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MIDNIGHT HAMMER

Inside the surprise attack on Iran's nuclear bunkers

20-22

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DEPARTMENTS

FEATURES

Ukraine's daring Operation Spiderweb used small drones remotely unleashed from cargo trailers to destroy Russian bombers on the ground. Air Force Lt. Col. Grant Georgulis argues that small drones do not negate air superiority, but rather change the calculus in land warfare. **See "Drone Hype and Airpower Amnesia," p. 46.**

ON THE COVER

The familiar shadow of a B-2 Spirit bomber is superimposed over a satellite image of the Fordow nuclear complex destroyed by U.S. bombs in June. Photo illustration by Zaur Eylanbekov, satellite image courtesy of Maxar.

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EDITORIAL

By Tobias Naegele

Global Reach, Global Power

"Topgun: Maverick" captured movie audiences with a plot built around the mission to destroy a fictional country's uranium enrichment facility hidden deep in a remote mountain range.

Combined with a feel-good redemption backstory, the movie depicts a four-ship of Navy F/A-18s defying enemy air defenses, fifth-gen fighters—and logic—to prevail against a seemingly impenetrable target.

Cartoonish, even laughable, it made for great entertainment: Just what we expect from Hollywood.

In June, we saw the remake: The Air Force executed the real thing as seven B-2 bombers, guided by Air Force stealth fighters, glided invisibly into Iranian airspace and delivered 210 tons of perfectly engineered ordnance on two remote nuclear sites. In a coordinated action, the guided missile submarine Georgia launched a barrage of more than two dozen Tomahawk cruise missiles at a third Iranian nuclear facility.

This demonstration of Global Reach, Global Power gave Americans just what they expect of their warfighters: exceptional precision, impeccable professionalism, and very little drama.

The Air Force made it look easy, but only because 99 percent of the effort is hidden from public view. The Airmen on that mission had trained for just this kind of operation for as long as they've been in uniform. The bombs they dropped—30,000-pound Massive Ordnance Penetrators, 14 in total—were engineered and purpose-built for this mission. A tanker bridge enabled the B-2 pilots to complete their 36-hour round-trip hauls without touching down, providing multiple refueling opportunities along the way. Countless others helped in the preparations, execution, and debriefs.

Speaking later to reporters, Chairman of the Joint Chiefs of Staff Gen. Dan Caine traced the history of this operation to the early 2000s and one analyst's discovery that Iran was building something suspicious at the Fordow site. But one might also wind the clock back further, to the development of the "Advanced Development Bomber"—a secret research and development project that eventually yielded the B-2 Spirit.

Following on the early success of the experimental F-117 and other secret stealth projects, the B-2 was conceived to evade enemy defenses not through sheer speed, like the B-1, or extreme altitude, like the U-2, through something almost magical: By means of advanced materials and exquisite design it would simply be undetectable by conventional radar.

Some 40 years later, detection technology has improved, but stealth—or low-observable—aircraft are still far harder to detect and counter than more conventional designs. Continued advancements in low-observable technology, embodied in the F-35 fighter and B-21 bomber, coupled with electronic warfare, advanced sensors and computer processors, make fifth-generation technologies required attributes for high-end combat aircraft.

Cheap drones and one-way cruise missiles may be capturing the attention of many due to their extensive use in Russia and Ukraine, but the real lesson of the 12-day war in Iran is that air superiority enabled the U.S. and Israel to impose their will on Iran. And Iran was powerless to do anything about it.

Indeed, it was next-generation stealth that made Midnight Hammer possible. Well before the B-2s departed Whiteman Air Force Base, Mo., the Israeli Air Force, armed with U.S.-built F-35s, systematically disabled Iran's air defenses. Executed against sophisticated S-300 integrated air defense systems—and without a single loss—Israel cleared the battlespace for the U.S. to deliver the final smackdown with weapons and aircraft only America possesses.

By boldly taking the fight to Tehran and destroying its enemies' ability to defend itself, Israel reset the possibilities for what could happen next. President Donald Trump's decision to complete the takedown by striking Iran's nuclear sites was a logical follow-on. Working together, two allies largely defanged a persistent foe—earning appreciation from both Europe and Israel's neighbors in the Middle East.

The President's willingness to use force in Iran changes the calculus for others around the world. This can't be lost on Kim Jong Un in North Korea, Vladimir Putin in Russia, and even China's Xi Jinping. By striking Iran, the President introduced a new element of uncertainty in the minds of would-be adversaries. Doing so enhanced American deterrence.

There are other lessons to take away, too: F-35 maker Lockheed Martin has endured extensive criticism for the F-35's shortcomings, from a notoriously underperforming logistics system to computer, radar, and software delays. Yet Israel's success in defeating Iran's air defenses demonstrates how effective even a flawed F-35 can be—and why the U.S. and its F-35 partners are right to invest in this remarkable fighter.

Here the President risks making a fatal error. The Pentagon has proposed cutting F-35 purchases to just 24 in 2026, half as many as in recent years. The thinking is that Lockheed should be punished for capability delays. But cutting the buy now will do lasting and irreparable damage, reducing the inventory at a time when the Air Force desperately needs to recapitalize its aging air fleet.

The lesson of the 12-day war in Iran: Air superiority enabled the U.S. and Israel to impose their will on Iran.

Buying F-35s today ensures the Air Force has jets it can upgrade in the future; not buying them accelerates the shrinkage that threatens its fighting capacity against a peer foe.

Congress should reject the Pentagon's plan and instead accelerate F-35A purchases to at least 72 per year.

Similarly, the Pentagon proposes canceling the E-7 Wedgetail airborne early warning and control (AEW&C) aircraft, reasoning that moving air and ground target indications can be delivered directly from space—and that a few extra Navy E-2 Hawkeyes can solve the Air Force's needs until that's possible. But the Hawkeye is ill-suited to the Air Force mission, built on and for the smaller scale of conflict defined by its carrier defense mission. Just as crucially, though space-based targeting is in development, it is still far from a proven capability. It could be a decade or more before it is. And even once a space-based solution is available, it may prove indefensible. Congress should reverse this decision as well.

Sixteen retired Air Force four-star generals—including six former Chiefs of Staff—joined in a common appeal to Congress in July: Save the E-7 and build more F-35s, they said. That message, coordinated and amplified by the Air & Space Forces Association and the Mitchell Institute for Aerospace Studies, should be echoed throughout the land.

Air Forces are like forests. They cannot be raised overnight, but must be cultivated, with seeds planted years in advance to produce fruit and capability in the future. Just as Operation Midnight Hammer was decades in the making—so too will be the sequel operations Airmen will have to fight five, 10, and 15 years from now.

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LETTERS

Completed Puzzle

I want to thank retired Col. Chuck Debellevue and your magazine for what was a fantastic May/June article [p. 28] about Bob Lodge.

I was in theater flying the F-4 at Ubon during 1972, was a charter member of the Aggressors on my return, and consider myself a serious student of air-to-air combat. But until this article, I never understood how all the pieces fit together to create the 432nd TFW's record of achievement in aerial combat in 1972.

I now understand. Colonel Debellevue's telling of the story is not only informative and well written, but is also told with a great deal of humility. He takes great care to give credit to those who in the end helped the author himself achieve what is a unique position in Air Force history.

Lt. Col. Art MacDonald,
USAF (Ret.)
Warner Robins, Ga.

Recommended Reading

This outstanding editorial "Eyes on the Prize" [p. 2]—and, in fact, the entire January/February edition of Air & Space Forces Magazine—is simply the best! Tobias Naegele and the A&SF magazine staff, have captured the challenges our Nation faces with the revitalized Trump administration and its new Pentagon leadership.

Your readers must take time to read and become educated on the challenges our Air Force and Space Force face, from budget, to flying hours, to threats, to mission focus, to Gen. David Allvin's on-point statement that "America needs more Air Force, and it needs it now."

I urge each air- and space-minded individual to use this content to make the public and our elected leaders aware of what lies ahead. As Naegele states: "The hard work starts now."

Col. Robert E. "Bob" Largent,
USAF (Ret.)
Former AFA National President
and Chairman of the Board
Harrison, Ariz.

Resource Management

I read with great interest John A. Tirpak's "Strategy & Policy: New Undergraduate Pilot Training Program Targets 1,500 Pilots Annually," [March/April, p. 6] and Heather Penney's ["Fixing the Air Force's Pilot Crisis," p. 48.] pertaining to what our Air Force needs to remain a viable combatant—more pilots, more training, more airplanes, more flying hours. I fully agree with all of that, which essentially points the finger at our civilian leadership for not providing the necessary funding for us to get where we need to be.

If that is the case, I do not understand the rush to retire older F-15s and the A-10. If in fact we need more aircraft, more flying time, it doesn't make a lot of sense to send these airframes to the boneyard at Davis-Monthan Air Force Base, Ariz. I experienced WWII as a kid and the Cold War in B-47s, so it is fair enough for you to label my views as dated.

However, there are some things which never change—wars never, and I repeat never, are fought and experienced the way we planners (and I was one once) think war will come our way. In 1948, I lived in a refugee camp adjacent to an air base that was to become one of the Berlin Airlift bases of 1948-49.

We, the United States, had disarmed to a point that once Soviet Dictator Jo-

WRITE TO US

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AFA's Mission

Our mission is to promote dominant U.S. Air and Space Forces as the foundation of a strong National Defense; to honor and support our Airmen, Guardians, and their Families; and to remember and respect our enduring Heritage.

To accomplish this, we:

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

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seph Stalin isolated the city we had no conventional military to speak of, and the A-bomb, it turned out, was not a viable option. The Berlin airlift option was a last straw so to speak, and the Pentagon leadership fully expected it to fail. It didn't, and as a kid I was inspired by those airlift flyers to become one of them.

Only a few years later Korea stared us in the face. We were going to fight that war with our new jet, the P-80. Well, the P-80 couldn't handle the rough field conditions in Korea so the P-51, a WWII fighter, carried the burden. It was not an ideal aircraft for a low-level close air support mission with a liquid cooled engine.

Come Vietnam the situation was even worse, the U.S. Air Force apparently had forgotten how to build tactical fighters and bombers. So we fought the war with Navy designs: F-4, A-7, B-66.

Our own inventory of F-102/-106/-104 fighters was useless in that war. Fortunately, the TAC leadership had wanted to get into the nuclear business with a fighter, that's where the money was, which resulted in the F-105. Built to carry nukes, but it became one of our principal ground attack aircraft against North Vietnam. In the south, the F-100, not ideal for the close air support mission, carried the load, and our unwillingness to listen to the Army's needs then resulted in the A-10—the best close air support aircraft ever built, bar none.

Thank you for bearing with me, my point is twofold: one, you fight with what you have; two, war is always different than what you planned for.

For the tactical force it is absolutely essential to be able to cover a broad threat spectrum, and no single airframe has been able do that in the past nor will there be such an airplane in the future. When I served in Ops at Hq USAFE under Col. Wilbur Creech, we had a cartoon on the walls of our offices of a tank flying close air support and counterair—the impossible dream.

Yes, we need to make our case to our civilian leadership for more aircraft, flying hours and so on, but we also need to look at ourselves for how we are using what we have. And I am making a strong case that we in the past have done a poor job at that, and not doing so well at the present.

Go make our case to the civilian leadership for what we believe we need for our survival, in the mean time use our on-hand resources as best as we can—and sending them to the boneyard is not a solution for either war or training.

Col. Wolfgang W. E. Samuel,
USAF (Ret.)
Fairfax Station, Va.

What a Difference ...

Twenty-nine years ago (Jun. 25, 1996), Iranian-trained and -financed terrorists detonated a sewage truck laden with 20,000 to 30,000 pounds of explosives just outside our Khobar Towers perimeter in Saudi Arabia. During those years whenever terrorism against America was a topic, the haunting "day after" photo showing the remains of the Khobar Towers building nearest the bomb was often included.

As it did in real time then, that scene still evokes in me deep sadness at the U.S. Air Force casualties (19 killed and 500 wounded) resulting from the blast ... and deep anger at the terrorists who attacked us with a cowardly drive-by bombing.

Within hours of the bombing President Bill Clinton spoke to the nation, "We will pursue this. America takes care of our own. Those who did this must not go unpunished."

They were appropriate words ... but, tragically, the action that followed was not. Instead of going after the terrorists who killed and wounded the people they are supposed to represent and protect, America's politicians were determined "not to let a good crisis go the waste" and focused on political agendas.

With a fawning media and an Intel-

ligence Community looking for absolution, they had plenty of help. Sadly, what unfolded is not a new story ... nor are its results. During the 29 years since the Khobar attack, not only has Iran's terrorism been responsible for murdering many more Americans, but the wistful thinking and pandering of our political leaders have enabled them to continue doing it.

The terrorist attack at Khobar Towers is but one example. Its many conflicting investigations underline the point. In the end, the political agendas overrode the facts. Even the evidence showing Iran's direct involvement was stifled. Then-FBI Director Louis J. Freeh makes this plain in his book, "My FBI," as he described the national security adviser's reaction to the Iran involvement proof.

"He was more interested in managing the news than rendering justice ... and had brought Script A and B options to spin the story." Instead of focusing on combating terrorism and improving our national security, the President's national security adviser was focused on "looking good" politically.

With Khobar Towers, the administration decided not to blame or act against the terrorists ... but instead, chose to scapegoat those they had sent into harm's way. After all there were casualties ... so as Sen. Joe Lieberman (D-Conn.) declared, "Somebody had to have screwed up."

The spinning included new buzz words like "force protection" which soon became the Department of Defense's number one priority. Reorganizing for the new mantra went into hyperdrive as did the promulgation of new policies and regulations. The 4404th Wing that I had commanded with its 11 sites in five countries ... one of which was my Hq. in Dhahran, Saudi Arabia, where Khobar Towers was located was included. "It was just too big a wing for one commander" was the rationale.

What good did the buzz words, reorganizations, new policies, and regulations do to thwart the terrorists? The 1998 attack against our embassies in Kenya and Tanzania; the 2000 attack against the USS Cole; the 911 attack against our homeland; the 2012 attack against our Benghazi consulate; the 2021 attack at Abbey Gate; and many others, tell us not very much.

The prevailing theme in the ensuing investigations remained the same. Political agendas overrode the facts. "Looking good" politically was more important than improving national security. If either was not true, subsequent attacks could have been significantly mitigated ... or avoided altogether. But they weren't. (My self-published book, "Collecting the Scars: The Tragedy of Khobar Towers and the Battlefields Beyond" offers more detail.)

America's action against Iran June 21 was different. This time our political leaders weren't focused on "looking good" politically. This time they didn't do the "easy" thing by scapegoating those they sent to war. This time they focused on America's national security. This time they went after the no-kidding bad guys.

It's a welcome change. After 29 years, it's also about damn time.

Brig. Gen. Terry Schwalier,
USAF (Ret.)
Knoxville, Tenn.

Waiting in the Wings

Who knew when your 2025 Almanac edition went to press that a future cover photo and feature story would be buried on page 161. Depicted there is a B-2 Spirit with a GBU-57 Massive Ordinance Penetrator (MOP) just emerging from its belly.

Overnight, that tag team has become more famous than the Gallagher brothers wrestling duo that I used to devotedly watch on B&W TV in my youth.

Depending on your political persuasion and media outlets of choice, opinions will likely vary on the long-term benefits of the B-2's bombing of Iranian nuclear facilities during Operation Midnight Hammer.

There can be no doubt however that from a mission perspective things went off seemingly without a hitch. No offense to Bobby Thomson of the New York baseball Giants, but this impressive joint-coalition endeavor will go down in the annals of airpower history as the "shot heard 'round the world."

I've never been prouder to be a member of the Air Force family! I can't wait to read your magazine's future minute-by-minute rundown on this momentous military undertaking.

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

Checklist

With regards to the June 21 U.S. Air Force B-2 bombing on Iran's nuclear enrichment complex, some of the critical takeaways from the Fordow attack include:

1. Stealth works.
2. Global Reach is essential.
3. Precision is vital.
4. Excellence in personnel and training is a must.

William Thayer
San Diego

To Each Their Own

The stylistic eagle graphics that appear in the Almanac 2025, on the cover and elsewhere, are beautiful but childish. Dressing an eagle with combat gear may appeal to a 9 year old who likes fantasy video games, but sends an entirely different message to serious adult readers.

Col. Dennis Beebe,
USAF (Ret.)
Solvang, Calif.

From the editor: *This year's was our 75th annual Almanac edition, a tradition that began in 1950. Those earliest Almanacs featured a variety of cover concepts, both illustrations and photographs. The first Almanac to feature an eagle was 1992, and since 1997, every Almanac has featured eagles in one form or another. With the creation of the Space Force, every cover since 2020 has featured two eagles. Perhaps that was foreshadowed by that very first Eagle cover 33 years ago, which displayed a mother eagle and her hatchling.*

Globally Deployed, Combat Proven – All Platforms, All Weapons, One Solution

Today's armament maintainers are tasked with performing flightline (O-Level) maintenance with an assortment of legacy test sets that greatly limit the ability to quickly and efficiently verify armament system readiness, diagnose failures, and ultimately return the aircraft to full mission capable (FMC) status. Legacy test sets typically support only a single aircraft or perform a single function across multiple aircraft, increasing training and logistics challenges, and longer than necessary test and repair times. This not only impacts armament maintainer effectiveness, but limits the realization of Agile Combat Employment (ACE) and the development of Mission-Ready Airmen.

Table 1. O-Level Test Set Replacement Matrix

Platform	Legacy Armament Test Set(s)	Next Gen Armament Test Set
F-15C / E / EX	-198, -199	 MTS-3060A SmartCan™
F-16	5060, SST, FIST (ALE-50)	
F-22	COLT, SWAT	
A10	MSLTS, Stray Voltage Test Set, PATS 70A	
F-35	WRAP, Stray Voltage Test Set	
B-2	COLT	
B-52	Mustang	
MQ-9	AMW-103	
All	A/C Countermeasure Dispenser Test Set	
Note: MTS-3060A SmartCan currently deployed as a replacemnt for these test sets		

The need for a universal armament test solution—easy to use, portable, rugged, with rapid setup and commonality across all platforms and weapons— is increasingly critical on the flightline. Working closely with armament maintainers from across the globe, both DOD and Allies, Marvin Test Solutions (MTS) identified essential capabilities required for supporting legacy, current, and future generation platforms and weapons systems. The outcome of this effort resulted in the widely deployed and combat proven MTS-3060A SmartCan™ Universal Armament Test Set eliminating the burden of multiple aircraft-specific test sets. A typical SmartCan kit, with all associated cables and adaptors contained in a single carry case, can replace over a dozen legacy flightline test sets across USAF fighters and UASs. It further supports a broader implementation for bombers and surface-to-air defensive systems as needed. (See Table 1 for additional details.)

All fielded aircraft—manned and unmanned, rotary and fixed-wing—can utilize a single SmartCan, eliminating multiple aircraft-specific armament test sets on the flightline. Test results and measurement variances for each weapon are displayed real-time for review, analysis, and fault-isolation. Additionally, test log files can easily be moved or copied for printing and analysis, supporting predictive maintenance initiatives.

Unlike legacy handheld test sets that only perform stray voltage and continuity tests, the SmartCan implements functional/active MIL-STD-1760 testing to verify armament readiness before weapons loading. It supports communication channels for all existing munitions protocols, enabling full system tests of legacy and smart weapons, pre-load and functional checks, multiple squib signals, and superior cross-fire tests unmatched by existing O-Level test sets.

SmartCan's four-year calibration cycle dramatically reduces sustainment burdens. Combined with flexible software updates and multi-weapon capabilities, SmartCan ensures continued relevance for future-generation platforms and munitions.

The rugged design, ergonomic layout, and small footprint enables field operation anywhere in the world, making it the ultimate tool for flightline armament test. Qualified to MIL-PRF-28800F Class 1, MIL-STD-810C, and MIL-STD-461F, SmartCan reliably operates under extreme environmental conditions. Battery operation enhances field usability; standard AA batteries coupled with innovative power management enable over 40 hours of continuous testing without battery replacements.

Test setup and execution times are also significantly improved reduced—F-16 setup times are reduced by an impressive 91%. Similarly, test execution times for an F-16 pylon utilizing MIL-STD-1760 with LAU-129 launcher tests for AIM-120 and AIM-9X showed reductions of 85% and 89%, respectively. (See Table 2 for additional details.)

Advanced cybersecurity protections further differentiate SmartCan, establishing it as the most cyber-secure O-Level test set. Enhanced features include data encryption, a custom operating system, NIST-certified software for Test Program Set (TPS) development, and a removable secure data (SD) card. This ensures no sensitive data remains when the card is removed, complying with stringent DOD information assurance standards.

Table 2. F-16 Setup / Test Time Comparison

	Test Time Improvement			
	PYLON WITH MIL-STD-1760 UMBILICAL	LAU-129 WITH AIM-120 AND AIM-9	SETUP	WEIGHT (LBS.)
EFFICIENCY IMPROVEMENT W/ MTS-3060A SMARTCAN	85%	89%	91%	95%

The ability to streamline TPS development and release cycles is another unique advantage of the SmartCan. ATEasy™ and SmartCanEasy create a powerful integrated TPS development environment. Deployed on 14 platforms across 21 countries, SmartCan has endorsements from Lockheed Martin and the USAF F-16 System Program Office with SERD #75A77, along with granted cybersecurity authority to operate (ATO). Additionally, SmartCan was successfully evaluated during AFWERX's ACE CASE initiative, proving its unmatched versatility, cyber resilience, and operational efficiency. SmartCan is the most advanced O-Level armament test set available, capable of testing all Alternate Mission Equipment (AME) and Aircraft Armament Equipment (AAE) including pylons, launchers, bomb racks, guns, and pods. It delivers the quickest setup and execution times with reduced training needs, a small logistics footprint, enhanced cybersecurity, and superior active armament test capabilities—all designed to maximize warfighter readiness and combat effectiveness.

By John A. Tirpak

NATO Members Sign Up for More Spending

NATO appears to be getting serious about spending enough on defense to keep Russia and other threats at bay. In the June NATO summit at The Hague, Netherlands, members vaulted past the alliance's long-standing goal—never quite achieved—of all members spending at least 2 percent of their gross domestic products on defense. Instead, member states committed to spend 5 percent of GDP over the next 10 years. The bar could be set even higher in the future.

NATO allies have "laid the foundations for a stronger, fairer and more lethal NATO," said Secretary-General Mark Rutte at the close of the summit. The spending increase "will fuel a quantum leap in our collective defense."

The meeting included extensive discussions on how members can better integrate their collective defense industries to generate needed equipment.

Citing the "long-term threat" from Russia and other "profound security threats and challenges," NATO's end-of-meeting communique said members committed to "invest 5 percent of GDP annually on core defense requirements as well as defense- and security-related spending by 2035."

NATO

President Donald Trump (left), NATO Secretary General Mark Rutte, and Dick Schoof (Prime Minister, the Netherlands) during the meeting of the North Atlantic Council at the 2025 NATO Summit in The Hague, Netherlands, in June.

Championing the 5 percent goal were Poland, the Baltic States and NATO's newest members, Finland and Sweden, all of whom share a border with Russia. They were joined by the U.S., France, Germany, the Netherlands, and the U.K.

"Our investments will ensure we have the forces, capabilities, resources, infrastructure, warfighting readiness, and resilience needed to deter and defend in line with our three core tasks … deterrence and defense, crisis prevention and management, and cooperative security," NATO declared.

Whether member states can get to the 5 percent level remains to be seen. NATO set the goal of investing 2 percent of each member state's GDP in 2006. As of the end of 2024, only 22 of NATO's 32 treaty partners had met the mark.

The U.S. has spent an average of about 3.5 percent of GDP on defense since the mid-2010s, down from a modern high of 4.9 percent in 2010. For 2025 and 2026, even with the $150 billion in one-time plus-ups from the "so-called" Big Beautiful Bill Act passed in early July, U.S. defense spending will be just 3.2 percent of GDP. President Donald Trump said at the summit that the U.S. should be excused from the new spending goal because he believes "we're … there already."

NATO's new 5 percent target comes in two parts. Members agreed to spend 3.5 percent of GDP on actual military items, such as troops, combat aircraft, munitions, artillery, vehicles, and ships. Members can achieve the other 1.5 percent by investing in infrastructure that NATO forces will need in wartime—roads, rail, ports, airfields—or on cybersecurity, civil preparedness, hardening power, and communications for increased "resilience" or by directly contributing war materiel or cash to Ukraine in its fight against Russia.

ALL FOR ONE AND ONE FOR ALL

Alliance members also reasserted their "ironclad commitment to collective defense," known as Article 5 of the NATO treaty, which declares that an attack on one member is considered an attack on all, and that all will respond to an aggression on any member. It was first invoked after the 9/11 attacks on the U.S. in 2001.

The reassertion of Article 5 seems to be the other side of a deal that President Trump has pressed for over the years with dire hints that the U.S. might not come to the aid of its European allies in the event of a foreign threat unless NATO members spend more for their defense.

The U.S. provides much of NATO's combat power and nearly all of its nuclear forces for strategic deterrence. Some 84,000 U.S. troops are deployed to Europe in direct support of NATO.

As recently as June, Trump answered cryptically when questioned about whether the U.S. would respond if a fellow NATO member was attacked: That depends, he said, "on your definition" of attack.

At the Summit, however, he voiced clear support for Article 5:

"I stand with it," he said. "If I didn't ... I wouldn't be here."

GETTING TO 5 PERCENT

Rather than set the 5 percent goal and hope for the best, NATO members established an annual review process. The allies agreed "to submit annual plans showing a credible, incremental path to reach this goal," the communique stated.

"The trajectory and balance of spending under this plan will be reviewed in 2029, in light of the strategic environment and updated capability targets," NATO announced. By then, after the next U.S. presidential election and depending on the state of war in Ukraine, among other factors, NATO will assess the situation. The allies also agreed to hold to a 2014 pledge to spend 20 percent of their defense investments on "major equipment."

Despite the stronger wording than in past goal-setting steps, NATO has no forcing mechanism to compel members to meet such commitments. While Germany is doubling its defense budget through 2029, others such as Spain, have balked. Spain has said it will hit the 2 percent goal this year and meet all its obligations to NATO by raising spending to 2.1 percent by 2029.

Pedro Sanchez, the Spanish prime minister, called the 5 percent goal economically "counterproductive" for that country, as it might require cuts to public health and education. But Spain, along with Belgium and Italy, nevertheless support the overall goal, although the three sought a 10-year timetable to reach the new standard.

German Chancellor Friedrich Merz, spelling out his nation's defense spending plans earlier this year, committed to building "the strongest conventional army in Europe." This he said, is "not to do the United States a favor, but because Russia actively threatens the freedom of the entire Euro-Atlantic region."

Germany will hit the 3.5 percent of GDP defense spending goal by 2029, raising its defense budget from roughly $100 billion in 2025—about 2.4 percent of GDP—to $190 billion over that span, including military aid to Ukraine.

Poland and the Baltic states, closer to Russia and more fearful of its ambitions, argued that the five-year timetable is too slow and that even the 2 percent benchmark might not be achieved before the Ukraine war ends.

Finnish President Alexander Stubb called the new spending targets "the birth of a new [and] ... more balanced NATO" and said they will return the alliance "to the defense expenditure levels of the Cold War." He called the increases "a big win ... for both President Trump and ... for Europe."

But as if to demonstrate the varying level of commitment across the spectrum of NATO members, Slovakia declined to commit to a future spending figure.

LET KIEV DO IT

Ukraine's desire to become a NATO member and gain the security of having NATO's full military commitment in its defense against Russia's invasion remains unfulfilled. NATO reiterated that Ukraine's security "contributes to ours," and by counting "direct contributions toward Ukraine's defense and its defense industry when calculating" members' defense spending, the alliance acknowledged that aid as roughly equivalent to national defense investment.

Admission to NATO must be unanimous among current members, and the Trump administration has put off such consideration indefinitely.

Since the war in Ukraine began, most NATO members—as well as a broader coalition of non-NATO members of the European Union and others—have contributed cash, as well as both lethal and nonlethal aid to Kiev. The 57-nation Ukraine Defense Contact Group—comprising armaments directors from all NATO nations—has met regularly to discuss how to meet Ukraine's needs for ammunition and other weapons. The group has moved to remove supply chain obstacles, donate materiel from member military forces, standardize the provision of equipment where possible, and plan out same-item production in multiple countries, such as 155 mm artillery shells.

NEW EMPHASIS ON SHARED PRODUCTION

The communique says that NATO reaffirms "our shared commitment to rapidly expand transatlantic defense industrial cooperation," and "harness emerging technology and the spirit of innovation to advance our collective security." NATO will "work to eliminate defense trade barriers among allies and will leverage our partnerships to promote defense industrial cooperation."

The verbiage resulted from sidebar discussions among members that the alliance needs not only to spend more, but spend wisely, and indicates a consensus to jointly develop new defense technologies and spread production out across many countries.

These conclusions have been gelling in NATO for at least two years and address some of the production shortfalls that the contact group has warned of in previous summits. The language also signals a heightened focus on Alliance readiness and sustainability.

NATO Defense ministers meeting in Brussels in February—ironing out details that would be finalized at the June summit—noted that they are quickening the pace of moving to standardize NATO armaments and equipment.

"The Alliance's role as a convener, standard setter, requirements setter and aggregator, and delivery enabler, has been increasingly leveraged to expand defense industrial capacity, and recent actions taken have set a framework for allies to better deliver against their NATO capability targets," the defense ministers said in their concluding statements. They noted that at last year's summit in Washington, NATO members took an "Industrial Capacity Expansion Pledge," which "outlines the commitment to accelerate the growth of defense industrial capacity and production across the Alliance; foster a sustainable, innovative and competitive industrial base, where reciprocal cooperation and openness are the norm; shore up industrial resilience, deliver critical capabilities urgently, and increase large-scale, multinational procurement."

The defense ministers also agreed "develop and share" their countries' national military plans and strategies with alliance partners, update the plans frequently, and report to the group their "measurable outcomes" toward modernization.

Echoing domestic discussions in the U.S. defense industrial base, the ministers said they would ensure suppliers had "increased insight," "clear demand signals," and where possible, "long-term orders." They also pledged to use multiyear and multinational procurement contracts for priority equipment.

Homework for the defense ministers includes identifying and reporting on risks to their critical defense manufacturing capabilities, supply chains, and access to key raw materials and components. Non-U.S. countries will also explore creating U.S.-style materials stockpiles and present "mitigating solutions" that could benefit the entire alliance.

The ministers also pledged to partner with Ukraine's defense industry "to the fullest extent" to help that country indigenously produce as much war materiel as possible.

Air Force Gen. Alexus G. Grynkewich, in his Senate confirmation hearing to become Supreme Allied Commander of NATO and head of U.S. European Command, emphasized that a strong NATO, "capable of defending Europe, remains essential to American interests."

Maj. Joshua Burress, a pilot with the Air Force Thunderbirds Demonstration Squadron, prepares to take on fuel from a KC-135 Stratotanker. The Thunderbirds will perform at least 32 times this summer across the United States.

Staff Sgt. Ivy Thomas

Three pararescuemen leapt from the ramp of an HC-130J Combat King II over Jean Lake Bed, Nev., in June. Jumping from 6,000 feet, they were competing in the PJ Rodeo, with other pararescuemen from all of the Air Force's major commands. The Air Force employs about 630 pararescuemen or 1Z1s across the force, one of just four Air Force specialties that remain open to men alone.

Staff Sgt. Jose Miguel T. Tamondong

A SpaceX Falcon 9 rocket launched into space from Space Launch Complex 40 at Cape Canaveral Space Force Station, Fla., in June, carrying additional satellites for SiriusXM. SpaceX has more than 86 launches scheduled from the Cape in 2025. Even when the payloads are commercial, the Space Force remains intimately involved in every launch.

U.S. Space Force photo illustration by Robert Mason

An AC-130J Ghostrider flies near Hurlburt Field, Fla., in a flight commemorating the 35th anniversary of Air Force Special Operations Command. In 1980, a decade before AFSOC's founding, Operation Eagle Claw, a failed mission to rescue American hostages that ended in catastrophe, fueled a national commitment to ensure greater success in future special missions. Since its founding, AFSOC commandos have earned more than 400 Bronze Star Medals with Valor, 64 Silver Stars, 12 Air Force Crosses, 123 Distinguished Flying Crosses, and one Medal of Honor.

Airman 1st Class Tori Haudenschild

VERBATIM

Loyal Wingman

"With this flight, we mark a crucial step in developing capabilities that harness human-machine teaming to overcome complex threats and expand our advantages. ... By developing and integrating autonomous platforms with manned systems, we can quickly adapt, increase combat effectiveness, and reduce risk to our aircrews in contested environments."

Keith Lewis

—Brig. Gen. Jason E. Bartolomei, commander of the Air Force Research Laboratory, after U.S. Air Force fighter pilots integrated two Kratos XQ-58A Valkyrie drones into an aerial combat training exercise at Eglin Air Force Base, Fla., on July 3 advancing human-machine teaming and training.

More Mission, More Budget

"The new missions that are being asked of the Space Force to contest the domain of space, which has become a new warfighting domain, are going to require a new level of resources, and that means we are going to need more in order to accomplish the missions that we've been given."

—Chief of Space Operations Gen. B. Chance Saltzman, testifying before the Senate Appropriations defense subcommittee, June 26.

A-10 Scar Tissue

"We wouldn't be having this discussion about the A-10 if we had optimized the deliveries of the F 35A. The F-35 was designed to replace the F-117, the A-10 and F-15E model, but we truncated the buy of the of the aircraft. ...Now, we have to make decisions on heritage inventory ... It's a self-defeating, circular argument. You know, you can't buy more [F-35s]; ... that forces you to keep the older [aircraft], but you can't get rid of the older ones because you're not buying enough of the newer. ... So it's like [pilot-induced oscillation], ... just freeze the stick. Go back and figure out what's the delivery schedule that we need."

Master Sgt. Mark Bucher

—Former Chief of Staff Gen. T. Michael Moseley on how the Air Force wound up struggling with its "divest to invest" plan, particularly on the A-10, when it needs as many 5th-generation or better fighters "as fast as we can get them" [AFA Mitchell Institute media roundtable, July 7].

Senior Airman Wyatt Stabler

DISRUPTION, NOT MANAGEMENT

"There's often this misperception that DARPA's a bunch of cowboys and we're shooting from the hip, and every once in a while, we get lucky. Nothing could be further from the truth. The reason that we have earned, after more than 60 years ... this right to take these audacious shots at these disruptive things—and often fail—is because the Pentagon leadership, Congress, American taxpayers, they know that when we fail, we fail for the right reasons, because we are pushing beyond the state of the art ... [toward the] ... impossible, not because we mismanaged our program. ... But ... we don't do research for research sake. On Day One of every DARPA program, we start with the impact objective. How is this program going to change the world in some way that improves our national security? And then the whole program is designed and executed to go achieve that impact. ... Our objective is to maximize the probability of finding massive disruptions, not efficiently leveraging work in any one program."

—Rob McHenry, deputy director of the Defense Advanced Research Projects Agency, [AFA Mitchell Institute "Aerospace Nation" webinar, June 25].

Let There Be No Doubt

"Our B-2s went in and out of ... these nuclear sites, in and out and back without the world knowing at all. ... It was historic, a strike that included the longest B-2 Spirit bomber mission since 2001 and the first operational employment of the MOP, a massive ordinance penetrator. The mission demonstrated to the world the level of joint and allied integration that speak to the strength of our alliances and our joint forces. As President Trump has stated, the United States does not seek war, but let me be clear: We will act swiftly and decisively when our people, our partners or our interests are threatened."

— Defense Secretary Pete Hegseth, June 20, on the U.S. strikes on Iran's nuclear sites.

ONE BUDGET, TWO BILLS

When I came into the position ... one of the things that surprised me was the level of modernization going on in pretty much every mission area. ... I think to be able to maintain that, as well as maintain readiness, ... the one budget, two bills total—the total request from the Department of the Air Force perspective—we will need a comparable top line going forward to do everything that we're being asked to do right now."

—Air Force Secretary Troy Meink, testifying before the Senate Appropriations defense subcommittee, June 26.

FACES OF THE FORCE

1st Lt. Heather Cozad-Staley

Tech. Sgt. Michelle Doolittle, a vocalist in the U.S. Air Forces in Europe-Air Forces Africa Band, honors her heritage through music and military service as the great-grandniece of Gen. Jimmy Doolittle, famed for the 1942 Doolittle Raid. At Ramstein AB, Germany, representing U.S. Airmen across Europe, she uses performance to strengthen international ties and preserve World War II history. At the 81st D-Day anniversary on June 7, she returned in uniform (visiting as a spectator in 2023), calling it "truly an honor." Inspired by her great-granduncle's legacy and character, she said, "He was setting records and revolutionizing aviation long before World War II made him a household name." For her, music is more than art—it's a bridge between past and present, unity and remembrance.

Via Facebook

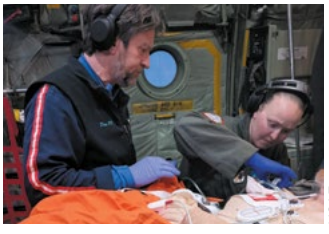
2nd Lt. Wyatt Hendrickson, an Air Force officer and Oklahoma State wrestler, was named the nation's top college wrestler after winning the 2025 Dan Hodge Trophy. The honor follows his NCAA heavyweight championship win and Big 12 Wrestler of the Year title. Competing through the Department of the Air Force's World Class Athlete Program, Hendrickson is now training for the 2028 Olympics. "For the next three years, my main job will be representing the Air Force on the wrestling mat," he said. After the World Class Athlete Program, Hendrickson plans to continue his military career as an acquisitions officer and fulfill his obligation.

Staff Sgt. Jessica Montano

Chief Master Mike Kassebaum spent four decades blending martial arts and military values. Now the honorary commander of the 343rd Recruiting Squadron at Offutt Air Force Base, Neb., brings legacy rooted in discipline, mentorship, and service. Kassebaum began training in 1984 and now holds an eight-degree black belt. He owns and operates Kassebaum's Martial Arts and Krav Maga where he trains students from 3 years to over 70—including Active-duty military members and veterans. His leadership mirrors the Air Force's core values—integrity, service, and excellence. "Martial arts gave me structure, confidence, and focus," he said. Through his role, he hopes to support recruiting efforts and help Airmen grow. His story exemplifies the impact of mentorship and commitment to lifelong learning.

Senior Airman Alexis Morris

Master Sgt. Eric Robbins, a 512th Civil Engineer Squadron Reservist and Philadelphia police officer, was named a Hometown Hero by 6ABC Action News after saving a 5-year-old from a rooftop. Responding to a call in 2024, Robbins acted quickly—racing through an apartment, climbing to the roof, and pulling the nonverbal child to safety who was 'tippy toes over the edge.'" "I just knew I had to get to the roof," he said. With 19 years of military service operating heavy equipment and a passion for public safety, Robbins now hopes to join the police SWAT team. The rescue reflects his instinct to act in the face of danger—shaped by decades of service and training.

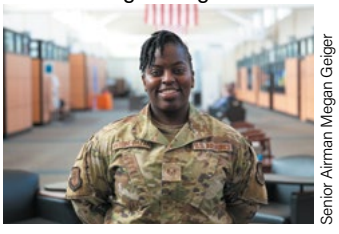


USAF

Members of the Wyoming Air National Guard's 187th Aeromedical Evacuation Squadron helped save a contractor suffering cardiac arrest at McMurdo Station, Antarctica—the first successful evacuation of its kind in more than 35 years. Facing blizzards, subzero temperatures and limited daylight, **Maj. Nate Krueger** and **Master Sgt. Lyndsey Glotfelty** led lifesaving efforts across a 2,500-mile airlift to New Zealand. The Temperature was nearly minus-31 degrees Fahrenheit "This was more than a mission—it was a life saved against all odds," said Brig. Gen. Michelle Mulberry. Their success shows how training, precision, and global partnerships can deliver hope even in the planet's most unforgiving conditions.

Courtesy

Airman 1st Class Carissa Fisher, 107th Attack Wing, New York Air National Guard, donated part of her liver to save her former preschool student, 5-year-old Ezra Toczek. After seeing a social media post about this urgent need for a transplant, Fisher—who knew her blood type from military service—learned she was a perfect match. Toczek was in end-stage liver failure. The surgery took place in August 2024 and was a success. "Donating part of my liver to Ezra wasn't just about saving a life. It gave me even deeper purpose," she said. Fisher's selfless choice reflects the heart of service: showing up, stepping in, and making a difference beyond expectations.



Senior Airman Megan Geiger

Staff Sgt. Briana Antoine-Bazan, an information controller with the 62nd Aerial Port Squadron, uses her artistic talent to uplift others across Joint Base Lewis-McChord, Wash. From designing unit coins to creating custom artwork for pediatric hospital patients—even during her own cancer treatment—Antoine's creativity brings comfort and connection. "I found something to do that made me happy," she said, recalling how she painted children's favorite cartoons to brighten hospital walls. Whether through vibrant portraits or heartfelt designs, Antoine's work reflects her deep care for those around her. Her art doesn't just decorate spaces—it strengthens the spirit of the community she serves.

Airman 1st Class Michael Sanders

Senior Airman Trevor Thrasher, an aerospace medical technician at Creech Air Force Base, Nev., rescued a drowning teen caught in a rip current in California near his hometown just before leaving for Ranger School. Relying on instinct and former lifeguard training, he kept the swimmer calm until help arrived. Thrasher completed the grueling 62-day Army Ranger School, becoming one of just 355 Airmen to earn the Ranger tab. "The military demands people who rise to the occasion. ... Leadership isn't about how you perform when things are easy," he said, "but how you hold yourself when everything is hard." After graduating, he received the Air and Space Achievement Medal.

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

OPERATION MIDNIGHT HAMMER

Air Force photo

One of the seven B-2 Spirit bombers to strike Iran's nuclear sites in June takes off from Whiteman Air Force Base, Mo. The strike demonstrated the value of air superiority and the unique capacity and capability of these unique U.S. bombers.

Smackdown in Iran

'15 years of incredible work'—the inside story of Operation Midnight Hammer.

By Chris Gordon

The 36-hour operation to fly deep into Iranian airspace in June and destroy three heavily fortified nuclear complexes began more than 15 years ago with the discovery of a major construction complex among the remote mountains of northwest Iran.

It ended June 22 with the homecoming of seven B-2 Spirit bombers—more than a third of the entire fleet—which had delivered without incident 14 30,000-pound Massive Ordnance Penetrators on Iran's three nuclear sites.

The U.S. began grappling with the challenge of how to destroy the Fordow mountain complex after Iran began building it in 2006. An analyst at the Defense Threat Reduction Agency (DTRA) was first shown the photos of the site and started work on how to counter it three years later. DTRA is a little-known agency headquartered at Fort Belvoir, Va., a short drive from the Pentagon, with the mission to counter weapons of mass destruction.

"For more than 15 years, this officer and his teammate lived and breathed this single target: Fordow, a critical element of Iran's nuclear weapons program," said Chairman of the Joint Chiefs of Staff Gen. Dan Caine. "He watched the Iranians dig it out. He watched the construction, the weather, the discarded material, the geology, the construction materials, where the materials came from. He looked at the vent shaft, the exhaust shaft, the electrical systems, the environmental control systems—every nook, every crater, every piece of equipment going in, and every piece of equipment going out."

The task was painstaking, with no guarantee the U.S. would ever decide to act on the knowledge.

"We have some incredibly gifted and smart people within the DTRA agency … if you watch "James Bond" films, they're kind of like those folks that work in Q that come up with these incredible solutions to difficult problems that have tremendous and successful effects in the end," a senior military official told reporters.

Uranium enrichment is believed to have begun at Fordow in late 2011. The Iranians have insisted their program is peaceful, but Western officials long ago concluded the enrichment was really intended to enable Iran to make its own nuclear weapons.

In March, U.S. intelligence officials warned in a report to Congress that "there has been an erosion of a decadeslong

Kashif Basharat

Gen. Dan Caine, Chairman of the Joint Chiefs of Staff, briefing reporters on Operation Midnight Hammer, used a weapons test to demonstrate the destructive power of a Massive Ordnance Penetrator.

taboo on discussing nuclear weapons in public" in Iran, and that this had "emboldened nuclear weapons advocates within Iran's decision-making apparatus." But as of then, intelligence officials said, Iran's Supreme Leader, Ayatollah Ali Khamenei, had yet to give the go-ahead to produce a nuclear weapon.

Fordow was key to Iran's ability to do so, and the question of whether or when Iran would take that next step had preoccupied world leaders for more than a decade. "You do not build a multilayered underground bunker complex with centrifuges and other equipment in a mountain for any peaceful purpose," Caine said.

But how do you destroy a complex buried deep beneath a mountain, intelligence and military analysts wondered. "They began a journey to work with industry and other tacticians to develop the GBU-57," Caine said.

The GBU-57 Massive Ordnance Penetrator, or "MOP," is armed with a warhead encased in steel and fused to blow up an estimated 200 feet underground. Under development since 2004 by the Air Force and DTRA, the weapon has been updated and refined multiple times since then.

"Obviously, we did not build Fordow in the United States and test it," a senior defense official told reporters. "What we do try to do is test in what we call a threat-representative environment. And in this case, we built a test site to test the munitions against, in collaboration with the Air Force and test organization, to try to ascertain the effects that the MOP would have in certain environments."

At a Pentagon press conference days after the bombing, he shared video from a December 2020 test.

"In the beginning of its development, we had so many Ph.D.s working on the MOP program doing modeling and simulation that we were quietly and in a secret way the biggest users of supercomputer hours within the United States of America," Caine said. "They tested it over and over again, tried different options, tried more after that. They accomplished hundreds of test shots and dropped many full-scale weapons against extremely realistic targets, all for a single purpose: Kill this target at the time and place of our nation's choosing."

Days after Israel launched its air war on Iran on June 12, Iran began working to protect its secret facility, sealing off the ventilation shafts with a massive layer of concrete, Caine said. "The planners had to account for this. They accounted for everything," he said.

Meanwhile, Israel campaigned to get the United States to finish the job it had started. Only the U.S. Air Force had the means and capacity to destroy those buried facilities.

On June 21, seven B-2s piloted by 14 Airmen, drawn from the Active-duty Air Force and the Missouri Air National Guard, and ranging in rank from captain to colonel, took off from Whiteman Air Force Base, Mo. While other B-2s headed west as a decoy, the seven headed east, crossed the Atlantic and then southward toward Iran. Over the Middle East, the bombers met up with U.S. fighter jets.

Recounting the mission later, Caine said a crew member told him on a video call that, that it "felt like the Super Bowl—the thousands of scientists, Airmen, and maintainers all coming together."

"We think, we develop, we train, we rehearse, we test, we evaluate every single day," Caine told a packed Pentagon pressroom. "And when the call comes to deliver, we do so."

Air Force Chief of Staff Gen. David W. Allvin, testifying at a Senate hearing June 26, said the Airmen involved all deserved credit for their parts in the operation. "There's a lot of success to go around here," he said. "They may not have fully understood the geostrategic impact it had, but they knew that was their job to do, and they knew that the mission depended on them. … The Air Force makes the ridiculously complex look routine," he added. "But that doesn't come without effort."

The fighter escorts led the strike package, launching some 30 munitions at Iranian surface-to-air systems, none of which engaged U.S. forces. Whether the Iranian systems were already blinded and rendered useless by the Israelis, or whether they could not combat the stealth jets overhead, or whether they simply held fire is unknown.

Six B-2s attacked Fordow first, dropping six bombs each on the two main ventilation shafts; the first bombs blew off the concrete covers to expose the shafts, then the next four penetrated deep into the facility. The sixth was a "flex" weapon in case of a weapons failure.

A seventh B-2 dropped two more MOPs on the Natanz complex.

Kashif Basharat

A B-2 Spirit returns to Whiteman Air Force Base, Mo., following Operation Midnight Hammer. Of 19 B-2s in the inventory, seven joined the raid and several others took part in a decoy operation, flying west, rather than east, at the start of the mission.

The GBU-57s create an "overpressure" effect, generating shockwaves deep underground. The bombs' fuses are calibrated to explode only after they have penetrated the rock and entered a subterranean facility.

Caine pointed to satellite imagery of the attack and the test video of the weapon's previous performance as evidence of the strike's success.

The pilots took off on their mission without telling anyone; families were informed of their secret mission on the evening of June 21—around the same time the world found out the United States had bombed the Fordow and Natanz sites and launched 30 Tomahawk cruise missiles at a third Iranian facility, Isfahan.

Initial reports about the bombing drew the ire of administration officials, who questioned the motives of whoever leaked that first Defense Intelligence Agency assessment, which suggested the attack might have only set Iran back "by months." That report was issued with "low confidence."

Asked for his own assessment, Caine declined. "The Joint Force does not do [battle damage assessment] by design," Caine said. "We don't grade our own homework. The Intelligence Community does."

But Secretary of Defense Pete Hegseth said the weapons had a "devastating effect." While Hegseth says that enriched uranium at Fordow was destroyed, the Iranians also had enriched urnaium at other sites, including Isfahan, which was attacked by cruise missiles and not the MOP. A senior Israeli official said the supply of enriched uranium at Isfahan is believed to have survived, but may be buried and hard to access. Pentagon chief spokesman Sean Parnell said the U.S. believes the strikes "degraded their program by one to two years."

It remains unclear how much equipment and materiel Iran was able to get out of the Fordow facility before it was attacked. Satellite imagery showed trucks, apparently loading up outside Fordow's entrance only days before the attack. It is unclear if enriched uranium had been moved from Fordow and if so, how much was removed and where it was taken.

Hegseth said he believed the U.S. hit "what we wanted to hit in those locations."

There is, however, little doubt that the B-2s executed one of the biggest and most grueling airstrike missions in history. All told, 125 aircraft took part, including refueling tankers, fourth-generation fighters, F-35s, and F-22s. The B-2s flew nonstop for 36 hours.

"Here's what we know following the attacks and the strikes on Fordow," Caine said. "First, that the weapons were built, tested, and loaded properly. [Second], the weapons were released on speed and on parameters. [Third], the weapons all guided to their intended targets and to their intended aim points. [Fourth], the weapons, they functioned as designed—meaning they exploded."

Quoting one of the pilots in a trailing jet, the Chairman recalled his description: "This was the brightest explosion that I've ever seen. It literally looked like daylight."

When the B-2s entered the landing pattern at Whiteman—one four-ship formation and a second three-ship formation—they were greeted with local news crews staged in Knob Noster, Mo. On June 25, Army Gen. Michael "Erik" Kurilla, the head of U.S. Central Command, congratulated the B-2 crews and maintainers in person at Whiteman, and Allvin and Secretary of the Air Force Troy Meink did the same on July 10.

"Operation Midnight Hammer was the culmination of those 15 years of incredible work," Caine said. "The aircrews, the tanker crews, the weapons crews that built the weapons, the load crews that loaded it. Our adversaries around the world should know that there are other DTRA team members out there studying targets for the same amount of time and will continue to do so."

AIR BASE DEFENSE

Experts Warn of Pacific Threats

Capt. Frank Spatt

Soldiers with the Army's 1st Air Defense Artillery Regiment align a training SM3 missile onto a MIM-104 Patriot during an exercise at Misawa Air Base, Japan. The Army is responsible for air base defense, but lacks the capacity to protect all bases at all times.

By Matthew Cox

Ukraine's drone strike on Russian bomber bases didn't just shock Russia—it also raised alarm among U.S. officials concerned that American military installations could also be vulnerable to attack.

Nicknamed "Operation Spiderweb," the daring June 1 operation prompted Defense Secretary Pete Hegseth and Chairman of the Joint Chiefs of Staff Gen. Dan Caine to review U.S. base defenses and accelerate counter-drone technology for installations at home and abroad.

"Cheaper, attritable, commercially available drones with small explosives represent a new threat, as was exemplified in that operation," Hegseth told Senate lawmakers June 11. "It's a critical reality of the modern battlefield that we have a responsibility to address."

Drones are only part of the problem: U.S. air bases in the Pacific are vulnerable to attack from long-range Chinese missiles, and cheap cruise missile technologies are proliferating around the globe.

Recent studies from AFA's Mitchell Institute for Aerospace Studies, the Hudson Institute, and RAND, the federally funded research firm, have all recommended over the past year that the Air Force increase its passive and active defenses, from rapid runway repair and blast-resistant shelters to directed energy defenses against drones and new air defense systems to shoot down larger missiles.

The Army is responsible for base defense, and most missile interceptor systems, such as Patriot, belong to the Army. But force protection is in short supply compared to the potential threats. The Air Force has more control over what it spends to harden air bases than it does over when and where the Army deploys Patriot and Terminal High Altitude Area Defense, or THAAD, batteries.

Dispersing forces can decrease vulnerability to attack, but ACE locations won't be invisible to China's space-based targeting systems. China has placed hundreds of satellites in orbit to form a network designed to track U.S. and allied forces in the Pacific.

Former Air Force Secretary Frank Kendall saw air base defense as a more glaring need for the Air Force than the future F-47 next-generation air dominance jet. "If we leave our bases vulnerable to attack, the F-22s, the F-35s, and the F-47s will never get off the ground," Kendall said on the "Defense & Aerospace Report" podcast.

TRACKING FOREIGN STOCKPILES

China has poured resources into developing long-range cruise and ballistic missiles to hold at risk U.S. air bases in the Pacific. China has also demonstrated drone swarms and, according to RAND, aims to be the "preeminent producer and user of such systems."

"China is capable of attacking all U.S. bases in the Indo-Pacific region," researchers wrote. Yet "air base defense has not kept pace with the continued technological threats to air bases and other military installations."

China's stockpile of intermediate-range ballistic missiles, which can travel up to 3,500 miles, has increased from just 20 missiles in 2012 to 500 missiles in 2023—a 2,400 percent increase, according to RAND. Researchers also noted similar upticks in medium-range ballistic missile launchers and missiles, which can travel up to 2,100 miles. Those ranges also may have grown, RAND added.

U.S. bases are well within those ranges. Kunsan Air Base

in South Korea sits less than 250 miles from China across the Yellow Sea; Kadena Air Base in Okinawa and Misawa Air Base in Japan are also within hundreds of miles. Andersen Air Force Base on Guam is now also in range of Chinese missiles, even though it is some 2,000 miles away.

LIMITS OF ARMY AIR DEFENSES

U.S. Army force-protection capabilities and capacity may not be aligned with the needs of air bases, said J. Michael Dahm, a retired Navy captain and China expert at AFA's Mitchell Institute for Aerospace Studies.

"It appears that the Army has prioritized ground-based air defense for Army units, first and foremost," said Dahm, who researches aerospace and China at the Mitchell Institute. Dahm authored a July 2024 report that concluded a lack of resources and funding caused air base protection in the Pacific to atrophy, even as threats grew in recent decades.

The Air Force's primary defense is tactical redistribution, employing what it calls agile combat employment to "move aircraft around the theater to find places that they can operate from, probably for a short period of time, then pick up and move somewhere else," Dahm said. "There could be greater investment in short-range air defenses," Dahm added, suggesting the Army should invest in mobile systems that can be loaded onto a Humvee-sized vehicle.

But Daniel Karbler, a retired Army lieutenant general at the Center for Strategic and International Studies' Missile Defense Project, disagreed that the Army had left the Air Force vulnerable. Karbler, who commanded the Army's Space and Missile Defense Command in 2019 and the Pacific-focused 94th Army Air and Missile Defense Command from 2012 to 2014, said the Army has recently begun to funnel resources toward air defense to rebuild a huge gap in short-range defenses.

"Yes, we protect our Army forces, but not every infantry platoon or armored platoon, or even company, is going to have an air defense branch element," Karbler said. "We have really pushed down counter-drone technology and capabilities, and we train these maneuver guys on using these systems, because we can't do it all. ... That's part of what the Air Force needs to look at, too."

GOING IT ALONE?

RAND, however, recommends the Air Force "conduct a serious cost-benefit analysis of fielding its own active defense capabilities, ones that are tailored for air base defense in Pacific and European threat environments," the report states. "'Free' defenses provided by the Army are understandably difficult to turn down but may simply be too limited in number and face too many compromises in capability to provide much real-world utility to a dispersed basing posture."

Long-range systems are extremely expensive. A single Patriot missile costs $3.8 million, and THAAD missiles cost about $8.4 million each, Dahm wrote. The Air Force evaluated comparatively cheap air defenses and concluded that the National Advanced Surface-to-Air Missile System could be a more cost-effective option. The NASAMS, which features repurposed AIM-9X and Advanced Medium-Range Air-to-Air Missiles, can deploy on C-130 cargo planes and consists of just three components: a radar, a fire control center, and a canister launcher.

Still, those are also pricey. Dahm said the Air Force probably should invest in technology with a lower cost per round, such as laser and microwave systems or even cannon-fired, maneuverable 30 mm to 155 mm projectiles.

"There is great promise in maneuvering projectiles," he said. "The threat is coming from a particular direction, you fire the maneuvering projectile in that direction, and it can maneuver within certain parameters as the inbound cruise missile or threat maneuvers in front of it."

An Army spokesperson told Air & Space Forces Magazine that the service's integrated air and missile defense is "undergoing the most significant modernization in its history" by adding troops and fielding the Integrated Battle Command System. IBCS is designed to improve the way sensors and shooters are integrated across the battlefield to increase capacity and depth.

Over the next several years, the Army is planning significant fieldings of THAAD and IBCS-adapted Patriot batteries, the Mobile Short Range Air Defense System, counter-drone weapons and other air defense systems, the spokesperson said without elaborating.

Experts say the Air Force should also prioritize funding so-called passive defenses that make installations harder to destroy. The service has redirected hundreds of millions of dollars from passive defenses to higher-priority initiatives in recent years. It changed course to secure about $1.4 billion in fiscal 2024, researchers said.

While the uptick in funding is a good start, experts say it must continue. Air Force leaders should be taking advantage of the "significant momentum in Congress for increases and improvements to air base defense," RAND recommended, adding that the service "should not be seen as dithering in air base defense investments, especially passive defenses."

The RAND report was requested by Pacific Air Forces and the recommendations were presented to the Air Force last fall. The Air Force did not provide comment to Air & Space Forces Magazine by press time.

HARDENED SHELTERS NEEDED

In 2004, Pacific Air Forces did begin to recognize the growing threat from China and advocated for hardened shelters at Andersen AFB, Guam, to protect stealthy B-2 bombers and F-22 fighters at a projected cost of $1.8 billion. But Air Force officials canceled the proposal due to a lack of funding, Dahm wrote in his policy paper.

Two decades later, China's military has built hundreds of hardened aircraft shelters while the U.S. has built a handful, the Hudson Institute said in its own report earlier this year.

Hardened aircraft shelters cannot survive a direct missile strike, but they are capable of protecting against cluster munitions tucked into ballistic and cruise missiles, Dahm said.

"If I can build a really substantial, hardened concrete shelter with ventilation and plumbing and the whole nine yards for $4 million, that hardened aircraft shelter can sit there in the Pacific for decades," he said. "But if I fire ... two Patriots at every inbound ballistic missile, that is $8 million per engagement, and there is no guarantee that I am actually going to hit that."

KEEPING RUNWAYS OPERATIONAL

Even if every aircraft survives an attack, cratered runways can still shut a base down, Dahm said.

The Air Force has been developing its Expeditionary Airfield Damage Repair program since 2021. Initial requirements called for the capability to deploy the equipment on four C-130s so a 16-member crew could resurface up to 18 craters in 24 to 36 hours, according to the Mitchell Institute paper, which added that the service should try to slash repair times.

That creates its own cost trade-offs, Dahm said.

Iranian Missile Hits US Air Base in Qatar

By Chris Gordon

Master Sgt. Joshua Strang

The Modernized Enterprise Terminal that sat inside this radome at Al Udeid Air Base, Qatar, was destroyed by an Iranian missile in a June 23 attack following the U.S. Operation Midnight Hammer against Iran.

A ballistic missile fired at Al Udeid Air Base in Qatar, part of a response to the U.S. bombing of Iranian missile sites days earlier, destroyed a radome on the base, the Pentagon told Air & Space Forces Magazine.

Al Udeid is the U.S. military's largest base in the Middle East, and is also the closest to Iran, just across the Persian Gulf. Defense officials touted the success of U.S. and Qatari Patriot anti-missile systems in blunting the missile attack and initially did not acknowledge that one missile got through.

"One Iranian ballistic missile impacted Al Udeid Air Base June 23 while the remainder of the missiles were intercepted by U.S. and Qatari air defense systems," Pentagon chief spokesman Sean Parnell said in a statement to Air & Space Forces Magazine. "The impact did minimal damage to equipment and structures on the base. There were no injuries. Al Udeid Air Base remains fully operational and capable of conducting its mission."

Commercial satellite imagery reported on by Iranian media exposed the damage, which appears to have destroyed a radome that housed the modernization enterprise terminal (MET), a $15 million communications suite. MET "provides secure communication capabilities including voice, video and data services, linking service members in the U.S. Central Command area of responsibility with military leaders around the world," the Air Force said in a 2016 release.

The base, which is normally defended by American and Qatari Patriot batteries, received additional U.S. Patriot systems that were relocated from Japan and Korea in advance of the attack.

In a briefing with reporters, Chairman of the Joint Chiefs of Staff Gen. Dan Caine said the base had been evacuated in advance of the attack. "There was a lot of metal flying around," Caine said. "Between attacking missiles being hit by Patriots, boosters from attacking missiles being hit by Patriots, the Patriots themselves flying around and the debris from those Patriots hitting the ground, there was a lot of metal flying around, and yet our U.S. air defenders had only seconds to make complex decisions with strategic impact."

Al Udeid typically houses approximately 10,000 military and civilian personnel. Iranian missiles, either fired directly from Iran or its proxy forces, have been a persistent concern for U.S. forces over the years.

The U.S. had taken steps to mitigate potential damage should Iran or its proxy forces attack U.S. forces in the region, moving most planes away from the base and evacuating it during the attack.

"Most folks had moved off the base to extend the security perimeter out away from what we assessed might be a target zone, except for a very few Army Soldiers at Al Udeid," Caine said. "At that point, only two Patriot batteries remained on base, roughly 44 American Soldiers responsible for defending the entire base, to include CENTCOM's forward headquarters in the Middle East, an entire air base, and all the U.S. forces there."

Space Wing Honored for Missile Tracking

By Matthew Cox

The Guardians of the 11th Space Warning Squadron were honored as the top U.S. Space Force unit for 2024 for their role in thwarting Iranian missile barrages last year.

The Mitchell Institute for Aerospace Studies selected the 11th SWS for the first-ever General Atomics Space Force Unit of the Year largely for unit's the precise early warning of incoming missiles, which helped Air Force fighter pilots thousands of miles away launch to destroy hundreds of incoming Iranian missiles aimed at Israel in April and October of 2024.

The new award follows the Mitchell Institute's annual General Atomics Remotely Piloted Aircraft Squadron of the Year award and seeks to recognize the achievements of Space Force units that often operate in the shadows from bases in the U.S. to deliver critical capabilities to front-line warfighters.

When Iran began to launch missiles on April 13, alarms were set off at the 11th SWS and 2nd SWS operation centers. Just one missile will trigger an alarm that sounds "ding, ding, ding," and before the attack was over, those alarms rang out 300 times.

Crews of a half dozen Guardians scurried to track each missile, verify the data, and pass it along as quickly as possible.

Capt. Abigail Flannery, weapons officer for the 11th, recalled how her teammates worked under extreme pressure in a recent episode of the Mitchell Institute's "Aerospace Advantage" podcast.

"Those were both unprecedented attacks; we saw hundreds of missiles in a matter of minutes, and that really required us to look at how we're doing our job," Flannery said. "It really pushed our squadron to just figure out how [to] best tackle this new kind of threat … to make sure we're providing that missile warning and missile defense that we need to be."

Throughout 2024, the 11th SWS reported some 2,700 missile launches, evaluated game-changing battlefield technologies, and developed courses of action for responding to large-scale missile salvos. Their work that increased on-time warning by 69 percent, according to their awards package.

General Atomics

Members of the 11th Space Warning Squadron were selected by Mitchell Institute of Aerospace Studies to be the first-ever recipients of the General Atomics Space Force Unit of the Year Award for their precise missile tracking and warning of incoming Iranian missiles aimed at Israel in 2024.

Based at Buckley Space Force Base, Colo., the 11th traces its roots to Operation Desert Storm, where it was first created to provide early warning of Iraqi Scud missile launches. Today, it operates the Space-Based Infrared Systems satellite constellation and the Overhead Persistent Infra-Red Battlespace Awareness Center.

During Iran's April attack, the 11th was evaluating the next-generation ground architecture for space-based missile warning, known as the Future Operation Resilient Ground Evolution, or FORGE. That system will eventually replace the Space Awareness Global Exploitation, or SAGE, system, providing a scalable framework capable of handling greater volumes of missile launches more quickly, even while under cyberattack.

"We were actually in a trial period during the April attacks … and my team not only was trying to assess this new system, but put it to the test under literal fire," the squadron's commander Lt. Col. Amanda Manship said.

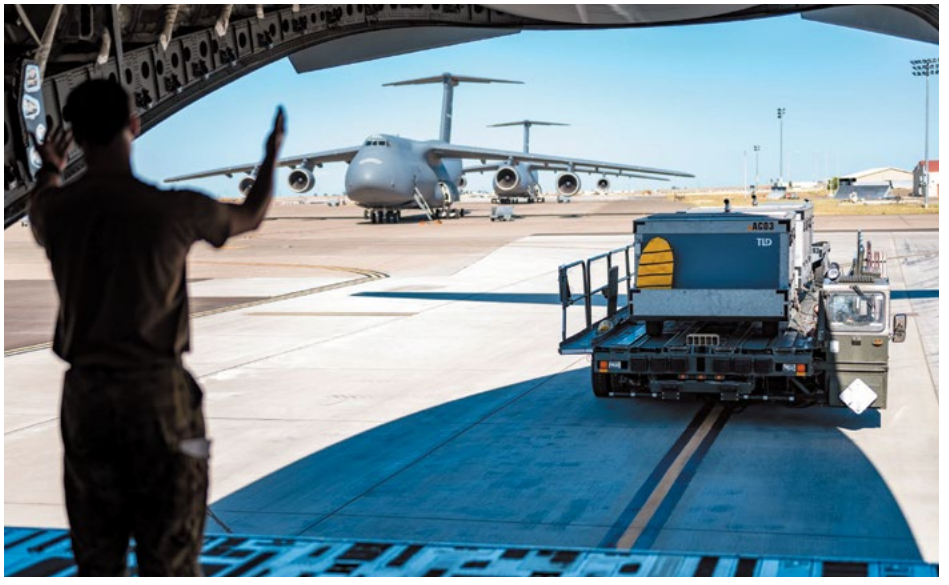
TRAINING

Major Exercises Kick Off

By Greg Hadley

The Air Force and Space Force kicked off a busy summer of major exercises across the Pacific on July 8, with thousands of Airmen and Guardians set to participate in a series of Department-Level Exercises (DLE):

- Mobility Guardian, Air Mobility Command's flagship exercise
- Resolute Force Pacific (REFORPAC), led by Pacific Air Forces, which was introduced 17 months ago as part of a "re-optimization" plan to better prepare for potential conflict with China
- Resolute Space, a parallel Space Force exercise led by Space Training and Readiness Command
- Emerald Warrior, led by Air Force Special Operations Command; and
- Bamboo Eagle, an Air Combat Command exercise focused on Agile Combat Employment.



Senior Airman Robert Nichols

A U.S. Airman directs a Tunner 60K aircraft cargo loader to load equipment into a C-17 Globemaster III as part of Emergency Deployment Readiness Exercise 25-1 on the flight line at Travis Air Force Base, Calif., in May.

This series will also feed other major exercises, such as Talisman Saber, a joint U.S-Australia-led exercise that includes about a dozen countries and tens of thousands of service members.

All told, the DLE series will test more than 12,000 Air Force and Space Force personnel, more than 350 USAF aircraft, and satellites and ground systems conducting space electromagnetic warfare, space domain awareness, orbital warfare, and navigational warfare, according to a release. All told, that's a scale that rivals anything the Air Force has done in years.

"Exercising at this speed, scale and tempo is how we prepare for the future fight," said Air Force Chief of Staff Gen. David

Allvin said in a statement. "We need Airmen to move fast and think outside the box, disrupting the operational status quo. We also build trust and understanding through deliberate planning, operating and learning alongside our partners across the Pacific."

Added Chief of Space Operations Gen. B. Chance Saltzman: "By training at this unprecedented scale, we're sharpening warfighter instincts, strengthening combat credibility, and proving our commitment to deliver peace through strength in the face of any challenge."

Developed over the past two years, beginning shortly after 2023's upscaled Mobility Guardian, the 2025 excercises were developed by planners meeting throughout multiple conferences, wargames, and tabletop exercises. The work was led by the U.S. Air Force Warfare Center.

T-7 Completes Climate Tests

By Chris Gordon and David Roza

The T-7A Red Hawk next-generation jet trainer underwent a second round of extreme weather testing as the Air Force presses to get the Boeing aircraft into production so it can replace the aging T-38 Talon.

"This new round of tests looked to verify the new aircraft's sustainability in any operational environment," reported the 96th Test Wing, which conducted the tests at Eglin Air Force Base, Fla., in a release.

The T-7 is in developmental flight testing. Previous climate tests in 2024 saw Boeing and Air Force crews perform system operations and engine runs to assess how well the aircraft fared under high and low temperatures ranging from 110 degrees to minus-25 degrees Fahrenheit.

The latest round of weather tests, concluded June 17 at the McKinley Climatic Lab at Eglin Air Force Base, Fla. They included subjecting the T-7 to cockpit icing and 190-mph crosswinds, a spokesperson for Eglin Air Force Base said.

Boeing's lead engineer for the project said the tests made headway that will facilitate future deliveries. The testing approach "allowed for more effective use of our test time and will expedite delivery to the customer," said David Neely, the interim program manager and chief engineer for T-7, responding to questions from Air & Space Forces Magazine. "We were able to reduce the test time in the chamber from approximately 2.5 months to about 1.75 months."

The T-7 is needed more than ever. The T-38 is now 60 years old and increasingly unreliable. Aging T-38 airframes are limited in terms of flying hours and have contributed to the Air Force's pilot shortfall.

"For this phase, the McKinley Climatic Lab set up an icing spray system and crosswind tunnel. The series of ground tests simulate the flight tests through extremely cold and hot temperatures. This experiment tests whether the pilots have sufficient visibility for flight and landing in extreme temperature conditions," the wing said in a release.

Samuel King Jr.

The T-7A Red Hawk undergoes a cockpit icing test in the McKinley Climatic Lab in May at Eglin Air Force Base, Fla.

Neely said Boeing and the Air Force also "evaluated water intrusion modifications."

The McKinley Climatic Lab is a 55,000-square-foot test chamber where Air Force aircraft go to be tested to extremes.

In January, the Air Force delayed the first production contract by a year until fiscal 2026 and said it would first buy four more production-representative T-7 jets for testing.

"Our goal is to ensure the T-7A Red Hawk is fully capable and ready to perform its mission in representative climates," said Mike Keltos, the Director of Test & Evaluation for the Air Force Life Cycle Management Center Training Directorate. "These extreme weather tests are a critical step in achieving that objective."

ADVANCED TECHNOLOGY

Air Force Pushes Ahead with 2 Hypersonic Missile Programs

By John A. Tirpak

The Air Force's Hypersonic Attack Cruise Missile (HACM) is delayed and may significantly overrun its expected cost, which could partially explain why the service is reviving the hypersonic AGM-183 Air-Launched Rapid-Response Weapon (ARRW).

The Government Accountability Office, in its annual report to Congress on the status of various major defense programs, said last week that the HACM is "behind schedule," though the Air Force is working with prime contractor Raytheon and engine supplier Northrop Grumman to field the weapon on time.

The service and the contractors are working toward a new schedule that still adheres to the five-year time frame for rapid

Raytheon Missiles and Defense illustration

Behind schedule, Raytheon's Hypersonic Attack Crusie Missile Program is working on ways to field the weapon on time. One possible measure includes dropping two flight tests in order to reduce costs and gain time.

prototyping efforts, with the potential fielding of HACM as soon as 2027.

Raytheon, a division of RTX, is "projecting that it will significantly exceed its cost baseline" for HACM, the GAO reported. The Air Force is considering dropping two flight tests as a cost-saving measure to get spending back on track, the watchdog agency said.

HACM, the Air Force's preferred hypersonic missile, is envisioned as a weapon small enough to be carried by F-15 or other fighters and able to travel at five times the speed of sound. The HACM vehicle is propelled to hypersonic speed by a booster that separates from the main weapon; the vehicle then ignites an air-breathing engine that powers it to its target.

"The Air Force plans to build 13 missiles during the rapid prototyping effort," the GAO said, "including test assets, spares, and rounds for initial operational capability."

The service expects to start rapidly fielding missiles in fiscal 2027 before tweaking its design ahead of full production, "based on global power competition and urgency" to address threats, GAO said. A decision to begin full production would come in 2029, the Air Force told the watchdog agency.

The HACM is one of several hypersonic design initiatives underway within the Air Force. Lockheed Martin tried to develop the AGM-183 ARRW in a rapid maturation effort that yielded mixed results in testing. Though the last few tests, which mimicked operational flight, were generally satisfactory, the service paused funding in this year's budget. One senior service official even reported ARRW was "officially dead."

But the fiscal 2026 budget appears to resurrect ARRW, a "larger form factor [missile] that is more strategic, long-range, that we have already tested several times," sccording to Air Force Chief of Staff Gen. David Allvin.

Air Force Secretary Troy Meink said the Air Force is determined not to buy a token number of hypersonic missiles. "We've got to be able to buy more than 10," he said.

ARRW is a large weapon that would be carried by B-52 bombers using wing pylons. The booster—adapted from an Army Tactical Missile System rocket—propels the warhead to hypersonic speed, after which it glides to its target. The Air Force prefers the HACM, though, because it is smaller, more maneuverable, longer-ranged, and can be carried by both fighters and bombers in the future.

A former senior defense official argues it makes sense to keep ARRW going because the HACM's delays are "just what you would expect with a cutting-edge technology."

"It's generally a good idea to have an alternative," he said.

Raytheon has received about $1.4 billion from the Air Force for the HACM program so far. The missile began as a middle-tier acquisition program, which can move faster than typical procurement, but will likely become a more traditional major defense acquisition program at some point.

"Program officials said that the delays will reduce the number of flight tests the program can conduct during the five-year rapid prototyping effort from seven to five," the watchdog added.

Even with five test flights instead of seven, the Air Force told the GAO "that the program will still be able to establish sufficient confidence in the missile to declare it operational and to meet all the [rapid acquisition] objectives."

In 'Crucial' Test, F-16 and F-15 Pilots Control Drone Wingmen

By Chris Gordon

The U.S. Air Force took a major step toward integrating crewed fighters with semiautonomous drones as Air Force F-16C and an F-15E pilots each controlled two XQ-58A Valkyrie drones in an "air combat training scenario," the Air Force Research Laboratory said in July.

The test flights demonstrated USAF's ability to achieve "real-time integration between manned and semiautonomous systems," the lab announced. The XQ-58A, built by defense startup Kratos, first flew in 2019. It is a forerunner to the Collaborative Combat Aircraft being developed by Anduril Technologies and General Atomics, the YFQ-42A and the YFQ-44A, the first two uninhabited systems to earn "fighter" designations. The XQ-58A tests will contribute to the CCA program.

The Air Force is spending $711 million on the CCA program

in fiscal 2025 and planning another $789 million in fiscal 2026. But it is also investing elsewhere, including some $50 million in an Autonomous Collaborative Platforms program intended to "mature technology to reduce risk through development, integration, experimentation, and test activities."

"With this flight, we mark a crucial step in developing capabilities that harness human-machine teaming to overcome complex threats and expand our advantages," Brig. Gen. Jason E. Bartolomei, the commander of AFRL, said in a statement. "By developing and integrating autonomous platforms with manned systems, we can quickly adapt, increase combat effectiveness, and reduce risk to our aircrews in contested environments."

AFRL did not elaborate in its statement on how the XQ-58A drones were controlled by the F-16C, a single-seat aircraft, and the F-15E, which carries a pilot and a weapons system officer. Nor did AFRL offer details on what maneuvers the aircraft conducted.

Ilka Cole

U.S. Air Force's XQ-58A Valkyrie's recent test flight and data collected will inform future air operations and contribute to advancing autonomous programs.

PERSONNEL

USAF, USSF Hit Recruiting Goals—3 Months Early

By Chris Gordon

The Space Force and Air Force both hit their fiscal 2025 recruiting goals with months to spare, extending a promising trend that has boosted the services' ranks.

The Space Force goal was 800 new enlisted Guardians this year, and the Air Force needed to enlist more than 33,000 Active-duty Airmen, plus 7,600 in the Reserve and 8,679 in the Air National Guard.

By June 30, the Air Force Recruiting Service said, the Department of the Air Force had "achieved 100 percent of its annual recruitment goal three months ahead of schedule."

That includes some 30,000 recruits who will complete Basic Military Training by the end of September, and more than 14,000 recruits now in the Delayed Entry Program (DEP), the strongest figure in the past decade. The Air Force also said it had signed up a record 750 Special Warfare recruits.

Hayden Haulman/USAF

U.S. Space Force Lt. Gen. DeAnna M. Burt, deputy chief of space operations for Operations, Cyber, and Nuclear, administers the oath of enlistment to Delayed Entry Program recruits during an enlistment ceremony at AFA headquarters in July.

"I am excited that both the Air Force and the Space Force have met their fiscal year 2025 recruiting goals three months early," Secretary of the Air Force Troy E. Meink said in a statement. "The fact that we have even exceeded this goal and currently have a DEP at its largest level in 10 years speaks to the vast number of volunteers interested in serving their country today."

For the Space Force, it is the sixth straight year it has hit its recruiting goals, meeting its target every year since its inception as a service. The Air Force has now hit its goals two years in a row.

"It's clear Americans are excited about the Space Force, and this achievement is a direct reflection of the talent our mission continues to attract," Chief of Space Operations Gen. B. Chance Saltzman said in a statement, praising the "high-caliber patriots" his service has signed on.

Space Force officials touted not only the quantity but the quality of the recruits. According to service data as of May 31, some 93.5 percent of Space Force recruits scored above average on the Armed Services Vocational Aptitude Battery (ASVAB), a mandatory test given to those seeking to serve in all U.S. military branches that determines which jobs the recruit qualifies for.

One in five recruits holds some form of college degree, and 12.9 percent have at least a bachelor's degree, according to USSF officials.

The Air Force Recruiting Service (AFRS) handles recruiting for the Space Force, as one of the support functions the Air Force provides its sister service. However, AFRS has established

a dedicated squadron of Guardian recruiters as the Space Force continues to carve out its own culture, and its mission and ranks continue to expand.

"I'm grateful to the incredible recruiters whose tireless dedication made this milestone possible," Chief Master Sergeant of the Space Force John Bentivegna said in a statement.

Bentivegna also showered praise on the USSF recruits, saying, "Each one reflects the very best of our nation, and their decision to serve speaks volumes about the talent, drive, and potential they bring to our mission."

Air Force Chief of Staff Gen. David W. Allvin touted "record recruitment" in a statement. "The Air Force invests in our Airmen and patriotic Americans ready to serve have noticed and are lining up and signing up," Allvin said. "That's evident with the largest number of Special Warfare candidates awaiting training on record and the throngs of recruits motivated to start basic military training. We're thrilled to welcome these warriors into our Air Force!"

New Recruiting Task Force Looks to Build on Recent Gains

By Rachel S. Cohen

As the U.S. military enjoys a resurgence in interest among potential recruits, a new Pentagon task force will try to build on that momentum.

The Military Service Recruitment Task Force, established June 13 by Defense Secretary Pete Hegseth, aims to woo a new generation of service members with a fresh, unified message and new ways to expand the pool of eligible Americans.

The task force is the latest initiative to encourage young Americans to enlist after a rocky few years prompted concerns about whether the 52-year-old all-volunteer force could survive a second half-century.

"Changing environmental factors demand a targeted and strategic approach to strengthen recruiting efforts across the department," Hegseth wrote in a memo creating the task force.

Airman 1st Class Sarah Hoover

Maryland Air National Guard Tech. Sgt. Tiffany Anstead, a recruiter for the 175th Wing, works with a recruit in the recruiting office at Warfield ANGB at Martin State Airport, Md., in May. Portions of this image were blurred for security reasons.

Jay Hurst, the Defense Department's acting personnel boss, and Chief Pentagon Spokesperson Sean Parnell will co-chair the panel. Public affairs, marketing, and recruitment experts from each service will weigh in, as will the Pentagon's top legislative affairs official and its general counsel.

The team is asked to assess the current recruiting landscape within 30 days; propose policy and legislative changes to address those challenges within 60 days; and draw up a communications plan to support the armed forces and the Pentagon's internal polling office, which tracks public sentiment about military service, within 90 days, the memo said.

Hegseth hopes to capitalize on the Navy and Marine Corps' 250th anniversaries this fall as major recruiting events, as well as America's own semiquincentennial in July 2026. The Army did not respond to a query on whether it has seen a spike in interest following its 250th birthday parade in Washington June 14.

The share of Americans who know someone in uniform has dwindled since the 1990s, diminishing young people's familiarity with military life and, by extension, their propensity to serve.

Recreational drug use, criminal convictions, and common prescription medication for conditions from attention deficit disorder to asthma have also been barriers. Even basic health and physical fitness can be barriers to entry. Many would-be recruits can't qualify under health and weight standards. Nearly eight in 10 Americans between the ages of 17 and 24 would need a waiver to join because they would otherwise be disqualified from service, the Pentagon said in October.

Under the last administration, the military attacked the downturn by loosening some standards, including body fat limits and bans on neck and hand tattoos. The Army launched a preparatory program to help potential recruits meet both academic and physical standards. The Air Force added recruiters to reach more prospects.

Hegseth cited a different reason: "Because of President Trump and his 'America First' priorities, recruitment and retention under this administration are higher than they've been in decades," Hegseth told House lawmakers June 12.

Data shows recruitment was rebounding even before the 2024 presidential election, however, as 12.5 percent more people signed up in fiscal 2024 than in the previous year. Every military service but the Navy met their accession goals for 2024.

This year, all six branches of the armed forces have already met or appear on track to hit their recruiting goals. However, the Army and Navy met their numbers by lowering quality benchmarks, something the Air Force has not had to do.

Commerce Cuts Space Traffic Management Program

Courtesy of Penticton Western News

The civilian-led Traffic Coordination System for Space (TraCSS) was readying to take over monitoring and warning civilian space operators of hazards in space, but the Commerce Department wants to cut the program. That would return responsibility to the Space Force, just as the number of objects in space is skyrocketing.

By Shaun Waterman

The first Trump administration moved to relieve the Space Force of its burden to monitor and warn civilian space operators about potential space traffic hazards. But now, just as the Commerce Department's new Traffic Coordination System for Space (TraCSS) program is nearly ready, the second Trump administration is looking to cancel it.

Space Policy Directive 3 issued in June 2018 laid out objectives for the future of space traffic management (STM) and commercial space situational awareness (SSA), with the idea that a civilian, rather than military, organization should be responsible for advising commercial operators when they are at risk of a collision in space. "In recognition of the need for DOD to focus on maintaining access to and freedom of action in space, a civil agency should, consistent with applicable law, be responsible for the publicly releasable portion of the DOD catalog and for administering an open architecture data repository," the policy states. "The Department of Commerce should be that civil agency."

A spokesman for Space Operations Command (SpOC) provided a statement that said the command will "continue to advocate" for the objectives outlined in SPD-3. The TracCSS solution was an answer to that policy direction, and without it, the next steps are unclear.

Commerce zeroed out funding for TracCSS in its fiscal 2026 budget request at a time when the burgeoning number of commercial satellites is making the domain increasingly congested and potentially less safe. The administration argues the private sector should be responsible for tracking satellites and warning operators about potential collisions.

The Space Force has had the de facto mission to manage space traffic for decades, notes Charles Galbreath, a retired Space Force colonel and now senior fellow at the Mitchell Institute for Aerospace Studies.

If TracCS goes away now, that mission will fall back to the Space Force at a time when the service's military mission is already growing.

The Space Force and, before that, the Air Force Space Command, began the road to handing off space traffic management to Commerce and TracCS seven years ago.

The objective was a system that relieved the Space Force of the civilian STM mission but that also would be better than existing capabilities.

"TracCSS has Space Force data but there are also commercial sources, international sources, and sources from satellite operators," Galbreath said. "That can all be fed into the algorithms, into a shared database, to do the orbit determination. And the more data you have coming in, the more accurate your orbital determination can be."

Getting the Space Force out of the business of warning individual operators is key. "This allows our squadrons, both operational and sustainment, to focus more fully on our core mission of exploiting opportunities and mitigating vulnerabilities in the national security space terrain," the SpOC spokesperson said in an email. "This is especially important as the space domain becomes increasingly contested by our adversaries."

Shutting down TraCSS would save $55 million annually. Space advocates say that's a small price to pay for space safety, and complain that doing away with the program will increase the chance of collisions in orbit and undermine America's leadership role in international space.

A broad industry coalition of seven trade groups representing some 450 space companies are appealing to Congress to reverse the decision to cancel TracCSS. The groups include: The Commercial SSA Coalition, the Aerospace Industries Association (AIA), the Satellite Industry Association, the American Institute of Aeronautics and Astronautics (AIAA), the Commercial Space Federation, the National Security Space Association, and the Space Data Association. "The U.S. space industry is very concerned that this move will introduce new risks to our operations and to our businesses," said Audrey Schaffer, a space industry executive representing the Commercial SSA Coalition, which represents companies that offer space situational awareness services to private sector space operators. It's notable that even the companies that hope to profit by competing with TraCSS are advocating for it.

SpOC and before it, Air Force Space Command, have long had the job of tracking objects in orbit—including operational and decommissioned satellites, as well as larger orbital debris—and sharing that data for free with commercial space operators. SpOC now tracks 60,000 space objects, according to SpaceTrack.org, the command's web accessible orbital catalog

The first Trump administration decided in 2018 to move the STM mission to NOAA, the National Oceanic and Atmospheric Administration, which is part of the Department of Commerce and already had a regulatory role regarding satellites. TraCSS, the result of that move, began beta testing last year. It has been scheduled to take over the mission fully next year.

The transition would get the Space Force out of "being the Call Center for Space Safety for the whole world," Schaeffer said.

Without it, Galbreath noted, the mission falls back on the Space Force as "an unfunded mandate."

The SpOC spokesperson said the command "remains fully committed to the provision of data for the execution of spaceflight safety operations."

The command will "continue to advocate for the completion of milestones established in support of Space Policy Directive-3 (SPD-3), which is critical to maintaining a safe, secure, and sustainable space environment," the spokesperson said. SPD-3 is the 2018 policy directive that moved the mission to NOAA.

NOAA's justification for zeroing out TraCSS in the budget pinned responsibility on the Biden administration, which it said failed to get the program going in time. "Under the prior administration, DOC was unable to complete a government owned and operated public-facing database and traffic coordination system," the documents state. "In the [intervening] time, private industry has proven that they have the capability and the business model to provide civil operators with SSA data and STM services."

A NOAA spokesperson referred questions about the cuts to the Office of Management and Budget. OMB did not respond to a request for comment.

But Richard DalBello, who headed the Office of Space Commerce at NOAA during the Biden administration and oversaw the set-up of TraCSS said that conclusion is incorrect.

"That's the giant gap in the logic of the administration's proposal," he said. "They wish into existence this imaginary solution, which is that the commercial SSA operators will just do this, and that somehow magically they will get paid."

DalBello said commercial providers may want to do this work, but they are not ready to do so. TracCSS, meanwhile, is already in beta testing. He noted that the original 2018 SPD-3 policy directive came without funding, and that it was not until 2023 that funding for TraCSS was made available, a year after he joined the department.

"All things being equal, given that we started the program in 2022 ,the fact that we're in beta already is pretty damn good," he said.

It will take time for private services operators to develop offerings and satellite operators to determine which capabilities to pay for.

"How are you picking and choosing among all the companies who do SSA?" Dalbello asked. "Some are good at observations in low-Earth orbit. Others are good at higher orbits. Some don't do observation at all, but they do really great software and analysis and prediction."

Also still undecided: What firms can acquire and resell U.S. data. "There are dozens of global companies that can do SSA," DalBello said.

Steve Jordan Tomaszewski, vice president for space systems at the Aerospace Industries Association, which also signed the letter to Congress, said civilian space situational awareness needs are very different from military requirements for space domain awareness (SDA). Tomaszewski, a two-decade Air Force veteran, who now serves as a lieutenant colonel in the Reserve, compared it to the difference between civilian air traffic control and an Air Operations Center. It wouldn't make sense "if the Air Force got called in to operate every single air traffic control tower in our country," he said.

He added: "Every time that the military has to take on an additional mission that's outside of [its] scope, it's a distraction and it's taking resources away from the core mission."

TraCSS "frees up the Department of Defense to focus on space warfighting because they're no longer doing this very basic space safety mission," Tomaszewski said.

Madelaine Chang, director of policy at the Satellite Industry Association said TraCSS was also modernizing what users could see. TraCSS capabilities impressed beta users, she said, largely because it was built new and applied the latest technology.

"It will be world leading," Chang predicted—if the system survives the cuts.

Space Force Ecosystem of GPS Alternatives

Iridium

The GPS market in space for commercial satellite constellations is gaining a new set of competitors, such as TrustPoint and Xona, looking to join Iridium who was the first-ever low-Earth orbit constellation.

By Shaun Waterman

The Space Force is playing midwife to a new ecosystem of commercial satellite constellations providing alternatives to the service's own Global Positioning System from much closer to the Earth, making their signals more accurate and harder to jam.

A half-dozen companies, including two with research contracts from Space Force or Air Force tech incubators, are currently planning low-Earth orbit (LEO) constellations of hundreds of small satellites that will offer position, navigation, and timing (PNT) services to augment or back up GPS.

The military has long been concerned about its reliance on GPS, but over the past few years civilian users have experienced increasingly severe GPS interference around conflict zones in Eastern Europe and the Middle East.

In particular, civil aviation has been hard-hit, said Lisa Dyer of the GPS Innovation Alliance, a trade association that represents GPS receiver manufacturers, satellite operators, and user groups like boaters, surveyors, and autonomous vehicle developers.

GPS jamming, used to stop drone attacks and smart bomb targeting, creates "unnecessary extra burdens on our air traffic controllers and flight crews, and it's increasing risks to the safety of the flight crews and the passengers," Dyer told Air & Space Forces Magazine.

PNT signals from low-Earth orbit are harder to jam, experts say, because they are broadcast from much closer to the earth's surface. New cryptographic techniques make the signals hard to impersonate with bogus data, a problem known as spoofing. And two of the new constellations also plan to use a completely different frequency band for their signals, which will make jamming more difficult and more complicated.

LEO satellites orbit between 100 and 1,200 miles above the surface of the Earth. GPS and its other major PNT constellations like China's BeiDu, Russia's GLONASS, and Europe's Galileo are all in medium-Earth orbit (MEO), 11,000-15,000 miles above the surface.

"There are some advantages to medium-Earth orbit and some advantages to low-Earth orbit," said Dyer.

The main advantage of MEO, she explained, is the smaller number of satellites required. From a higher orbit, a satellite is visible over a greater proportion of the Earth's surface. In MEO, 24 satellites is enough to offer near-global coverage. The current GPS constellation has 31 satellites in orbit, which means there's some redundancy, Dyer said.

The main advantage of LEO is the signal can be orders of magnitude stronger when it arrives at the receiver, making it easier to receive and harder to jam, said Patrick Shannon, co-founder and chief executive officer of TrustPoint, a LEO PNT startup that launched its third satellite last month.

With several hundred satellites in a large LEO constellation, users can also see more satellites in the sky at one time, and therefore receive more triangulating signals, making LEO PNT potentially more accurate than MEO-based systems.

The new GPS alternatives use cryptographic authentication, which means the user can be sure the data they're getting is genuine and not a fraudulent replacement, or "spoofed" signal, designed to mislead. The new generation PNT systems also use encryption, which scrambles the signal so only those with the correct cryptographic key loaded in their receiver can use it. As well as guarding against spoofing, this makes subscription-only services easy to offer.

Both the Air Force and Space Force technology incubators—along with Department of Defense-wide efforts like the Defense Innovation Unit—have sought to seed commercial companies working in this space, with the aim of easing the emergence of a new ecosystem of LEO PNT providers that can provide a secure alternative to GPS.

Last year, TrustPoint was awarded three phase II research contracts from the Department of the Air Force: a Small business Technology Transfer (STTR) award of $1.6 million from AFWERX, the Air Force's technology incubator; and two Small Business Innovation Research (SBIR) awards worth a total of $3.8 million from SpaceWERX, the Space Force equivalent. The company is commercially focused, said Shannon, but is happy to be part of the Space Force's Alt-PNT cadre of startups that are developing alternatives to GPS for military use, as well.

The awards helped TrustPoint develop technology to broadcast and receive PNT signals in C-Band, Shannon said, with a frequency just over 5 gigahertz. That's much higher than the 1 to 2 gigahertz L-Band frequencies used by GPS and its state-backed alternatives.

The higher frequency C-Band signals are more subject to degradation during adverse weather and when traveling through buildings than L-Band, but make up for that by being transmitted from satellites over 30 times closer to the Earth, Shannon said. And the faster fall off in signal power over distance for the higher frequency C-Band signal, called path loss, complicates jamming efforts as well.

"The distance a signal travels is a function of the power behind it," said Shannon, but a C-Band jammer loses power more quickly. An L-Band broadcast will travel three times as far as a similarly powered signal in C-Band, meaning someone trying to jam C-Band service will need many more jammers or much more powerful ones. They'll also need new equipment, since existing GPS jammers are built to target L-Band broadcasts.

"The infrastructure required and the physical complexity of denying C-Band makes it much more difficult and costly," concluded Shannon.

The satellites in TrustPoint's constellation will be microsats, only about the size of a four-slice toaster. The company aims to have about 350 of them in orbit by the end of the decade, but will be able to start offering a service with a fraction of that number in 2027, Shannon said.

He also said that the small size of the satellites and advanced manufacturing technologies would allow the firm to put the entire constellation up for "$100 million, give or take, not billions."

The global market for assured, or hard-to-jam, PNT is predicted to grow almost 25 percent a year from $400 million a year in 2022, to $3.5 billion a year in 2032, according to one forecast.

Shannon acknowledged that TrustPoint was already facing competition. "This is a massive problem," he said of GPS jamming and spoofing. "Many industries, many nations, are experiencing these issues, and everyone's looking for a solution. And that, of course, is an economic opportunity that a lot of companies are looking at."

Those competitors include other members of the Space Force's altPNT cadre, like Xona, a California-based startup which launched its first production satellite last month and recently announced a series B funding round and other capital backing to the tune of $92 million.

Xona aims for a constellation of 250 to 300 satellites and will broadcast signals in both L-Band and C-Band, according to its website. The company says it is partnering with receiver manufacturers to produce devices that can receive both GPS L-Band and LEO PNT C-Band signals.

Xona, TrustPoint, and other LEO PNT startups will have to contend with an incumbent; Iridium, the first-ever LEO constellation, has been providing an L-Band PNT service for eight years, initially in partnership with Satelles, until Iridium acquired it last year. The partnership, said Satelles founder and now Iridium Vice President of PNT Michael O'Connor, began as an ahead-of-its-time venture founded in the early years of the last decade, when concerns were only just starting to emerge about the fragility of GPS and the increasing dependence of the U.S. and global economy on it.

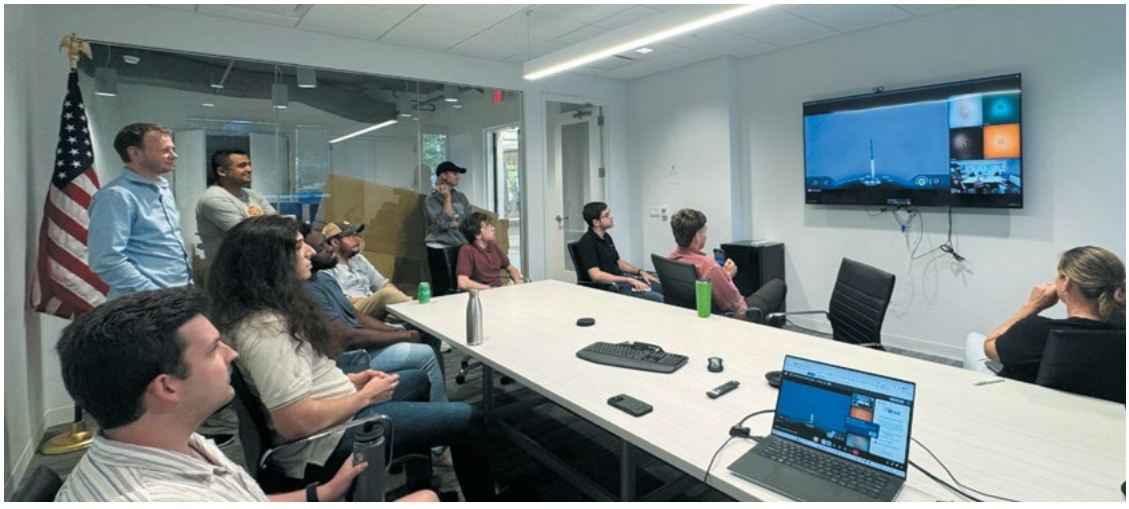
Iridium, which launched in the 1990s, had an L-Band channel originally used to provide a global pager service, O'Connor said. Satelles' engineers figured out how to design a signal that could use it for PNT: "You're 25 times closer to the Earth, and that [pager] channel was a strong signal … 1,000 times stronger" than GPS, said O'Connor.

By the time the service launched in 2016, North Korea had begun periodically jamming GPS signals over Seoul, and researchers from the University of Texas at Austin had shown how to take over drones by spoofing GPS signals.

GPS antennas are generally able to receive the Iridium broadcast, explained O'Connor, and Satelles partnered with equipment manufacturers to update the software that interpreted the signal so it could get timing and positioning data from the signal.

The initial customers were technology-driven businesses that used GPS for timing, rather than location, O'Connor said, like mobile phone network operators, cloud computing providers, and financial institutions. "We're installed in major stock exchanges all around the world," he said. "It turns out that if you can mess with the time at the New York Stock Exchange or the NASDAQ, bad guys can get up to all kinds of mischief."

Now that GPS interference is a reality, O'Connor said, Iridium's LEO PNT is expanding into maritime, aviation, and other markets. "Industries out there are starting to recognize today that they have very serious problems around GPS jamming and spoofing. … Everyone's seeing the writing on the wall that it is a problem, and you need a solution to that. And that's our mission: To protect networks, protect our society, protect the fabric that keeps us connected."



Trustpoint

In June, TrustPoint staffers at the company headquarters in Herndon, Va., watch the launch of Time Flies, their third LEO PNT satellite, from Vandenberg Space Force Base, Fla.

U.S. Air Force battle managers have been training with the Royal Australian Air Force to learn the E-7A Wedgetail. The Pentagon has proposed canceling the program, prompting pushback from Congress and retired USAF generals.

Richard Gonzales/USAF

A Budget Season Like No Other

Congress passed the Big Beautiful Bill. Now for the 2026 Budget.

By Rachel S. Cohen

By the time the 2026 defense budget request arrived on Capitol Hill in June, Congress was closing in on passage of the One Big, Beautiful Bill Act, a massive tax-and-spending bill that included some $150 billion for defense. The budget reconciliation measure narrowly passed the House on July 3 and was signed into law by President Donald Trump on the nation's 249th birthday.

Now comes the hard part: The House and Senate are still hashing out their versions of the 2026 defense policy and spending bills. Those measures will spell out how much—and for what—the Department of the Air Force can spend in the next fiscal year, which begins Oct. 1.

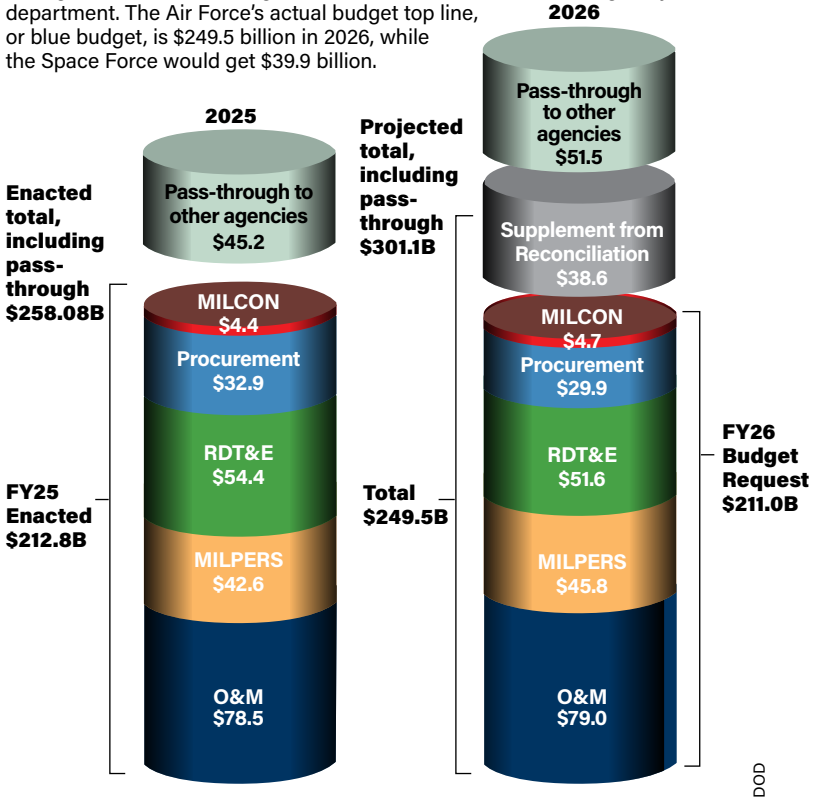
While the outcome of the annual legislation remains murky, this much is clear: The Air Force and Space Force go into the budget fight with Congress having lost ground compared to 2025. Observers say the Pentagon's 2026 budget, if approved, would leave the Air Force smaller than today and with fewer new planes on order than a year ago. The Space Force, which will benefit from a piece of the $25 billion in spending for the Golden Dome missile defense initiative provided by the reconciliation bill, likewise sees no real growth in the base budget blueprint.

Whether funding is in the base budget or in a supplemental bill matters when it comes to building the next year's financial picture, which is typically based on what was in the prior year's budget alone.

The President's budget request seeks $249.5 billion for the Department of the Air Force in fiscal 2026. It funds a slight increase in military end strength, to

Inside the 2026 Spending Plan

President Trump's fiscal 2026 spending plan for the Department of the Air Force includes $38.6 billion included in the reconciliation bill signed into law July 4, plus a budget request for the Department of the Air Force of $301.1 billion. Of that, $51.5 billion is considered "pass-through" money, or funds that pass through the Air Force's budget and are never controlled or managed by the department. The Air Force's actual budget top line, or blue budget, is $249.5 billion in 2026, while the Space Force would get $39.9 billion.



DOD

* Numbers may not add due to rounding

** FY25 figures excludes Disaster Supplemental

505,700, and a reduction of aircraft to a total of 4,600. Almost $210 billion would go to the Air Force and its 495,300 Airmen. The Space Force wants about $40 billion and 10,400 Guardians.

Another $51.5 billion known as "pass-through" funding is part of the Department of the Air Force request but funds outside organizations like the National Reconnaissance Office.

The budget plan accelerates production of the new B-21 Raider stealth bomber and funds development of the next-generation F-47 fighter and of the two Collaborative Combat Aircraft, the YFQ-42 and YFQ-44, which are competing to become the first high-end combat drones. Two hypersonic weapons programs, the Air-Launched Rapid Response Weapon and Hypersonic Attack Cruise Missile, would also move forward. So do new air- and ground-launched nuclear missiles.

But other decisions raised alarm among Air Force advocates: The administration proposes slashing from 44 to 24 the number of new F-35A Lightning II jets the Air Force would buy and canceling outright the E-7 Wedgetail, a replacement for the aging E-3 Airborne Warning and Control System jets. The budget also slows pursuit of a stealthy aerial refueling plane and cuts flying time for Active-duty pilots to fewer than 1 million hours.

Other savings laid out in the spending plan include $1.7 billion from civilian staff cuts, $1 billion from canceled consulting contracts, $368 million in reduced travel expenses, $341 million for canceled climate initiatives, $39 million in savings from reduced security assistance to other countries, and $15 million in savings from canceled diversity, equity, and inclusion programs.

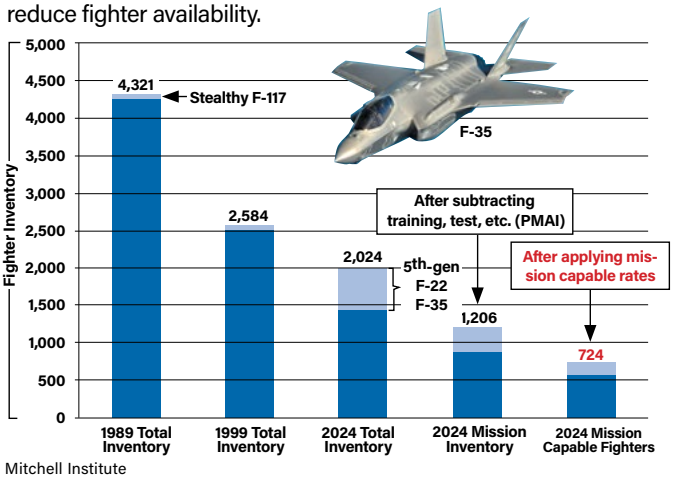
Defense experts raised concerns that the Air Force and Space Force budgets lack a holistic view of what the U.S. needs to win future fights and diminishes airpower's role in the joint force. J.J. Gertler, a longtime staffer at the nonpartisan Congressional Research Service who now works as an aerospace consultant, is most surprised by the decision to scale back certain future development programs, like the next-generation tanker and airlift initiatives.

"You're seeing the next generation delayed, [and] also money coming out of procurement programs at the same time," he said. "So you're not building for the fight tonight and you're not planning for the future fight."

The Air Force is competing for funds with other programs that may be harder to nip and tuck. Building a ship is a more expensive, larger undertakings than producing airplanes, so it is harder to stretch out those programs, Gertler said.

USAF's Shrinking Fighter Force

The U.S. Air Force is shedding legacy fighters faster than it is acquiring new aircraft. Declining mission-capable rates further reduce fighter availability.



Mitchell Institute

Staff Sgt. Zachary Rufus

The Air Force budget proposes buying just 24 F-35s in 2026, about half as many as have been purchased annually in recent years.

"If you cut the annual procurement of an F-35, say, by 20 jets, you still get some F-35s and some useful combat power," Gertler said. "If you cut a third out of a ship, it doesn't float."

Kari Bingen, who was deputy undersecretary of defense for intelligence and security during Trump's first term, questioned the choice to cancel the Wedgetail and acquire a few Navy E-2D Hawkeye planes instead while waiting for a satellite-based moving air targeting system to materialize.

"I don't see air and space as being an either/or," she said. "I think you will need both, and each of them will have their strength to compensate for each other's weaknesses. It starts to beg the question … where is the Air Force headed in its overall force design?"

Former top brass are pushing back on some of the proposed changes, too. Sixteen retired Air Force four-star generals, including six former Chiefs of Staff, have urged Congress to block the planned E-7 cancellation and to triple the number of F-35A fighters the Air Force will buy. In a media roundtable, they argued air superiority remains key to U.S. military strength and deterrence, and that investment is essential to correct a decades-long slump in air and space investment.

Gen. Kevin Chilton, a retired four-star who led U.S. Strategic Command and Air Force Space Command before becoming the spacepower chair at AFA's Mitchell Institute for Aerospace Studies, said it would be unwise to abandon the E-7 purchase even if a space-based solution were available today—which isn't the case.

"We have to remember that the space domain today is arguably more vulnerable than any other domain," Chilton said. Although "we have visions for ubiquitous, large numbers of satellites" doing reconnaissance and surveillance, that has yet to be proved in real-world operations, he said.

"Now we're saying we're going to throw [air moving target indication] into space. Well, maybe we will one day, but the challenges there are quite difficult," Chilton said, noting that aircraft and enemy targets move in three axes and at different speeds.

The E-7 is "a priority" for House Armed Services Committee Chair Mike Rogers (R-Ala.) and Ranking Member Adam Smith (D-Wash.), a senior staffer said while briefing reporters on the committee's budget bill. The draft added $600 million to the $200 million the Pentagon requested to wind down the E-7 program; the combined total of nearly $800 million is more than double the amount the Air Force projected last year it would need for the program in 2026.

Major USAF RDT&E Programs

PROGRAM	2024 C.R.	2025 APPR.[1]	2026 REQ.[2]	2026 RECON.[3]	PROJECTED TOTAL 2026	2026 FYDP	2027 FYDP	2028 FYDP	2029 FYDP
BOMBER									
B-1B	12.619	17.939	116.589	-	116.589	1.976	-	-	-
B-2A	87.623	37.862	12.519	-	12.519	0.004	0.004	0.004	0.004
B-2B	-	-	-	-	-	-	-	-	-
B-21	2984.143	2654.073	2,347.23	2391.92	4,739.15	2051.427	1648.845	1478.595	1486.123
B-52	950.815	1,051.116	931	-	931	895.365	506.982	473.368	426.807
FIGHTER/ATTACK									
A-10	-	-	-	-	-	-	-	-	-
F-15C/D/E	50.965	158.603	233.018	-	233.018	202.168	298.351	138.559	172.172
EPAWSS	13.982	-	-	-	-	-	-	-	-
F-15EX	100.006	56.228	78.345	2.1	80.445	-	-	-	-
F-16	98.633	104.252	216.638	-	216.638	199.054	185.414	112.794	115.020
F-22	725.889	758.754	852.332	-	852.332	647.983	474.352	582.879	594.387
F-35	97.231	47.132	48.446	-	48.446	49.156	47.709	49.561	50.539
NGAD/F-47	2,326.128	2,424.208	2579.362	900	3,479.36	3,684.211	5,396.538	7,247.656	8,829.396
F-35 BLK 4 C2D2	1,275.268	1,134.207	1182.094	-	1182.094	1,192.420	1,160.610	975.101	989.293
F-35 MODS	-	-	-	-	-	-	-	-	-
HELO									
HH-60W	48.268	39.629	43.579	15.129	58.71	-	-	-	-
UH1 REPLACEMENT (MH-139)	25.737	15.000	5.982	-	5.982	-	-	-	-
ICBM									
MINUTEMAN III SQUADRONS	33.237	59.320	106.032	-	106.032	24.436	20.830	16.194	9.343
LGM-35A SENTINEL	3,746.935	2,011.024	2647.563	1500	4,147.56	3,791.551	3,568.798	2,890.117	2,011.934
MMIII FUZE MODERNIZATION	71.732	-	3.252	-	3.252	-	-	-	-
MINUTEMAN III MODIFICATIONS	-	-	10.594	-	10.594	-	-	-	-
ISR/BM/C3									
AIR AND SPACE OPERATIONS CENTER	72.059	65.102	113.806	-	113.806	96.738	99.707	104.657	106.723
DCGS	31.589	30.932	49.716	-	49.716	31.396	32.008	33.127	33.782
CRC	2.005	2.012	-	-	-	-	-	-	-
E-3	-	-	-	-	-	-	-	-	-
E-3 BLOCK 40/45	-	-				-	-	-	-
E-7	681.039	607.413	199.676	-	199.676	297.334	161.838	167.697	171.006
E-8	-	-				-	-	-	-
ABMS	500.575	611.943	1040.475	-	1040.475	958.948	727.834	562.905	577.983
E-4B	39.868	40.441	54.457	-	54.457	43.496	24.649	3.005	3.065
COMPASS CALL	66.932	132.475	-	63.137	63.137	107.766	101.785	108.169	109.544
MQ-9	81.123	7.074	26.689	-	26.689	0.297	0.303	0.315	0.322
RQ-4	1.242	6.171	-	-	-	-	-	-	-
RC-135	14.330	16.323	41.882	-	41.882	16.729	17.073	17.692	18.041
U-2 MODS	16.842	-	-	-	-	-	-	-	-
MOBILITY									
C-5	29.502	32.903	33.713	-	33.713	51.939	19.737	50.032	68.031
C-17	2.753	11.986	76.514	4.41	80.92	27.998	82.177	127.463	129.980
C-32	-	-	-	-	-	-	-	-	-
C-130J	19.100	63.533	31.354	-	31.354	32.469	17.216	15.691	16.000
KC-10 (ATCA)	-	-	-	-	-	-	-	-	-
KC-135	51.105	9.899	-	43.1	43.1	49.847	93.235	12.826	12.825
KC-46	124.662	77.804	145.434	-	145.434	58.744	53.345	36.584	-
PAR (VC-25B)	490.701	433.943	602.318	-	602.318	400.905	441.009	59.604	34.803
VC-25A	-	-	-	-	-	-	-	-	-
MUNITION									
AIM-9	41.958	34.932	86.549	-	86.549	16.146	16.478	17.074	17.412
AIM-120	53.679	53.593	51.242	-	51.242	51.994	53.062	54.982	56.069
JASSM	132.937	181.692	232.252	-	232.252	41.017	17.941	21.858	22.289
SDB1	-	-	-	-	-	-	-	-	-
SDB2	37.518	29.91	24.81	-	24.81	24.918	25.419	25.817	26.326
JDAM	-	-	-	-	-	-	-	-	-
SIAW	298.585	346.341	255.336	-	255.336	405.136	381.648	299.313	301.956
LRASM	-	-	-	-	-	-	-	-	-
AGM-114 HELLFIRE	-	-	-	-	-	-	-	-	-
ARRW	150.34	-	-	-	-	-	-	-	-
LRSO	911.406	623.491	606.955	-	606.955	601.584	288.272	76.487	77.997
SOF									
CV-22B	18.127	26.249	0.653	30.857	31.51	30.865	26.018	21.878	21.099
HC-130/MC-130	0.926	0.748	0.891	-	0.891	0.894	0.765	0.792	0.808
COMMUNICATION MODERNIZATION (HC-130J/MC-130J)	35.610	24.186	49.549	-	49.549	45.223	44.910	36.252	36.770
TRAINERS									
T-6	-	-	-	-	-	-	-	-	-
T-7A	77.252	83.985	362.083	-	362.083	30.826	5.255	5.366	5.471
T-38	-	-	-	-	-	-	-	-	-
T-1	-	-	-	-	-	-	-	-	-

[1]Appropriated [2]Requested [3]Reconciliation

AN ATYPICAL YEAR

Here's how the annual budget process is supposed to work: Each branch of the military, led by their civilian secretaries, submits a spending plan for review by the Joint Chiefs of Staff and the defense secretary and his deputies. The plan then goes to the White House Office of Management and Budget. Final decisions are made and the budget is submitted to Congress, with thousands of pages of justification outlining every program and plans for spending in future years. Budgets are supposed to get to Congress in February and be approved by the time the next fiscal year starts Oct. 1. It almost never happens that way.

This year's piecemeal rollout started with broad-brush figures released May 2, followed by the bulk of the details on July 1. By then, all four congressional defense and appropriations panels had held hearings—without having seen the budgets they convened to review. The House defense appropriations subcommittee had already debated and advanced a defense spending bill on its own.

Nearly $39 billion—or 15.5 percent—of the money the Air Force and Space Force is on tap to receive in 2026 comes from the spending law enacted in early July. That includes more than one-third of the Space Force's budget and 12 percent of the Air Force's. The result could put both services in a precarious position in the future.

Though the defense portion of the reconciliation package was intended as a five-year investment in the Pentagon's most pressing needs, the Defense Department plans to use 80 percent of that funding in 2026 to make up for an otherwise no-growth budget.

"This budget is a cut rather than a path to peace through strength," said David Deptula, a retired lieutenant general who now runs AFA's Mitchell Institute.

'SHELL GAME'

The fragmented, atypical budget season has bewildered longtime defense watchers and left key players in the process searching for clarity.

Republicans and Democrats alike have criticized the administration's reconciliation gambit as a "shell game" that presents the facade of a $1 trillion budget without a meaningful path to repeating it. Lawmakers' frustration over not receiving the budget request by June was a constant refrain at hearings that were intended to delve into budget details.

Sen. Mitch McConnell (R-Ky.), the former Senate majority leader and defense hawk who chairs the Senate defense appropriations subcommittee, questioned Air Force Chief of Staff Gen. David Allvin on why the Trump administration put programs with broad bipartisan support, like the B-21 bomber and Sen-

Major USSF RDT&E Programs

(Current $ millions)

PROGRAM	2024 C.R.	2025	2026 REQ.[2]	2026 RECON.[3]	2026 FYDP	2027 FYDP	2028 FYDP	2029 FYDP
Counterspace Systems	30.243	34.978	31.298	-	37.385	38.155	39.532	40.313
Next-Gen OPIR	495.875	458.727	432.073	-	204.238	203.707	214.191	217.471
Weather System Follow-On	72.66	49.207	38.501	-	39.901	35.753	25.828	9.367
Protected Tactical Service	210.727	419.996	571.921	-	656.025	465.054	483.274	492.806
Protected Tactical Enterprise Service	70.27	77.509	114.43	-	38.592	36.245	87.712	89.442
Space Test Program	29.121	30.279	28.787	-	29.833	30.447	31.545	32.167
Evolved Strategic SATCOM	473.622	918.581	1.229.929	-	1,283.92	1,061.42	970.789	745.132
Polar MILSATCOM	73.757	-	-	-	-	-	-	-
Wideband Global SATCOM	34.368	-	-	-	-	-	-	-
GPS III Space Segment	121.770	68.072	29.665	-	-	-	-	-
GPS III Follow-On Satellites	237.907	240.246	179.249	-	189.659	160.487	130.374	106.704
GPS III Operational Control Segment	238.821	272.224	190.484	-	22.875	6.628	6.867	7.003
Ballistic Missile Defense Radars	30.885	12.024	-	-	-	-	-	-
Space Science and Technology Research & Development (Space Development Agency)	450.599	488.916	459.989	-	477.878	428.174	281.289	428.318
Space Development Agency Launch	-	-	-	-	-	-	-	-
Long-Range Kill Chains	-	-	-	6440.000	-	-	-	-

[1]Appropriated [2]Requested [3]Reconciliation

Major USSF Procurement Programs

(Current $ millions)

PROGRAM	2024 C.R.	2025	2026 REQ.[2]	2026 RECON.[3]	2026 FYDP	2027 FYDP	2028 FYDP	2029 FYDP
Counterspace Systems	50.165	4.277	2.027	-	2.059	2.111	2.156	2.199
Next-Gen OPIR	-	-	-	-	-	-	-	-
Weather System Follow-On	-	-	-	-	-	-	-	-
Protected Tactical Service	-	-	-	-	-	-	-	-
Protected Tactical Enterprise Service	50.225	56.148	29.949	-	11.866	-	-	-
Space Test Program	-	-	-	-	-	-	-	-
Evolved Strategic SATCOM	-	-	-	-	-	-	-	-
Polar MILSATCOM	-	-	-	-	-	-	-	-
Wideband Global SATCOM	-	10.020	-	-	-	-	-	-
GPS III Space Segment	101.370	54.805	29.274	-	29.723	2.812	-	-
GPS III Follow-On Satellites	53.248	647.165	109.944	-	710.019	744.030	759.736	775.039
GPS III Operational Control Segment	-	-	-	-	-	-	-	-
Ballistic Missile Defense Radars	51.779	-	-	-	-	-	-	-
Space Science and Technology Research & Development (Space Development Agency)	-	-	-	-	-	-	-	-
Space Development Agency Launch	529.468	357.178	648.446	-	457.943	1,235.117	827.558	396.242
Long-Range Kill Chains	-	-	-	-	-	-	-	-

[1]Appropriated [2]Requested [3]Reconciliation

Major USAF Procurement Programs

PROGRAM	2024 C.R.	2025 APPR.[1]	2026 REQ.[2]	2026 RECON.[3]	PROJECTED TOTAL 2026	2026 FYDP	2027 FYDP	2028 FYDP	2029F FYDP
BOMBER									
B-1B	12.757	13.406	73.893	-	73.893	13.154	1.003	1.370	1.397
B-2A	109.818	62.592	76.906	-	76.906	58.891	52.463	15.807	16.124
B-2B	33.076	31.418	37.938	-	37.938	16.026	16.854	17.204	17.547
B-21	2270.693	2600.468	3452.116	2099.126	5551.242	845.000	964.000	1,005.665	1,026.784
B-52	65.815	77.527	223.938	-	223.938	267.169	1,092.683	1,047.284	988.289
FIGHTER/ATTACK									
A-10	-	-	-	-	-	-	-	-	-
F-15C/D/E	34.83	39.76	120.044	-	120.044	118.303	47.944	20.753	21.827
EPAWSS	280.658	227.342	252.607	-	252.607	207.723	118.624	102.513	123.474
F-15EX	2511.061	1808.472	-	2632.804	2632.804	60.714	-	-	-
F-16	297.342	194.805	448.116	50	498.116	528.492	530.110	364.998	326.756
F-22	794.676	818.537	977.526	100	1077.526	1,019.413	1,101.842	886.729	842.638
F-35	5247070	4489.93	3555.503	-	3555.503	5,314.029	5,690.148	5,600.821	5,738.909
NGAD/F-47	-	-	-	-	-	-	-	-	-
F-35 BLK 4 C2D2	287.607	291.773	242.966	-	242.966	384.098	381.713	388.583	469.085
F-35 MODS	329.387	102.681	137.371	-	137.371	173.808	173.841	178.522	109.289
HELO									
HH-60W	282.533	374.096	116.65	32.667	149.317	54.671	-	-	-
UH1 REPLACEMENT (MH-139)	228.807	284.105	374.556	150.1	524.656	159.817	177.854	146.696	79.876
ICBM									
MINUTEMAN III SQUADRONS	-	-	-	-	-	-	-	-	-
LGM-35A SENTINEL	-	-	0.742	-	0.742	1,634.097	4,131.827	5,073.777	5,697.755
MMIII FUZE MODERNIZATION	158.789	153.569	157.049	-	157.049	123.564	110.274	100.583	0.728
MINUTEMAN III MODIFICATIONS	48.639	24.212	14.604	-	14.604	16.339	10.359	10.581	10.793
ISR/BM/C3									
AIR AND SPACE OPERATIONS CENTER	5.032	21.175	22.785	-	22.785	22.937	23.742	24.253	24.732
DCGS	129.655	51.594	87.044	-	87.044	79.617	115.616	115.803	118.083
CRC	-	21.199	4.55	-	4.55	60.894	38.333	39.146	39.92
E-3	1.35	68.192	17.291	-	17.291	17.355	0.839	1.399	1.426
E-3 BLOCK 40/45	-	-			-	-	-	-	-
E-7	-	-	200	-	200	-	-	-	-
E-8	-	-		-	-	-	-	-	-
ABMS	73.593	56.144	27.605	-	27.605	65.252	56.314	63.280	64.530
E-4B	13.055	24.828	45.232	-	45.232	36.835	44.487	45.414	46.316
COMPASS CALL	144.686	94.654	-	167.369	167.369	126.803	214.492	216.548	221.612
MQ-9	107.643	12.351	100.923	-	100.923	-	-	-	-
RQ-4	-	-	-	-	-	-	-	-	-
RC-135	220.138	242.066	231.001	-	231.001	226.333	231.415	236.228	240.921
U-2 MODS	54.727	69.806	-	-	-	13.072	13.367	13.644	13.915
MOBILITY									
C-5	24.377	43370	34.939	-	34.939	29.401	63.33	36.643	34.577
C-17	140.56	85.691	12.525	64.724	77.249	139.078	140.81	181.645	209.181
C-32	19.06	6.422	-	-	-	0.010	0.010	0.010	0.010
C-130J	137.179	565.391	151.386	214.234	365.62	-	-	-	-
KC-10 (ATCA)	-	-	-	-	-	-	-	-	-
KC-135	153.595	146.564	-	-	-	176.454	139.928	206.590	171.045
KC-46	2882.59	2804.572	2818.977	-	2818.977	2,833.054	2,429.705	-	-
PAR (VC-25B)	-	-	-	-	-	-	-	-	-
VC-25A	29.707	11.388	-	-	-	9.395	-	-	-
MUNITION									
AIM-9	95.643	101.802	100.352	-	100.352	127.838	130.045	132.837	135.479
AIM-120	489.049	442.873	365.125	300	665.125	738.09	186.616	39.966	-
JASSM	1685.668	820.051	328.081	-	328.081	821.193	829.091	850.81	867.157
SDB1	48.734	42.257	41.51	-	41.51	41.744	44.571	84.551	86.232
SDB2	291.553	322.122	307.743	-	307.743	181.872	166.239	136.181	134.739
JDAM	110.884	115.427	126.389	-	126.389	127.838	130.318	132.969	135.625
SIAW	41.947	152.646	185.324	-	185.324	149.489	347.978	400.068	408.025
LRASM	187.667	379.067	319.369	112.225	431.594	296.205	336.935	339.325	345.996
AGM-114 HELLFIRE	1.049	-	-	-	-	-	-	-	-
ARRW	-	-	387.055	-	387.055	-	-	-	-
LRSO	66.816	70.335	192.409	-	192.409	295.523	1,074.934	1,685.006	2,210.506
SOF									
CV-22B	153.006	54.82	78.713	100.329	179.042	100.356	96.582	79.524	65.408
HC-130/MC-130	101.055	213.284	17.986	-	17.986	367.274	261.148	169.774	169.902
COMMUNICATION MODERNIZATION (HC-130J/MC-130J)	-	-	-	-	-	-	-	-	-
TRAINERS									
T-6	2.942	49.281	247.814	-	247.814	413.188	185.123	370.785	324.55
T-7A	-	20.78	362.083	-	362.083	548.486	524.987	835.7	852.307
T-38	125.34	112.986	85.381	82.398	167.779	82.398	96.737	99.014	156.432
T-1	10.95	2.205	0.137	0.137	0.274	0.137	0.140	3.577	3.648

[1]Appropriated [2]Requested [3]Reconciliation

Petty Officer 1st Class Alexander Kubitza

Sen. Mitch McConnell, center, chairman of the Senate Appropriations defense subcommittee, questioned the administration's decision to pack so much spending into the reconciliation bill. He and others worry that the 2027 budget won't take that spending into account.

tinel intercontinental ballistic missile, into the reconciliation bill rather than keep them in the base budget itself.

"I don't fully understand all of the mechanisms," Allvin answered, "but … a sustained topline to be able to continue our modernization and maintain readiness is going to be key, however that happens."

Elaine McCusker, who was acting Pentagon comptroller during Trump's first term and is now a defense budget analyst at the American Enterprise Institute (AEI), said the unusual idea of using reconciliation to bolster defense was inspired by the supplemental spending bills that were nearly annual affairs through most of the 2000s. The move recognizes the long-term consequences of insufficient defense spending, she said, and was designed to get past the Senate filibuster rules and narrow vote margin.

"I think there's goodness to it," she said.

But she and others said offering top aerospace priorities a one-time bump is a risky maneuver that may not create the generational change the reconciliation bill sought to achieve.

Those programs need sustained funding through the base budget to succeed, observers said, especially new efforts trying to get off the ground.

"$25 billion … does a lot to get you started, but no one thinks you can build something [of] the magnitude Golden Dome is intended to be with $25 billion in one shot," said Todd Harrison, a defense budget analyst, who works with McCusker at AEI.

Reconciliation dollars are also intended to speed up production of the secretive B-21. Slated to eventually become the Air Force's primary bomber, it is unclear how much faster the acquisition can actually move. The B-21 is "manufactured differently," Allvin said in June. "We don't want to be overly zealous."

Relying on reconciliation is particularly risky for the Space Force, which will take about half of its nearly $29 billion research-and-development budget from that pot in 2026. The Space Force won with reconciliation, Bingen said, but may struggle to sustain that level of investment.

"We think about all of the money tagged in reconciliation for space sensors, space superiority, [air moving target indication] from space, space infrastructure, space-based interceptors related to Golden Dome—there's a lot in there for the Space Force," she said. "Don't get me wrong, it's good, but you have to see a follow-through."

Reconciliation will make it harder for military officials to plan for the future, especially when that money makes up a chunk of funding a program would otherwise have gotten through the more predictable base budget, Gertler said: "This is a one-time budget gimmick with lasting effects over many years."

But McCusker suggested the maneuver could have one lasting benefit. She argues reconciliation has opened the door to treating more defense spending as mandatory, meaning the funds can continue past the end of a fiscal year. Doing so in the future could insulate funding decisions from the whims of lawmakers seeking to re-litigate decisions from prior years.

"We've been needing to have some modernization of the way we do defense appropriations for quite a while," she said.

One enduring problem she'd like to see ended for good is the near-annual ritual known as a continuing resolution (CR). Those are necessary to avoid a federal shutdown when Congress fails to pass a budget by the start of the new fiscal year.

"If we can, at the same time, get away from the annual, destructive, wasteful nature of normal CRs, that's all a good thing," McCusker said.

WHAT'S NEXT?

With only two months until fiscal 2025 ends Sept. 30, the Pentagon is on track to begin its seventh-straight year without permanent funding in place. Lawmakers have already started discussing the prospect of another stopgap CR to allow federal agencies to operate at the same funding level as they received the prior year.

Congress could also turn a CR into a slimmer spending package, as it did with its full-year stopgap legislation enacted for fiscal 2025 in March. In addition, reconciliation funding could also provide a bridge between fiscal years, McCusker said.

In recent years, the House and Senate passed and reconciled their respective defense policy bills in December, and appropriators followed soon after. Meanwhile, summer means the Pentagon has begun crafting the fiscal 2027 budget, and the top-line figure is an open question. Will Trump put forward the America's first $1 trillion base budget plan for defense? Will Congress and the Trump administration get the budget process back on track?

"We have been so far from the regular order for so long that eventually this was inevitable," Gertler said. "I don't see anything out of this year that I would hope would become a norm. But it is foolhardy to wish for the regular order of the past that is likely never to return."

Lockheed Martin illustrates its affordable, modular uncrewed aircraft called Speed Racer flying with a U.S. Air Force F-35 Lightning II utilizing software from Project Carrera, its $100 million investment in teaming technologies in support of joint all-domain operations. Company officials said the ghostly F-35 outline hints at its role as a possible decoy.

Disconnected by Design: A New Way to Employ 5th-Gen Jets

Disaggregated Collaborative Air Operations offers a creative response to China's focus on disrupting U.S. combat networks.

By J. Michael Dahm

The U.S. Air Force operational concepts for penetrating into contested areas assume that U.S. forces can maintain highly networked connectivity and reach-back to data and command centers. But China's People's Liberation Army's "informationized" warfighting strategy is specifically designed to counter the networked U.S. approach.

Disaggregated collaborative air operations (DCAO) offers a counter to the Chinese strategy. It is a proposed operational concept that leverages the unique attributes of advanced fifth- and next-generation aircraft—not just their physical speed and stealth, but their advanced sensing and computing—to wage high-end warfare without having to depend on long-distance two-way communications or centralized command and control.

The PLA has long modeled itself after the U.S. military, striving to become a "world-class" military by midcentury. Over the past 25 years, China's PLA has studied, adopted, and evolved U.S. concepts related to effects-based operations, parallel warfare, and system-of-systems confrontation—all linchpins of success in America's last major conventional war in, 1991's Operation Desert Storm. China's military has also optimized its offensive and defensive capabilities to target and counter what the PLA sees as the U.S. military's critical operational center of gravity: its sprawling command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) system-of-systems.

For the first decade of this century, U.S. military assessments described the PLA's military strategy as "asymmetric." Today, however, there is an extraordinary symmetry between the PLA and U.S. military. The PLA has developed a countermeasure for virtually every major U.S. military capability. More concerning, the PLA appears to be out-cycling U.S. technology development and acquisition, eroding U.S. military advantages faster than new U.S. capabilities emerge.

The PLA's strategy is based largely on U.S. military concepts borne out of the Cold War's Second Offset Strategy. Following U.S. acquisition strategies of the 1970s and 1980s, China invested in stealth technology, precision guided munitions (PGMs), and networked C4ISR. These capabilities now provide the foundations for a PLA warfighting strategy that is, at its core, a simple two-step process. First, disaggregate an enemy force by attacking its C4ISR system-of-systems and then target and strike the disaggregated and disconnected

enemy force with long-range precision fires.

The U.S. Air Force's always-connected, network-dependent operations are, in fact, dangerously vulnerable to PLA countermeasures and must be replaced with new operational concepts. Aircraft in a high-end fight today must operate in relative silence for fear of being detected and targeted. "Reachback" for intelligence and coordination orders is now becoming a relic of "the last war."

To counter the PLA's approach, DCAO leverages the advanced information collection and processing capabilities of fifth-generation aircraft to break dependencies from centralized C4ISR and operate with forces that are disconnected and disaggregated by design. This approach renders the PLA attacks on U.S. C4ISR irrelevant. By fielding a force disconnected by design, the U.S Air Force can empower its fifth-generation F-22 Raptor and F-35 Lightning II fighters to independently collect, process, and act upon information at the tactical edge of the battlespace, effectively turning them into independent airborne command centers. These advanced aircraft can orchestrate offensive and defensive operations, directing relatively small packages of fourth-generation fighter aircraft and uninhabited collaborative combat aircraft (CCA) using low-power or optical communications that are less likely to compromise their stealth. In the future, the B-21 Raider and F-47 Next-Generation Air Dominance Penetrating Counter-air Aircraft (NGAD PCA) will bring even more capabilities to enable disconnected air operations.

The Air Force, Navy, Marines Corps, and U.S. allies all possess substantial numbers of fourth-, fifth- and next-generation combat aircraft. These make up what is termed an "inside force," one composed of comparatively short-range, high-speed aircraft based within attack range of a potential adversary. An inside force, supported by a well-considered operating concept can better deter near-peer adversaries than a purely "outside force," which must operate from bases far away from the adversary. For the U.S. to retreat to rely on an outside force may message to friends and enemies an inability or unwillingness to fight. Additionally, inside forces, especially fifth-generation "stand-in forces" can penetrate highly contested airspace and generate the necessary capacities to deliver sustained effects in a large-scale conflict.

DCAO focuses on using battlespace information dominance to fracture adversary offensive operations and create effects that cascade through an enemy force. Most importantly, while capacity is still crucial, the concept does not rely on mass, which generally requires highly centralized planning and coordination, continuous network communication, and quantities of aircraft that the U.S. does not possess. Instead, DCAO pushes information collection, processing, and battle management to the tactical edge of the battlespace, acknowledging that in highly contested environments, weapons systems will not be able to broadcast, network, or "reach back" for data for fear of transmissions being detected, geolocated, and targeted. By minimizing their emissions, fifth- and sixth-generation aircraft can provide pilots fused data to fully inform their decisions about how to engage adversary forces.

Uninhabited systems, like CCA, will be complementary and additive capabilities that promise to increase the lethality, survivability, and capacity of Air Force operations in highly contested environments.

China's military has spent over a quarter-century developing the means to sever the information links that enable U.S. air dominance. Yet the PLA's informationized warfare doctrine is less a counter to U.S. military operational concepts as it is a carbon-copy of the formula that made the U.S. so successful in modern warfare: that is, to render adversaries deaf, dumb, and blind and then pick them off with long-range

Airman 1st Class Tristan Biese

The Air Force's four principal fighter jets, an F-16, F-15, F-22, and F-35, fly in formation. In a disaggregated collaborative air operation, stealthy F-35s or F-22s could penetrate enemy air defenses undetected, then relay critical targeting data to fourth-generation F-15s or F-16s.

precision fires. PLA thought leaders seized upon U.S. military's concepts and force designs in the 1990s and evolved them even as the U.S. military turned its attention to the Global War on Terrorism.

The result is that by the 2020s, the PLA held a much more expansive view of "information warfare" than did the U.S. military. The PLA's approach to informationized warfare includes kinetic strikes on C4ISR networks, advanced electronic warfare, stealth technology, and increasingly intelligent munitions. Its 2015 military strategy synthesized operational guidance into a single sentence that might have been taken from a U.S. playbook: "Integrated combat forces will be employed to prevail in system-of-systems operations, featuring information dominance, precision strikes on critical nodes and joint operations."

The PLA regards C4ISR systems-of-systems as critical centers of gravity. It envisions attacking those key links and nodes to achieve battlespace information dominance, blinding an enemy force and paralyzing decision-making. De-linking operational elements increases the efficiency and effectiveness of follow-on strikes against bases and forces.

Even the most recent U.S. military strategies for generating combat effects appear to be largely symmetric with the counterstrategies the PLA has developed over the past several decades. Today's U.S. Air Force Future Operating Concept (AFFOC) prescribes "pulsed airpower" to conduct strikes and other missions in high-threat environments. AFFOC synchronizes and aggregates airpower in space and time to create massed effects, generating temporary, episodic air superiority. The AFFOC approach aligns with the Joint Warfighting Concept (JWC), which revolves around concepts of "expanded maneuver" and "pulsed operations." These designs, however, play directly to the PLA's strategies and strengths.

The JWC relies on the integration of capabilities across domains to generate "distributed mass," where forces and capabilities may be geographically dispersed but are highly networked and coordinated. The JWC and its airpower component appear to rely on an unproven assumption that large U.S. force packages can be integrated, coordinated, and synchronized in the face of enemy countermeasures to provide superior situational awareness and interconnected decision-making. But China's military has dedicated itself to using overwhelming kinetic and non-kinetic strikes to degrade and eliminate the very information capabilities the U.S. prioritizes.

Initiatives like the U.S. Department of Defense's Joint All-Domain Command and Control (JADC2) concept seeks to achieve seamless integration and rapid decision-making in complex operational environments. JADC2 will no doubt generate efficiencies and outsized effects in benign electromagnetic environments, such as the U.S. encountered in the Middle East over the past 30 years, but against a highly connected force like the PLA, they face significant risks. Given the PRC strategy to target, disrupt, and destroy U.S. C4ISR networks and capabilities, the U.S. Air Force must have a plan to fight China's strategy—a way to secure battlespace information dominance when—not if—the PLA collapses critical U.S. information links and nodes.

Key Terminology: Inside, Outside, Stand-in, Stand-off

- **Inside force:** A force comprising of shorter-range aircraft that are based relatively close to areas of combat operations, within adversary direct attack ranges.
- **Outside force:** A force comprising of longer-range aircraft that are based outside of adversary direct attack ranges.
- **Stand-in force:** Stand-in strikes, also known as "penetrating strikes" employ low-observable aircraft to penetrate enemy defenses and release munitions in close proximity to targets.
- **Stand-off force:** Stand-off strikes attack targets from a distance with long-range weapons, generally launched from outside of adversary threat ranges.

Courtesy

The B-21 Raider, in flight tests at Edwards Air Force Base, Calif., will bring a new level of stealth and sensing attributes to the fight. B-21s could penetrate enemy air defenses and guide uninhabited systems while delivering ordnance. The distributed approach maximizes combat effectiveness and minimizes risk to vulnerable assets.

Forward Air Controllers Offer a Model for DCAO

The concept of Distributed Collaborative Air Operations (DCAO) has its roots in a U.S. military doctrine employed for years to manage close air support. CAS aircraft take on hostile targets in close proximity to friendly forces.

Integrating and synchronizing CAS among air and ground forces in time, space, and purpose is among the most complex tasks performed by the U.S. Air Force. Joint terminal air controllers (JTACs) on the ground work with airborne forward air controllers to control maneuvers and clear weapons release for attacking aircraft.

During the Vietnam War, the Air Force employed OV-10 Bronco light attack aircraft as an observation and airborne forward air controller platform to coordinate close air support in real time. The OV-10 had multiple radios, could remain station on for an extended period, and could therefore act as a communications hub while providing persistent overwatch. The OV-10s' real-time intelligence gathering, target marking, and flexibility enabled them to direct other strike aircraft operating at higher altitudes to roll in and attack in a fast-moving, highly complex battlefield.

DCAO applies these same concepts in a much broader way. Even though the DCAO concept does not necessarily involve friendly troops in contact with enemy forces on the ground, DCAO puts fifth-generation aircraft in a similar forward air controller role. Pilots flying fifth-generation aircraft with their advanced information collection and communications capabilities are at the center of the DCAO fight, sensing the battlespace, making decisions, and directing other aircraft, including uninhabited systems and fourth-generation aircraft carrying long-range standoff weapons onto targets in highly contested battlespaces.

TURNING THE TABLES: DCAO

Rather than large formations attacking episodically, DCAO envisions numerous small force packages—combining advanced fifth-generation aircraft with both fourth-generation and uninhabited systems—executing precision attacks simultaneously while disconnected from broader networks. These small, agile force packages could overwhelm an adversary with asymmetry and complexity, forcing the adversary into reactive paralysis.

DCAO builds on proven concepts like Effects-Based Operations (EBO) and parallel warfare developed in the 1990s to achieve strategic effects with an economy of force. In 1991's Operation Desert Storm, stealth and PGMs were pivotal in maximizing results of effects-based and parallel operations using comparatively few aircraft. F-117 stealth fighters were able to penetrate deep behind enemy lines; PGMs ensured every sortie yielded a high-impact strike. While F-117s accounted for less than 2 percent of sorties during that war, they hit more than 40 percent of strategic targets. The use of stealth, precision strike, electronic warfare, and nascent cyber capabilities redefined the concept of combat mass, prioritizing combat efficiency over massed forces.

Similarly, a DCAO force can act rapidly and continuously—even with limited access to centralized C4ISR, reworking traditional organizational structures to push command and control to the very edge of the battlespace and secure decisive outcomes. DCAO relies on outcome-driven mission orders: A theater air operations command center might transmit objectives, target sets, and intelligence by broadcasting one-way into the battlespace. Receiving that information passively, without ever replying or retransmitting, DCAO forces at the tactical edge would deny adversaries the ability to geolocate and target stray signals.

In this concept, fifth- and next-generation aircraft are individual airborne command posts, synthesizing command broadcasts with locally acquired ISR and assigning missions to wingmen or accompanying uninhabited platforms using very low-power directional links or optical communications to minimize signature exposure and preserve stealth. Rather than massing firepower or even massing effects, DCAO elements would independently strike critical targets across the depth of the adversary system, creating shock and chaos at multiple locations simultaneously.

For example, stealthy F-35s or B-21s could penetrate enemy air defenses undetected, relay critical targeting data to fourth-generation jets equipped with long-range standoff munitions and guide uninhabited systems executing electronic warfare actions or reconnaissance missions. The distributed approach maximizes combat effectiveness and minimizes risk to vulnerable assets.

FIFTH-GENERATION AIRCRAFT: THE HEART OF DCAO

Given the current state of technology, only piloted fifth- and next-generation combat aircraft can operate disconnected from battle networks, engage in complex problem solving, and act on mission orders to target adaptive enemy systems. Without significant advancements in general artificial intelligence, autonomous systems will not be able to independently execute a concept like DCAO.

Recent upgrades to F-35s have realized massive increases in airborne data collection and information processing capabilities that provide a strong foundation to build out the DCAO operational concept. Technology Refresh 3 (TR-3) and Block 4 F-35 upgrades include a new integrated core processor that is 25 times more powerful than its predecessor, a larger memory unit, and enhanced electronic sensing, protection, and attack capabilities. The upgraded AN/APG-85 radar reportedly doubles the capabilities of its predecessor. The F-35's Distributed Aperture System (DAS) consists of six infrared cameras that look in all directions around the aircraft, providing the pilot with unparalleled passive situational awareness. An upgraded Electro-Optical Targeting System (EOTS) provides super high-definition video and precise laser designation capabilities, combining both forward-looking infrared (FLIR) and infrared search and track (IRST) capability. F-35 pilots can detect and track targets or potential threats at long ranges without emitting any detectable signals.

The core upgrade to the F-35's F135 engine also provides increased durability and capabilities to facilitate next-generation weapons, sensors, and jammers. The engine provides the necessary power for the Block 4 upgrades, enhancing target recognition and electronic warfare capabilities and an expanded arsenal of weapons. Built on an open mission systems architecture, Block 4 will allow for rolling improvements to the F-35 without major system redesigns.

The B-21 is likewise designed with powerful attributes to penetrate contested airspace and understand where and how to employ airpower in real time. Similarly, the F-47

promises to deliver key advancements in the penetrating counterair mission, as described by Air Force Chief of Staff Gen. David Allvin: "The F-47 will have significantly longer range, more advanced stealth, be more sustainable, supportable, and have higher availability than our fifth-generation fighters," he said earlier this year. "[It will have] next-generation stealth, sensor fusion, and long-range strike capabilities to counter the most sophisticated adversaries in contested environments."

The DCAO operational concept offers an innovative and adaptive approach to outmaneuver near-peer adversaries' evolving strategies and capabilities designed to defeat current U.S. approaches to generating combat mass. DCAO, like any operational concept, forms a basis for operational planning or military force design. It is a conceptual point from which to work backward toward other supporting requirements. It does not, by itself, solve all the enduring challenges facing the U.S. Air Force in the Indo-Pacific, which include:

■ Defending U.S. air bases against air and missile attacks. Forward-based air forces are essential for DCAO in the face of long-range missile threats in the Indo-Pacific and other theaters of operation.

■ Decentralizing command and control. DCAO requires a significant shift toward training for decentralized operations, away from centralized C4ISR systems that will be explicitly targeted by advanced militaries like the PLA.

■ Integrating mixed air forces. Forces will need to train to coordinate complex operations between fifth generation aircraft, older fourth generation aircraft, and uninhabited systems.

■ Increasing capacity of the air force's fifth generation and beyond aircraft inventories. DCAO depends heavily on using fifth generation and beyond aircraft for sensing, processing, and decision-making. Continued delays and shortfalls in production, upgrades, or deployment of these aircraft will undermine the core capabilities of the concept. Rapidly fielding upgrades to fifth-generation and fourth-generation aircraft will be necessary to maintain an edge over countermeasures developed by adversaries.

Funding fifth generation and beyond aircraft acquisition alongside the requisite air base defense, logistics, communications capabilities, and training will be essential for the successful implementation of DCAO.

REQUIRED: A BALANCED FORCE MIX

On a practical level, inside forces composed of both fifth- and fourth-generation strike fighters are what the U.S. Air Force has available in the greatest numbers in its present-day inventory. The current U.S. bomber force—even when augmented with dozens of B-21s in the next several years—will not have the capacity to generate large numbers of sorties from distant bases, nor will it have enough extended-range weapons to generate sufficient stand-off strikes in a large-scale operation against a near-peer adversary.

Balancing funding and the development of DCAO with other strategic priorities, such as long-range strike capabilities and overall force modernization, poses an enduring resource challenge. To mature DCAO and ensure the Air Force's new force design delivers the capabilities U.S. warfighters will need in a future fight, the Mitchell Institute offers the following recommendations:

■ Reduce dependence on centralized C4ISR. The Air Force should design operational concepts to ensure its combat forces will continue to function effectively without reliance on long-range, highly networked or centralized communication systems that are vulnerable to catastrophic attacks from adversaries like China's PLA.

■ Adopt and develop Disaggregated Collaborative Air Operations as an operational concept. Employ fifth generation and beyond aircraft as central components to lead decentralized and disaggregated operations.

■ Modernize and scale fifth generation and beyond forces. The Air Force should rapidly scale up its inventory of fifth-generation aircraft to replace its geriatric fourth-generation combat aircraft. The Air Force should also develop and acquire CCA, B-21, and F-47 NGAD PCA aircraft at scale to create a collaborative, disaggregated, effects-based family of combat systems.

■ Balance stand-in and stand-off forces. The Air Force should create a balanced mix of stand-in and stand-off combat air forces to provide optimal flexibility in potential conflicts with near-peer adversaries or any number of lesser contingencies.

■ Expand forward base defense and hardening efforts to enable DCAO. The Air Force should double down on its agile combat employment concept to enable DCAO with base hardening, active defenses, aircraft dispersal, and deception capabilities.

In a future large-scale conflict, the most important question may not be, "How many aircraft do you have?" or "How many weapons can you carry?" but "How many decisions can you still make when the lights go out?" DCAO envisions a force designed to fight in the dark, thrive in chaos, and leaves adversaries chasing shadows. DCAO is a return to the fundamentals of effects-based operations and parallel warfare, fundamentals that capitalize on fifth-generation capabilities. If the future is indeed dark, it will belong to those whose forces are designed to exploit that reality.

Retired Navy Commander J. Michael Dahm *is the Senior Resident Fellow for Aerospace and China Studies at AFA's Mitchell Institute for Aerospace Studies.*

The Israel-Iran Conflict: A DCAO Concept in Action

As early as 2015, U.S. Air Force F-22s were used as "quarterbacks" to direct other aircraft in operations over Syria. F-22s deconflicted multiple assets using their superior sensing, processing, and information fusion capabilities. In 2024 and again in 2025, Israeli Air Force strikes against Iranian nuclear and missile infrastructure offered a window into the DCAO concept's potential. Israeli F-35s flew ahead of the main strike formation, penetrating heavily defended airspace and mapping hostile radars and SAM sites. Their data enabled rapid vectoring of Israeli F-15s and standoff missiles from Israeli submarines and loitering munitions. Despite advanced Iranian air defense capabilities, the strikes achieved near-complete surprise and successfully degraded key military infrastructure with no reported Israeli losses. The DCAO concept envisions standardizing and institutionalizing these types of operations at a larger, more complex scale.

Drone Hype and Airpower Amnesia

Cheap drones may be changing warfare, but the value of air superiority endures.

Ukrainian Security Service

A freeze-frame captures a drone exploding, disabling a Russian Tu-95 bomber during Ukraine's Operation Spiderweb, a covert drone attack in June. Ukraine's surprise attack unleashed small drones armed with explosives to destroy dozens of unprotected Russian aircraft at air bases across the country.

By Lt . Col. Grant "SWAT" Georgulis, USAF

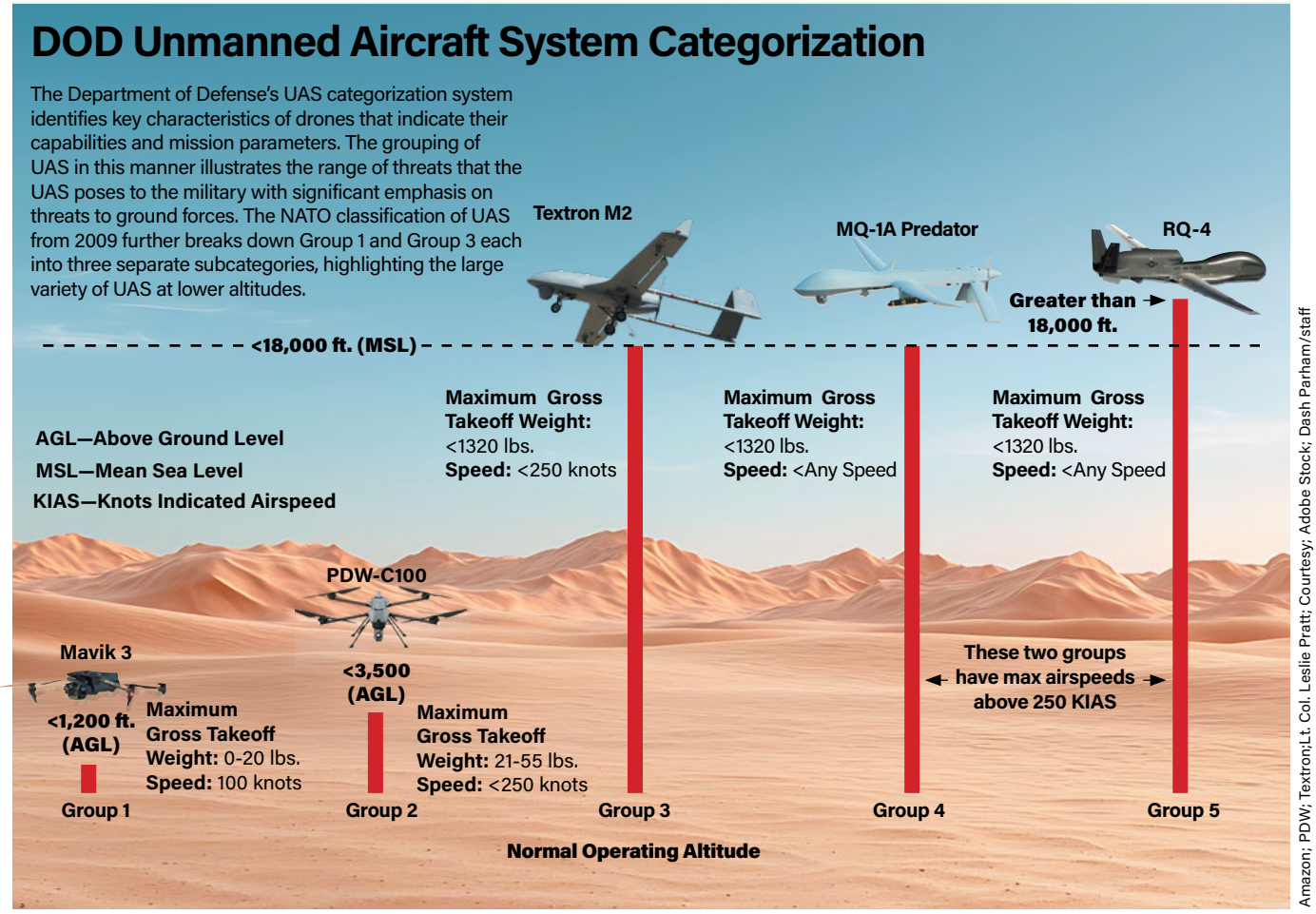
The proliferation of small unmanned aerial vehicles (UAVs) has shaken up the military world, fueling concern that UAVs could revolutionize airpower concepts and even negate the need for air superiority as a fundamental objective of airpower strategy. Dr. Kelly A. Grieco and Col. Maximillian K. Bremer's "air littoral" concept—defining the airspace from the coordinating altitude to the Earth's surface—argues that increasing numbers of UAVs and one-way attack "drones" have shifted the importance of air control to low altitudes, altering the doctrine of air superiority. Retired Army Lt. Gen. David Barno and Nora Bensahel assert that "drones" have displaced manned aircraft and are now threatening the U.S. Air Force's relevance with "an almost-existential crisis."

These perspectives all share another commonality: They suffer from a collective airpower amnesia acquired over a 30-year period in which American airpower reigned supreme against a series of nonpeer rivals. Absent the challenge of air-to-air combat and without the context to understand what could happen in a peer fight, these observers are overstating the impact of UAVs and misinterpreting their tactical role.

The term "drone" lies at the heart of the problem. It is, at best, a lazy catchall, covering everything from an out-of-the-box commercial quadcopter to the YFQ-42 and YFQ-44 Collaborative Combat Aircraft autonomous fighters now under development for the U.S. Air Force. Lumping all these aircraft into a single, oversimplified category obscures their unique capabilities and fuels misguided hype.

The biggest lesson from the Russia-Ukraine war is not how small UAVs are reshaping air warfare, but rather how they are reshaping ground combat.

Breaking down UAVs into distinct groups based on weight, operating altitude, and speed as their defining characteristics can help clarify the diversity of this category of aircraft. Groups 1-3 represent small UAVs, which are the aerial weapons employed abundantly in the Russia-Ukraine conflict, causing some to shift airpower assumptions prematurely. These small UAVs frustrate ground operations and excel in reconnaissance, precision strike, and electronic warfare roles. But they do not challenge air superiority, which is defined as the degree of control of the air domain necessary to "enable successful execution of joint operations such as strategic attack, interdiction, and close air support (CAS)," according to Air Force doctrine. Small UAVs lack the capability and capacity to achieve such control because they do not possess the advanced air-to-air combat capability necessary to deny adversaries access to airspace. The fact is, the biggest lesson emerging from the Russia-Ukraine war is not how small UAVs are reshaping air warfare, but rather how they are reshaping ground combat. Neither side has been able to achieve air superiority over the other, resulting in an environment where small UAVs can wreak havoc on both infantry and armor.



Amazon; PDW; Textron; Lt. Col. Leslie Pratt; Courtesy; Adobe Stock; Dash Parham/staff

The argument that UAVs have created a new domain between the ground and air known as the air littoral proposes an unnecessary redefinition of airspace management below the coordinating altitude (CA)—a combat-tested height that separates fixed-wing and rotary-wing operations. Small UAVs fit within existing doctrine, and air superiority's fundamental principles remain unchanged. Coordination must begin between the air and ground components, adapting the CA to assign responsibility for targeting. This reinforces established airspace-management doctrine, preserving resources for securing air superiority against peer adversaries like China and Russia, whose advanced air defenses demand robust air control. As with past innovations, adapting to UAVs strengthens, rather than rewrites, the primacy of air superiority as a necessary goal in joint warfare.

Assigning the Army to defend against enemy UAVs below the coordinating altitude and the Air Force to defend above it aligns with current tactics, technologies, and operational concepts. Though UAVs may be relatively new, their underlying operational characteristics are not. As retired Lt. Gen. David Deptula recently commented on the Aerospace Advantage Podcast from the Mitchell Institute of Aerospace Studies, "Drones are simply cruise missiles being used as a substitute for penetrating aircraft delivering PGMs." Introducing new terms to replace existing ones with the same meaning undercuts a working system and risks confusion over solutions.

Small UAVs provide new capabilities that primarily affect ground operations. Deptula said small UAV's "most effective use to date is in countering conventional infantry and armor engagements." Additionally, counter-tactics, techniques, and procedures (TTPs), as well as emerging kinetic and directed energy technologies, such as SHORAD (short-range air defense) and IRON BEAM, are rapidly diminishing their marginal impact on air operations. Claims of the revolutionary relevance of small UAVs in air operations are rash and simply unsupported by the reality of combat, as recently proven by Israel's resounding, successful air campaign against Iran, which, lacking air superiority, has had to resort to ballistic missiles and cruise missiles. The U.S. is not doctrinally "woefully unprepared" to counter small UAVs operating below a coordinating altitude based on the past 30 years of successful air operations utilizing proven airspace management practices. Redefining this airspace as an air littoral is unnecessary and redundant. Instead, adapting and standardizing a UAV coordinating altitude for targeting responsibility will enhance efficiency in future operations.

DRONES: EVOLUTIONARY, NOT REVOLUTIONARY

Revolutionary technologies fundamentally reshape warfare by opening new domains and contesting control; evolutionary developments, however, merely enhance existing capabilities without altering core principles.

When the Confederate submarine H.L. Hunley sank the USS Housatonic in 1864, it represented a revolutionary development that turned the undersea world into a new domain of warfare. Forever after, naval forces would have to operate in a new world where combat could take place both on the sea and beneath it. By World War II, submarines had become a significant difference-maker in warfare, disrupting shipping and diverting assets to develop anti-submarine technologies, such as sonar, ASW (antisubmarine warfare) aircraft, and depth charges, to counter their stealth advantages. This ultimately

redefined naval strategy. Today, the balance of naval power increasingly hinges on the capabilities of submarines.

The advent of the airplane was likewise revolutionary, extending conflict into the vertical dimension and enabling the projection of combat power from the skies. Billy Mitchell envisioned that airplanes would end wars by overflying ground forces to strike cities and strategic industries, attacking the capacity to wage conventional wars. World War II confirmed airpower's transformative role, though it hardly paved the way to end future wars. Counterair technologies, such as antiaircraft artillery (AAA), surface-to-air missiles, and radar, emerged as vital factors, and, according to airpower strategist Colin Gray, "war had been forever transformed." Airplanes redefined military strategy, requiring dedicated air forces to secure air superiority.

Today, a growing number of observers are ascribing similar characteristics to small unmanned aerial systems. Yet, unlike submarines or airplanes, which opened new domains of warfare, small UAVs are not so transformational. Deptula pointed out that these low-cost weapons are largely an extension of the ground domain, providing reconnaissance, precision strikes, and electronic warfare capabilities to ground warfighters without compromising air superiority. Furthermore, functioning like cruise missiles or precision-guided munitions, one-way UAVs rely on low-altitude flight, autonomous navigation, and precision targeting to evade radar cost-effectively. What is evident from conflicts like Ukraine's is that these systems displace existing weapons, rather than offer domain-altering innovations.

This historical perspective clarifies why contemporary claims about "drones" reshaping air superiority are misguided. Assertions that "drones," as witnessed in the Russia-Ukraine war or Iranian proxy wars, threaten the established doctrine of air superiority, misinterpret their impact and role. Barno and Bensahel's claim of an Air Force "existential crisis," where small UAVs supposedly "wrested command of the air from piloted aircraft," collapses under scrutiny: Their cited Jordan strike was a cruise missile attack, not a drone wresting air superiority, according to Deptula. Their conflation exemplifies the amnesia that plagues the drone hype. UAVs are evolutionary tools that cost-effectively achieve similar effects to cruise missiles and long-range precision fires. Thus, as Deptula claims, "if there is any lesson to extract from the Russia-Ukraine war to date, it is the absolute necessity of air superiority." This distinction reaffirms the Air Force's enduring role in securing the skies.

COUNTERING UAVS

Before the mid-2000s, the U.S. Army had embedded SHORAD capability to defend maneuver forces against low-altitude threats. However, according to U.S. Army Air Defense Artillery Capt. Leopoldo Negrete, in the decades that followed, the lack of enemy fixed- or rotary-wing threats in Afghanistan and Iraq led the Army to prioritize point-defense air defense artillery (ADA), such as the Patriot, over SHORAD, thereby removing ADA coverage from maneuvering ground forces. Correctly, the Russia-Ukraine war and the emergence of small UAVs motivated the Army to reintroduce the Maneuver-SHORAD (M-SHORAD) capability, which includes a variant employing a laser called the Directed Energy (DE) M-SHORAD, according to Negrete. The reintroduction of M-SHORAD reestablishes doctrinally proven air defense relationships between the air and ground components to defend the airspace over maneuver forces, regardless of altitude, even while air superiority is achieved.

Other counter-UAV technologies are rapidly emerging. The U.S. Army is working with Raytheon to field a fixed and mobile low, slow, small unmanned aerial vehicle integrated defense system (F/M-LIDS), equipped with a Coyote Block 2 SAM and two different machine guns capable of targeting UAVs. Israel's Iron Beam anti-air defense laser could soon be operational, reducing the cost-per-shot compared to the kinetic Iron Dome, which costs $40,000 to $50,000 per shot, to $2-$3.50 per laser shot. The U.S. Marines fielded a hand-held Dronebuster system designed to jam the signals UAVs need to operate. As observed in the Russia-Ukraine conflict, UAV loss rates are high due to iterations of electronic attack capabilities, said Deptula. Even if adversaries scale small UAVs into mass swarms, advanced fighters, and networked defenses—like the F-22's and F-35's sensor fusion paired with air battle management—they retain the edge in denying air control, keeping superiority beyond "drones'" grasp. No example better illustrates this point than

Senior Airman Alexandria King

Drones and other loitering munitions are forcing ground forces to train on how to defend against these new weapons. Here a soldier takes cover and shoots at incoming drones during Exercise Northern Strike 24-2, a Reserve component training event in Michigan last summer.

kyivcity.gov.ua/

The remains of a Russian Shahed 136 kamikaze drone, effectively a low-cost cruise missile, on display in Ukraine. Russia has sought to overwhelm Kyiv with cheap uncrewed weapons.

Iran's launching of more than 170 "drones" and cruise missiles against Israel in early 2024, thwarted by manned U.S., Israeli, and Jordanian fighter aircraft aided by U.S. air battle management. Small UAVs' psychological toll on ground forces—evident in Ukraine—amplifies their tactical bite, but this intimidation does not translate into air control.

While small UAVs have altered the language of combat in the land domain, the U.S. Air Force does not need to redefine its doctrine, air superiority, or the pursuit of attaining it. Re-emerging is the codified doctrine for how the air and land components work together to achieve vital air defense for ground forces, allowing the USAF to focus on air superiority and prevent enemy air interdiction efforts in a near-peer fight. The seminal lesson from the Russia-Ukraine war is that freedom of maneuver is severely restricted without air superiority, and a decisive advantage cannot be achieved to meet military and political objectives without it.

ADAPTING DOCTRINE: UAVS IN THEIR PLACE

Adaptation preserves primacy. To account for UAVs in a future conflict, airspace control plans should establish a coordinating altitude suitable for the area of operations to delineate targeting responsibilities between the ground component and the air component. The ground component, nominally through Army M-SHORAD or other ADA capabilities, should own responsibility for Group 1-3 UAVs—low, slow threats—coordinating with the air component commander for by-exception targeting. Group 4-5 UAVs, operating at higher altitudes, suit traditional interceptors (either fighters or surface-to-air missiles), which is why having the joint force air component commander dual-hatted as the area air defense commander is still an appropriate organizational construct. However, as recently demonstrated in operations defending Israel from air assault by Iranian cruise missiles, which are often mischaracterized as "drones," fighter aircraft may be the only means to intercept these threats down to very low altitudes.

The airspace below the coordinating altitude has long been a contested area. AAA, man-portable air defenses (MANPADs), and mobile surface-to-air missiles create significant tactical problems for fighter aircraft. Additionally, the presence of rotary-wing aircraft at low altitudes requires airspace control measures, such as a coordinating altitude, that deconflicts fixed-wing and rotary-wing aircraft within an area of operations. Operating at low altitudes carries risks, and the need to deconflict fixed-wing and rotary-wing aircraft limits traditional fighters' ability to counter UAVs. This has always presented a problem. Redefining the airspace below the coordinating altitude as the "air littoral" does not solve this problem.

Drones and cruise missiles have not redefined air superiority in Ukraine, the Middle East, or elsewhere. On the contrary, small UAVs have proved necessary precisely because Russia, Ukraine, and Iran have been unable to attain air superiority. In the case of Ukraine, they do not have the aircraft necessary to achieve air superiority and have been denied authority by the U.S. to use long-range weapons to suppress Russian air defenses. Small UAVs alone have demonstrated no capacity to gain air superiority, even at low altitudes. Advanced aircraft such as the F-22 and F-35, and, in the future, the F-47 and collaborative combat aircraft (CCA), paired with air battle management platforms like the E-7 and Control and Reporting Centers, will be needed to conduct offensive counterair missions against advanced surface-to-air threats and enemy aircraft to attain air superiority and provide temporal freedom from effective enemy interference against friendly ground forces. In short, small UAVs thrive where air superiority is absent, not because they redefine it.

To stay ahead, combatant commanders must integrate counter-UAV technology, such as M-SHORAD, lasers, and jammers, into wargaming against peer threats, ensuring the viability of air superiority as it remains the linchpin of future victories. Avoiding the drone hype fallacy ensures resources are bolstered, not bypassed, by this framework. This requires prioritizing budgets for counter-UAV tech, advanced fighters, and air battle management capability to achieve air superiority. Advocating that the U.S. Air Force must pivot to a drone-heavy force based on suppositions derived from the Russia-Ukraine war, a conflict that does not reflect the capabilities or envi-

Courtesy photo

The word "drone" has become a broad inexact term that covers a myriad of aircraft, from high-end Collaborative Combat Aircraft, like this YFQ-44A from Anduril Industries to cheap commercial quadcopters.

ronment that the U.S. is likely facing in the future, is not only reckless but irresponsible.

AIR SUPERIORITY UNSHAKEN

The Russia-Ukraine war and the Middle East conflicts highlight the tactical value of small UAVs, not a doctrinal crisis. An appropriate coordinating altitude for engagement aligns the roles of air and ground components to combat adversary UAVs effectively without overreacting. Over-focusing on low-altitude, small-payload, short-range drones diverts attention from advanced air forces and missile systems, which continue to pose genuine threats, especially after decades of counterinsurgency eroded high-end combat readiness. The current aim of the People's Liberation Army Air Force (PLAAF) is "to serve as a comprehensive strategic air force capable of long-range airpower projection," per the DOD's 2024 annual report to Congress. The USAF must not abandon plans to recapitalize its combat air forces and air battle management capabilities to counter China. This will not happen by diverting money to saturate low-altitude airspace with drone swarms, as suggested by Grieco and Bremer.

The lack of recent air-to-air combat experience against medium- to high-altitude threats, shaped by 20 years of counterinsurgency operations in Iraq and Afghanistan, must not distract our military from prioritizing air superiority, which does not include quadcopters with hand grenades. Against a peer threat, pursuing air superiority in challenging threat environments requires strategic thinking, planning, and budgeting that drives requests; otherwise, the U.S. risks ceding the air domain advantage to its adversaries. Gen. Kenneth S. Wilsbach, Commander of Air Combat Command, summed up this imperative recently: "There's been some talk in the public that the age of air superiority is over, and I categorically reject that." Air superiority is "the first building block of any other military operation that you need to establish if you want to achieve objectives," said Wilsbach.

The emergence of UAVs demands adaptation, not alarm. No time for airpower amnesia: Russia-Ukraine's stalemate teaches us that the use of drones is evolutionary, not revolutionary. Doctrine endures—air superiority remains a prerequisite for success in major combat. Sustaining this edge requires budgets that prioritize advanced crewed airpower, supplemented with CCA and other UAVs as their capabilities evolve, rather than discarding validated doctrine learned over the past 100 years of airpower employment. That is the drone hype fallacy laid bare—tactics do not trump dominion. The low-cost, mass-deployable nature of small UAVs enhances ground operations and challenges infantry and armor, as seen in the conflicts in Ukraine and the Middle East, but it does not necessitate a change in the doctrine of air superiority. Commenting on comparisons between a potential invasion of Taiwan and Russia's ongoing invasion of Ukraine, wherein some argue UAVs could thwart the People's Republic of China's aims, Adm. Samuel Paparo, Commander of U.S. Indo-Pacific Command, said, "Oh let's just quit on everything. We've got some drones. All right, well, the PRC's got 2,100 fighters, three aircraft carriers, and a battle force of over 200 destroyers." The U.S. Air Force's biggest problem is securing air superiority, not an alarmist doctrinal shift, which would almost certainly result in ceding the airpower advantage.

The U.S. Army must collaborate with industry to bolster defenses against UAV attacks, continue standing up M-SHORAD battalions, and refine systems like F/M-LIDS to protect bases and forces. Meanwhile, the U.S. Air Force must sustain investments in advanced crewed and uncrewed aircraft, including the F-47 next-generation air dominance (NGAD) penetrating counterair aircraft (PCA), the F-22, F-35, CCA, and air battle management platforms like the E-7 and Control and Reporting Centers to counter sophisticated adversaries—and maintain the air superiority vital to achieving national objectives. Far from signaling an existential crisis, small UAVs underscore a dual truth: Air superiority remains paramount, and coordinated air and ground component efforts, rooted in proven doctrine, are required to secure victory in future wars.

Lt. Col. Grant "SWAT" Georgulis, USAF, *is a Master Air Battle Manager and currently assigned as the Deputy Chief of C2 Inspections as part of the Headquarters NORAD and NORTHCOM Inspector General team. He recently finished a yearlong Air Force National Defense Fellowship at The Mitchell Institute for Aerospace Studies. Lt. Col. Georgulis has served on a combatant command component staff, was an Air Force Weapons School instructor, and graduated from the Naval War College's College of Naval Command and Staff and Air University's School of Advanced Air and Space Studies. He previously commanded an E-3G Squadron, the 965 Airborne Air Control Squadron, at Tinker Air Force Base, Okla.*

AFA Nominees 2025-2026

CANDIDATES FOR NATIONAL OFFICERS AND DIRECTORS.

The Air & Space Forces Association Nominating and Governance Committee met by video conference in April 2025 and selected four candidates to send forward for open National Officer positions and National Director positions on the Board of Directors. The Committee consists of a Chair and Vice Chair of the Committee as well as at least three actively serving AFA Directors. The Chair and the Vice Chair of the Committee shall be the two most recent past serving Chairs of the Board, unless the Board determines to elect a different Chair or Vice Chair by a majority vote of the Board.

Voting will take place from

8:00 a.m. EST, Saturday, Sept. 20 - 8:00 a.m. EST, Sunday, Sept. 21.

Authorized delegates can cast their vote anytime, electronically, during this period.

AFA CHAIR OF THE BOARD

Kathleen Ferguson, Fairfax Station, Va., nominated for a first-year term as Chair of the Board joined AFA in 2015 and is currently a Life Member. Ferguson served nearly 35 years as a civilian in the Air Force, retiring as the Principal Assistant Secretary for Installations, Energy, and Environment, overseeing infrastructure critical to mission success and quality of life. Now with The Roosevelt Group, she advocates for defense communities nationwide. Her experience in policy, mission support, and family advocacy uniquely positions her to advance AFA's mission of supporting Airmen, Guardians, and their families. She has previously held a position as AFA National Director and has served as an AFA Board Member for the past three year.

A message from Kathleen Ferguson: The Air Force became my career by chance, not by choice. As I look back on the tremendous opportunities I was given in my Air Force career, the experiences I was provided, and the love I have for the institution, I think being the Chairman of AFA would be a fitting way to give back. I could not imagine another career that would have been as rewarding. I understand the mission of the Air Force and AFA, I have managed large organizations throughout my Air Force career, and worked Air Force budget for nearly 20 years. My "superpower" is being able to work well under pressure, and I was always the senior executive the SECAF sent to the Hill to answer the tough questions. I always treat people with kindness, work to fully understand the issues, and I'm not afraid to make a decision.

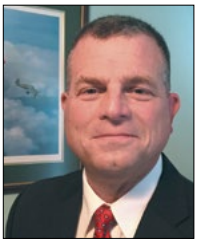
NATIONAL DIRECTOR, CENTRAL AREA

Janelle Stafford, Shawnee, Okla., an AFA member for over 20 years., has held numerous AFA positions, including, National Director; Region President; serving on the Strategic Planning, Membership, Advocacy and AIMS Steering Committees; roles as Chapter President, Vice President, and Secretary; and also State President and Treasurer. AFA Awards encompass Chapter and State Community Partner of the Year (2017 to 2020); AFA Medal of Merit and Exceptional Service Awards; Chapter Officer of the Year; Chapter and State Person of the Year and National Member of the year (2024). Stafford has nearly 25 years in the aerospace and defense industry, with strong ties to Tinker Air Force Base and Oklahoma's defense sector. She advocates for airpower, support STEM education through AFA's programs, and promotes family and quality-of-life issues vital to recruitment and retention and also believes in honoring veterans and preserving our heritage to educate future generations.

A message from Janelle Stafford: I seek to further support AFA's mission through advocacy for airpower, STEM education, and military family quality-of-life. With deep roots in the Oklahoma defense industry and active engagement in programs like CyberPatriot and StellarXplorers, I aim to strengthen workforce development and honor our service members' contributions. I bring deep organizational knowledge from experience at all levels of AFA. I'm committed to financial sustainability and unafraid to address tough challenges.

NATIONAL DIRECTOR, AT LARGE

Two National Director, At Large positions are open and each will be elected for a three-year term.



Dennis Dwyer, Dayton, Ohio, is an AFA Life Member and retired U.S. Air Force officer with 35+ years in Acquisition, overseeing cost, schedule, and performance of major weapon systems. Dwyer served as Group and Wing Commander and twice as Program Executive Officer (Fighters & Bombers; C3I & Networks). He is currently EVP and advisor at DAI, offering strategic guidance to government and industry while mentoring future leaders. As a lifelong AFA member, he revitalized the Space Coast Chapter post-retirement, serving as Chapter President, AFA Florida EVP, and now Florida State/Regional President—deeply committed to advancing AFA's mission through leadership, advocacy, and community engagement. Dwyer's military awards include the Distinguished Service Medal, Defense Superior Service, Medal and the Legion of Merit (2 clusters).

A message from Dennis Dwyer: Initially hesitant due to limited AFA experience, I ran for an At-Large position in 2019 and was not elected. Since then, I've served in multiple field roles, gaining valuable insight into AFA's structure and mission. As I conclude my term as State/Regional President, I'm eager to bring my expanded knowledge, leadership experience, and strategic perspective to the national board to help further AFA's goals and impact. I bring strong leadership and management skills in strategic planning, organizational development, and innovation. I've led the creation of new organizations using "form follows function" principles and bring deep experience in financial oversight, including budgets, 401K management, and philanthropic initiatives.

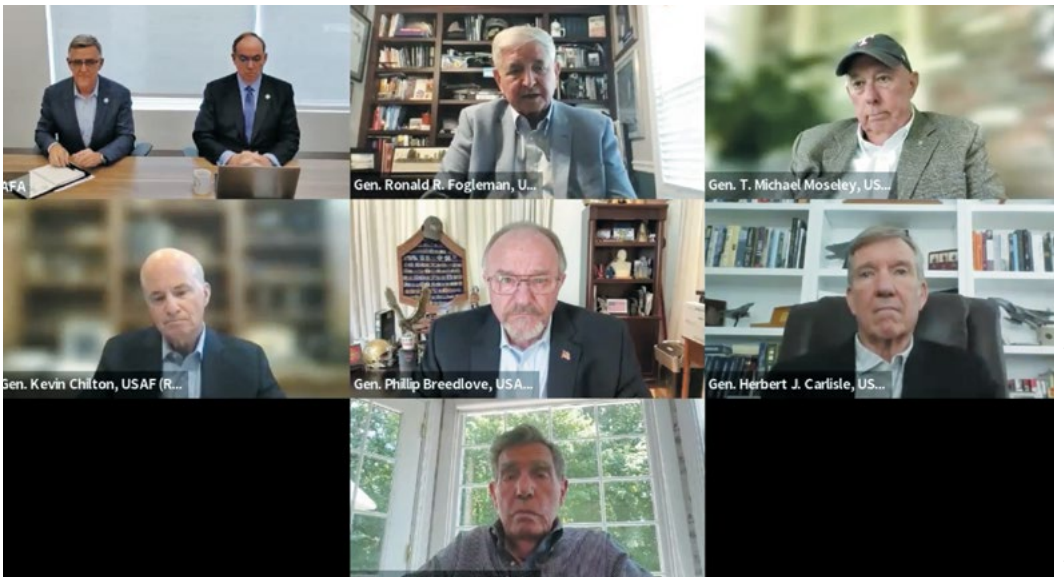
Wesley Hallman, Washington, D.C., nominated for a second-year term, served 27 years in the U.S. Air Force before retiring as a colonel. His last assignment was as the Chief Air Force Liaison to the House of Representatives. Prior to Congress, he served in several flying and staff positions, including commanding a squadron and a fighter group. Hallman was a White House Fellow, serving as Special Assistant to the Secretary of Agriculture, and his staff assignments included AFCENT Forward Chief of Staff and Joint Staff (J5).

He was formerly the Senior Vice President for Strategy & Policy at the National Defense Industrial Association (NDIA) and is now a private sector Executive Vice President and Head of Washington Operations. Hallman has a bachelor's from the U.S. Air Force Academy and graduate degrees from The Ohio State Univeristy, the School of Advanced Air and Space Studies, and the Eisenhower School. He also serves on the Falcon Foundation's Board of Trustees, the parent board of School Without Walls, and as a mentor for the White House Fellows program.

A message from Wesley Hallman: I seek a position on the board to help ensure AFA remains a powerful advocate for Airmen, Guardians, and the advancement of air and space power. As global threats rise, our strategic advantage must be preserved through stronger investment and support. AFA plays a vital role in this effort, and I am committed to strengthening its voice and impact.

16 Generals to Congress: Buy More F-35s, Fund the E-7

Six four-star generals and two AFA leaders joined reporters for a virtual media roundtable on July 10 to discuss the F-35 and E-7 shortfall in the DOD's proposed 2026 budget. Roundtable panelists included: - Gen. Ronald R. Fogleman, USAF (Ret.) - Gen. T. Michael Moseley, USAF (Ret.) - Gen. Philip M. Breedlove, USAF (Ret.) - Gen. John M. Loh, USAF (Ret.) - Gen. Herbert J. "Hawk" Carlisle, USAF (Ret.) - Gen. Kevin Chilton, USAF (Ret.) - Lt. Gen. Burt Field, USAF (Ret.) - Lt. Gen. David A. Deptula, USAF (Ret.).



Air & Space Forces Zoom meeting

Sixteen retired four-star generals joined Air & Space Forces leadership in a joint letter to Congress advocating for greater investment in F-35 fighters in fiscal 2026 and to fund the E-7 Wedgetail as an essential successor to the E-3 AWACS.

The July 11 letter to House and Senate leaders expressed "alarm at recent proposals to reduce the next fiscal year's ("FY") procurement of F-35As to only 24 aircraft and terminate the E-7 Wedgetail program" and urged lawmakers to use their power of the purse to reverse both decisions.

"We cannot emphasize enough the importance of rapidly acquiring F-35As to achieve the Air Force's requirement for 1,763 aircraft," the generals wrote, citing the jets' role in Operation Midnight Hammer. The future of space-based targeting is bright, they said, but while "We have high confidence the U.S. Space Force will develop and deploy a space-based air battle management system... the scientific and engineering hurdles to accomplish this goal are daunting and the timeline to success is unclear."

Six of the generals joined AFA President Lt. Gen. Burt Field (USAF, Ret.) and Lt. Gen. David Deptula (USAF, Ret.), Dean of AFA's Mitchell Institute for Aerospace Studies on a call with reporters to explain their concerns and draw attention to the issue.

"I'm advocating that both of these platforms, the E-7 and the F35, are key to air superiority," said Gen. T. Michael Moseley, 18th Air Force Chief of Staff, on the call. "We need them in bigger numbers if we're serious. That's why I decided that it was time to sign on to something that would go to the Congress. ... Air superiority is key to winning wars."

The letter was signed by:

Gen. Joseph W. Ralston, USAF (Ret.), 4th Vice Chairman of the Joint Chiefs of Staff and 13th Supreme Allied Commander, Europe (NATO)

Gen. Merrill A. McPeak, USAF (Ret.), 14th Chief of Staff of the United States Air Force

Gen. Ronald R. Fogleman, USAF (Ret.), 15th Chief of Staff of the United States Air Force

Gen. Michael E. Ryan, USAF (Ret.), 16th Chief of Staff of the United States Air Force

Gen. John P. Jumper, USAF (Ret.), 17th Chief of Staff of the United States Air Force

General T. Michael Moseley, USAF (Ret.), 18th Chief of Staff of the United States Air Force

Gen. Mark A. Welsh III, USAF (Ret.), 20th Chief of Staff of the United States Air Force

Gen. John D.W. Corley, USAF (Ret.), 32nd Vice Chief of staff of the United States Air Force and 8th Commander of Air Combat Command

Gen. Philip M. Breedlove, USAF (Ret.), 17th Supreme Allied Commander, Europe (NATO) and 36th Vice Chief of Staff of the United States Air Force

Gen. Ralph E. Eberhart, USAF (Ret.), 1st Commander, U.S. Northern Command (USNORTHCOM) and NORAD

Gen. Kevin Chilton, USAF (Ret.), 7th Commander, U.S. Strategic Command and 14th Commander, Air Force Space Command

Gen. Lori J. Robinson, USAF (Ret.), 7th Commander, U.S. Northern Command (USNORTHCOM) and NORAD

Gen. John M. Loh, USAF (Ret.), 24th Vice Chief of Staff of the Air Force and 1st Commander, Air Combat Command

Gen. Herbert J. "Hawk" Carlisle, USAF (Ret.), 11th Commander, Air Combat Command

Gen. Robin Rand, USAF (Ret.), 4th Commander, Air Force Global Strike Command

Gen. Lance W. Lord, USAF (Ret.), 12th Commander, Air Force Space Command

Brig. Gen. Bernie Skoch, USAF (Ret.), AFA's Board Chair

Lt. Gen. Burt Field, USAF (Ret.), AFA's President and CEO

Lt. Gen. David Deptula, USAF (Ret.), Dean, Mitchell Institute of Aerospace Studies.

Former SECAF Kendall Joins AFA Board

Frank Kendall, the 26th Secretary of the Air Force, has joined the AFA Board of Directors as an Armed Forces Director.

Armed Forces Directors are appointed by the Chairman and are voting members of the Board. Kendall joins fellow Armed Forces Directors Gen. David Goldfein, former Air Force Chief of Staff; Roger Towberman, former Chief Master Sergeant of the Space Force; and JoAnne Bass, former Chief Master Sergeant of the Air Force.

Kendall led the Department of the Air Force from 2021 to 2025, has more than 50 years of experience in engineering, management, defense acquisition, and national security affairs, including private sector, government, and military experience. A West Point graduate and retired Army officer, he has been a consultant to the defense industry, nonprofit research institutions, and defense agencies.

"During the four years he led the Department of the Air Force, Mr. Kendall was a steadfast supporter, friend, and believer in AFA's value and mission," said AFA Board Chair Brig. Gen. Bernie Skoch, USAF (Ret.). "His depth of knowledge and wide-ranging expertise will be invaluable in furthering our mission to develop dominant air and space forces as the bedrock of our national defense."

"I'm pleased to join the AFA board and continue to advocate on behalf of Airmen, Guardians, and the American people for the air and space forces. America needs to deter conflict and fight and win, if fight we must," Kendall said. "AFA's role in informing the public and making the case for airpower and space power is as vitally important today, as it has ever been since its founding nearly 80 years ago."

Jud McCrehin/Staff

Air Force Secretary Frank Kendall told thousands of Airmen at the AFA Warfare Symposium in March to better prepare for potential conflict with China. He said we must enhance readiness today and modernize for tomorrow.

Forces & Families Day Focuses on Wellness

AFA hosted ENGAGE: Wellness on the Homefront, a daylong event dedicated to the analysis and exploration of military and veteran spouse wellness at its headquarters in Arlington, Va, in June. The event included the public data release of the "Military Spouse & Veteran Spouse Wellness Survey," an independent poll of 1,200 spouses of Active-duty and veteran service members. The study's authors billed it as the first study of its kind.

More than 50 guests, including several spouses of members of the Joint Chiefs of Staff, both past and present—joined hundreds more online.

The survey was a collaborative research initiative between the University of Texas at Austin's Institute for Military and Veteran Family Wellness (IMVFW) and InDependent, a nonprofit run by and for military spouses. Respondents reported moderate overall wellness satisfaction, with an average rating of 6.58 out of 10, but more than 50 percent of respondents said they had experienced some level of anxiety or depression, at a rate two to three times the general population—and almost a quarter of respondents said accessing mental health care for themselves was a challenge.

"About 50 percent of participants felt that finding community or friends was the number one challenge that they are currently facing," said Evie King, president of InDependent. "You can probably start sewing a line through so many areas of wellness where this trend seemed to resonate."

Jud McCrehin/staff

Savannah Stephens, left, Corie Weathers, Military Clinical Consultant, as part of a daylong military spouse and wellness event in June.

Elisa Borah, director of IMVFW, which built the survey agreed. "We know that this lifestyle is isolating, lonely, it leads to mental health concerns if you're not supported or even know how to pay attention to your mental health," she said. "I think that's where we can make the most impact and improve our programming."

Following the survey report, attendees joined breakout sessions to discuss the findings among themselves. AFA shared the latest edition of ENGAGE, a publication written by military spouses for military spouses. Go to AFA.org/F2 to learn more.

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By Col. Phillip S. Meilinger, USAF (Ret.)

ALEXANDER P. DE SEVERSKY

A futurist with airpower prowess.

Alexander de Seversky was a well-known and popular aviation figure in America during World War II. He was a fighter ace and war hero, aircraft designer, entrepreneur, writer, and theorist. In that last role he was a transitional figure between the conventional bombing theorists of the 1940s and the nuclear thinkers of the 1950s. He was an unabashed airpower advocate.

"Sasha" was born in Georgia, then part of Russia, and after graduating from the Imperial Naval Academy he joined the flying service. On his first combat mission he met with disaster. While attacking a German ship his aircraft was hit by antiaircraft fire and crashed into the Baltic Sea. The concussion detonated one of his bombs, killing the observer and severing his own right leg below the knee. Seversky survived, was rescued by a Russian patrol boat, and after eight months in convalescence, returned to Active duty with an artificial limb.

Assigned a job in aircraft production, he applied his mechanical acumen to the design of devices that would make a pilot's job easier: hydraulic brakes, adjustable rudder pedals, and special bearings for flight controls. He also experimented with aircraft skis for landing on icy surfaces and a sophisticated bombsight. These inventions won him an award for the top aeronautical ideas of the year.

Although designing aircraft was important work, Seversky wanted to return to flying duty, but was told this was impossible. Nevertheless, he persevered and eventually his situation came to the attention of Czar Nicholas, who decided that Russia needed colorful heroes and intervened to have Seversky returned to combat duty.

Over the next year he flew 57 combat missions and scored 13 victories over German aircraft. The exploits of "the legless ace" won him a Gold Sword from the Czar as well as the Cross of St. George, Imperial Russia's highest decoration. Posted to Washington as part of the Russian naval mission soon after, Seversky elected to remain in the U.S. after the Russian Revolution.

In 1921 he was introduced to Brig. Gen. Billy Mitchell, who secured him a job at McCook Field, Ohio. There Seversky designed a gyroscopic bombsight and an innovative air-refueling device used on the "Question Mark" flight of 1929 when an Air Corps aircraft remained aloft for over six days. In 1927 Seversky became a naturalized U.S. citizen and was commissioned a major in the Air Corps Reserve.

He founded Seversky Aircraft Corp. in 1931 and there patented devices such as split flaps, metal monocoque construction, retractable landing gear and pontoons, and specialized flight instruments. His design talent was obvious, and his SEV-3 amphibian set world speed records in 1933 and 1935. A version of this model became the P-35, a remarkable aircraft that was the first all-metal monoplane fighter mass produced in the U.S., incorporating an enclosed cockpit, retractable landing gear, and cantilever wing. The Air Corps purchased 137 of this aircraft, the direct ancestor of the famed P-47 "Thunderbolt." There were two other unusual characteristics of the P-35: it was extremely fast, its civilian version won the Bendix Air Race in 1937, 1938, and 1939 (flown by Jackie Cochran in 1938); and it had long range, incorporating fuel tanks in its thick wing. Seversky also called for increased armament; whereas, standard equipment was two .30-caliber machine guns, he advocated for six to eight .50 caliber guns. These would soon become standard equipment on fighter aircraft.

Seversky's ability as an aeronautical engineer was obvious, and he was awarded the Harmon Trophy, presented by President Franklin D. Roosevelt in 1939, and the Lord and Taylor American Design Award for 1940. He was not, however, a businessman. His corporation never made much money and was constantly behind in its production orders. In May 1939, while out of the country, he was removed as president and ousted from the company, whose name was then changed to Republic. In truth, Seversky's removal from business had positive results: it gave him the time to use his considerable charm and communication skills to write and talk about his favorite topic, airpower.

Courtesy

Maj. Alexander de Seversky sits at the controls of an early aircraft, circa 1914.

Alexander de Seversky was the most effective and prolific airpower advocate of his era. His hundreds of articles and lectures spanned the country. His most famous book, "Victory Through Air Power," was a Book-of-the-Month selection that was read by millions and turned into an animated movie by Walt Disney. Because of his homey, down-to-earth style, he spoke the language average Americans could understand. He preached that airpower had become the dominant arm of military power and should be recognized as such. The development of atomic weapons solidified this position. The major died in 1974 at age 80.

*Seversky wrote two other books, "**Airpower: Key to Survival**" and "**America: Too Young to Die,**" but neither was of the same caliber as **"Victory."** An outstanding biography is James K. Libbey's, **"Alexander P. de Seversky and the Quest for Air Power."***

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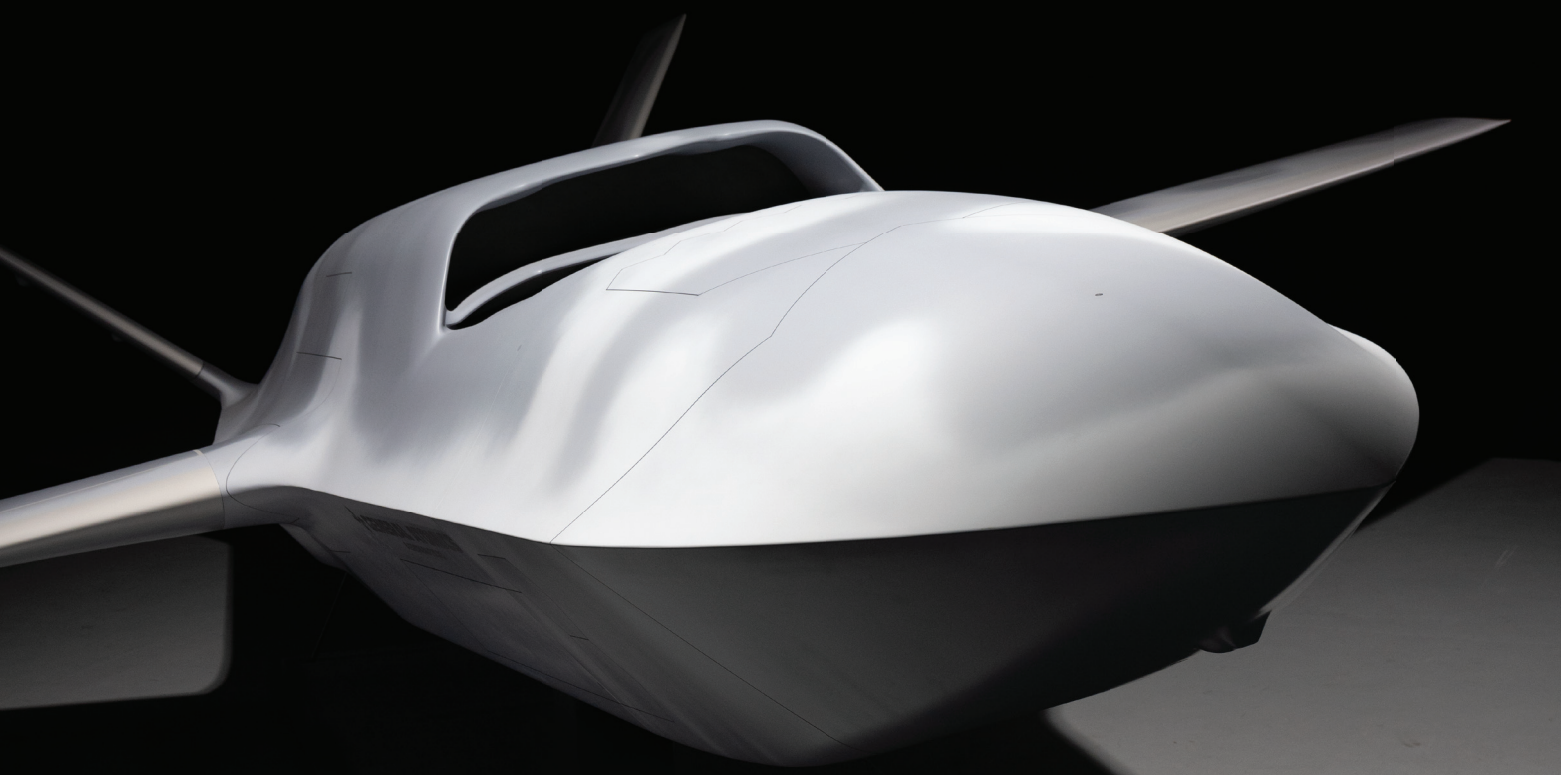

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