroup from the 12th Missile Squadron, work in a launch control center near Malmstrom Air Force Base, Mont.

Senior Airman Lane Plummer

A loadmaster watches a formation of MC-130Js from Cannon Air Force Base, N.M.

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:*** 1,094. ***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:*** 1,388. ***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:*** 19,876. ***Active-duty Air Force:*** 5,173. ***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:** 4,719. ***Active-duty Air Force:*** 4,628. ***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:*** 4,999. ***Active-duty Air Force:*** 4,517. ***Owning command:*** AETC. ***Unit/mission:*** 49th Wing (ACC), 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:*** 7,723. ***Active-duty Air Force:*** 3,245. ***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. ***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:*** 1,239. ***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:*** 2,253. ***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:*** 2,296. ***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:*** 2,272. ***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:*** 1,944. ***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:*** 1,660. ***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:*** 310. ***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:** 1,901. ***Active-duty Air Force:*** 2,505. ***Unit/mission:*** 18th ASOG (ACC), combat weather, TACP

Senior Master Sgt. Jennifer Shirar/ANG

Airmen perform a postflight check on an F-15 at Kingsley Field ANGB, Ore.

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:*** 6,135. ***Active-duty Air Force:*** 4,660. ***Owning command:*** ACC. ***Unit/mission:*** 4th FW (ACC), 414th FG (AFRC), fighter operations; 567th RED HORSE (ACC), 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:*** 33. ***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:*** 1,706. ***Active-duty Air Force:*** 1,701. ***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:*** 2,081. ***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:*** 5,727. ***Active-duty Air Force:*** 5,612. ***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:*** 177. ***Component:*** ANG. ***Unit/mission:*** 123rd ACS, command and control.

Mansfield Lahm ANGB, Ohio 44903. ***Nearest city:*** Mansfield. ***Phone:*** 419-520-6420. ***Acres:*** 2987. ***Total Force:*** 1,529. ***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:*** 3,414. ***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:*** 537. ***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:*** 1,049. ***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:*** 22,239. ***Active-duty Air Force:*** 5,714. ***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:** 1,534. **Component:** AFRC. **Unit/mission:** 910th AW, air mobility operations.

Zanesville ANGB, Zanesville Municipal Airport, Ohio 43701. ***Nearest city:*** Zanesville. ***Phone:*** 740-450-4748. ***Acres:*** 13. ***Total Force:*** 112. ***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:*** 2,680. ***Active-duty Air Force:*** 1,350. ***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:*** 405-739-2025. ***Acres:*** 4,858. ***Total Force:*** 7,714. ***Active-duty Air Force:*** 4,644. ***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:*** 1,079. ***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:*** 1,564. ***Active-duty Air Force:*** 1,330. ***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:*** 1,159. ***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:** 998. **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:*** 1,728. ***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

Tech. Sgt. Tory Patterson

Airman 1st Class Steve Robertson prepares to marshal a B-1B Lancer at Dyess Air Force Base, Texas.

recovery operations.

PENNSYLVANIA

Harrisburg ANGB, Harrisburg Intl. Airport, Pa. 17057. ***Nearest city:*** Middletown. ***Phone (public affairs):*** 717-948-2311. ***Acres:*** 42. ***Total Force:*** 1,477. ***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:*** 621. ***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:*** 1,440. ***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:*** 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:*** 83. ***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:*** 1,461. ***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:*** 17,295. ***Active-duty Air Force:*** 3,589. ***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:*** 3,655. ***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:*** 6,640. ***Active-duty Air Force:*** 6,978. ***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:*** 3,946. ***Active-duty Air Force:*** 3,328. ***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:*** 399. ***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:** 448. ***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:*** 1,355. **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:*** 1,543. ***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:*** 1,244. ***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:*** 5,482. ***Active-duty Air Force:*** 4,790. ***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:*** 3,781. ***Component:*** ANG. ***Unit/mission:*** 147th RW, 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: 3,711. ***Active-duty Air Force:*** 4,450. ***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. ***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:*** 24,296. ***Active-duty Air Force:*** 1,684 (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:*** 25,959. ***Active-duty Air Force:*** 19,631. ***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:*** 3,404. ***Active-duty Air Force:*** 2,994. ***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:*** 1,460. ***Active-duty Air Force:*** 1,384. ***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:*** 8,070. ***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:*** 7,931. ***Active-duty Air Force:*** 6,630. ***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 US 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:*** 19,044. ***Active-duty Air Force:*** 4,297. ***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:*** 1,576. ***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:*** 1,142. ***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:*** 21,883. ***Active-duty Air Force:*** 7,839. ***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:** 5,710. ***Active-duty Air Force:*** 3,135. ***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:*** 38,819. ***Active-duty Air Force:*** 3,206. ***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:*** 1,362. ***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:*** 1,516. ***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:*** 1,378. ***Component:*** ANG. ***Unit/mission:*** 128th ARW, air mobility operations. ***History:*** Named for Brig. Gen. William "Billy" Mitchell.

Hardwood Range, Wis. ***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:*** 3,169. ***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:*** Madison. ***Phone:*** 608-427-1204. ***Acres:*** 2,385. ***Total Force:*** 859. ***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:*** 3,596. **Active-duty Air Force:** 3,092. ***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. ***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.

GERMANY

Buechel AB, Germany APO AE 09719. **Nearest city:** Cochem. ***Phone:*** 011-49-0267-89-5208. ***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 Air Force:*** 9,377. ***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.

Airman Thomas Keisler IV

A 56th Rescue Squadron HH-60G Pave Hawk helicopter lifts off over Aviano Air Base, Italy.

Spangdahlem AB, Germany APO AE 09126. ***Nearest city:*** Bitburg. ***Phone:*** 011-49-6565-61-1110. ***Acres:*** 1,617. ***Active-duty Air Force:*** 3,981. ***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 Cheyenne Mountain AFS operator) 719-474-3840. **Acres:** 233,034. ***Owning command:*** USSF. ***Unit/mission:*** 12th SWS (USSF), missile warning; 821st ABG (USSF), support. ***History:*** dates from 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 Air Force:*** 4,502. ***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 Air Force:*** 6,677. ***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 Air Force:*** 2,717. ***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 Air Force:** 3,719. ***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:*** 154. ***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 AFB). ***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 Air Force:*** 5,338. ***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 (PACAF), 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. ***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 Air Force:*** 1,485. ***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:*** 116. ***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. ***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. ***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. ***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 Air Force:*** 4,393. ***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. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 421st Air Base Squadron, communications and intelligence support services. ***History:*** B ecame operational in 1959.

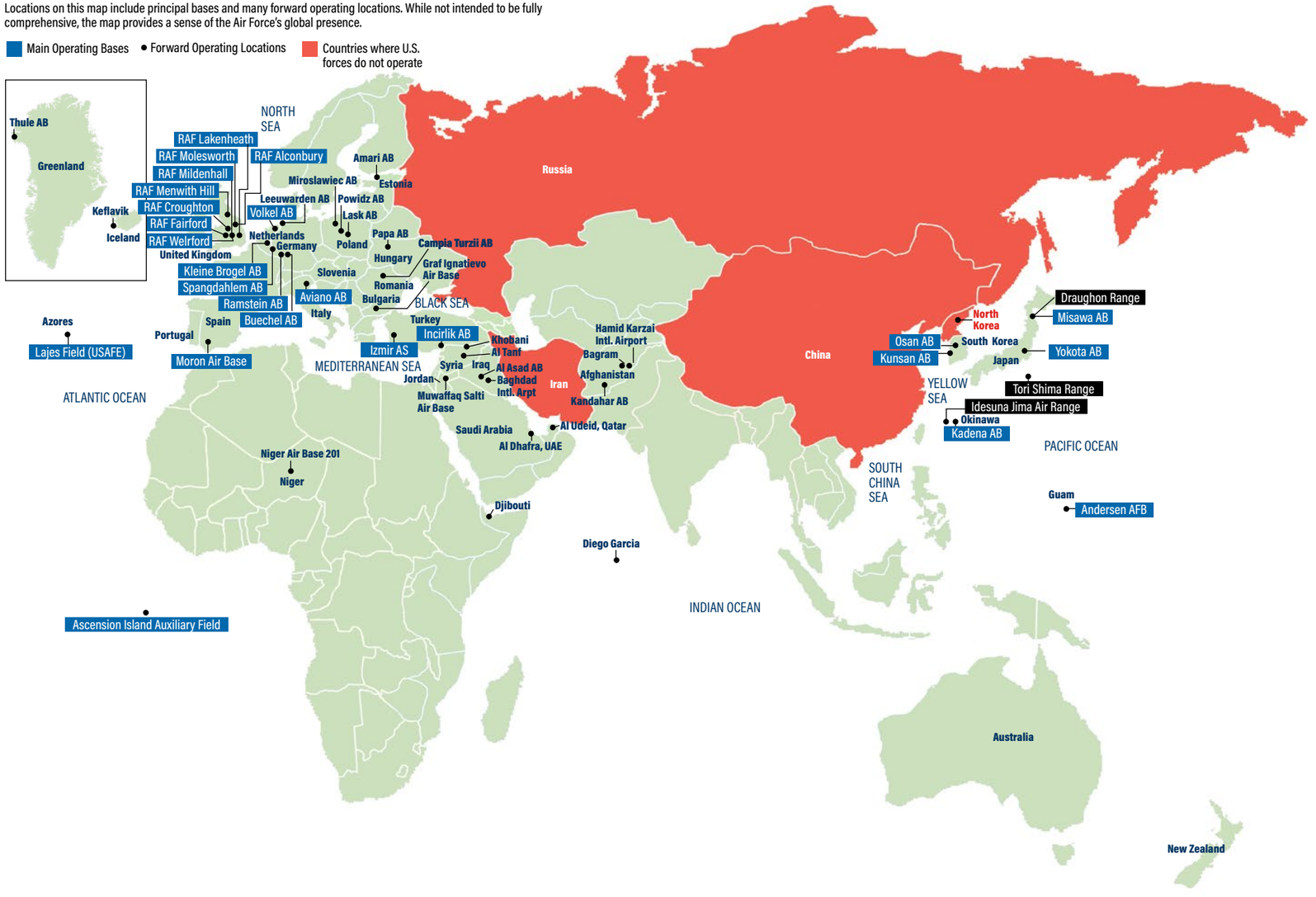
RAF Mildenhall, UK APO AE 09459. ***Nearest city:*** Cambridge. ***Phone:*** 011-44-1638-54-1110. ***Acres:*** 1,163. ***Active-duty Air Force:*** 4,278. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 95th RS (ACC), reconnaissance operations; 100th ARW (USAFE), air mobility operations; 352nd 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. ***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. ***Owning command:*** USAFE-AFAFRICA. ***Unit/mission:*** 420th Munitions Squadron; munitions storage area. ***History:*** first used by U.S. Army Air Forces in 1943.

MAJOR OVERSEAS AIR FORCE OP ERATING 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.



Staff Sgt. Ramon Adelan

Mike Oser (right), a joint terminal attack simulator program manager, explains the functions of the training simulator at Osan Air Base, South Korea.

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.

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William Lewis/USAF

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 useable 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 Sniper ATP to track and target moving vehicles. B-1B made its combat debut over Iraq during Desert Fox in 1998. Integrated Battle Station (IBS) mods are the most comprehensive refresh in the bomber's history. The three-part program includes Vertical Situation Display (VSD), adding a digital glass cockpit, Fully Integrated Data Link (FIDL) enhancing targeting/LOS/BLOS C2, and Central Integrated Test System (CITS) for real-time simplified troubleshooting. Sustainment Block 16/IBS is slated for fleetwide completion in 2020. FY20 accelerates ADS-B/Mode 5 IFF to meet 2020 FAA airspace compliance mandates. Development includes Fully Integrated Targeting Pod (FITP) to replace the current laptop-controlled system, 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. AFGSC recently reconfigured a B-1 with six external hardpoints and an extended weapons bay to demonstrate its ability to carry large hypersonic or multiple 5,000 lb-class freefall weapons. B-1Bs were briefly grounded for egress safety inspections in 2019, and USAF is looking to return B-1 to a strike instead of CAS role due to structural strain. The fleet is slated for phased replacement by the B-21 around 2032, and FY21 plans would cut 17 of the least serviceable airframes.

Contractor: Boeing (formerly Rockwell Collins).
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) Quick Strike 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 or JASSM-ER LRASM.
Accommodation: Pilot, copilot, and two WSOs (offensive/defensive), on ACES II zero/zero ejection seats.

Master Sgt. Matthew Plew

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. 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 Anderson, Feb. 23, 2008. AESA paves the way for future advanced weapons including the Long-Range Standoff (LRSO) missile and B61-12 bomb. The aircraft's blended fuselage/wing holds two weapons bays capable of carrying nearly 60,000 lb in various combinations. Weapons integration and armament upgrades focus on increasing loadout, hardened/buried target strike capability, and improving flexibility. Integration includes the improved the B61-12 guided nuclear bomb, JASSM-ER, GBU-57 Massive Ordnance Penetrator, and future weapons, such as the GBU-53 SDB II, GBU-56 Laser JDAM, and JDAM-5000/Hard Target Void Sensing Fuze (HTVSF). Flex Strike mods will feed GPS data to the bays prerelease to thwart jamming, and are required for B61-12. A notional Phase 2 would allow simultaneous nuclear and conventional loadout for increased flexibility. Due to delays, the Defensive Management System upgrade was downsized to an imrovement of displays, eliminating some ew sensors to detect ground threats. DMS-M improves survivability in signal-dense, anti-access/area denial (A2/D2) environments, aids situational awareness, and enables real-time threat avoidance. RATS adds radar-aided nuclear precision guidance for GPS-denied strike. Ongoing upgrades include an Adaptable Communications Suite (ACS) for time-sensitive mission updates and Link 16-based, jam-resistant, in-flight retasking. Efforts underway shorten depot maintenance, increase intervals between overhaul, add airspace-compliant CNS/ATM, as well as VLF for nuclear C2 redundancy. USAF plans to add wideband nuclear C2 under the FAB-T program. The B-2 is slated for replacement by the B-21 Raider by 2032. A total of 12 aircraft are considered deployed in the nuclear deterrent role under the New START agreement.

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.

Airman 1st Class Shannon Bowman

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. Litening and Sniper targeting pods have been added. The B-52 is undergoing several major upgrades to replace key obsolescent components. Combat Network Communications Technology (CONECT) is replacing cockpit displays and comms, adding Link 16, and enabling machine-to-machine tasking/retargeting. The first upgraded aircraft was redelivered in 2014. CNS/ATM replaces the B-52's analog systems with digital systems, and the Internal Weapons Bay Upgrade enables internal carriage of smart weapons. The Conventional Rotary Launcher roughly doubles advanced weapon payloads and reduces drag to increase range. The upgrade was deployed to combat for the first time in Afghanistan in 2017 and supports transition from CALCM to the AGM-158B JASSM-ER long-range cruise missile. Both CONECT and the bay upgrade are slated for fleetwide installation by 2021 and future plans call for integration of the GBU-54 Laser JDAM. Some 31 B-52s were modified to prevent nuclear use under the New START agreement, and a total of 38 aircraft are currently considered "deployed" nuclear delivery platforms under the treaty. Major development includes replacing the radar with a modern, off-the-shelf system, and replacing the TF33 engines with a more modern and efficient power plant. USAF is also upgrading BLOS voice/data crypto, and adding color MFDs to enhance targeting and situational awareness. FY20 launches Tactical Data Link efforts to add low-latency, jam-resistant C2/comms in conjunction with CONECT, as well as GPS and crypto upgrades. The upgraded B-52 will eventually complement the B-21 Raider after retirement of the B-1 and B-2, 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.

Staff. Sgt. Daniel Snider

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 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. Current development includes advanced IFF and open architecture software to allow quick integration of future weapons and sensors. 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. USAF is converting surplus F-15 external tanks to increase endurance and speed cannon-reloading. Ongoing mods include HMCS and ATP improvements and airspace compliance mods and Lightweight Airborne Recovery System/Combat Survivor Evader Locator (LARS/CSEL) upgrades will enhance aircrew location and recovery. An initial 173 aircraft have been re-winged, and Boeing was awarded a follow-on contract to re-wing the remaining 109 aircraft in August 2019. FY20 launches cockpit display replacement to eliminate analog instruments and add hi-resolution target tracking, SDB-1 integration, directional audio threat cueing, UHF/VHF comm modernization, and ethernet to enable EW upgrades. USAF plans to retain the fleet through 2030 or beyond but requested to retire 44 airframes starting 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.

Senior Airman Matthew Seefeldt

F-15 EAGLE

Air superiority fighter

Brief: The F-15 Eagle was the world's dominant, supersonic, all-weather, day/night air-superiority fighter for more than 30 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 and offered 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 following Multistage Improvement Program enhanced its tactical capabilities. The F-15C/D fleet is undergoing comprehensive modernization to enable it to fight in contested airspace, including new AESA radar and advanced self-defenses. The first APG-63(V)3 AESA-modified F-15 was delivered in 2010, and the Eagle Passive/Active Warning Survivability System (EPAWSS) development contract was awarded in 2016. EPAWSS first replaces the current defensive system on a total of 214 aircraft, followed by a second phase to add towed decoy/angled countermeasures. USAF is also developing and procuring 100 belly mounted Infrared Search and Track (IRST) pods to discreetly engage air targets without radar emissions. Ongoing upgrades include advanced fourth-to fifth-generation aircraft data links, Multifunctional Information Distribution System/Joint Tactical Radio System (MIDS/JTRS) jam-resistant Link 16 networking, AESA-compatible digital cockpit displays (common with the F-15E), mandated airspace compliance mods, and jam-resistant Mode 5 IFF. The fleet averages 8,300 flying hours and suffers performance-limiting structural problems requiring wing/forward fuselage SLEP. USAF announced FY20 plans to procure the first six of up to 144 new-build F-15EX to begin replacing the F-15C/D. The new version is based on the F-15QA built for Qatar, but incorporating EPAWSS and USAF-specific software from the outset. A pair of F-15EX will begin flight testing within the next two years. DOD European Deterrence Initiative funds continue to retain F-15C/Ds at Lakenheath to augment allied air superiority due to tensions with Russia.

Contractors: McDonnell Douglas (now Boeing); BAE Systems (EPAWSS); Raytheon (AESA); Rockwell Collins (MIDS/JTRS).
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.
▪F-15EX. Future F-15C/D replacement based on the F-15QA.
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.

Airman 1st Class Rhonda Smith

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. The 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 Mode 5 IFF, Joint Helmet Mounted Cueing System (JHMCS), ATP improvements, and radar enhancements to counter high-end electronic threats. Major development includes EPAWSS, MIDS/JTRS to enable higher capacity, jam-resistant Link 16, and new central computer and cockpit displays (in common with the F-15C/D). Future weapons include SDB II and enhanced the B61-12 guided nuclear freefall bomb. FY20 starts digital color displays for both pilot and CSO to improve targeting and prevent fratricide, and Data Transfer Module replacement to improve flight planning and debrief.

Contractors: McDonnell Douglas (now Boeing); 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, ferry range 2,400 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.

Senior Airman Alexander Cook

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. USAF debuted the F-16 in 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. All Blocks are now cockpit-standardized with new color MFD, modular mission computer, Helmet Mounted Integrated Targeting (HMIT), and Link 16. Automatic Ground Collision Avoidance System (A-GCAS) has saved eight F-16s and nine pilots since introduction in 2014. Efforts are underway to add midair avoidance fleetwide by 2022. Some 72 NORAD alert F-16s are receiving AESA radar under urgent requirements to combat cruise missile threats to the homeland. An additional 300 aircraft will receive AESA through FY24. JASSM-ER integration is planned in FY20, and development encompasses mission computer, sensor, self-defense, comm, and digital RWR. Ongoing mods cover SLEP, MIDS/JTRS for higher capacity, jam-resistant Link 16, Aggressor improvements, and Mode 5 IFF. Lockheed Martin moved production/support from Fort Worth, Texas, to Greenville, S.C., in 2019, and the Vermont ANG flew its final F-16 sortie that April.

Contractors: General Dynamics (now Lockheed Martin); Northrop Grumman (radar).
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: 783 (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), and ECM pods.
Accommodation: Pilot (C), two pilots (D), on ACES II zero/zero ejection seats.

2nd Lt. Sam Eckholm

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 great maneuverability. Features include six LCD color cockpit displays, APG-77 radar, an EW system with RWR and missile launch detection, JTIDS, IFF, laser gyroscope inertial reference, and GPS. 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 group ground targets during Inherent Resolve in 2014. The F-22 program adopted an "agile" modernization strategy in 2017 which uses rapid development, testing, and acquisitions to continuously field timely, 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 adding high-resolution ground mapping SAR, threat geolocation, EA capability, and integration of SDB I, AIM-120D, and AIM-9X. TACLink-16 will be fielded with 3.2B and enable data link transmit capability between F-22 and legacy aircraft. 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 in FY20. Additional efforts include engine safety, performance, and maintainability mods, structural life extension to 8,000 hours, crypto mods, Mode 5 IFF tactical improvements, and GPS-denied navigation capability. USAF is changing F-22 force structure and deployments to meet DOD's 80 percent availability rate and evaluating potential for a Mid-Life Upgrade Program to increase survivability and lethality.

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: 183.
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.

Capt. Kip Sumner

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 born from the multinational Joint Strike Fighter program. USAF's conventional F-35A is complemented by the F-35B short take-off and vertical landing (STOVL) version for USMC, and the carrier-capable F-35C for the Navy. The X-35A 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 at will. 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. The F-35B reached IOC in 2015, followed by USAF's F-35A in 2016, and the Navy's F-35C on Feb. 28, 2019. 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 in April 2019 as part of Inherent Resolve. Development, production, and operations are being 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 starting in 2015. The current production/retrofit Block 3F software delivered full combat capability and added a range of precision guided munitions starting in 2018. FY20 funds developing the next Block 4 iteration, which will add weapons including the nuclear B61-12 and SDB II, sensors, improved EW, and maritime strike capabilities. Dubbed Continuous Capability Development and Delivery (C2D2), Block 4 will correct deficiencies discovered in concurrent development/testing and add future capabilities. USAF is holding to a lower delivery rate until Block 4 production begins to minimize retrofit costs. Initial operational testing began in 2018 and completion has slipped to early 2021 or beyond, delaying full-rate production. International development partner Turkey was expelled from the program in 2019 for procuring advanced Russian air-defense systems that threaten F-35 capabilities. USAF completed both full-scale durability testing as well as a Congressionally mandated CAS trial evaluating its ability to replace the A-10 in 2019 and is working to raise fleetwide mission capable rates from 65 percent to 80 percent. Fielded F-35As are currently capable of interdiction, basic CAS, and limited SEAD, and FY20 funds procure 60 F-35As and materials for 48 aircraft in FY21. The ANG received its first F-35 assigned to the 158th FW at Burlington Arpt., Vt., on Sept 19, 2019.

Contractors: Lockheed Martin; BAE Systems; Northrop Grumman; Pratt & Whitney (engines).
First Flight: Dec. 15, 2006.
Delivered: April 2011-present.
IOC: Aug. 2, 2016.
Production: Planned: 1,763 (USAF F-35As).
Inventory: 203 (USAF).
Operator: ACC, AETC, AFMC, AFRC (associate), ANG. Planned: PACAF, USAFE.

Aircraft Location: Burlington ANGB, Vt.; Edwards AFB, Calif.; Eglin AFB, Fla.; Hill AFB, Utah; Luke AFB, Ariz.; Nellis AFB, Nev.; Planned: Dannelly Field, Ala.; Eielson AFB, Alaska; 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.

SPECIAL OPERATIONS AIRCRAFT

Staff Sgt. Keith James

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 next-generation gunship is based on a highly modified MC- 130J, fitted with a modular precision strike package and wing-mounted weapons. The AC-130J is designed to provide ground forces a persistent direct-fire platform. PSP includes a mission management console, robust communications suite, two EO/IR sensors, advanced fire-control equipment, PGM delivery capability, and trainable cannons. The initial Block 10 was superseded by the Block 20, adding a 105 mm gun, laser guided SDB, side-mounted pilot tactical display, and Large Aircraft Infrared Countermeasures (LAIRCM). Airframes are delivered as MC-130Js and modified to gunship standards. The airframe is then upgraded and managed in common with the HC/MC-130J, receiving Block 8.1 avionics upgrades (including airspace compliance) along with the baseline C-130J. SOF-specific enhancements are rapidly developed and integrated in response to operational requirements. The first Block 20 was delivered to Hurlburt for operational testing in 2016 and deemed operationally effective for most CAS/interdiction taskings in April 2018. Post-initial operational test upgrades will result in Block 20+/30 configuration. Significant mods include software updates to improve gun accuracy, wing-mounted Hellfire and GBU-69 Small Glide Munitions, a permanent CSO cockpit workstation, EW/self-defensive upgrades, and bubble-type observation windows. The first Block 30 aircraft was delivered for testing March 12, 2019. FY20 funds delivery/conversion of five airframes and continues the multiyear contract for 23 combined AC/MC-130J airframes. Development includes a high-energy laser weapon planned for demonstration in 2022, radio frequency countermeasures to detect, locate, and respond to threats, IR suppression, and PSP and EO/IR sensor improvements. Enhanced all-weather strike capability and sensors will enable future through-cloud engagement. An AC-130J from Hurlburt's 73rd Special Operations Squadron deployed to Afghanistan in late June 2019, marking the type's first operational use.

Contractor: Lockheed Martin.
First Flight: Jan. 31, 2014.
Delivered: July 29, 2015-present.
IOC: Sept. 30, 2017.
Production: 12 (37 to be converted from new-build MC-130Js).
Inventory: 15.
Operator: AFSOC.
Aircraft Location: Hurlburt Field, Fla.

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; PGMs including pylon-mounted GBU-39 SDB, AGM-114 Hellfire, and ramp-mounted AGM-176 Griffin.
Accommodation: Two pilots, two CSOs, three gunners (four, with inclusion of 105 mm gun).

Airman 1st Class Jacob Stephens

AC-130U SPOOKY/II

Attack

Brief: AC-130U is a gunship-modified C-130H optimized for CAS, interdiction, armed reconnaissance, convoy escort, strike coordination, overwatch, and point defense. The "Spooky" moniker salutes the original AC-47 gunships fielded during the Vietnam conflict. The fleet is modified with electronic and EO sensors, fire-control systems, enhanced navigation, sophisticated comms, defensive systems, and in-flight refueling capability. All AC-130U weapons can be subordinated to the APQ-180 digital fire-control radar, FLIR, or all-light-level television (ALLTV) for adverse weather attack operations. Rockwell Collins converted the initial 13 AC-130Us between 1994 and 1995, and Boeing converted four additional aircraft under the "Plus 4" program starting in 2001. AFSOC retired a single, nonstandard AC-130U in 2015 and held the fleet at 16 aircraft until restarting phaseout in FY18. Recent upgrades include Enhanced Situational Awareness (ESA) mods to provide near real-time intel and data fusion of threat detection, avoidance, geolocation, and adversary-emitter identification. AFSOC also replaced obsolescent mission computers and EO/IR sensors with a new high-definition suite. AC-130Us are undergoing center wing box replacement/structural mods in common with the C-130H fleet to extend service life/meet operational demands until replacement by the AC-130J. Two 1st Special Operations Wing aircraft completed the type's final planned combat deployment, returning to Hurlburt from CENTCOM on July 8, 2019.

Contractors: Lockheed Martin (airframe); Boeing (formerly Rockwell).
First Flight: Dec 20, 1990.
Delivered: July 1, 1994-2007.
IOC: 1996.
Production: 17.
Inventory: Seven.
Operator: AFSOC.
Aircraft Location: Hurlburt Field, Fla.

Active Variant:

▪AC-130U Spooky II. Third-generation gunship based on C-130H.

Dimensions: Span 132.6 ft, length 97.8 ft, height 38.5 ft.
Weight: Gross 155,000 lb.
Power Plant: Four Allison T56-A-15 turboprops, each 4,910 shp.
Performance: Speed 300 mph; range 1,300 miles (further with air refueling).
Ceiling: 25,000 ft.
Armament: One 25 mm Gatling gun, plus one 40 mm and one 105 mm cannon.
Accommodation: Two pilots, navigator, flight engineer, fire-control officer, EWO, TV operator, IR detection set operator, loadmaster, four aerial gunners.

Staff Sgt. Westin Warburton

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 the AC-130H Spectre. The airframes were originally converted as MC-130W Combat Spear for SOF infiltration/exfiltration and in-flight refueling. They were redesignated Dragon Spear with the addition of the roll on/roll off PSP, filling a need for more gunships 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 25 years old. Recent 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) are also recent adds. The SDB was added in 2012 and integration efforts include Laser Guided SDB (LSDB) and GBU-69B Small Glide Munition (instead of continued Hellfire integration). Developments and upgrade include PSP and EO/IR sensor improvements and other low-cost mods. A single aircraft will be modified with a high-energy laser (in place of the 30 mm gun) to develop future AC-130J armament.

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: 30 mm GAU-23/A Bushmaster II chain gun; PGMs, incl GBU-39 SDB and AGM-176A Griffin, 105 mm cannon.
Accommodation: Two pilots, two CSOs, flight engineer, two special-mission aviators.

Staff Sgt. Ryan Conroy

C-145 SKYTRUCK

Foreign training and light mobility

Brief: Brief: The C-145 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, supplying surplus aircraft to several partners, including NATO ally Estonia. 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.

Staff Sgt. Joshua Smoot

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.

Contractors: Fairchild-Dornier; Sierra Nevada Corp.
First Flight: December 1991 (Do 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.

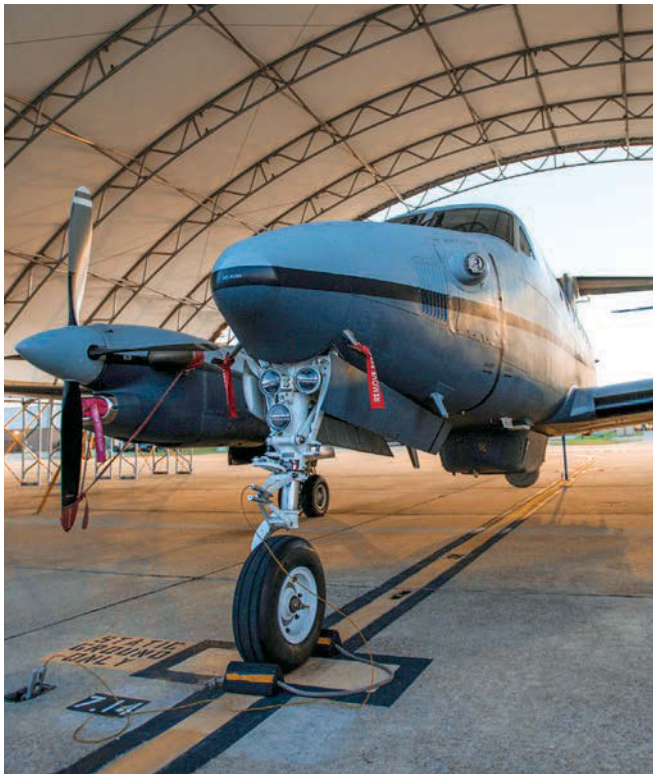
Trevor Cokley/USAF

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. Silent Knight TF/TA radar will replace the current radar with a stealthier, low-altitude, night/all-weather navigation radar. Development includes improving rapid, long-distance self-deployment capabilities, reducing engine dust/debris ingestion, as well as adding helmet-cued forward-firing weapons for self-defense. Europe-based CV-22s are slated to shift from RAF Mildenhall to Spangdahlem. Under the current multiyear contract, USAF's final CV-22 is slated for delivery in 2022, and the Navy recently opted for the new CMV-22B to replace its C-2 Greyhound Carrier Onboard Delivery (COD) fleet.

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. Planned: Spangdahlem AB, Germany.
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 7.62 mm minigun.
Accommodation: Two pilots, two flight engineers. **Load:** 24 troops seated, 32 troops on floor, or 10,000 lb cargo.



Senior Airman Jordan Martin

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 350. 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, various sensors, BLOS connectivity, and SATCOM. An initial seven King Air 350s were modified with basic sensors and data links, followed by an additional 30 extended-range King Air 350s with enhanced FMV and laser designator, improved SIGINT, and increased bandwidth BLOS. ACC divested its 33-strong fleet in 2015, passing its aircraft to USSOCOM (designated MC-12W/Javaman III) and the Oklahoma ANG. These aircraft formed as a dedicated SOF support mission deploying for the first time to Afghanistan in 2016. Ongoing upgrades include navigation enhancements for GPS-degraded operations, IR suppression to improve survivability, and an improved high-definition EO/IR sensor. The aircraft still require Link 16, operator display upgrades, and a high-fidelity roll-on/roll-off EO/IR sensor to meet COCOM requirements. Uprated engines and five-bladed propellers are also needed to boost performance, cut noise signature, and improve safety during short/austere airfield operations.

Contractors: Beechcraft; L3Harris.
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 equipped for battlefield ISR and targeting.
Dimensions: Span 57.9 ft, length 46.7 ft, height 14.3 ft.
Weight: Max T-O 15,000 lb (350) and 16,500 lb (350ER).
Power Plant: Two Pratt & Whitney Canada PT6A-60A turboprops, each 1,050 shp.
Performance: Speed 359 mph, range 1,725 miles (350) and 2,760 miles (350ER).
Ceiling: 35,000 ft.
Accommodation: Two pilots, two sensor operators.

Staff Sgt. Joseph Pick

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 inflight. 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-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. Ongoing mods include center wing replacement, GPS upgrades, permanent SIGINT installation, data link integration, new lightweight armor, digital propeller control system and flight data recorders, and airspace compliance mods. Kadena retained a squadron of H models until Dec. 4, 2019, as a stop-gap until the MC-130J squadron attained TF/TA capability.

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.; Kadena AB, Japan.
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 load-masters. **Load:** 77 troops, 52 paratroops, or 57 litters.

Airman 1st Class Mandy Foster

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. 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, 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. Combat Shadow II was redesignated Commando II in reference to the WWII C-47 in 2012 and replaced the legacy MC-130P in 2017. FY20 funds procure eight airframes under a follow-on multiyear contract through FY24. Funds continue Radio Frequency Countermeasure (RFCM) installation to detect, locate, and respond to emerging threats, and adds Airborne Mission Networking (AbMN), which gives aircrew a common air/ground picture to better manage complex workloads. MC/AC-130J lag the baseline C-130J fleet on Block 7/8.1 upgrades and airspace compliance mods will be fielded separately to meet FAA's 2020 mandate. AFSOC began flight testing the developmental Silent Knight TF/TA radar in 2019. The system, housed in a second, small radome between the nose and cockpit gives MC-130J low-level nighttime/adverse weather penetrating capability. TF/TA will allow the type to fully replace the legacy MC-130H by 2021. Other mods include defensive systems upgrade and variable-speed drogue to refuel diverse aircraft types during a single sortie. An MC-130J delivered to Cannon on Oct. 21, 2019, marked the 2,600th C-130J-model variant delivered worldwide.

Contractors: Lockheed Martin (airframe); Boeing.
First Flight: April 20, 2011.
Delivered: Sept. 29, 2011-present.
IOC: Dec 7, 2012.
Production: 57 (planned).
Inventory: 46.
Operator: AETC, AFSOC.
Aircraft Location: Cannon AFB, N.M.; Kadena AB, Japan; Kirtland AFB, N.M.; RAF Mildenhall, U.K. Planned: Spangdahlem AB, Germany.
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).

Staff Sgt. Victor Caputo

U-28A DRACO

Tactical ISR

Brief: The U-28A is a manned, tactical ISR and targeting platform based on the Pilatus PC-12. It is employed worldwide in support of special operations ground forces, humanitarian efforts, and search and rescue. Mods include advanced radio-comms suite, survivability equipment, EO sensors, and advanced navigation systems. The USSOCOM-owned aircraft are operated by AFSOC as a nonstandard fleet. AFSOC first employed the aircraft during Enduring Freedom in Afghanistan and Iraqi Freedom. The fleet includes 28 operational and eight training aircraft. Two aircraft were lost to fatal mishaps in Djibouti in 2012 and at Cannon in 2017. Ongoing upgrades include sensor, self-defense, remote SIGINT, and navigation mods to enable ops in GPS-degraded environments and comply with Federal Aviation Administration airspace mandates. Multispectral Targeting System installation includes FMV, EO-IR, IR real-time video, and co-aligned laser designator. New Advanced Threat Warning (ATW) includes missile, hostile fire, and laser warning. Urgent infrared suppression mods are ongoing, and Enhanced Ground Proximity Warning will prevent flight-into-terrain accidents. FY20 funds additional U-28 EQ+ mods to enable deployment of four additional high-definition, FMV-equipped aircraft for extended stand-off "find, fix, finish" capabilities in support of counter-ISIS ops. AFSOC officially dubbed the type "Draco" in May 2019, but announced plans to replace the fleet with 75 "armed overwatch" aircraft capable of tactical ISR and light CAS.

Contractor: Pilatus Aircraft Ltd.
First Flight: May 31, 1991 (PC-12).
Delivered: 2006-N/A.
IOC: June 2006.
Production: 36.
Inventory: 28 (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.
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.

ISR/BM/C3 AIRCRAFT

Stefaano Benedetto

CHALLENGER CL-600 COMBAT FLIGHT INSPECTION

Combat Flight Inspection

Brief: Challenger is a modified, 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 USAF to certify that airbase 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 US, allied, and partner-nation facilities overseas. 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.

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:
▪CL-600-2B16. CL-600 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.

Airman 1st Class Christina Bennett

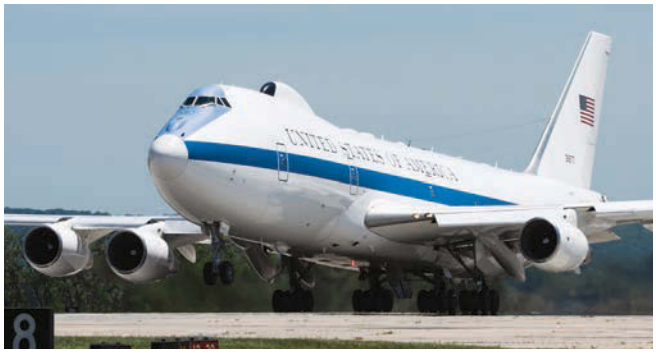
E-3 SENTRY

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 200 miles 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. USAF is equipping the aircraft with interim IFF to keep it airspace-compliant until Block 40/45 upgrade or divestiture. 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 and are being jointly developed with NATO to maintain interoperability. Ongoing efforts include shortening the kill chains for time-sensitive targets, modernizing airborne moving target indication, and FY20 adds high-speed jam-resistant Link 16 and accelerates Mode 5 IFF. Electronic Protection (EP) will improve radar processing for a classified requirement. FY20 starts advanced BLOS satcom/second-generation NATO UHF, as well as anti-jam GPS. Three airframes completed Block 40/45 upgrades last year bringing the upgraded fleet to 24 and funds supported retaining a squadron of seven AWACS previously slated for divestiture in FY19. 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 1977-84.
IOC: 1977.
Production: 31.
Inventory: 10 (E-3B); one (E-3C); 20 (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.



Staff Sgt. Jacob Skovo

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 of nuclear explosions, 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 upgrading CNS/ATM with civil compliant systems. Development includes SHF satcom modernization and FY20 begins UHF satcom modernization. USAF is also drafting requirements to replace E-4B with a more modern platform, while DOD is looking to combine both the Navy's E-6B Mercury and USAF E-4B into a single commonly configured "Survivable Airborne Operations Center" (SAOC) fleet. Airframes are viable to 2039, but phaseout of commercial 747-200s hampers sustainment beyond 2020.

Contractors: Boeing; Raytheon (FAB-T).
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.

Tech Sgt. Michael Charles

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 retrofitted 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 at distances exceeding 124 miles, and more recent refinements have enabled human-target tracking. Target data is transmitted via data link to ground stations or other aircraft. USAF halted modernization funds and retired the program's testbed aircraft in 2015 but then canceled plans to replace the E-8 with a more affordable, business-class airframe. The service now plans to retain JSTARS through the mid-2020s, upgrading the aircraft with Mode 5 IFF, digital UHF/VHF comms and other needs to maintain its viability. Officials are considering disaggregating JSTARS functions among several platforms rather than fielding a direct replacement, now known as the Advanced Battle Management System (ABMS). Ongoing modification consists of Secure Common Data Link (SDL) to enable LOS networking with Common Ground Stations. USAF began efforts to improve fleetwide availability starting in FY18 via system upgrades and optimized maintenance flow. The service aims to be capable of simultaneously deploying six aircraft to meet combatant command requirements by 2022.

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.

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.

Capt. Anna-Marie Wyant

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 relay between ground troops and other airborne platforms. The system entered combat in Afghanistan in 2008 and enables troops to overcome the limitations of LOS comms 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. The combined BACN fleet has provided near-constant coverage in theater, surpassing 100,000 flying hours in 2019. USAF is transitioning the E-11A from contract-support to a permanent program of record and is currently developing the maintenance training, technical documentation, and sustainment plans to operate the aircraft long-term. Officials anticipate needing to expand the fleet post-transition to meet simultaneous demand across multiple theaters of operation. Ongoing upgrades include adding military GPS to operate in higher-end threat environments, Link 16, advanced navigation, as well as various flight safety, reliability, and performance improvements. An E-11A crashed north of Kandahar Airfield, Afghanistan, on Jan. 27, 2020, killing both aircrew and destroying the aircraft.

Contractors: Northrop Grumman; Bombardier.
First Flight: August 2007.
Delivered: Dec. 2008-Aug. 30, 2012.
IOC: Circa 2011.
Production: Four.
Inventory: Four.
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 and survivable aircraft. USAF added procurement of two EC-37B airframes to the existing Compass Call program in FY17. 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. The first aircraft was purchased in FY17, followed by a second in FY18. Congress accelerated the program by funding two airframes in FY19. FY20 funds a fifth airframe and USAF plans to procure and modify one aircraft a year until reaching a 10 aircraft fleet. The upgraded Baseline 3 Compass Call package will include the Advanced Radar Countermeasure System (ARCS) and other significant capability enhancements. The new platform will be faster, more economical, capable of higher altitude operations, and more survivable than the current EC-130H. These capabilities will allow the EC-37B to conduct stand-off jamming/EA from greater distance, enabling attack on A2/AD targets. Modification of the first and second aircraft is ongoing with a third airframe beginning retrofit in FY20. Air Combat Command plans to field the first two 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.

Tech. Sgt. Daniel Martinez

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 retrofitted 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 2020. USAF is procuring the EC-37B to replace the EC-130H, but funding delays required extending the current fleet. EC-130H recently underwent center wing box replacement/structural mods (in common with the C-130H fleet). Some 70 percent of the EC-130H's mission equipment will be directly cross-decked to the EC-37B, and 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. Airframe improvements include digital glass cockpits, Mode 5 IFF, and airspace compliant CNS/ATM. Ten primary mission aircraft are supplemented by two backups, two attrition reserves, and one system integration testbed.

Contractors: Lockheed Martin; BAE Systems; L3Harris.
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.

Mark Olsen/NJANG

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. 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 baseline C-130J. Ongoing mods include Large Aircraft IR Countermeasures (LAIRCM) to counter MANPAD threats and Multi-Mission Platform-Heavy (MMP-H) digital broadcast system. MMP-H, previously the Removable Airborne MISO Systems (RAMS), was developed from the Army's Fly Away Broadcast System and will allow all aircraft to be de-modified to a SOF multimission configuration. After accelerated development, testing, and combat evaluation MMP-H will enable stand-off radio, television, UHF/VHF, and cellular broadcast against denied threats from up to 175 miles away. All variants are operated by the ANG's 193rd Special Operations Wing. Low-cost mods include safety, reliability, parts obsolescence, and smaller capability improvements.

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.

Charles Haymond

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. Recent efforts include acquiring and certifying a digital camera suite to replace obsolete and difficult to maintain wet-film cameras in compliance with presidential directive, and adding FAA-compliant CNS/ATM. The U.S. State Department declared Russia in violation of the Open Skies Treaty for preventing access to Kaliningrad and the border with Georgia, and USAF flew no sorties in 2018. The U.S. only resumed overflights of Russia in 2019. USAF is seeking to replace the unreliable, performance-limited fleet with two "small airliner class" aircraft to permit full access across the Russian Federation. The service expects to award a replacement contract and procure both airframes by mid-2020 to enable IOC in late 2022.

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 three 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 three different configurations, including six Block 25R, five Block 20, and two non-mission equipped C-26As. Ongoing upgrades include airspace compliance mods to meet FAA mandates. The ANG was barred from divesting the platform starting in FY20 unless it demonstrates to Congress that the fleet's missions can be performed by other assets. If retained, priority upgrades include SAR to enable all-weather ground moving target tracking and replacing the existing propellers with five-bladed units to increase range and short-field performance.

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 (plus two non-mission essential C-26As).
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:
▪C-26A. Non-missionized general utility aircraft.
▪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

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 Baseline 5 mods (similar to Rivet Joint Baseline 11/12). FY20 launches Baseline 7, 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.

Senior Airman Amber Mullen

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 aircraft are currently undergoing Baseline 5 mods (similar to Rivet Joint Baseline 12). Flexible funding permits rapid variant-specific mods in response to emerging/evolving threats. FY20 focus on completing Baseline 5/6 upgrades 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.

Senior Airman Alexandria Lee

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. 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. Ongoing Baseline 11/12 upgrades include new direction finding COMINT, precision ELINT/SIGINT system integration, wideband satcoms, enhanced near real-time data dissemination, new steerable beam antenna, improved weather radar, digital cockpit instruments, and compliant CNS/ATM. Baseline 12 efforts also include modernized operator interface, improved dense- signal environment capabilities, increased signal bandwidth/exploitation, add operator 3D maps, and integrate RC-135 with Distributed Common Ground Station (DCGS). FY20 efforts focus on completing Baseline 11/12 upgrades, launching Baseline 13, 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. The British Royal Air Force operates three RC-135W "Airseeker" aircraft, which are co-manned by USAF/RAF personnel. USAF will shift forward-deployed RC-135s from RAF Mildenhall to RAF Fairford starting in 2023 to consolidate infrastructure.

Contractors: Boeing (airframe); L3Harris.
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).

Senior Airman Gracie Lee

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. U-2s comprise 50 percent of the high-altitude ISR fleet, and they are heavily tasked—pushing retirement to 2022 or beyond. 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. Two ASARS-2B equipped aircraft 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. A U-2 successfully received missile launch data detected by an F-35 to a ground station during a USAF/Missile Defense Agency demo in 2019.

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-101 turbofan.
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.


Tech. Sgt. Christopher Carranza

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. During the 2019 hurricane season, WC-130Js logged 80 missions monitoring 10 major storms including Hurricanes Dorian, which devastated the Bahamas.

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 weapons tests, including recent North Korean activity, as well as nuclear disasters including Chernobyl and Fukushima. 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, and FY20 funds complete procurement and conversion of three KC-135R tankers. The replacement WC-135Rs will be equipped with the same sensor suite. Conversion of the three aircraft began in 2019, and FY20 funds complete sensor installation ahead of initial fielding in 2022. The service is pursuing development of the C-130J-mounted Particulate Airborne Collection Systems (PACS), or Harvester, to augment Constant Phoenix, and USAF will continue sustaining the legacy fleet until the WC-135R enters service.

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

Staff Sgt. Jared Trimarchi

HC-130N/P KING

Aerial refueling/airlift

Brief: The HC-130N/P is tasked with helicopter, in-flight refueling support for CSAR/personnel recovery, tactical C2, pararescue (PJ) deployment, and forward area refueling point missions. It conducts operations to austere airfields and denied territory for expeditionary, all-weather ops. Secondary roles include humanitarian assistance, disaster response, security cooperation/aviation advisory, emergency medical evacuation, noncombatant evacuation, and spaceflight support for NASA. Features include integrated GPS/INS navigation package, NVG lighting, FLIR, radar/missile warning receivers, chaff/flare dispensers, and data-burst communications. The HC-130P was similar to HC-130N, but was initially fit with a specialized radome to accommodate the Fulton recovery system. The HC-130J is replacing both models, and corrosion issues forced early retirement of a significant part of the fleet. Serviceable HC-130Ns were diverted from storage to replace the remaining HC-130Ps at Patrick in August 2017, and the HC-130N fleet was fully retired in December 2019. The New York ANG transitioned to the HC-130J with the arrival of its first airframe May 17, 2019, and Patrick is slated to receive its first HC-130J in early 2020.

Contractor: Lockheed Martin.
First Flight: Dec. 8, 1964 (as HC-130H).
Delivered: 1965-circa 1993.
IOC: 1986.
Production: 33 converted N/P models.
Inventory: Three.
Operator: AFRC, ANG.
Aircraft Location: Francis S. Gabreski Arpt., N.Y.; Patrick AFB, Fla.
Active Variants:
▪HC-130N. C-130H model modified with new center wing and aerial refueling capability.
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 289 mph at S-L, range 4,000+ miles.
Ceiling: 33,000 ft.
Fuel Capacity: 73,000 lb at 160 gpm (80 gpm dual, simultaneous refueling).
Accommodation: Two pilots, navigator; flight engineer, airborne comm specialist, two loadmasters, three PJs.

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 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), and wireless intercom. LARS transitions to the new 406 MHz distress frequency and improves timely location of aircraft, vessels, and personnel. Five HC-130Js are slated for delivery in FY20, and USAF expects to complete fleet recap by 2023. New York ANG's 106th Rescue Wing took delivery of its first HC-130J on March 21, 2019, transitioning from the HC-130H.

Airman 1st Class Kevin Donaldson

Contractor: Lockheed Martin.
First Flight: July 29, 2010.
Delivered: Sept. 24, 2010-present.
IOC: April 25, 2013.
Production: 37 (planned).
Inventory: 31.
Operator: ACC, AETC, ANG. Planned: AFRC.
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. Planned: Patrick AFB, 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).
Ceiling: 33,000 ft.
Fuel Capacity: 61,360 lb at 150-300 gpm (100 gpm dual, simultaneous refueling).
Accommodation: Two pilots, CSO, two loadmasters, three PJs.

Tech. Sgt. John Raven

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) in line with FAA mandates, and advanced Mode 5 IFF. AMC is upgrading the entire 59-aircraft fleet and extending service life through 2045, full divestiture is planned by 2024. USAF is working to resolve widespread reliability problems with the fleet's egress equipment after an escape slide/raft failed to deploy following an aborted takeoff in 2018.

Contractors: McDonnell Douglas (now Boeing); Collins Aerospace (CNS/ATM).
First Flight: April 1980.
Delivered: March 1981-April 1990.
IOC: August 1982.
Production: 60.
Inventory: 59.
Operator: AMC, AFRC (associate).
Aircraft Location: JB McGuire-Dix-Lakehurst, N.J.; Travis AFB, Calif.

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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.

Tech. Sgt. John Winn

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. The full-up KC-46A flew for the first time from Everett, Wash., on Sept. 25, 2015. 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, and 15 in 2019. Japan is the launch international customer and plans to take delivery of six tankers through FY24. FY20 funds support Lot 6 purchase of 12 tankers, while the FY21 budget proposal would fund 15 aircraft. The KC-46 completed developmental, and entered operational testing in 2019, though planned IOC has slipped due to problems with the boom, remote vision system, cargo floor, and electrostatic compatibility. Three bases received their first KC-46 in 2019, including McConnell on Jan. 25, Altus on Feb. 8, and the first ANG KC-46 to Pease on Aug. 8.

Contractor: Boeing.
First Flight: Sept. 25, 2015 (KC-46A).
Delivered: December 2018-present.
IOC: TBD.
Production: 179 (planned).
Inventory: 46 (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 Airman Matthew Seefeldt

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, designated KC-135T, are also receiver-capable, incorporating a forward-fuselage receptacle. Modern features include a digital flight deck and Global Air Traffic Management upgrades completed in 2011 and a limited number of Link 16-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 through 2026. A total of 38 aircraft are slated for upgrade in FY20. USAF tested and cleared the modular Large-Aircraft IR Countermeasures (LAIRCM) pod for use to track/jam IR missiles for high-threat missions in 2019. Ongoing efforts include long-distance oceanic satellite tracking/C2, real-time in-cockpit threat awareness, and safety enhancements. KC-135 operations at Pease ended on March 24, 2019, as the New Hampshire ANG transitioned to the KC-46. USAF is considering retaining the fleet 10 years beyond its currently projected service life due to KC-46 program delays, keeping the jets in service to 2050—despite retiring several airframes in FY21. USTRANSCOM requested that even these airframes be retained to meet current COCOM requirements. Three KC-135s will be converted to WC-135R standard in FY20 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: 343 (KC-135R); 51 (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. Planned: Ramstein AB, Germany.
Active Variants:
▪KC-135R. Re-engined KC-135A fitted with CFM turbofan engines.
▪KC-135T. 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 mission.
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.

Staff Sgt. Bryan Hoover

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 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 GE CF6-80C2 (F138-GE-100) turbofans with 20 percent increased thrust, along with avionics, structural, and reliability fixes. A total of 49 B models, two C models, and the single C-5A were converted. Ongoing mods include CNS/ATM upgrades, improved Large Aircraft IR Countermeasures (LAIRCM) to counter MANPAD threats, and a lavatory redesign to fix corrosion issues. FY19 began installation of new mission computers and an off-the-shelf weather radar needed to keep the fleet deployable worldwide. C-5s continue to suffer nose landing-gear malfunctions, and AMC is replacing key mechanical components and limiting "kneeling" to reduce wear. The command is also evaluating the C-5 in a mass-casualty/large-scale evacuation role carrying up to 100 stretchers (66 percent more than the C-17).

Contractor: Lockheed Martin.
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 incorporating AMP and RERP.
▪C-5M-SCM. Super Galaxy converted from C-5C to carry large NASA 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 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.

Yasuo Osakabe/USAF

C-12 HURON

Light airlift

Brief: C-12 is tasked with multimission passenger and priority light-cargo airlift, medevac, embassy, and test support. The family of aircraft includes military versions of the Beechcraft King Air B200 and 1900C aircraft (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.; 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).

Joshua Seybert/USAF

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. Fleetwide Block 16 avionics and weather radar mods were completed in 2015, and all aircraft will be upgraded to Block 20 standard during depot maintenance. Block 20 retrofits include some 60 programs to bring early production aircraft to a common configuration. Ongoing mods include next-generation Large Aircraft Infrared Countermeasures (LAIRCM) to combat the proliferation of man-portable air defenses, next-generation CNS/GATM, Mode 5 IFF, dynamic retasking, and structural, safety, and sustainment mods. Priority upgrades include HUD replacement and airspace compliance mods to meet FAA's 2020 deadline. Development includes Fixed Installation Satellite Antenna (FISA) to enable high-bandwidth BLOS data/comms and a roll-on/roll-off C2 capsule (replacing the "Silver Bullet") for in-flight conferencing. Though production ceased in 2015, USAF ferried the final aircraft to the Indian Air Force on Aug. 22, 2019. AFRC's 911th AW at Pittsburgh Airport officially transitioned from the C-130 to the C-17 in 2019.

Contractor: McDonnell Douglas (now Boeing).
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 (altered as required). Load: 102 troops/paratroopers; 36 litter and 54 ambulatory patients; 18 pallets up to max payload 170,900 lb.

Senior Airman Daniel Garcia

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 US and the European Theater, including AE missions if required. USAF awarded a $32.2 million contract for CNS/ATM upgrades in May 2017. 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. Funds additionally cover low-cost flight safety, reliability, and maintainability mods as needed. Eleven airframes completed AUP by the end of 2019, and the remaining eight were scheduled to undergo upgrades through July 2020. AMC inactivated the 457th Airlift Squadron at JB Andrews on June 18, 2019, consolidating the U.S.-based C-21 fleet to Scott.

Contractors: Bombardier (previously Gates Learjet); Global Aviation Technologies (CNS/ATM upgrade).
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 (adjusted as required). **Load:** eight passengers, 3,153 lb cargo; one litter or five ambulatory patients (AE role).

Senior Master Sgt. Vincent De Groot

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. DOD is considering replacing the C-32, E-4B, and Navy E-6B Mercury with a common airframe, possibly reshuffling mission sets to increase efficiency.

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.

Tech. Sgt. Kentavist Brackin

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 and took delivery of a fourth C-37B on Dec. 20, 2019. FY20 funds procure two airframes for delivery through 2021. The service also recently selected a C-37 variant for its Compass Call replacement and is evaluating several derivatives for C2 and ISR roles.

Contractor: Gulfstream Aerospace.
First Flight: October 1998 (C-37A).
Delivered: Oct. 14, 1998-present.
IOC: Dec. 9, 1998.
Production: 13.
Inventory: Nine (C-37A); three (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 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, crewchief; **Load:** Up to 12 passengers (A); 14 passengers (B).

Tech. Sgt. Timothy Moore

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-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. Both 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. Recent mods include nitrogen fuel-tank inerting for the C-40C and commercial wideband satcom for the C-40B to ensure leader's secure top-secret voice, data, and video links, and navigation/air traffic management compliance. Ongoing work is limited to low-cost sustainment. The fleet is designed for a 30-year service life, with an average of 22 years remaining. PACAF and USAFE ended C-40B operations, transferring the aircraft to AMC at Andrews in 2019.

Contractor: Boeing.
First Flight: April 14, 1999 (C-40A).
Delivered: 2002-2007.
IOC: Feb. 28, 2003.
Production: 11.
Inventory: Four (C-40B); seven (C-40C).
Operator: AMC, ANG, AFRC.
Aircraft Location: JB Andrews, Md.; Scott AFB, Ill.
Active Variants:
▪C-40B. Military version of the Boeing 737-700 with added winglets.
▪C-40C. VIP configured Boeing 737-700 with added winglets, but 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 89 passengers (B); up to 111 passengers (C).

Senior Airman Christina Russo

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. The ANG is upgrading 28 aircraft, including Modular Airborne Fire Fighting Systems (MAFFS)-equipped airframes, with eight-bladed NP2000 propellers to enhance performance and safety. The first modified airframe was redelivered to the Wyoming ANG in January 2018, and the ANG eventually aims to retrofit the entire fleet. The service grounded 60 aircraft for propeller blade inspection and replacement following a fatal Marine Corps accident, and a further 123 aircraft were inspected after wing-joint cracks were found in depot maintenance in 2019. Ongoing upgrades include critical center wing box replacement, electronic propeller controls/engine efficiency mods, and the C-130H Avionics Modernization Program (previously Viability and Airspace Access Program). AMP increment 1 adds new CNS/ATM to bring a total of 166 C-130H in compliance with U.S. and international airspace rules by January 2020. Increment 2 will add terrain awareness and warning, new flight management, and modern MFDs. USAF announced plans to cut 24 ANG airframes in FY21.

Contractor: Lockheed Martin.
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: 171.
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.

Staff Sgt. Dana Cable

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 in combat in Southwest Asia in 2004. The Super Hercules features three-crew flight operations, more powerful engines, composite six-blade propellers, and digital avionics and mission computers. The C-130J can fly faster, higher, and farther than earlier C-130s. The C-130J-30 variant features a 15-foot longer "stretched" fuselage. The combined fleet is sustained via block upgrades. USAF is combining the future Block 7/8.1 upgrades to reduce modification down-time. 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 will be fielded ahead of cycle to meet the FAA's 2020 compliance deadline. Airframes delivered since 2009 incorporate enhanced service life center wings, and three of 21 early production airframes programmed will be retrofitted in 2020. The current multiyear contract procures 29 USAF C-130J-variants between FY19 and FY23 at a production rate of 16 aircraft per year.

Contractor: Lockheed Martin.
First Flight: April 5, 1996.
Delivered: February 1999-present.
IOC: October 2006.
Production: 2,600+ (all variants).
Inventory: 132.
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: Maryland.
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).

Tech. Sgt. Amy Picard

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 digital 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 adding airspace-compliant CNS/ATM. 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. USAF began testing new, eight-bladed NP-2000 propellers to increase take-off performance by 20 percent and replace the dwindling stock of JATO (Jet-Assisted Takeoff) rockets in 2008. All 10 aircraft have now been upgraded with new propellers and engine enhancements. The research season ending in February 2019 marked the first time all participating LC-130s were equipped with NP-2000 propellers.

Contractor: Lockheed Martin.
First Flight: 1957 (ski-equipped C-130D).
Delivered: 1974-96.
IOC: January 1960 (C-130D).
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.

Staff Sgt. Anthony Agosti/ANG

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, 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 three years' estimated service life remaining and requires a life-extension/block upgrade to remain viable until replaced by the VC-25B (based on Boeing's modernized 747-8 Intercontinental). Block mods including protected satcom, chillers, a nitrogen-generation system, weather radar, digital/voice data, and network upgrades are slated for completion by mid-2020. SLEP is accomplished during regular depot maintenance. Flight deck upgrades include digital avionics, compliant CNS/ATM, Mode 5 IFF, Advisory Vertical Navigation, and other pilot situational awareness aids. 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. The current specification excludes aerial refueling capabilities have been deleted from requirements to reduce program cost.

Contractor: Boeing.
First Flight: Sept. 6, 1990 (VC-25A).
Delivered: August-December 1990.
IOC: Dec. 8, 1990.
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

Staff Sgt. Bethany La Ville

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 a 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). Ongoing Block 162 upgrades include an Avionics Communications Suite Upgrade, as well as replacing obsolete systems and standardizing HH-60G and loss-replacement aircraft. Obsolescence mods include color weather radar, improved TACAN, new RWR, auto direction finding, and digital intercoms. ACSU upgrades wrap up in 2020, followed by fleetwide standardization in 2024. Ongoing mods include safety/survivability, situational awareness mods for low visibility ops and data-linking offboard ISR, mission avionics, and sensor turret improvements. The first of 19 Army-surplus HH-60U replacements was delivered to Elmendorf on Aug 5, 2019, to return the fleet to 114 helicopters by mid-2020. Both types will be replaced by the HH-60W Jolly Green II in developmental testing.

Contractor: Lockheed Martin Sikorsky.
First Flight: October 1974.
Delivered: 1982-1998 (HH-60G); 2019-present (HH-60U).
IOC: 1982.
Production: 112 (HH-60G); 19 (HH-60U).
Inventory: 103 (HH-60G); three (HH-60U).
Operator: ACC, AETC, AFMC, 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.
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.

Samuel King Jr./USAF

HH-60 JOLLY GREEN II

Personnel recovery/medium lift

Brief: The HH-60W Pave Hawk II is an armed, all-weather day/night CSAR helicopter fielded to replace the HH-60G derived from the UH-60M Blackhawk. 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. Early evaluations revealed shortcomings with radar interface, data links, RWR, rescue hoist, gun mounts, fuel cells, armor, and aircrew seats, which

were rectified with minimal delays. A total of nine HH-60Ws will support developmental testing at Eglin/Duke. USAF plans to procure a total of 112 HH-60Ws over eight lots through 2026. FY20 funds procure an initial 12 aircraft, and a full-rate production decision is expected in 2021. The helicopter made its initial flight from Sikorsky's West Palm Beach, Fla., facility on May 17, 2019, developmental testing will stretch through the end of FY20, and operational testing will begin in FY21. A total of four aircraft each will be delivered to Moody and Kirtland to support maintenance training and initial operational employment. USAF announced the name "Jolly Green II" in 2020 honoring the legacy Vietnam-era HH-3 and HH-53.

Contractor: Lockheed Martin Sikorsky.
First Flight: May 17, 2019.
Delivered: 2019-present.
IOC: N/A.
Production: 112 (planned).
Inventory: Nine.
Operator: AFMC. Planned: ACC, AETC, PACAF, USAFE, ANG, AFRC.
Aircraft Location: Duke Field, Fla. Planned: Aviano AB, Italy; Davis-Monthan AFB, Ariz; 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-60W. Developmental next-generation Combat Rescue Helicopter.
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-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 to begin initial testing in December 2019. Full rate production is planned for 2023.

Contractors: Boeing (prime contractor); Leonardo (formerly Agusta Westland) (airframe); Honeywell (avionics).
First Flight: 2019.
Delivered: N/A.
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.; 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 190 mph, range 660 miles (with auxiliary fuel, no reserves).
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.

Devin Doskey/USAF

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 US 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. USAF is modifying the UH-1N with NVG-compatible cockpit, 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 fully fielded.

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

Airman 1st Class Jacob Thompson

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 detection 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. FY20 starts crew relief station replacement. The service is working to return the last of 39 aircraft severely damaged in a hailstorm at Laughlin to flying status. The fleet's estimated 18,000 flying-hour service life keeps it structurally airworthy to 2032.

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 side by side, one to the rear.

Airman Davis Donaldson

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 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 and future plans would add controlled flight into terrain avoidance. Development includes Next-Generation Onboard Oxygen Generation System (OBOGS) to combat the hypoxia-like incidents that grounded the fleet in 2018. Improved maintenance and inspections will mitigate risk until fleetwide retrofit is complete. A single T-6 was lost in a non-related training accident near Sheppard on May 1, 2019. USAF plans to buy three AT-6 Wolverines in 2020 (in addition to an equal number of AFSOC A-29 Super Tucanos) to continue experimentation with a rapidly procurable, exportable, light CAS/ISR aircraft. AT-6s will be assigned to ACC at Nellis.

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: 443 (USAF).
Operator: AETC, USN. Planned: ACC (AT-6).
Aircraft Location: USAF: Columbus AFB, Miss.; Laughlin AFB, JBSA-Randolph, and Sheppard AFB, Texas; Vance AFB, Okla.; NAS Pensacola, Fla. Planned: Nellis (AT-6).
Active Variants:
▪T-6A. Joint service primary training aircraft, based on the Pilatus PC-9.
▪AT-6 Wolverine. Experimental light attack/armed reconnaissance variant.
Dimensions: Span 33.5 ft, length 33.4 ft, height 10.7 ft.
Weight: Basic 6,500 lb.
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.

Tech. Sgt. Carlin Leslie

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. 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. Sustainment measures include replacing major engine components to improve reliability and maintainability. T-38s were designed for 7,000 flying hours but many have surpassed 20,000 hours, requiring life-extension prior to reaching their 2034 replacement date. 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. Additional upgrades include wing replacement, digital avionics, replacement HUD, VHF nav/comms, and airspace compliance and safety mods. FY20 begins forward canopy replacement to improve bird-strike survivability. USAF awarded Boeing/Saab a $9.2 billion T-X contract to replace the T-38 on Sept. 20, 2018. The first of up to 475 T-7A Red Hawks are slated for delivery to Randolph in 2023.

Contractors: Northrop Grumman; 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); 442 (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.; 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.

USAF

T-53 KADET II

Trainer

Brief: The T-53 is the military designated civilian Cirrus SR20, primarily serving USAFA's Powered Flight Program which conducts some 12,600 annual training and competition-flying hours. The aircraft is dubbed "Kadet" in reference to the Boeing/Stearman PT-17, which was the USAAF's mainstay primary training aircraft during WWII. It is an all-composite monoplane with advanced avionics and safety features that include GPS, Cirrus Airframe Parachute System, integrated fuselage roll-cage, cuffed wing design, and other active and passive safety systems standard on Cirrus aircraft. T-53s are designed for 12,000 flying hours. Upgrades are limited to FAA-mandated airworthiness compliance mods and simulator updates.

Contractor: Cirrus.
Delivered: 2012.
Inventory: 24.
Operator: AETC.
Aircraft Location: USAFA, Colo.
Active Variant:
▪T-53A. Military designated Cirrus SR20.
Dimensions: Span 38.3 ft, length 26 ft, height 8.9 ft.
Weight: Max T-O 3,050 lb.
Power Plant: One Continental IO-360-ES six-cylinder, fuel-injected, air-cooled engine, 200 hp.
Performance: Speed 178 mph, range 690 miles.
Ceiling: 17,500 ft.
Accommodation: Two pilots, three passengers.

Trevor Cokley/USAF

UV-18 TWIN OTTER

Utility

Brief: The UV-18 is a military variant of the civilian De Havilland Canada DHC-6 Twin Otter. It serves USAFA, supporting various parachuting and general utility missions. Special use includes supporting the Air Force Academy parachute team, Wings of Blue. The UV-18 is designed for 40,000 flying hours. Upgrades are limited to FAA-mandated airworthiness compliance mods.

Contractor: De Havilland Canada.
First Flight: May 1965 (commercial version).
Delivered: 1977-1982.
IOC: 1977.
Production: Three.
Inventory: Three.
Operator: AETC.
Aircraft Location: Peterson AFB, Colo.
Active Variant:
▪UV-18B. Military variant of the DHC-6 Twin Otter.
Dimensions: Span 65 ft, length 51.9 ft, height 18.7 ft.
Weight: Max T-O 12,500 lb.
Power Plant: Two Pratt & Whitney Canada PT6A-27 turboprops, each 620 shp.
Performance: Speed 210 mph, range 806 miles.
Ceiling: 25,000 ft.
Accommodation: Two pilots; **Load:** Up to 20 passengers/parachutists.

FULL-SCALE AERIAL TARGETS

Master Sgt. J. Scott Wilcox

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. FY20 funds procure 12 conversions, and a follow-on sixth lot contract for 12 airframes is expected in mid-2020. ACC declared IOC with 15 operational

aircraft in 2016, and ongoing operational testing includes a comprehensive cyber security evaluation. 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.

Contractors: Lockheed Martin; Boeing (drone conversion).
First Flight: May 4, 2012.
Delivered: February 2015-present.
IOC: Sept. 23, 2016.
Production: 126 (planned).
Inventory: 9 (QF-16A); 30 (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.

REMOTELY PILOTED AIRCRAFT

Airman 1st Class William Rosado

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, and 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. Current efforts include the new DAS-4 high-definition EO/IR sensor to improve targeting accuracy, fuselage mods to improve system cooling, bandwidth-efficient data links, enhanced JDAM targeting, and more modular weapons interface software. Long-term fixed programs include Block 5 aircraft/Block 30 GCS, and the Extended-Range Reaper which entered combat in 2015. 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. USAF plans to upgrade the entire fleet to ER standards, comprising 165 Block 1 and 136 Block 5 aircraft. FY20 funding supports MQ-9 Block 5 and GCS Block 30, upgraded Lynx SAR and Gorgon Stare, reliability and maintainability mods, ER kits, and capability upgrades. FY20 also procures 12 new-build MQ-9s. An MQ-9 notably killed the head of Iran's Revolutionary Guard in an airstrike near Baghdad International Airport on Jan. 3, 2020. USAF announced it plans to end MQ-9 procurement beyond FY21, capping the fleet at 337 aircraft.

Contractors: General Atomics Aeronautical Systems; L3Harris; Raytheon (sensors).
First Flight: February 2001.
Delivered: November 2003-present.
IOC: October 2007; 2015 (ER).
Production: 346 (planned).
Inventory: 269.
Operator: ACC, AFMC, 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.
GCS 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, GBU-12/49 Paveway II, and GBU-38 JDAMs.
Accommodation: Pilot, sensor operator (operating from GCS).

Airman 1st Class D. Blake Browning

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 Block 10 debuted in combat in 2001 ahead of production 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. Block 40 is a ground moving target surveillance platform equipped with the Multiplatform Radar Technology Insertion Program (MP-RTIP). Its AESA and SAR simultaneously conduct moving target and cruise missile tracking, as well as stationary imagery collection. ASIP is installed on three airframes with plans to equip an additional eight. The universal payload adapter enables U-2-unique sensors including the MS-117 and SYERS II EO sensors, and a wet-film Optical Bar Camera to be carried.

Two Block 30s were retrofitted with MS-117 for development and a total of six sensors will be delivered through 2020 to meet a congressional mandate to match the U-2. FY20 funds support adding weather radar and anti-icing, as well as Ground Segment Modernization, FAA-mandated airspace compliant Mode 5/ADS-B, sensor enhancements including a new, higher resolution EO camera, and increased onboard data storage. BACN EQ-4Bs will be upgraded with 5th-to-4th Generation Gateway to enable comm/data transfer between the F-22, F-35, and legacy aircraft. Ground Segment Modernization installs upgraded "cockpits" starting with Beale and Grand Forks this year. USAF announced plans to retire the EQ-4B and RQ-4B Block 30 in FY21, retaining only the Block 40.

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: 35; four (Block 20); 20 (Block 30); 11 (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 in Iran crashed and was captured almost intact. 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.

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.

USAF

AGM-86 AIR LAUNCHED CRUISE MISSILE (ALCM)

Strategic air-to-surface cruise missile

Brief: The AGM-86 is a low-level, penetrating nuclear or conventional 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 is capable of adverse weather, day/night, air-to-surface, accurate, standoff strike capability at ranges greater than 500 miles. Block 1A enhancements offer improved accuracy and increased immunity to electronic jamming. The AGM-86D is CALCM's Block II penetrator version with AUP-3(M) warhead. It provides standoff capability against hardened, deeply buried targets and was successfully used in Afghanistan. CALCM was retired in early 2019, and remaining weapons are awaiting disposal at Barksdale. ALCM is undergoing SLEP 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 and plans to field 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.
▪AGM-86C. Conventional CALCM variant.
▪AGM-86D. Penetrating CALCM Block II 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 (B), high subsonic (C/D); range 1,500+ miles (B), 690 miles (C/D).
Guidance: Inertial plus Terrain Contour Matching (B); inertial plus GPS (C/D).
Warhead: W80-1 nuclear (B), blast/fragmentation conventional (C), hard target penetrating warhead (D).
Estimated Yield: W80-1 warhead: five-150 kilotons (preselectable).
Integration: B-52H.

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 and equips both the F-16 and F-15E in the forward-deployed, allied extended deterrent role. The weapon was first delivered in 1966, and the most recent 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). Production engineering work began in 2016 to eventually consolidate the B61-3, -4, -7, and -10 weapons into a single, standardized configuration. USAF and National Nuclear Security Administration qualification flight testing completed June 9, 2018, included 31 inert test drops and greatly exceeded required performance. These drops validated nonnuclear components, such as arming/fire

National Nuclear Security Administration graphic

control, guidance, spin-rocket motors, and software. B61-12 was approved for production and began operational flight testing in 2019. The LEP upgrades/refurbishes the warhead and aims to improve the safety, security, and reliability of the weapon through 2040. B61-12 also adds a guided tail kit, making it the first precision guided weapon of its type. Improved accuracy will permit higher effectiveness at lower yields. Delivery of the first production example was delayed two years to 2022 due to technical issues. Integration is planned for the B-2, F-15E, 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.

Senior Airman Abbigayle 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. AFGSC initially deployed 550 missiles, later reducing that number to 400 based at Malmstrom, Minot, and F.E. Warren. AFGSC completed reducing its 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. 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: 398 deployed; 265 non-deployed.
Operator: AFGSC.
Unit Location: F. E. Warren AFB, Wyo.; Malmstrom AFB, Mont.; Minot AFB, N.D.; Vandenberg AFB, 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

Raytheon

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 serve as the basis for a new Navy 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: September 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.
Performance: Range up to 575 miles, endurance 90 minutes (50 minutes on-station loiter).
Guidance: GPS/INS.
Integration: B-52H, F-16C.

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 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.

Master Sgt. Michael Jackson

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 variant was cleared for combat use on the B-1B in 2015. The variant reached full operational capability on the F-15E in 2018, and is planned for use on all fighter/bomber platforms. It is currently undergoing integration on the F-16C/D. Full-rate production of the ER began the same year, and JASSM production shifted to ER-only in FY16. Total planned production includes 2,034 JASSMs and 2,866 JASSM-ERs. JASSM-ER development has resulted in the "extreme range" JASSM-XR, which is slated for future production. Lockheed Martin is developing the Long-Range Anti-Ship Missile (LRASM) variant for both the Air Force and Navy. LRASM reached early operational capability on the B-1B in December 2018, and USAF is pursuing additional fielding on the B-52. The service is considering upping total procurement to as many as 10,000 JASSMs and 400 LRSAMs. FY20 funds support procurement of 430 JASSM-ER and initial procurement of the extreme-range variant.

Contractors: Lockheed Martin; Raytheon; Honeywell.
First Flight: April 8, 1999.
Delivered: Through FY19.
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).
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-52H, F-15E; planned: B-2A, F-16, and F-35A (JASSM-ER). B-1B; planned: B-52 (LRASM).

AIR-TO-AIR MISSILES

Samuel King Jr./USAF

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 capability. The current production AIM-9X Block 2 was cleared for full-rate production in September 2015, and an F-35A conducted its first live-fire with the weapon in early 2016. Ongoing development includes control actuation, IR counter-countermeasures, improved lock-after-launch, added partial/degraded cue capability, and improved small target acquisition and surface attack capability. FY20 production missiles will add a redesigned dome, inertial measuring unit, and processor. AIM-9X production includes 67 converted AIM-9Ms, 1,289 Block 1, and a planned 6,309 Block II (including the newly developed Block II-plus, incorporating enhanced survivability features). FY20 funds procure a combined 355 AIM-9X Block II/II-plus.

Contractor: Raytheon; Northrop Grumman (propulsion).
First Flight: September 1953.
Delivered: AIM-9M 1983; AIM-9X from 2002-2011 (Block I); 2011 to present (Block II); 2017-present (Block II-plus).
IOC: Circa 1983 (9M); 2003 (9X).
Production: 1,289 (Block I); 6,309 (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.

Airman 1st Class Mandy Foster

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 completed operational testing in 2014 and was fielded in 2015. The latest variant 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 220 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 WEAPONS

BAE Systems

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 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: A-10, F-16 (tests also conducted on AT-6).

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. FY19 contingency funds modified 293 legacy missiles to Laser Maverick standards and replenished weapons expended in combat. FY20 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.

Raytheon

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 considering using the extended range AARGM as the basis for its next generation Stand-in Attack Weapon (SiAW) to equip the F-35A with SEAD capability.

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.
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).

Capt. Tristan Hinderliter

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 successfully fired an AGM-114 for the first time in February 2000. The combo was employed in combat for the first time in Afghanistan on Oct. 7, 2001. USAF is working to integrate the latest AGM-114R, which replaces several types with a single, multitarget weapon, onto the MQ-9. FY20 funds 3,859 missiles as well as procurement of the next-generation Joint Air-to-Ground Missile (JAGM) via the Army. JAGM adds a new multi-mode guidance section to the AGM-114R propulsion, warhead, and control section for use against high value moving or stationary targets in all weather.

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.

Raytheon

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 a $105.2 million contract modification to supply additional Griffin missiles in 2018.

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-130W (A); MQ-9 (B); planned: AC-130J (A).

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 weap-

Textron Systems

ons 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 awarded a $60 million procurement contract for a compliant family of Next Generation Area Attack Weapons (NGAAWs) in 2019. NGAAW will initially be a 500-lb improved-lethality, anti-personnel/materiel weapon, followed by a second, more potent 2,000-lb high-fragmentation warhead.

Contractor: Textron Systems.
First Flight: Circa 1990.
IOC: 1997.
Active Variants:
- CBU-105.
- CBU-97 with 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 sensors in each warhead.
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.

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: Via WCMD.
Warhead: Non-explosive projectiles.
Integration: B-52, F-15E, F-16C/D.

2nd Lt. Karissa Rodriguez

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. USAF is procuring up to 400 GBU-49 to provide 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.

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, MQ-9. Planned: F-35

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: GBU-24 in service May 1985.
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).

Justin Connaher/USAF

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-139 bunker buster. JDAM-class weapons are the most frequent air-to-ground munition expended in combat. FY20 continues to maximize production capacity to replenish stocks depleted over Iraq and Syria, procuring 37,000 guidance kits. USAF is procuring an upgraded tailkit with anti-jam receiver for use in GPS degraded conditions. The service is also seeking to develop a lighter weight successor class of weapons incorporating IR/GPS guidance, maneuvering wings, stealth, and EW capabilities. An F-35A dropped a JDAM-class weapon during its combat debut over the Middle East on Apr. 30, 2019.

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, and MQ-9.

Alejandro Peña/USAF

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 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. SDB I is a priority procurement, and Boeing is maximizing production output to replenish stocks depleted in combat. FY20 funds procure a total of 7,078 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: Bomb: 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.

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 4 covering 660 weapons in January 2018. SDB II began operational testing in June 2018,

Raytheon

and initial fielding is planned on the F-15E in 2020 with follow-on integration on the F-35A. FY20 funding supports production of up to 1,175 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: Planned: A-10, AC-130W/J, B-1, B-2, B-52, F-15E, F-16, F-22, F-35, MQ-9.

USAF

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, or 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 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.

2nd Lt. Stephen Hudson

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 and GBU-32 variants.

Contractor: Boeing.
First Flight: 2005.
IOC: 2008.
Active Variant:
▪GBU-54 Laser JDAM. Laser/GPS/INS guided 500-lb bomb.
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.

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 for FY20.

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).

USAF

ADVANCED EXTREMELY HIGH FREQUENCY (AEHF) SATELLITE SYSTEM

Communications

Brief: AEHF provides global, secure, protected, and jam-resistant military communications. It is replacing existing 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.

Contractors: Lockheed Martin; Northrop Grumman.
Operator/Location: AFSPC; Schriever AFB, Colo.
First Launch: August 2010.
IOC: 2015.
Design Life: 14 yrs.
Launch Vehicle: Atlas V.
Constellation: Five.
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, in testing.
- AEHF SV-6. Launched in 2020, on orbit, in testing.

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.

Lockheed Martin

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 linescan 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) as an eventual replacement for DMSP in November 2018.

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: Five low Earth orbit (LEO).
Active Satellites:
- Block 5D-2. Launched 1982 to 1997; one on orbit but presumed inactive (DMSP-14).
- 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 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: AFSPC; 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: Five (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).

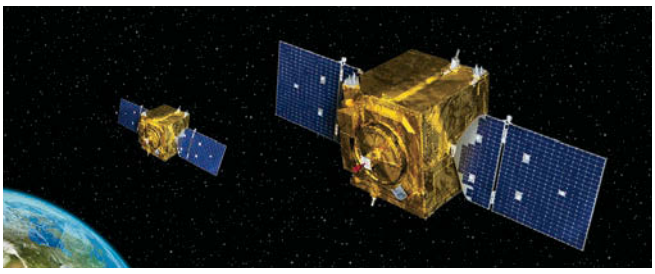
DOD

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. 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: AFSPC; Buckley AFB, 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:
▪Block 5. Most current on-orbit version.
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. The fifth and sixth are slated for launch aboard the AFSPC-8 mission planned for launch from Cape Canaveral in late 2020.

Contractor: Orbital ATK.
Operator/Location: AFSPC; 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.

Dave Grim/USAF

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. GPS Block IIA first launched in 1990. The Air Force decommissioned the final Block IIA, launched to replace original GPS Block I series in 2016. 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, with a new military signal and a second and third dedicated civil signal. A reserve Block IIA satellite launched in 1993 was reactivated in 2018, to replace an unusable Block IIR satellite launched in 2001. The Space Force decommissioned the last Block IIA satellite in 2020. The last of 12 GPS IIF satellites launched from Cape Canaveral on Feb. 5, 2016. The next generation GPS Block IIIA, currently in production, is expected to improve accuracy, availability, integrity, and resistance to jamming. The newest satellites will add capabilities including nuclear detonation detection and search and rescue. SpaceX was awarded its first National Security Space contract to launch the second GPS IIIA on its Falcon 9 booster in May 2018. USAF recently contracted Lockheed Martin to build GPS IIIA vehicles nine and 10 for expected launch in 2022. USAF awarded three companies production-readiness contracts for vehicle 11 and is looking to competitively award a 22-satellite production contract (with added capability) to a single bidder. The first GPS III satellite dubbed "Vespucci" successfully launched on Dec. 23, 2018, and completed on-orbit checks on Jan. 13, 2020. The second GPS III satellite successfully launched Aug. 22, 2019, three launches are slated for 2020 and a total of 10 GPS III satellites are planned. Block III improvements include a steerable, high-power,

anti-jam capability. FY20 funds procure the first GPS Block IIIF satellite which adds additional capabilities, including a hosted search and rescue payload, as well as geographically targetable high-power military signal.

Contractors: Boeing (II, IIA, IIF); Lockheed Martin (IIR, IIR-M, IIIA).
Operator/Location: AFSPC; Schriever AFB, Colo.
First Launch: Feb. 22, 1978.
IOC: Dec. 9, 1993.
Design Life: 7.5 yr (II/IIA); 7.5 yr (IIR/IIR-M); 12 yr (IIF); 15 yr (IIIA).
Launch Vehicle: Delta II, Delta IV, Falcon 9 (planned).
Constellation: 33 spacecraft (not including decommissioned or on-orbit spares).
Active Satellites:
- GPS Block IIA. Launched 1990 to 1997. One reactivated in 2018.
- GPS Block IIR. Launched 1997 to 2004; 11 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; two 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 700 watts (II/IIA); 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. AEHF will eventually replace Milstar as DOD's primary satcom and is fully back-compatible with Milstar.

Contractors: Lockheed Martin; Boeing; Northrop Grumman (formerly TRW).
Operator/Location: AFSPC; 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.

Lockheed Martin

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 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. 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 $1.4 billion for FY20. The constellation will comprise three GEO satellites and two polar HEO sensors. SBIRS and DSP 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: Lockheed Martin; Northrop Grumman.
Operator/Location: AFSPC; Buckley AFB, 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: 7 x 6.3 x 19.7 ft (GEO).
Weight: 5,603 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 is working to extend SBSS service life and tasked one of its experimental Operationally Responsive Space satellites to cover a four-year gap in coverage before it can launch a follow-on spacecraft in 2021. 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.

Contractors: Boeing (system integration, ground segment, operations, and sustainment); Ball Aerospace (satellite).
Operator/Location: AFSPC; Schriever AFB, Colo.
First Launch: Sept. 25, 2010.
IOC: Aug. 17, 2012.
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 10 ft; 10 x 3.2 ft, plus solar panels.
Weight: Approx 2,273 lb.
Orbit Altitude: 390 miles, sun-synchronous orbit.
Power: Solar arrays and batteries generating 750 watts.

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 is reviewing alternatives to eventually replenish the constellation with three additional satellites or develop a follow-on system. SV-10 successfully launched on March 15, 2019, completed on-orbit checks and was declared operational Nov. 19.

Contractor: Boeing.
Operator/Location: AFSPC; 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 made the craft's first landing at Cape Canaveral 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. The Space Force will launch its inaugural X-37B mission as a service in 2020.

Contractor: Boeing.
Operator: AFSPC.
First Launch: April 22, 2010.
IOC: N/A.
Launch Vehicle: Atlas V, Falcon 9.
Production: Two.
Inventory: Two.
Operational Location: Cape Canaveral AFS, Fla. (launch/landing); Vandenberg AFB, 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: 718+ 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 2020 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
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
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
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
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
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
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
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
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
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
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
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
RAOC	Regional Air Operations Center
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
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
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
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

Imperial Japanese Army

A Japanese soldier trains women to defend the homeland with bamboo spears in 1945. Bushido, or "the way of the warrior," was a code deeply ingrained not only in the military but also in Japan's citizenry.

Japan's Last Ditch Force

In the summer of 1945, the Japanese had almost seven million troops remaining and were not nearly ready to quit.

By John T. Correll

The Allied strategy in World War II was to win first against Germany and until then to treat the Pacific as a secondary theater. VE Day (Victory in Europe Day), May 8, 1945, marked the victory in Europe. The primary effort shifted to the Pacific, where the war with Japan continued with escalating ferocity.

The Battle of Okinawa was still in progress on VE Day. By the time it was over, 104,520 had been killed in action with total casualties reaching 165,0000 (US 46,000; Japan 119,000).

"If we are prepared to sacrifice 20 million Japanese lives, victory will be ours!"
—Adm. Takijiro Onishi, vice chief Japanese naval operations

The next step was subjugation of the Japanese home islands, a far bigger undertaking than Okinawa and with casualties on a higher scale. Japan had a military force of about 7 million remaining and was not nearly ready to quit.

The Japanese could not possibly win, but they might be able to delay the end of the war into the fall of 1946. If the Americans found the rising casualties intolerable, they might settle for terms less than unconditional surrender.

Operation Downfall, the pending U.S. invasion of the Japanese islands, was planned in two phases. It would begin with Operation Olympic on Nov. 1, 1945, an amphibious operation a third larger than the D-Day landing in Europe.

Once Olympic captured the southernmost island of Kyushu, it would be followed March 1, 1946, by Operation Coronet against the main Japanese island of Honshu. About 2 million U.S. troops were projected to participate in Operation Downfall.

It is unknown how the invasion would have turned out. Japan surrendered on Aug. 15, after the atomic bombs were dropped on Hiroshima and Nagasaki.

In the postwar period, revisionist historians—eager to prove that it had not been necessary to use the atomic bombs—claimed the war would not have lasted that much longer, and that defeating Japan would not have been that difficult. According to Gar Alperovitz, a leading revisionist, "Japan was on the verge of surrender."

The revisionists like to quote the U.S. Strategic Bombing Survey (USSBS), which said Japan would "in all probability" have surrendered by November 1945, and "certainly" prior to Dec. 31. This conclusion, which the USSBS study team reached before leaving for Japan to gather information, has been debunked. There is little support for any such theory, either in the survey findings or in the evidence presented by surviving Japanese leaders.

In 1995, egged on by his advisers, the director of the Smithsonian's Air and Space Museum altered the plan for an exhibit on the dropping of the atomic bomb, marking down from 250,000 to 63,000 the probable U.S. death total from an invasion of Japan. He aroused the wrath of Congress and the exhibition was canceled.

The revisionists have not given up on arguing their theme. They have also been able to persuade many in the academic world and in the news media to join them in ignoring a mountain of relevant information from 1945.

CLOSING IN ON JAPAN

Acquisition of air bases in the Marianas in late 1944 sealed the military outcome of the war. From there, U.S. B-29 bombers could reach Tokyo and all important targets in Japan. Night after night, the B-29s rained firebombs and high explosives on the wood and paper architecture of Japan.

An attack on Tokyo on March 9, 1945, destroyed 16 square miles of the city and killed 83,793. By the middle of 1945, 50.8 percent of Tokyo had been destroyed, along with 57.6 percent of Yokohama, and 55.7 percent of Kobe.

The Japanese navy was gutted. Most of the Japanese shipping fleet had been destroyed, and maritime activity was severely constrained by a blockade and mines. Conventional air power was greatly reduced, but there were thousands of kamikaze aircraft and plenty of pilots to fly them on suicide missions. Japan hung on with great tenacity. The army still had 4.9 million troops and was the strong hand in running Japan.

On a visit to Guam in June 1945, Gen. Hap Arnold, commander of the Army Air Forces, expressed his belief that the B-29 campaign would "enable our infantrymen to walk ashore on Japan with their rifles slung." Arnold did not have the latest information on Japanese strength, and the Japanese did not share his assessment of their position.

There was also some belief that the B-29s were running out of targets. However—and pointed out by the USSBS, no less—the Japanese railroad system had not yet been subjected to substantial attack and trains were running through Hiroshima 48 hours after the dropping of the atomic bomb. Major armament plants at various locations were producing the regular output of military weapons and equipment.

BUSHIDO NATION

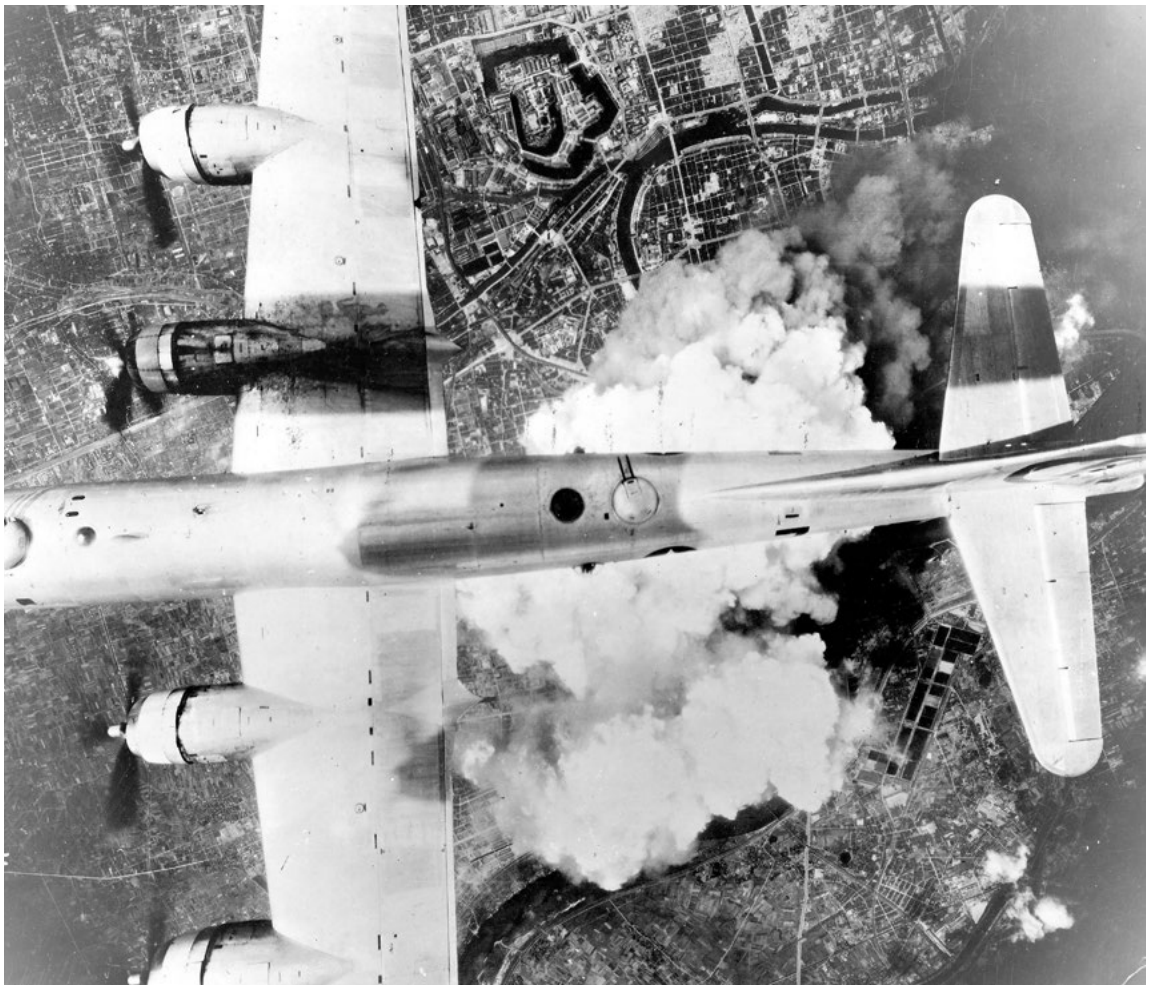
What made Japan's determination to keep fighting credible was the code of Bushido, "the way of the warrior," which was deeply ingrained, not only in the armed forces but also in the nation at large.

Surrender under any circumstances was dishonorable. Suicide was expected of commanders who had been defeated in battle. Soldiers who surrendered were not deemed worthy of regard or respect.

On Kwajalein, the fatality rate for the Japanese force was 98.4 percent. On Saipan, almost 30,000—97 percent of the garrison—fought to the death. Of 23,000 Japanese troops on Iwo Jima, only 216 surrendered. On Okinawa, 92,0000—80 percent of the total Japanese force—was killed in action. During the entire Pacific War, only one organized Japanese unit ever surrendered: a 23-man "independent mixed battalion" in New Guinea in May 1945.

Adm. Takijiro Onishi, vice chief, Naval General Staff, was not alone in the astounding proposition that, "If we are prepared to sacrifice 20 million Japanese lives in a special attack effort, victory will be ours!"

Between them, the army and navy could scrape together 10,700 aircraft from all corners of the war front and adapted about 7,500 of them for kamikaze suicide missions, which began in the Philippines in 1944. They sank 33 U.S. ships,



A USAAF B-29 drops incendiary bombs on Osaka, Japan, during a June 1, 1945, mission. The firebombs and high explosives devastated the wood and paper architecture of Japan.

U.S. Air Force

damaged 4,900, and claimed almost 10,000 US casualties. In 1945, the Japanese had a million barrels of aviation fuel stored in the home islands, a seven-month supply.

In June 1945, Japan established the "National Volunteer Combat Force," a civilian paramilitary corps. All males age 15-60 and females 17-40 were required to join. They received training from the army on whatever weapons were available, notably bamboo spears and hand grenades. They were expected to strap explosives to their bodies and throw themselves under advancing U.S. tanks. About 28 million Japanese were subject to conscription under this program.

JAPAN'S REMAINING FORCES

The combination of Japanese military assets in 1945 was not a force to be brushed aside or easily neutralized.

■ On the day of surrender, the Imperial Japanese forces officially numbered 6,983,000 troops—a hard figure, not an estimate. They were spread in a great arc from Manchuria to the Solomons and the Southwest Pacific, but 3,532,000 of them were based in the Japanese home islands.

■ Four million civil servants, declared by the War Minister to be on call for military duties.

■ Millions of civilians, armed with bamboo spears and primitive weapons, organized into paramilitary units under army direction.

■ 7,500 kamikaze aircraft, dwindling toward 5,000 through attrition, which was the inevitable result of the suicide strategy.

■ Almost 700 pieces of seacoast artillery, most of it on Honshu and Kyushu.

■ Naval coastal defenses: 38 surviving fleet submarines and 19 destroyers, plus suicide boats and midget submarines to attack US troop transports before they reached the invasion beaches.

The Japanese navy was down but not out. On July 26, the heavy cruiser USS *Indianapolis* delivered the first atomic bomb to Tinian, then departed for the Philippines to train for the coming invasion. Three days out of Tinian, *Indianapolis* was torpedoed and sunk by a Japanese submarine.

NUMBERS IN MOTION

In the spring of 1945 public pressure was growing to begin demobilization and discharge of military members. On May 10, two days after VE Day, the War Department announced a point system under which veterans would be returned to civilian life. Credit was given for length of service, combat experience, awards and decorations received, and parenthood of young children.

The first, long-serving troops arrived home from Europe in August, but many others were transferred to the Pacific Theater instead.

"Fifteen of the divisions in Europe were to augment the 21 Army and six Marine divisions already in the Pacific to fulfill the requirements of Downfall," said historian Richard B. Frank. "No fewer than 63 air groups likewise were to migrate to the Pacific."

Meanwhile, Selective Service draft calls to provide the additional forces necessary were running at 100,000 a month. Concurrently, invasion planners discovered that imperial forces in the Japanese islands were increasing faster than anticipated. Between January and June, Japanese strength in the homeland doubled—from 980,000 to 1,865,000.

The United States had broken the Japanese codes. "Magic" was intelligence from intercepted diplomatic communications, and "Ultra" intelligence was from Japanese army and navy messages.

The Ultra report in August estimated 625,000 troops on Kyushu. That was almost double the Ultra estimate in June of 350,000, but it was far short of actuality. U.S. officials would not learn until after the war that the number of Japanese troops on Kyushu had been 900,000.

DOWNFALL

In April 1945, Gen. Douglas MacArthur was named Commander in Chief of U.S. Army Forces in the Pacific and designated to lead the invasion of Japan, code-named Operation Downfall. The Operation Olympic phase was to begin Nov. 1 with the objective of seizing the lower third of Kyushu, southernmost of the Japanese home islands. The heart of it would be an amphibious assault operation by nine divisions, compared with six divisions employed in the D-Day landing in Normandy the year before.

The initial expectation was that the nine U.S. divisions would be opposed by three Japanese divisions. That three-to-one ratio satisfied the standard military principle that an offensive force should be significantly larger than the defense force it intends to attack. Even with the updated Ultra estimates in August, the plan for Olympic was not fully adjusted for the 14 Japanese combat divisions in place on Kyushu.

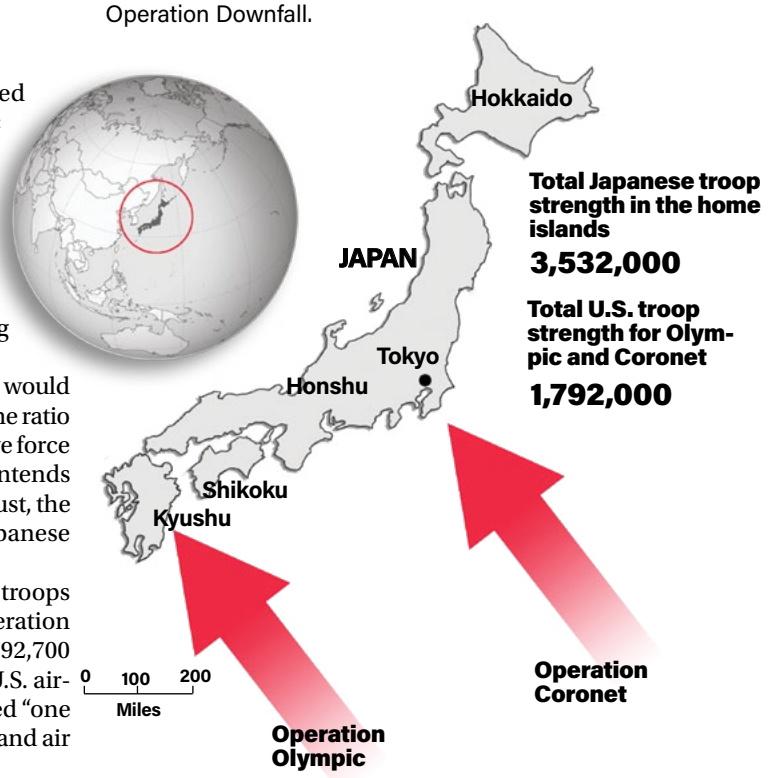
The US projection of forces in May forecast 766,700 troops to take part in Olympic, with another 1,026.000 for Operation Coronet aimed at Honshu in March 1946: a total of 1,792,700 committed for the combined operation. About 7,000 U.S. aircraft were assigned to Olympic in what MacArthur called "one of the heaviest neutralization bombardments by naval and air forces ever carried out in the Pacific."

Department of Defense

U.S. Marine 1st Lt. Hart Spiegal tries to communicate with two very young Japanese "soldiers" captured during the Battle of Okinawa on June 17, 1945.

Operation Downfall

The invasion of Japan was planned in two phases. It would begin with Operation Olympic on Nov. 1, 1945, an amphibious operation a third larger than the D-Day landing in Europe. Once Olympic captured the southernmost island of Kyushu, it would be followed on March 1, 1946, by Operation Coronet against the main Japanese island of Honshu. About 2 million US troops were projected to participate in Operation Downfall.



Mike Tsukamoto/staff

Operation Coronet, taking advantage of staging bases on Kyushu, would punch directly into central Honshu, striking for Tokyo and the Kanto Plain. For that, the Japanese would pull out all the stops and throw everything they had left into a desperate defense.

Even so, it was not an automatic assumption that Olympic and Coronet would be the end of it. MacArthur's war plan said that, operations would continue as necessary to eliminate "organized resistance."

CASUALTY ESTIMATES

President Harry S. Truman was ridiculed by revisionists for saying after the war that Gen. George Marshall, the Army Chief of Staff, had told him the invasion "would cost at minimum one quarter of a million casualties, and might cost as many as a million, on the American side alone."

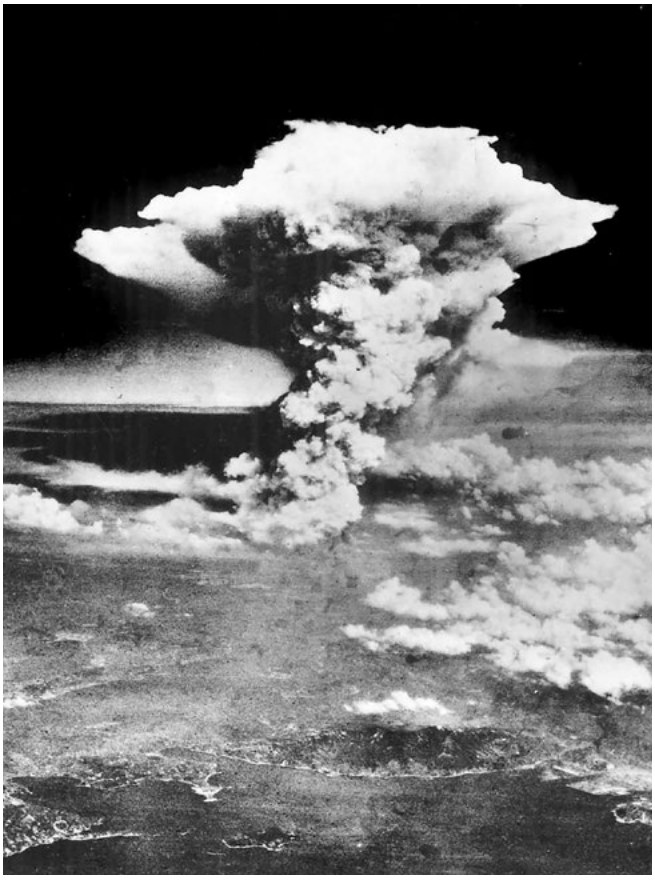
The revisionists said there was no basis for such numbers. Such a statement was uncharacteristic of Marshall. Truman may have been embellishing, but the numbers are not nearly as preposterous as often alleged.

On at least two occasions, Joint Staff planners made estimates in that range. Using casualty rates from fighting on Saipan as a basis, the planners said that "it might cost half a million lives and many times that in wounded" to take the Japanese home islands. An April 1945 projection set the total casualties probable for the first 90 days of Operations Olympic and Coronet at 1,202,005.

In June 1945, MacArthur gave Marshall his estimate of about 110,000 casualties in the first three months of Olympic. After

A Japanese A6M Zero Kamikaze pilot hones in on the side of USS Missouri, off Okinawa, on April 11, 1945. The attack caused only minor damage, but the psychological toll of the suicidal bombers on Sailors was significant.

U.S. Naval History and Heritage Command



509th Operations Group

The atomic cloud over Hiroshima. The photo was taken from the Enola Gay, which had just dropped the nuclear bomb, Aug. 6, 1945. It took a second bomb to force Japan to surrender.

the war, having seen better information on the suicide defense plans and preparations in Japan, MacArthur revised his opinion. "Those bombs that ended the war saved us about 500,000 casualties, "he said. "The Japanese would have sacrificed at least a million."

Casualty estimating is notoriously uncertain, but the cost would have been high in two amphibious invasions, facing 7 million Japanese regulars and up to 30 million armed civilians and others, fired up with Bushido and fighting from defensive positions in their home territory.

SURRENDER

Japan did not respond immediately to the atomic bombs at Hiroshima Aug. 6 and Nagasaki Aug. 9. The invasion was still on.

Marshall had his staff studying an alternative to using atomic bombs in direct support of the invasion force. At least seven more bombs would be available by the end of October. Manhattan Project officials advised Marshall that although lethal radiological effects would reach out 3,500 feet, the ground would be safe to walk on in an hour.

The Emperor, who had aligned himself with the peace faction, broadcast his rescript of surrender Aug. 15. There was a flurry of revolt within the army, but War Minister Gen Korechika Anami committed ritual suicide. He was opposed to surrender but would not challenge the Emperor. The formal instrument of surrender was signed Sept. 2 aboard the USS Missouri in Tokyo Bay.

Various factors no doubt contributed to the outcome, but revisionist fantasies aside, the key events were the atomic bombs at Hiroshima and Nagasaki.

Conventional bombing and blockade would have eventually ended the war, but were not likely to have done so any time soon. Bombing by the B-29s would have resumed, and two nights on a par with the Tokyo attack on March 9 would have exceeded the death toll of both atomic bombs.

Meanwhile, Operation Olympic would have gone forward, against an enemy force three times as large as previously estimated. And that would have left the invasion of Honshu and Operation Coronet yet to come.

In the end, Japan would have been defeated, but the price in lives on both sides would have been terrible. ✪

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

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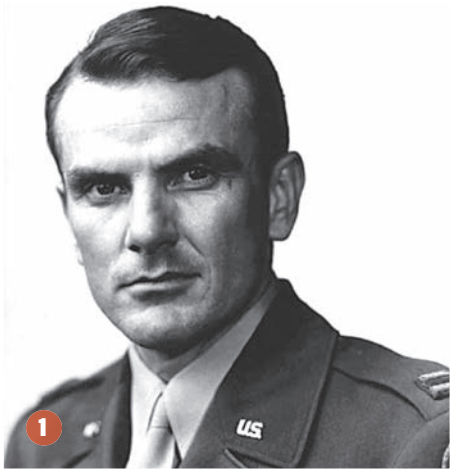

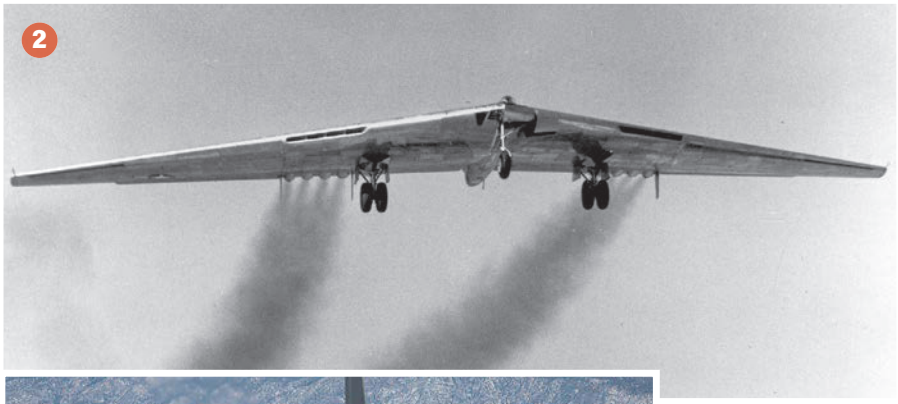

USAF (1,2); Chad Bellay/Lockheed Martin

1 Capt. Glen W. Edwards. **2** YB-49 first flight, 1947. **3** An F-35 test sortie over the Mojave Desert in California.

EDWARDS

The Vanguard

In 1948, an experimental bomber crashed in the Mojave Desert, killing all five crew members. One was 30-year-old Glen Edwards.

Thus ended a brief but significant Air Force career, and Muroc Air Force Base, Calif., was rechristened Edwards Air Force Base in his honor.

That honoree, Glen Walter Edwards, was born in Medicine Hat, Canada, in 1918, to American parents. At 13, he and the family left for California. Bright and highly motivated, Glen took a degree in chemical engineering from University of California, Berkeley in June 1941.

His was not to be the life of a civilian engineer, however. Pearl Harbor was still six months in the future, but young Edwards quickly joined the Army Air Forces and took flight training at Luke Field, Ariz., where he was commissioned in early 1942.

Edwards won early fame as an A-20 light bomber commander in North Africa, where he led his squadron on risky, low-level attacks on tanks, convoys, and troops of Rommel's Afrika Korps.

Fifty combat missions later, he returned to the States in 1943 bearing four Distinguished Flying Crosses and six Air Medals.

Unbeknownst to Edwards, though, his combat career was over. An equally important one—military test pilot—was just beginning.

Edwards was sent to Flight Test Division at Wright Field, Ohio, and was among the first to graduate from Flight Performance School (now Air Force Test Pilot School). He spent much of his time at Muroc Army Air Field, Calif., on the Mojave, flying highly experimental aircraft such as the XB-42 and XB-46 prototypes.

In late 1945, he flew the XB-42 cross-country at an average speed of 433.6 mph, setting a new transcontinental record.

The highly regarded Edwards nearly became project pilot for the Bell X-1 bid to exceed the sound barrier. When that job went to Capt. Chuck Yeager, Edwards instead was sent to Princeton, where he took cutting-edge courses in aerodynamics and control.

Armed with that knowledge, he joined a vanguard of select USAF pilot-engineers blazing the way to advanced air and space flight.

Edwards soon began testing experimental "flying wings," aircraft, devoid of conventional fuselage and tail. These included Northrop's piston-engine-driven XB-35 and YB-35.

In May 1948, Edwards joined a Muroc team evaluating the Northrop YB-49, a jet-propelled flying wing. He was not impressed, finding it "quite uncontrollable at times."

On June 5, 1948, Edwards and four others took off in the YB-49. Maj. Daniel Forbes was pilot, Edwards was co-pilot. For reasons still unknown, the futuristic jet broke apart in the sky and crashed to Earth not far from Muroc. There were no survivors.

The California base has been the scene of many advances in flight. On Oct. 14, 1947, Yeager broke the sound barrier in the X-1 aircraft. The landing of the first Space Shuttle took place there in 1981. Virtually all of America's early jets—both Air Force and Navy—were tested there, as have all advanced aircraft in years since. It is home of Hq. Air Force Test Center, U.S. Air Force Test Pilot School, and 412th Test Wing. ✪

GLEN WALTER EDWARDS

Born: March 5, 1918, Medicine Hat, Alberta, Canada
Died: June 5, 1948, near Mojave, Calif.
Citizenship: U.S. and Canada (dual)
Colleges: UC Berkeley, Princeton University
Occupation: Engineer, U.S. military officer
Services: U.S. Army Air Forces, U.S. Air Force
Main Eras: World War II, Postwar
Years Active: 1941-48
Combat: North Africa Theater 1942-43
Final Grade: Captain
Honors: Distinguished Flying Cross (4); Air Medal (6); Aerospace Walk of Honor (posthumously inducted)
Resting Place: Lincoln Cemetery, Calif.

EDWARDS AIR FORCE BASE

State: California
Nearest City: Rosamond
Area: 407.3 sq mi / 301,000 acres
Status: Open, operational
Opened as Muroc Bomb and Gunnery Range: September 1933
Renamed Muroc Army Air Field: July 1942
Renamed Muroc Air Force Base: September 1947
Renamed Edwards Air Force Base: December 1949
Current owner: Air Force Materiel Command
Former owners: Army IX Corps Area, GHQAF, AAC Southwest Air District, AAC Fourth Air Force, AAF Materiel and Services Command, AAF Technical Service Command, AAF Continental Air Forces, AAF Air Technical Service Command, USAF Air Materiel Command, USAF Air Research and Development Command, USAF Air Force Systems Command

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