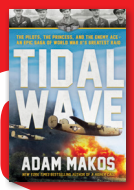
Drone Killer: New Life for Old Weapon 13 | A Case for Contract Air Refueling 36 | Saving Scott O'Grady 40

BOOK EXCERPT 45



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A Growing Space Force Lifts the Veil on Combat Operations | 28

Plus: The Future of SATCOM 30

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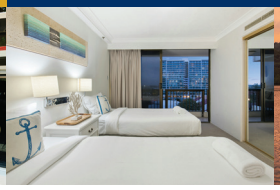

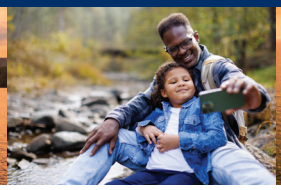



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Senior Airman Brooklyn Golightly/USAF

AIR&SPACE FORCES

November/December 2026, Vol. 109, Nos. 11 & 12 airandspaceforces.com

DEPARTMENTS

2 **Editorial: Whose Risk Is It Anyway?** By Tobias Naegele

4 **Letters**

4 **Index to Advertisers**

7 **Verbatim**

8 **Airframes**

12 **Faces of the Force**

13 **World** Drone-Killer Rockets; Battlefield Promotions; Autonomous Aircraft; The Future Fighter Force; Remembering Michael Wynne, SECAF 21

61 **AFA in Action** Gulf War map featured in Smithsonian Exhibit

64 **Heroes/Leaders** Charles "Chuck" Horner

ON THE COVER



Senior Airman Ryan Quijas/USSF

Guardians and Airmen assigned to United States Space Force Combat Forces Command stand in formation during a redesignation ceremony at Peterson Space Force Base, Colo., Nov. 3, 2025. CFC comprises approximately 12,000 Guardians, Airmen and civilian personnel across 11 Deltas, 82 squadrons and 25 units of action.

FEATURES

24 Growing—and Armed in Space
By Greg Hadley
USSF breaks its silence, speaking out about orbital weapons and plans to grow.

28 Space Force Goes to War
By Chris Gordon
Inside the Space Force's contributions to Operation Epic Fury.

31 Data Transport, Decision Advantage, and the Future of Military Space Communications
By Col. Jennifer Reeves, USSF (Ret.)
More data and greater demand for timely delivery point to a hybrid Optical and RF approach to SATCOM.

36 The Future of Civil Contract Air Refueling
By Robert C. Owen
The case for expanding aerial refueling on a pay-as-you-go commercial model.

41 Finding BASHER 52
By Colin E. Kimball
USAF Pilot Thomas T.O. Hanford followed his hunches, and never gave up.

46 Book Excerpt: Tidal Wave
By Adam Makos
The Pilots, the Princess, and the Enemy Ace—A True Story of Courage and Survival in WWII.

51 2026 AFA Almanac
By Chequita Wood
Statistics, Awards, and History of the Air & Space Forces Association.

A U.S. Navy F/A-18 Super Hornet aircraft receives fuel from a U.S. Air Force KC-135 Stratotanker aircraft in the U.S. Central Command area of responsibility July 29, 2026. See "The Future of Civil Contract Air Refueling," p. 36.

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By Tobias Naegele

Whose Risk Is It Anyway?

There is risk in any endeavor: a chance of loss, danger, even harm. In business, it could mean losing money. In combat, human lives.

Geopolitically, decisions about war and peace carry unseen, unmeasurable risks, ripple effects that can stretch around the world. The war in Iran drove up global energy prices. The war in Ukraine fueled a munitions shortage. Operations in one theater can trigger opportunism in another.

When an F-15E was shot down in April over Iran, the resulting scramble to rescue the two crewmembers proved so costly, with at least four aircraft not counting the Strike Eagle lost in the effort, that U.S. leaders feared sending manned aircraft into Iranian airspace.

There is prudence to that decision, but it might also have signaled weakness, undermining deterrence. Overcaution carries its own risks.

In June 1995, Air Force Capt. Scott O'Grady's F-16 was split in two by a Serbian surface-to-air missile during an Operation Deny Flight mission, downing the jet. O'Grady's whereabouts were unknown.

Unwilling to risk another shootdown, commanders ordered subsequent Deny Flight missions to remain outside Serbian-controlled airspace. O'Grady spent the next five days in hiding, surviving on insects and rainwater, while those looking for him couldn't get close enough to pick up his radio calls.

But one Airman, Capt. Thomas "T.O." Hanford, challenged the status quo. Breaking the rules, he flew into enemy airspace, picked up O'Grady's weak distress call, and ultimately vectored rescue crews to his location. To this day, O'Grady says he would not have survived if not for Hanford's persistence.

You can't build peace through strength without numbers.

Hanford's decision to ask forgiveness later rather than seek permission first is prudence of another sort. Call it doing the right thing, going with one's gut, leaving it all in God's hands—by whatever name or phrase, this was selfless servant leadership in action.

Former Air Force Secretary Mike Wynne, who died in October, didn't put his life on the line, but he did put his convictions ahead of his job and reputation, and paid a price for doing so.

In June 2007, Wynne and then-Air Force Chief of Staff Gen. T. Michael Moseley were on a collision course with Defense Secretary Robert Gates. With the Iraq occupation going badly, and insurgents inflicting real pain on U.S. forces, Gates desperately sought to stem the losses and reconfigure the military for a different kind of war. He leaned hard on the Air Force and Navy to pay the Army's growing bills.

Wynne and Moseley, meanwhile, maintaining a clear eye on China's growing military ambitions, refused to back down on modernization plans. Gates dismissed it all as hubris. He derided what he termed notions "of future conflict that aspire to upend the immutable principles of war: where the enemy is killed, but our troops and innocent civilians are spared. Where adversaries can be cowed, shocked, or awed into submission, instead of being tracked down, hilltop by hilltop, house by house, block by bloody block."

In another speech, Gates acknowledged he was "balancing risk—today's demands versus tomorrow's contingencies"—but he dismissed the notion of peer conflict with China.

"I have noticed too much of a tendency toward what might be called 'Next-War-itis'—the propensity of much of the defense establishment to be in favor of what might be needed in a future conflict," he said. "In a world of finite knowledge and limited resources, it is hard to conceive of any country confronting the United States directly in conventional terms."

That was then. Today, China's navy is the largest in the world, and its air force is on its way to surpassing America's.

Gates, a former CIA analyst, missed the clues in front of him and failed to foresee how China would convert economic power derived from American consumers into military power to be used against American interests.

Wynne stood for what he believed, and when Gates couldn't convince him to see things differently, he chose to oust Wynne and Moseley.

The recent war in Iran exposed how the degradation begun at that time affects operations today. Canceling the F-22 prematurely made that platform more costly and left the Air Force reliant on aging, less capable jets. It bet the future on F-35 capabilities that didn't mature as fast as expected. All that contributed to a weaker USAF.

U.S. forces were dominant in Iran—but at a price. To sustain Operation Epic Fury, USAF diverted parts, weapons, and people from every other theater. The endeavor exposed clear gaps in U.S. security.

Air Force leaders understand the challenge. Their fiscal 2026 Long-Term Fighter Force Structure report seeks to plus-up the future force. A year ago, the Air Force targeted 1,369 combat-coded fighters by 2030. This year's document raises the goal to 1,509 fighters by 2035.

That's moving in the right direction, but slowly. USAF counts 334 combat coded F-35s today, en route to 502 in 2031 and 600 in 2035—an average gain of less than 27 per year. Add in non-combat jets and that rises to perhaps 36 per year—barely half of what is needed to build a healthy fighter force.

The Air Force numbers meet requirements with what the report terms "moderate risk."

The report also cites a "low-risk" figure of 1,723 combat-coded fighters—15 percent more.

Recent history would suggest we've already experienced "moderate" risk and found it wanting. Gates' legacy is a force that went to war with too few aircraft and struggled to sustain operations.

The Air Force, having accepted moderate risk atop moderate risk for decades, maintains capability. But the willingness of Airmen and Guardians to pledge life, limb, and time away from home is limited.

If moderate risk means routine 10-month Guard deployments just to fight mid-sized belligerents like Iran, what does a peer fight look like?

American military strategy calls for a sophisticated and powerful deterrent force. But you can't build peace through strength without numbers.

Americans are largely unaware of the growing threats to their long-term security. They are also unaware of the risk calculations being made on their behalf. If they knew, few would accept "moderate risk."



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— Lt. Gen. Daniel P. Bolger, U.S. Army, Retired



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LETTERS

Support System

In the article: "The Future of NATO" [July/August, p. 26] Lt. Gen. Jason Hinds, commander of USAFE is quoted as saying, ... the capability "to fight, enter the combat zone, land at a different location, refuel, potentially even rearm."

The article went on to talk about a Gripen fighter that had been refueled and rearmed by a small team in less than 20 minutes, the kind of operation envisioned by U.S. forces.

From 1996-99, I was the senior logistician for what was then called AIRCENT (Allied Air Forces Central Europe) and one of my responsibilities was aircraft cross-servicing across the whole of Europe. The words about the Gripen's refuel and rearm reminded me of that responsibility.

Cross-servicing back then meant refueling and refueling and rearming. We trained teams from all over Europe to service aircraft from other nations, so that when a Belgian F-16 landed somewhere in Germany, a team from the Luftwaffe would perform the cross-servicing, and get the airplane back in the fight. So, crews in various countries had to be trained on aircraft of other countries, and on other than their own type of aircraft.

There were two methods for training ground and aircrew:

Exercise Ample Gain—missions flown between two nations, evaluate and train ground crews on aircraft cross-servicing duties, familiarize aircrews with alternate air base facilities, and exercise NATO airfield support.

Exercise Ample Train—held twice a year to exercise cross-servicing program, bringing NATO nations together at one location to conduct combined training on a variety of aircraft, promote closer relations between members, most economical way to meet operational cross-servicing requirements.

I had heard these exercises had been discontinued, but now it sounds like we are getting back on track.

Col. Frank Alfter,
USAF (Ret.)
Beavercreek, Ohio

Commissioning Tracks

I am interested in the recently announced U.S. Space Academy [See, "What to Watch from Trump's US Space Academy Commission," Daily Report, Aug. 31]. To be successful, the Academy must have an effective commissioning program. I believe that a useful model is the U.S. Merchant Marine Academy, which provides the option to be commissioned as a Naval Reserve officer, while serving in the civilian maritime sector. The Space Academy could provide similar options in the space sector.

I suggest that the U.S. Space Academy adopt a three-track commissioning program. The three tracks would be the Military Track, the Dual Track, and the Federal Civilian Track.

The Military Track would be a conventional military academy program, similar to that of the U.S. Air Force Academy. Graduates of the military track would receive a regular commission in the U.S. Space Force and would receive initial assignments to Space Force units.

Graduates of the Dual Track commissioning program would receive Reserve commissions in the U.S. Space Force and would receive initial assignments as federal civilian employees in space-related agencies. These assignments would include such agencies as NASA and NRO. As Space Force reservists, these officers would be subject to recall to Active duty in the Space Force, if ordered to do so.

Graduates of the Federal Civilian Track would not be commissioned as military officers. Upon graduation, they would be assigned to federal government civilian positions. They might be assigned to a civil space agency, like NASA, but could also serve at a defense-related agency,

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INDEX TO ADVERTISERS

Armed Forces Vacation Club . . . . . Cover II
Marvin Test 45
USAA . . . . . Cover IV

One Mission. 3
Ones to Watch . . . . . .Cover III
Shop AFA. 5

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like NRO. They would also be eligible to fill civilian positions in Space Force units.

This track may appeal to cadets who are interested primarily in space exploration. It would also be a good option for cadets who, because of physical limitations, do not meet the criteria for commissioning as military officers.

The output of each of these commissioning tracks is critical. Therefore, every applicant to the U.S. Space Academy should be required to commit to one of these tracks—and to an alternate choice if appropriate.

Lt. Col. Geoff Goodman,
USAF (Ret.)
Centennial, Colo.

Strategic Plan

In regards to "Ukraine Re-imagines Strategic Attack" [July/August, p.32]:

1. Strategic Attack

This is essential to weakening or defeating an enemy and Ukraine is finding a way to implement this without an air force. Ukraine is using UAVs and drones to hit strategic targets from oil refineries to bombers.

2. Russia's 10,000 Tanks

At a tactical level, Ukraine has used quadcopter and other UAVs to negate the 10,000 Russian tanks ... a gigantic tactical success. In fact, the "Unmanned Forces" of Ukraine cause 90 percent or more of Russian casualties in personnel and equipment. This "unmanned element of attack" is something the USAF does but could expand on.

3. Ukraine Spiderweb Attack on Russian Bombers

The imaginative Ukrainians attacked and destroyed bombers thousands of miles behind the front line by using unsuspecting Russian truck drivers to get their quadcopters close enough to attack bombers. The USAF could pack 50 to 100 quadcopters in the shell of a 600 gallon fuel pod on an F-15 and hit a similar enemy airfield 700-1,000 miles behind the front lines and take out 50-100 enemy planes with individually flown quadcopters using a Starlink comm link.

4. No-Go Zone for Iranian Nuke Bomb Sites

Using the "Ukrainian unmanned attack element of attack" combined with the USAF Rapid Dragon capability, the U.S. could declare a "no go zone" of 10 square miles around the Islamic Revolutionary Guard Corps' nuke bomb sites such as Isfahan and Fordow.

Any personnel or equipment entering these zones would be bombed with standoff weapons such as Extended Range Attack Munitions (range 280 miles) or Anduril Barracuda 500 (range 570 miles) dropped from C-130s or C-17s flying over Kuwait.

This would prevent the nuke sites from being restarted and would be similar to the decade long "no fly zone" over Saddam's Iraq.

The combo of manned USAF planes and unmanned attack vehicles has huge potential.

William Thayer
San Diego

Always Do Your Best

I commissioned on Nov. 9, 1977, age 34, eight days before my 35th birthday. I would never have been commissioned if it was not for Gen. Chappie James ["Heroes/Leaders: Daniel 'Chappie' James Jr.," May/June, p. 176]. During 1974 to 1975, I finished my four years of college under USAF's Bootstrap program.

I had orders for Officer Training School (OTS) in September 1975, but in July these were canceled because I was a "Liberal Arts major." I was offered a classified civilian clothes assignment in Australia and because my wife was Australian (we met on a classified tour in Australia in 1968) I accepted the assignment. In June 1977 my unit received a priority message that I was to report



to OTS Lackland Air Force Base, Texas, Aug. 3, 1977.

My commander and I could not understand why I was finally going to OTS because there had been no mention of this in prior two years. After two weeks at OTS, the commandant called me in for a discussion. He informed me that I was accepted at OTS because General James sent a letter to the Air Force Chief of Staff recommending "immediate steps be started for my acceptance at OTS." Also, so I could be commissioned before my 35th birthday.

I was shown the confidential letter, in which General James stated that based on my past record in the U.S. Army, CIA where I was assigned from 1967 to 1971, and USAF I was the most outstanding and highly qualified NCO in USAF for acceptance at OTS.

My USAF organization was not under General James' command nor had I ever met General James. I never found out why he selected me for OTS. Sadly, he died on Feb. 25, 1978, while I was attending a USAF Officer Intelligence Course and I never got to send him a letter thanking him for his letter to CSAF USAF.

I did graduate as a Distinguished Graduate of OTS. Because of injuries, hazardous duties and being a paratrooper, I had to retire in 1987 (I am now VA 100 percent totally and permanently incapacitated with 12 VA disabilities since 1998).

I have never forgotten what General James did for me, and I only wish I could have met him to personally acknowledge his support for me. He truly was a great American general.

Capt. William Mega,
USAF (Ret.)
Queensland, Australia

Basic Training is Not Basic

Reading the September/October issue ["Reinvigorating USAFA's Summer Training," p. 34], I had to laugh when I saw in the beginning of the article about the Academy's summer training the revelation that some of the cadets woke up early to avoid the mad rush to get shipshape.

When I went through basic training at Lackland Air Force Base, Texas, as an enlisted troop back in 1986, after the first week or so of the mad morning rush to make the bed, dress, and get prepped, I naturally began to wake about 10 to 15 minutes before 0600 every morning.

My body clock was kicked into fighting shape, I guess. Never needed an alarm! It gave me plenty of time to get dressed and have my bed halfway done (to bounce that quarter!) by the time the lights went on. As the days went on, more and more of the flight followed suit.

At first, one of the other recruits was bent out of shape at me, alleging that I was going to get us all in trouble. As the weeks wore on, he was up a little early as well. ... It just made too much sense. I was really amazed at my body's accuracy, down to plus/minus five minutes after eight or so hours sleep.

At the end of our six weeks, almost the entire bay was up and quietly busy before 0600 every day.

Also In the September/October issue, two of the articles deal with defending our air bases ["ACES's Defensive Blind Spot," p. 42 and "Defeating the Drones," p. 47], a critical and underresourced component of our operations these days.

Strangely enough, no mention is made of the RAF Regiment, a unit of the U.K. Royal Air Force that has specifically dealt with these issues since the second world war. Apparently, the Brits took a lot of losses of aircraft on the ground in the beginning of the war and formed the RAF Regiment to deal with air and ground threats to their air bases.

The Regiment grew to a total size of 80,000 personnel by the end of the war, and so was really a corps-sized outfit of numerous detachments. It seemed to be a combination of Security Police, light armored cars, and AAA defenses.

Nevertheless, I would be intrigued to see how the RAF Regiment today plans to deal with the same threats that we face.

MSgt. Chris Dierkes,
106th Rescue Wing, NYANG
Westhampton Beach, N.Y.

Logjam

The conflict in Iran seems to confuse the best strategists and politicians on both sides of the aisle. Most confusing is President Trump's rationale to hold off destruction of the Islamic regime of Iran and his off and on rationale for a peaceful resolution with the regime.

As a former Air Force intelligence officer of 20 years (1967 to 1987), I can only guesstimate the cause for this confusion. First of all, the U.S. does not have an unlimited supply of applicable munitions, such as rockets, missiles, and bombs. Additionally, and perhaps, more critical are shortages of fuses and, weapons/munitions guidance systems, which have limited shelf life.

These resources are distributed to the theaters and are ultimately managed by the COCOM commanders who must ensure they can defend their theaters in case of attacks by their potential adversaries and terrorists. Continuous transfer of these resources to U.S. and allied warfighters against Russia and Iran is currently impracticable.

Without these resources, the U.S. forces cannot fully utilize the multitude of intelligence that is collected by signals, geospatial (imagery, surveillance, and photographic) measurement, human and other technical intelligence systems.

With the abundance of at least two generations of Farsi (Iranian) language speakers in the U.S. who can interface with pro-freedom Iranians in-country, we should not be lacking information on the location of appropriate critical targets. The Air Force would do well to reestablish a human intelligence capability that could directly support Air Force warfighters.

Finally, though not directly Air Force related, the U.S. Army and Marine Corps would do well to reestablish a robust ground force capability that would give the commander in chief a resounding ground attack force that could be supported by a capable Air Force air-to-ground support which is basically being wasted in the Iran conflict.

As a former air-to-ground support officer, I am sure the COCOM commander could use armored forces (e.g., tanks and self-propelled artillery), demolitions and other covert attack capabilities that are well-supported by air forces.

Lt. Col. Russel A. Noguchi,
USAF (Ret.)
Pearl City, Hawaii

Hat's Off to You

When I was serving "back in the day," I loved the uniform but hated to wear a hat and took every opportunity to uncover if I thought no officer or NCO could see me! And serving on a SAC base there was also the dreaded encounter with Gen. Curtis LeMay checking out the ground maintenance—there WERE such encounters and you better have a hat!

So I open the magazine ["The Future of NATO," July/August p. 27], and what do I see? Four Airmen strolling down the flight line, no hats in sight! Well, as an old NCO I see them!!

I appreciate their service and wish them well (it's rumored that General LeMay is retired!)

Peter Hansen
Jacksonville, Fla.

VERBATIM

COLLABORATIVE COMBAT

"The DAF Battle Network is not about a single platform or program. ... It is about connecting the capabilities the department already has, bringing in the capabilities it needs next, and making sure they work together to give warfighters resilient decision advantage."

—Brig. Gen. Joshua Williams, Portfolio Acquisition Executive for Command, Control, Communications and Battle Management speaking at AFA's 2026 ASC Conference, Sept. 16.



Jud McCrehin/staff

Life and Death

"If you put on a uniform and put your life on the line protecting America you are a war hero.
If you build something to help those people you are a patriot.
We can appreciate both, but let's not confuse them."

—Frank Kendall, 26th Secretary of the Air Force, in response to a LinkedIn post that asserted those who invent or fund a weapon system that "vanquishes the enemy" are war heroes.



Jud McCrehin/staff

ESSENTIAL ROLE

"For decades, American air and space power has often operated from a position of sanctuary. Those days are over. We can no longer treat point defense as a side hustle. We must make it a core function of air and space power."

—Air Force Chief of Staff Gen. Kenneth Wilsbach's keynote address at AFA's ASC26.

Be Not Afraid

"AI is a different technology. ... There are real questions about how we use it, where we trust it, how we protect information, and how human judgment still has to lead. Skepticism should make us smarter about how we use AI. Skepticism of AI is not an excuse to ignore it. ... [Some] people believe AI might replace them. While it might not replace you, if you choose not to use AI, you are going to end up in everyone's rearview mirror."



Jud McCrehin/staff

—Chief Master Sergeant of the Air Force David R. Wolfe, in an address urging Airmen to embrace artificial intelligence rather than fear it.

Reps and Sets

"Throughout NASA's history, on average, we launched our design spacecraft every three and a half months. [With Artemis], we were on a schedule to launch every three and a half years. You don't do anything well if you do it every three and a half years. Imagine what your golf game would look like if you played every three and a half years."

—Jared Isaacman on accelerating the learning curve at NASA as it works toward a future manned mission to the Moon.

Lofty Goal



Jud McCrehin/staff

"We've all seen what Operation Spiderweb did in Russia. How do we prevent the same sort of thing, and maintain the sense of urgency?... Would I like to get there a lot faster? Yes, but I think we're getting there. I'd like to look back in two years and say, 'We're done,' but I don't know if we'll quite be there yet."

—Air Mobility Command Boss Lt. Gen. Daniel H. Tulley reacts to the Air Force elevating its sense of urgency to defend air bases from drone attacks.

Defining Parameters



Jud McCrehin/staff

"We cannot expect industry to invest in capacity, manufacturing, or top talent when we're moving requirements around, but we have to be able to adapt more quickly. That means sharing risk across government and industry."

—Gen. Dan Caine, Chairman of the Joint Chiefs of Staff at ASC26, Sept. 16.

◄ Back to Contents

In this rare and remarkable photo captured inside the cockpit of a Ukrainian F-16 in September, a Russian jet-powered Geran one-way attack drone plunges from the sky trailing smoke after being shot down with the F-16's 20mm cannon. Defending against a mass air attack, this was the pilot's third gun kill of the sortie.

Official Ukrainian Air Force

Back to Contents

A U.S. Air Force F-15E Strike Eagle assigned to the 48th Fighter Wing receives fuel from a 100th Air Refueling Wing KC-135 Stratotanker during exercise Atlantic Thunder over Scotland in September. Atlantic Thunder ensures the interoperability and warfighting effectiveness of the U.S. and its allies when responding to surface threats.

Senior Airman Cody J. A. Mott

FACES OF THE FORCE



USAF

Staff Sgt. Tabitha Awoniyi, 442nd Force Support Squadron Commander, Whiteman AFB, Mo., and her morning show team earned a Regional Emmy Award, one of journalism's highest broadcast honors. She is the weekday news producer at WLKY-TV, a 24-hour news station in Louisville, Ky. The award is for her team's coverage of the UPS plane crash in November 2025. Awoniyi writes the scripts for the newscast and manages the flow of information. She credits her military background with enabling her to handle breaking news with leadership and poise. As a Reserve Citizen Airman, Awoniyi said, "One of the biggest lessons I've learned from the Air Force is the importance of accountability and staying calm under pressure."



Airman 1st Class Keola Vischi

Airmen of the **176th Wing, Alaska Air National Guard,** during a single sortie achieved two rescue missions in Arctic Alaska in September. After receiving an SOS signal, the Alaska Rescue Coordination Center dispatched an HH-60W from the 210th Rescue Sq., an HC-130J, from the 212th RS, as well as Rescue Squadron Guardian Angels who were able to reference the SOS coordinates and hoist the two stranded hunters to safety from the Koness River. While on this mission, another SOS call was fielded and two other hunters in distress 30 miles away on the Sheenjek River were also lifted to safety. Cellphones do not have strong signals in these areas.



Jeremy Larle

Combat Artist Retired **Lt. Col. Warren Neary (left)** from the Air Force Reserve Command Office of Historical Services Combat Art and Outreach Section returned to Dover AFB, Del., in September to unveil a painting honoring the dignified transfer of the fallen. Titled, "A Solemn Promise," the painting depicts a transfer from a 512th Memorial Affairs Squadron ceremony in 2017. Neary's work shows the straight-on view, as opposed to many side views of previous transfers, to heighten (or amplify) the faces and emotions of the event. The painting, now part of the Air Force Art Collection, will be displayed periodically in other locations.



Tech. Sgt. Bradley Tipton

Senior Master Sgt. Luis Colon, 927th Security Forces Sq., MacDill AFB, Fla., while on duty as a civilian police officer sprinted to the scene after a speeding vehicle crashed into a light pole. The driver remained trapped and unresponsive as fire erupted. Colon cut the seat belt and dragged the victim from the car just in time. His dual career training prepared him to process chaos and prioritize life-saving action, Colon said. "When seconds mattered, and a life was on the line, Senior Master Sgt. Colon didn't hesitate," said Col. John Weeks, 926th Mission Support Group commander. "Service before self is in his DNA."



Staff Sgt. Kadielle Shaw

Tech. Sgt. Michael Dantzler, 31st Aircraft Maintenance Squadron resource advisor, acting outside of his primary duties, secured $50,000 to establish a new AMXS building for the 31st Maintenance Group and processed $520,000 of Defense Travel System reimbursement for 60 Airmen in just five days. He also helped attain financial support for the 31st Helicopter Maintenance Unit, affording help to 320 additional personnel. Going from maintenance to assisting as a resource advisor is new for Dantzler, and he said he learns something new every day. He and his crew received the 2025 Secretary of War Maintenance Awards Country Team Award in Phoenix in January.



USAF

Master Sgt. Troy Reed, a military entrance processing station liaison supervisor for the 331st Recruiting Sq. in Alabama, won a second-place Silver Trophy at the Natural Strongman World Championships in Glasgow, Scotland, in August. The strongman competition started with a 572-pound dead lift and then a Circus dumbbell event. He was in fifth-place after those events. Then the final challenge was a load medley—running while carrying kegs and sandbags back and forth. Reed attacked the final event with determination and grit and finished with the fastest performance of the weekend.



Brandon Hernandez

The 593rd Test & Evaluation Sq., Space Delta 12, introduced RAVEN, a new telescope for student use into the Air Force Test Pilot School's Space Course to provide hands-on observation and tracking of orbital objects. Commissioned on Sept. 8, 2026, Raven will provide situational awareness to operational crews and commanders. "What they learn at the schoolhouse will have far-reaching impacts in rapidly delivering combat-credible space systems to the joint force," said Maj. James Ross, 593rd TES assistant director of operations.



Daniel Peterson

U.S. Space Force **1st Lt. Nicholas Mckenzie** won the 2026 Air Force Marathon in the Men's Full Marathon category, which consisted of more than 9,000 registered runners across 50 states at Wright-Patterson AFB, Ohio, on Sept. 19. His time was 2 hours, 34 minutes, and 31 seconds. McKenzie recalled, "Running and seeing the tributes to our fallen service members along the route was emotional and heartwarming. … It motivated me to dig a little deeper." Those who crossed the finish line of the 30th Air Force Marathon proved mental readiness, discipline, and preparation can go a long way.

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

WORLD

IRAN

DRONE-KILLER ROCKETS



Staff Sgt. Thomas Barley

An F-15E tests the AGR-20F Advanced Precision Kill Weapon System II, a laser-guided rocket weapon adapted to affordably shoot down drones and cruise missiles used by Iran.

By Chris Gordon

When the Air Force needed a new solution to shoot down the one-way attack drones that have dominated the new era of drone warfare, it turned to a decades-old weapon: small air-to-air rockets.

How the Air Force quickly found the solution is a story of learning on the fly and rediscovering ideas discarded in previous years.

The Advanced Precision Kill Weapons System (APKWS), as the system is known, relies on rockets that have been used for years, paired with a guidance system. APKWS was originally designed as an air-to-ground capability: A mid-mounted laser-guided kit was added to Hydra 70 rockets to turn the system into a precision-guided munition to strike targets on land.

The weapon provided the military with a relatively cheap and accurate munition during America's wars in the Middle East, particularly in Afghanistan. First deployed in 2012, it was used over the years on Army and Marine Corps helicopter gunships, A-10 Thunderbolt II attack planes, and F-16 Falcons. In a short-lived experiment, a couple of OV-10 Broncos were deployed with APKWS to combat ISIS forces in Iraq and Syria.

A little over a decade later, the need would increase to defend against Iranian-built drones. In less than three years, it has become the primary way for U.S. and allied fighters to thwart one-way attack drones in a new age of semi-autonomous warfare.

Dubbed the AGR-20F FALCO (Fixed-Wing, Air-Launched, Counter-Unmanned Aircraft Systems Ordnance), the air-to-air APKWS variant was first used in 2024 on F-16s. It is now the go-to drone killer for U.S. pilots in the Middle East. Countries around the world are lining up to buy them.

Air-to-air rockets date back to World War II, when German forces used unguided systems to try to knock out swarms of bombers. U.S. attempts to use the technology proved ineffective. During the Cold War, the Pentagon developed an air-to-air rocket for air defense that was never used: the AIM-2 Genie, which was armed with a 1.5-kiloton nuclear warhead.

In 2019, the Air Force explored using the rockets in an air-to-air role in tests with the F-16 Fighting Falcon. For a few years, the experiment was considered only a proof of concept and not a real-world capability.

Without air-to-air rockets in its inventory, the Air Force relied instead on expensive, radar-guided AIM-120 AMRAAM missiles and infrared-guided AIM-9 Sidewinders. Iranian-origin drones were targeted by U.S. fighters using expensive air-to-air missiles when the Biden administration came to the defense of Israel. Those weapons were also a means of defense after the Houthis in Yemen began launching drones at commercial shipping and the U.S. and allied ships that came in to protect them.

The need for a new approach was made clear in April 2024 when U.S. and Western fighters patrolled the skies over Iraq, hunting for drones, tipped off that a massive Iranian ballistic missile and drone attack was headed for Israel. Iran sought to flood the zone and launched a barrage of drones, ballistic missiles, and cruise missiles to confuse and overwhelm Israel's air defenses—nearly 300 projectiles in all.

The fighters included F-15Es from the 335th Fighter Squadron and 494th Fighter Squadron, which carried up to eight air-to-air missiles, and F-16s from the 121st Fighter Squadron, along with French and British jets. Fighters from Jordan, which sits between Iran and Israel, also sought to defend their territory.

Jets from the 335th Fighter Squadron had been rushed to the Middle East, arriving from North Carolina less than a day before. "After we got jets in-country, intel came down saying, 'Hey, 'There's a potential for something coming up in the next 24 hours. You guys need to be ready to hunt," then-Master Sgt.

Christopher Oles, the production superintendent for the 335th Fighter Generation Squadron, told Air & Space Forces Magazine. "We're loading eight missiles on one jet, like, 'What are we going to do with all these?'"

Use them, it turned out.

Though the U.S. downed 80 drones, many fighters quickly exhausted their air-to-air missiles. Three F-15E crews even attempted—unsuccessfully—to drop laser-guided JDAM bombs on drones. That mission exposed a cost and capacity problem.

AMRAAMs cost roughly $1 million each, and AIM-9s cost hundreds of thousands of dollars depending on the variant. The most capable model is the AIM-9X, which costs around $500,000. Cost was not the only reason the weapons are no longer the optimal capability for the counter-drone mission. Another motive was to preserve the sizable inventories of AIM-9s, officials say.

Air Forces Central, led at the time by then-Lt. Gen. Alexus G. Grynkewich, and U.S. Central Command, pushed for a cost-effective alternative with support from the Air Force.

The service turned to 70 mm Hydra rocket. And the APKWS kit turned it into a precision munition. To develop the new capability, the Air Force and BAE updated the software, but little else. Paired with a proximity fuse, it became a drone and cruise missile hunting munition.

"The great thing about it is that there wasn't a formal requirement set out for this. This was sort of organic. People started figuring it out without it being a big program of record," former Air Force Chief of Staff Gen. David Allvin said in an interview with Air & Space Forces Magazine. "We were on the wrong side of the cost curve in our munitions employment. We didn't know this particular threat would manifest. They proceeded to test an idea, not really knowing exactly what the threat was going to be in the future, but could see that there were some potential applications. Good thing they did."

More than 8 million Hydra rockets have been produced and are currently made by General Dynamics, which makes the rocket and warheads for American use; the APKWS guidance kit itself can be fitted to similar rockets, making the system plentiful.

"From a technical aspect, it's 'Hey, I need more weapons on my jet,' and that's what the APKWS gives you: a pod of seven of those things versus a single AIM-9. You can shoot down a lot more drones when they're coming in swarms," retired Lt. Gen. Derek France, the commander of Air Forces Central from April 2024 to August 2026—when the weapon came into use—told Air & Space Forces Magazine.

"From an operational perspective, there's not just the magazine depth of an individual airplane, which I care about, but I care about the magazine depth of the theater and making sure that, across the theater, I've got wings with the right weapons in the right place and get them in the air where they can defend their bases," France added.

Even with the new capabilities, Iranian and Houthi drones were a hard target even for the most advanced missiles. They fly low and slow, have a small radar cross-section and a low infrared signature, making them harder to spot with optical sensors.

"We studied that very heavily before we came into theater as a great event, to understand how this could challenge us, and how we fly our formations and how we search for these," Lt. Col. William "Skate" Parks, who was commander of the 480th Expeditionary Fighter Squadron in CENTCOM from October 2025 to July 2026, said in a December 2025 interview, on the events of April 2024. Parks was one of the first pilots to use the system in combat.

The rush to field the munition on Air Force fighters was a collaborative—and speedy—effort across the Air Force. Work began at Eglin Air Force Base, Fla., to equip the system on F-16s in the spring of 2024.

"Rockets have been around for a very long time, and it's an iterative approach to developing and furthering what you already have in making it better for the use cases that you see at hand," said the head of the Air Force Test Center, Brig. Gen. Mark A. Massaro.

In 2025, testing began using F-15E Strike Eagles overseas nine days after flight testing began in May of that year, said Massaro, who commanded the 96th Wing. "The F-15E had never had—any F-15 had never had—any kind of rockets on it before this time," Massaro said. "So there was a lot of work that had been done to understand some of the integration capability differences and how to make that happen."

But the team had a bureaucratic hurdle. Munitions are normally fitted onto an aircraft after going through a biannual process by the Non-Nuclear Munition Safety Board. "That is a safety process where, when you integrate weapons onto aircraft, you have to go through this," Massaro said. "This was not on that normal timeline." Then-Brig. Gen. Sean Choquette, the Air Force Director of Safety at the time, issued a risk analysis letter, and work on the F-15E moved forward.



Airman 1st Class Nyanda Walker-Potts

An APKWS system mounted on an F-16 shows three launchers, each capable of carrying seven rockets.

The system got its first real-world test in the fall of 2024 when an Air Force F-16 from the 510th Expeditionary Fighter Squadron from Aviano Air Base, Italy, deployed to the Middle East. It scored the first combat air-to-air kill of a drone with an APKWS rocket system, current and former officials told Air & Space Forces Magazine. More kills soon followed.

In October of that year, the 480th Expeditionary Fighter Squadron from Spangdahlem Air Base, Germany, took the next step. The 480th scored dozens of kills using the rockets. It also used older AIM-9M Sidewinders, claiming the first air-to-air kill by an AIM-9M in over 30 years. In all, the squadron notched 108 total aerial kills of drones and cruise missiles during the deployment. News of the success quickly trickled across the Air Force.



Airman 1st Class Nyanda Walker-Potts

A U.S. Air Force F-16 Fighting Falcon aircraft assigned to the 20th Fighter Wing sits at the hot cargo pad after being loaded with rockets at Shaw Air Force Base, S.C., in June 2025.

"That's a fantastic tagline," Parks said, referring to the aerial kills. "We're doing that in an innovative way." Parks was later awarded a Bronze Star—along with a Silver Star for a mission over Yemen—in part for helping develop tactics to use APKWS against drones and cruise missiles and employing the AIM-9M missiles, which are much cheaper than newer models.

Parks had his squadron go to school—in combat.

"This was all new and innovative," Parks said. "It's very, very hard to build a training plan for your squadron when you're not exactly sure how you're going to do it. And so what we focused on was the basics for the squadron and just creating people and pilots who could dynamically think and every night sit down and reiterate, are we doing this right? Are we doing it wrong?"

"That's what I'm most proud of: We have these rockets come online. It's a brand-new thing, and we're the ones doing it," Parks added. "And it's with guys who are now spending every minute of their day, when they're not flying actual combat missions, preparing and improving on this. It showed because that success rate just started, started really becoming amazing with these rockets as we're defending partners and our own forces."

To guide an APKWS rocket, the target must be laser-designated or "lased," unlike more expensive "fire-and-forget" missiles. Tactics quickly improved after the first kill, which used "buddy" lasing from another aircraft, and the F-16s were eventually able to self-lase targets, though the buddy lasing method is still used, according to current and former U.S. officials. A-10s, which, like F-16s, originally used the rocket as an air-to-ground weapon, have also been fitted with APKWS for air-to-air use, along with F-15Es.

APKWS uses a unique guidance kit. BAE's Distributed Aperture Semi-Active Laser Seeker (DASALS) optics are located on all wings of the rocket, which deploy once it is fired, rather than a nose-mounted seeker that traditional laser-guided weapons use. The aircraft's targeting pod—the Air Force calls it either the SNIPER or LITENING pod—points the laser at an aerial target to strike the target.

BAE has said it is working on an upgrade to the laser-guidance system—an additional seeker in the nose of the munition—that could make the weapon easier to guide onto its targets.

F-16s have mostly been observed fitted with one or two rocket pods, each of which can carry seven rockets. The F-16s can simultaneously carry multiple air-to-air missiles. Two-seat F-15Es have the most capacity and can carry up to six pods or 42 APKWS rockets.

"The first time I ever shot an APKWS was in combat at an enemy drone," said Parks. "And," he added for emphasis, "that is true."

With some warning they would use the system, the squadron spent the weeks leading up to deployment training, rushing to learn how to use it, but by studying the academics and working in simulators, not firing rockets over the German countryside.

Building on its success, U.S. Air Forces in Europe incorporated the APKWS into its air-to-air training for F-16s in April 2025 out of a range in the U.K. U.S. fighters based on the continent not only routinely deploy to the Middle East, but also increasingly must be wary of Russian drone incursions into NATO airspace. The squadron that first trained to use APKWS ahead of combat that spring was the 555th Fighter Squadron, also based at Aviano.

"Employing these is challenging to do," Lt. Col. Eric "Diesel" Kitaif, then-commander of the 555th, told Air & Space Forces Magazine last year. "I need to put it in the right regime, and I need to make sure that there is laser energy on the target. And so getting both of those things to happen can be challenging to be the person both employing the munition and the person lasing that munition."

The U.S. found the munition critical enough that it diverted 30,000 proximity fuses intended for Ukraine for surface-to-air use to the Middle East for use on its fighters. Countries across the Middle East are ordering APKWS in the billions of dollars. Eurofighter Typhoons can carry the weapon, too, for anti-drone use, which the U.K. has done as the weapon is trickling its way across the globe. The Army, too, has fielded air-to-air APKWS on some of its Apache helicopters.

APKWS can also be used in a ground-to-air role, fitted to systems such as the Sierra Nevada Corp.'s BRAWLR, deployed overseas by the U.S. military, and L3Harris' VAMPIRE, which is used by Ukraine, with plans to field the system for U.S. use.

Now, just three years after it entered service, the Department of Defense and BAE agreed to a seven-year framework agreement to produce 25,000 APKWS guidance kits a year, and 35,000 a year total to support international customers.

But APKWS has not proved optimal for some situations. It is still considered the preferred anti-drone weapon, but APKWS

employment typically takes more time and space to set up the shot than using AIM-9s, especially when relying on buddy lasing. Aircrews found the airspace and timing were often too tight for APKWS employment in the Strait of Hormuz and Persian Gulf, so they have ended up relying on AIM-9s. But defensive counterair for base defense has featured APKWS.

The work to put APKWS on the F-16 and F-15E, as well as A-10s, has paid off in more than just cost savings for the Air Force. After the start of Operation Epic Fury on Feb. 28, Iran has fired more than 6,000 drones and 1,500 ballistic missiles, with numbers growing, U.S. officials said. What two years ago was an extreme outlier is now a routine threat.

"I would say that APKWS is a step in the right direction, but it can't be the final step," France said. "The two things that we need to focus on are air domain awareness at range: where are the drones coming from? How many are there? What's their target? What do I know about them? And then magazine depth, both individual airplanes and theater-wise, to have enough to shoot them down in a layered defense kind of way. So both of those are important."

"This drone problem is not going away," France added. It's accelerating in tactics, speed, advancements, and the numbers. That's the direction that we're going."

10 Epic Fury Airmen Earned Battlefield Promotions

By Chris Gordon

Ten Airmen received battlefield promotions for their roles in the daring rescue of DUDE 44, the crew of an F-15E Strike Eagle that was shot down over Iran last spring, Air Force Chief of Staff Gen. Ken. S. Wilsbach announced Sept. 14.

Wilsbach revealed the promotions—a rarity in the Air Force—and more details about Airmen's actions during Operation Epic Fury in a keynote address at AFA's Air, Space & Cyber Conference.

Over the course of Epic Fury, which lasted from Feb. 28 until a shaky ceasefire in early April, the U.S. struck more than 13,000 military targets. In what was the biggest air campaign in a generation, around 500 combat aircraft executed around 250 sorties per day—10,000 sorties in 38 days, Wilsbach said.

American air bases in the Middle East went under "Alarm Red" conditions to take shelter, meaning there was an imminent threat of danger, 1,200 times. Wilsbach also said there were 48 airfield repairs and 420 "long lonely sweeps" to ensure that explosive ordnance was not left on the runway.

"That walk is exactly what the name suggests: one EOD technician, leaving a place of relative safety and approaching a suspected bomb or unexploded munition to render it safe for everyone else," the chief said.



Jud McCrehin staff

Air Force Chief of Staff Gen. Kenneth Wilsbach shared stories of Airmen rising to combat challenges at AFA's Air, Space & Cyber Conference in September.

DUDE 44

Amid all these high-risk operations, the rescue of DUDE 44 in early April stood out as an example of the lengths the U.S. military was willing to go to save its service members.

In a recent interview with Air & Space Forces Magazine, Lt. Gen. Derek C. France, who was commander of Air Forces Central and the Combined Forces Air Component Commander for U.S. Central Command at the time of the mission and helped oversee the effort, said the rescue was one of his proudest moments in command.

"Watching 44 Bravo [the F-15E weapon systems officer] and getting the word that he was going to make it home and out of Iran with all the forces that were involved in that, knowing on Easter morning this guy was going to go see his family and call his wife for the first time in 48 hours was a high point, an emotional point for me having gone through that whole ordeal for the past 40-plus hours, and then recognized that we had got a win and got this guy back to safety," France said.

For his part, Wilsbach singled out a particular battle manager—call sign "Peaches"—who coordinated the extraordinary search-and-rescue operation over 50 hours. To rescue the two-man crew, she and her team integrated the operations of 176 aircraft, including fighters, bombers, tankers, intelligence platforms, and special operations forces.

"Think about the complexity of that problem," Wilsbach said. "Aircraft operating at different speeds, altitudes, fuel states, with different sensors, weapons, and responsibilities, while an adversary was actively trying to stop them."

And that team was just part of the effort. Maintenance teams, Wilsbach said, generated additional fighters while tanker crews extended the force's range and dwell time, and intelligence Airmen tracked threats.

"Every one of those Airmen was doing something different, yet all were contributing to the same mission," Wilsbach said. That led to the 10 battlefield promotions, a rare occurrence when enlisted personnel are promoted for extraordinary performance of duties while serving in combat or under combat conditions.

"I had the distinct honor of promoting six of those heroes, ranging from staff sergeant to chief master sergeant, during a

recent trip,' Wilsbach said.

The dramatic rescue of the DUDE 44 crew began after an Iranian heat-seeking surface-to-air missile slammed into the two-seater fighter aircraft. Both crew members ejected. The pilot was rescued on the first day by a force that included A-10 Thunderbolt II attack aircraft, HC-130 Combat King IIs, HH-60W July Green II rescue helicopters, drones, and special warfare Airmen. That rescue operation was executed under close-range gunfire.

But the WSO, dubbed DUDE 44 Bravo, was not rescued for another day. He was injured in the fall, hitting the ground at a speed of 70 to 100 miles per hour after he struggled to unfurl a damaged parachute, according to an interview he gave to the CBS News program "60 Minutes."

After landing five miles away from the pilot, DUDE 44 Bravo was suffering from a broken back, a broken arm, a broken shoulder, a sprained ankle, and cuts to his head and face. To elude capture, he scaled a 7,000-foot-tall ridgeline.

AIRMEN IN EPIC FURY

Wilsbach cited the work of Airmen across Epic Fury to emphasize his main directives for the service: be "ready to fight, built to endure, and integrated to win."

The rescue of DUDE 44 was a prime example of integration, the chief said.

To illustrate readiness to fight, Wilsbach told the story of an unnamed base under attack from Iranian missiles.

"As missiles were inbound, Airmen sprinted toward bunkers," Wilsbach said. "A missile struck nearby in a hangar, and the aircraft inside burst into flames. The bunker withstood the blast, but the force of the impact damaged the door so badly it wouldn't open, trapping the Airmen inside."

A security forces NCO used a pry bar to force the door partially open and spoke with the Airmen inside. But then the ejection seat on the burning aircraft ignited, "sending glass and metal fragments through the air," Wilsbach said. At last, the Airmen were able to get the door open and run for cover. Finally, the door gave way, and the Airmen ran for cover.

Wilsbach also shared the story of an F-15E crew chief, Garrett, who stayed with the jets on the flight line until the last F-15E taxied and took off while others were running for cover. "When somebody later asked him why, his answer was simple: They needed those airplanes in the air," Wilsbach said.

Hundreds of miles away, two Senior Airmen, Shanea and Nolan, tracked a swarm of enemy drones headed toward their base and, Wilsbach said, achieved more than 10 surface-to-air kills.

Shanea and Nolan's actions in particular show the need for the Air Force to advance point defense and make it a "core function of air and space power," Wilsbach said; the Air Force can no longer be assured that it is safe from drone and missile threats, including at airfields in the United States.

"Don't you think we ought to have them at every base?" Wilsbach said of a new field of Airmen specializing in point defense. "If every base is going to be threatened, we have to have somebody who knows how to defend it.

"If we had a more robust base defense, you know, perhaps those bases wouldn't have been as damaged as they were," Wilsbach added. "Look at Israel; they have a significantly layered, very robust defense of their country, and they didn't take that many hits, very few, in fact. And that shows you what a good defensive system can do, which can help you to operate not quite with impunity, but almost, and you can just keep generating airpower, and your defensive systems take care of the incoming."

To hammer home his point about endurance, Wilsbach told the story of a B-1 pilot, with the call sign Rocket, who coped with a harrowing refueling at night, in heavy clouds, and with jet fuel spraying across his cockpit windscreen.

The B-1 crew described the experience as "refueling by Braille," Wilsbach said.

"A bomber pilot who couldn't see depended on the tanker crew to guide them," Wilsbach added, noting that the B-1 went on to complete a 34-hour mission.

Another example, the Chief said, was an MQ-9 pilot, call sign Suit, who launched his drone while its airfield was under attack. The drone struck a target, then returned to base to conduct a damage assessment of the runway. That mission was one of many the MQ-9 conducted during Epic Fury, Wilsbach noted, with a remotely piloted aircraft striking more than 800 targets. It also played a key role in dynamic targeting and locations where the U.S. did not want to operate crewed aircraft. "Many more targets were hit because the MQ-9 found them and then passed them off to another platform," Wilsbach said. "There's a lot more than the 800 that they hit, and we were doing this in areas that were highly defended. And though we did decimate the Iranian Air Force and the Iranian Navy, and then we significantly attrited other capabilities that they have, it wasn't easy. Iran's not a pushover."

AUTONOMY

CCAs and Autonomy Gain Momentum

By Stephen Losey

For the past four years, the idea of autonomous drone warfare like Collaborative Combat Aircraft has been discussed as a future concept, rather than near-term reality.

But now that promised vision appears imminent, with the Air Force promising combat capability in 2032.

Air Force Secretary Troy Meink kicked off AFA's 2026 Air, Space & Cyber Conference by promising the service will have at least 500 CCAs by then. And going a step further, he also predicted USAF will field an additional 500 Massed Modular Aircraft (MMA)—a new semi-autonomous aircraft intended to inherit the MQ-9 Reaper's strike and intelligence, surveillance, and reconnaissance missions, but at a lower price.

These new aircraft will complement the high-end sixth-generation bomber and fighter now in development.

"The F-47 and B-21 are phenomenal aircraft," Meink said. "They will be able to do things no other aircraft have ever done before. However, they're not going to fully meet the mass or scale of combat power we need. But when we pair manned aircraft with lower-cost autonomous systems, we will be able to unlock combat power at scale."

Industry has heard the Air Force loud and clear, but at this year's conference, the concept was on full display, with vendors large and small touting their MMA and CCA offerings.

General Atomics Aeronautical Systems and Anduril Industries, as they did last year, highlighted their FQ-42A and FQ-44A aircraft, which represent the first series—or increment—of CCAs.



Maj. Joseph Thiele

A U.S. Air Force FQ-42A Dark Merlin aircraft, right, from the CCA Experimental Operations Unit, flies alongside an F-35 Lightning II from to the 422nd Test and Evaluation Squadron, above Nevada, in July. The CCA's enhanced tactical flexibility enables the platform to operate seamlessly alongside manned aircraft in contested, dynamic environments.

Meink confirmed the FQ-42A is named Fury, and disclosed the FQ-44A will be Vengeance.

Lockheed Martin, the world's largest defense contractor and the maker of the manned F-35 Lightning II and F-16 Fighting Falcon, built its display around a full-scale model of its tail-less Vectis CCA drone, predicting the aircraft will fly in 2027. And in a sign of how bullish Lockheed is about the burgeoning CCA market, Lockheed said it would build five Vectis drones, before it even has a contract.

Swarm Aero, a California startup, unveiled a full-scale model of its Gamera, a Group 5 drone about the size of an MQ-9 Reaper that it wants to offer for the MMA mission. And ShieldAI displayed its roughly half-size model of the autonomous X-Bat, a CCA design powered by an F100 engine that would take off and land vertically. General Atomics, the granddaddy of drone makers, released images of its new Wildfire drone, another candidate for the MMA program.

But it is General Atomics' FQ-42 CCA, along with rival Anduril's FQ-44 that are drawing the most near-term attention, as plans emerge for their move from test articles to production. General Atomics announced it is ready to produce six FQ-42s a month to meet Air Force requirements, and could ramp up higher if needed. Anduril, which moved the FQ-44 into production in March at its Arsenal-1 facility in Columbus, Ohio, said it has capacity to build 150 annually.

Meink said Sept. 14 that the Air Force wants to field an initial 100 MMA drones by 2029, upping the service's previous estimates. When asked about those expanded plans, he noted the aircraft's projected low cost—$10 million or less for a bare airframe—and the importance of being able to combine strike and recon.

The MQ-9 mission "is a very important mission," Meink said. "We're looking at how we do that with a mix of different platforms. … The ability to bring low-cost mass is a driver here, and we expect these to be significantly cheaper than even the MQ-9s or the CCA."

Pricing for an MQ-9B, the larger, next-generation model now available, depends on sensors and other factors, but starts around $25 million. The Air Force is now aiming for a $20 million price target for CCAs, again for just the aircraft.

Meink said the Air Force anticipates multiple MMA types produced by different manufacturers, similar to its competitive approach to developing CCAs. Asked if 500 MMAs is a ceiling or a floor, Meink said it would depend on budget, but "I think it should probably be much higher than that."

The Air Force plans for CCAs to develop iteratively over time, as technology and innovations advance. The next increment in the cycle is still in the conceptual stage, but officials expect to define the objectives in mid-2027 and to win now limit the competitive field to six or fewer.

Gen. Dale White, director of critical major weapon systems for the Air Force, told reporters at the conference the Air Force and industry are still hashing out what the second CCA increment will look like.

"It's getting defined as every day goes by," White said. In addition to acquisition leaders like himself, operators are also getting a say in what they want, and that's going to increase over time because conditions aren't uniform from region to region.

"The challenges I may have in the Indo-Pacific theater could be very different [from those] in the [U.S. Central Command] theater and different again in the [European Command] theater," White said. "So how do we take all of those different requirements and make sure we have a [CCA] capability that can address many different mission sets across many different requirement centers?"

OPERATIONAL USE

As autonomy advances, the Air Force is pushing ahead with new operational concepts. The Air Force's Experimental Operations Unit (EOU) at Creech Air Force Base, Nev., is the epicenter for that work. Brig. Gen. Timothy Helfrich, the portfolio acquisition executive for fighters and advanced aircraft, said the unit is operating CCAs "multiple times a week" as it develops and applies new thinking.

In December, CCAs will be included in a large-force engagement exercise for the first time, at Emerald Flag at Eglin Air Force Base, Fla.

EOU commander Lt. Col. Lyndon Bartlett said that will be CCAs' "first dip of the toe in an actual force integration," a crucial step.

"That will, in [my] mind, be the first time that we will ever do some CCA end-to-end kill chain live," Bartlett said. "That's the first time we'll ever be integrated in a fourth- and fifth-gen combined [offensive counter-air] push. It'll be small, but those type of building blocks are where, I think, you get the intangibles like trust in the CCA."

In 15 months since its June 2025 establishment, Bartlett said, his team members have been "pleasantly surprised" by the ease of maintenance of the unmanned CCAs, and what a comparatively small footprint they require compared to a manned jet.

In a series of recent Agile Combat Employment exercises, Bartlett said, "we're at a one-to-one maintainer-to-airplane ratio, which is crazy small." That is a small fraction of what a manned fighter jet typically requires.

That simplicity matches well to the concept of "cross-functional" Airmen generating CCA sorties even when those duties are beyond their standard job descriptions.

"Because they're a little bit simpler, because their role is so focused, what we found is that any [Airman] can be trained to generate sorties, to load weapons," Bartlett said. "We've done some of those things already, and we're going to do a lot more experimentation over the next couple of years."

The EOU now has both FQ-42 and FQ-44 airframes, with Andu-

As Air Force Goes Big on Autonomy, Are Cargo Drones Next?

By Greg Hadley

NATIONAL HARBOR, Md.—

The Air Force's plans to field 1,000 semi-autonomous fighter and intelligence, surveillance, and reconnaissance drones within just a few years made headlines at AFA's Air, Space & Cyber Conference.

But beyond the service's signature Collaborative Combat Aircraft and Massed Modular Aircraft programs, a half-dozen or so firms are pitching another kind of autonomous aircraft: cargo drones to solve some of the thorniest logistics problems.

Textron Aviation and Merlin Labs unveiled a cockpit-less Cessna equipped with Merlin's autonomy software and a nose hatch opening to a cavernous cargo bay.

"By pairing a proven aircraft platform with autonomy technology, we're exploring new approaches to contested logistics operations while also examining how autonomy may enable more efficient cargo aircraft designs that increase usable volume, improve cargo accessibility and support mission sustainment requirements," Bob Gibbs, Textron's vice president for defense and special mission sales, said of the company's Cessna SkyuCourier UX concept.

Reliable Robotics is offering its own modified Cessna 208B Caravan. Its aircraft flew in multiple Agile Flag exercises in 2024, installing actuators, sensors, and other gear in the cockpit and using a human pilot to command high-level direction from a ground station. Reliable announced a $17.4 million deal with the Air Force in 2025 to provide an aircraft for a yearlong test.

In a May blog post, Reliable's certification flight test lead Chris Baughman wrote that the firm is targeting the start of fiscal 2027 to begin the test, which will focus on the Indo-Pacific region. The company is also seeking FAA certification for its autonomy software to operate in U.S. airspace, targeting 2028 for that certification.

Joby Aviation, which previously acquired autonomy startup Xwing, is also flying a modified Cessna Caravan, racking up 40 hours and 7,000 miles during last summer's Resolute Force Pacific. Joby did not exhibit at AFA's Air, Space & Cyber, but sought to capitalize on the timing by announcing soon after that it completed 3,199 miles of autonomous flight across the U.S. this summer, including stops at Shaw Air Force Base, S.C., and near Washington, D.C. At a press event Sept. 24, Joby's head of defense policy John Barranco told Air & Space Forces Magazine that the aircraft carried a safety pilot for those flights in case human intervention was needed, but the autonomy software never required a pilot intervention.

Coming at the same time that other vendors are developing autonomous fighters and reconnaissance aircraft with clean-sheet designs, the modified Cessnas might seem like minimalist efforts. But aviation firms see a gap they can fill in the Air Force's logistics enterprise, a small airlifter that can do jobs that USAF's workhorse C-130 cannot do as efficiently. The Hercules can haul 40,000 pounds of cargo, and the Air Force has only about 270. A Cessna could be ideal for shorter hops and smaller loads at a fraction of the cost.

"It's a really robust, reliable existing cargo airframe that's in the world, and there are many of them, and so we can retrofit a lot of those for the customers," Barranco said.

ril's model arriving in August and General Atomics' in September.

Jason Levin, Anduril's senior vice president for air dominance and strike, said his company's Fury prototype took part in two exercises with the EOU.

The July exercise, at Creech, demonstrated that a single Air Force operator could launch and recover an aircraft on his own after just a few hours of training.

"The Air Force was operating mission autonomy by themselves, which was a first," Levin said. "They were flying multiple times a day, operating mission autonomy without Anduril personnel—they were on-site kind of helping, but it was really the Air Force operating that.

Fury also flew in the same airspace as crewed fighters during the exercise, using its mission autonomy, which helped to build trust among the Airmen flying with it.

General Atomics, meanwhile, said Vengeance has flown in formation with piloted F-35A Lightning II and F-15E Strike Eagle jets, en route to future test flights in which fighter pilots will command the drones.

Lt. Gen. Jason Hinds, commander of U.S. Air Forces in Europe-Air Forces Africa, said his command is thinking of how to incorporate CCA operations, including using them to boost—or even take over—USAFE's integrated air missile defense mission.

"You don't always have to have a human in a cockpit to be able to defend against a one-way attack drone or defend against a cruise missile," Hinds said. "You could use a CCA to be able to conduct that mission set."

If a hostile nation invaded a NATO ally, said Hinds, who also commands NATO's Allied Air Command, the Air Force could also use CCAs to attack adversaries' air defense systems, or attack invading forces.

NATO allies—particularly Germany, the Netherlands, and some Scandinavian countries—are watching CCA experiments, Hinds said, with some taking their own steps toward the concept. Hinds predicted Sweden, among others, will start to experiment with CCAs in the European theater in the next few years.

"You're going to see a lot more interest from other nations inside Europe," Hinds said.

As the autonomous era begins, Lt. Gen. Christopher Niemi, the Air Force's Chief Modernization Officer, said during a panel discussion that the service faces a massive cultural shift—one he acknowledged will face significant pushback from today's pilots.

"I can imagine a day in the future, 10 years [from now], maybe more, where a CCA autonomy algorithm does a better job flying a fighter airplane than I did as a captain," Niemi said. "That hurts my ego a little bit. But at the same time, I see that this trend is happening, and we've got to find a way to do that."

Meink challenged attendees to come up with an operational concept that was more challenging than urban driving, suggesting that the progress in self-driving cars over the past decade has proved that such skills can be automated. Niemi agreed.

But experienced pilots counter that there are a host of differences between flying combat operations and driving in a controlled urban environment, ranging from speed to the addition of flight's vertical dimension. Autonomous driving, which has taken years longer to perfect than most experts predicted a decade ago, has vastly more data to pull from than CCA operators do, pilots say.

Most importantly, the incentives are different. On the road, drivers are doing their best to act responsibly and predictably. In combat, however, rival pilots are doing their best to be dis-

ruptive and surprising. Those are challenges that could take time to master.

But Niemi is undeterred in his future vision and convinced those pilots are wrong. "As you institutionalize these capabilities," he said, "it's not too surprising that maybe fighter pilots are not too enthusiastic about the idea of fielding a capability [that] will start to replace some of what they do—how they define themselves."

Pentagon Editor Chris Gordon contributed.

BASE DEFENSE

Point Defense as a Key Warfare Mission

By Matt Cox

Flying and fixing aircraft remain the Air Force's reasons for being, but protecting air bases from attack is becoming an essential component that makes those possible. Following attacks on air bases across the Middle East during Operation Epic Fury, point defense was among the hottest topics at AFA's 2026 Air, Space & Cyber Conference in September.

The Iranian attacks, such as the March 27 air raid on Prince Sultan Air Base, Saudi Arabia, that damaged multiple refueling aircraft and an E-3 Sentry AWACS command and control plane, did not deliver crippling blows. But they did cause injuries, disrupt operations, and destroy some aircraft.

The damage was great enough to convince Air Force leaders to prioritize air base defense—or point defense, as they are calling it—and invest in new weapons and a new career field to man them.

Air Force Secretary Troy E. Meink and Chief of Staff Gen. Kenneth S. Wilsbach announced initiatives at the conference aimed at improving oversight of point defense acquisitions amid the recent explosion of growth in the counterdrone industry as it responds to increasing Pentagon demand.

Wilsbach pledged that point defense will no longer be treated as a "side hustle" but as a "core function of air and space power."

The Air Force began ramping up its point defense strategy in late 2023 after unidentified drones were seen flying repeatedly over Joint Base Langley-Eustis, Va. Soon the service, along with the rest of the U.S. military, was racing to catch up with the rapidly evolving drone war-fare threats and tactics emerging from the war in Ukraine. Then in June 2025, Operation Spiderweb, a bold Ukrainian drone attack on strategic bomber bases deep inside Russia, showed Air Force leaders just how vulnerable the service's own air bases were to this new threat.

But it took the hard lessons from a shooting war with Iran to elevate point defense to a new level of importance at the service's semiannual Corona summit in June and make it a key focus at this year's AFA event, said Retired Air Force Lt. Gen. David Deptula, Dean of the Mitchell Institute for Aerospace Studies.

"The reason why it was announced at AFA is because a decision had been made at the previous Corona to make point defense a mission function of the Air Force," Deptula said. The conference "was the first opportunity to really make a big splash."

During the conference, several Air Force generals said that the service's increased emphasis on point defense is needed after watching Iranian drone and missile attacks strike air bases during Epic Fury.

Air Combat Command Boss Gen. Adrian L. Spain said Epic Fury (OEF), "laid bare some of those things that have been in front of us for a while, and it just reminded us that we have to get after some of these things."

"Our bases are under attack; we have to continue to generate



Jud McCrehin/staff

Air Force Secretary Troy Meink speaks at AFA's Air, Space & Cyber Conference Sept. 14, 2026.

airpower in spite of that," Spain said. "We have to be able to be resilient under attack, and we have to be able to sustain the force under those kinds of pressures to win."

The Air Force's chief modernization officer, Lt. Gen. Christopher J. Niemi, said the service identified more than a year ago that it would have to "increasingly protect our assets at air bases with investments in point defense but that accelerated … because of some of the experiences that we had over there."

Prior to Epic Fury, the Air Force appeared to be banking on its agile combat employment (ACE) strategy to disperse forces from large bases to ad-hoc air in order to complicate targeting for adversaries and fight through attacks. The service evacuated Al Udeid Air Base, Qatar, before the Feb. 28 launch of Epic Fury, moving aircraft and most personnel to other locations both in the region and back in the United States.

When Iranian forces attacked Al Udeid, destroying the Combined Air Operations Center (CAOC) there, the facility was empty—the first time it hadn't participated in air combat operations since the 1990s. Instead, Epic Fury's air operations were commanded by Shaw Air Force Base, S.C. "ACE was really birthed out of necessity, [because] I cannot protect these forces any longer," Spain said. "But if I could perfectly protect all my forces at a location, I would not move. There's no reason to move. I'm only creating turbulence for myself if I do that." That turbulence extends to every part of an air operation, he said: "I have a logistics problem I've got to worry about. I've got a fuel problem I've got to worry about. I have a [command and control] problem I have to worry about when I move around more."

Spain said Iran's proven ability to threaten a base means the Air Force is returning to "a time well before 9/11, where we were preparing to fight a peer adversary in an existential way. We see

what that looks like through the experience of OEF."

Air base defense has long been a complex problem for Air Force leaders. Ostensibly, the Army is responsible for protecting air bases from missile attacks, dating back to the 1948 Key West Agreement on roles and missions of the armed forces. That's why the Patriot ballistic missile defense system is an Army weapon system. But with the rise of low-cost attack drones such as the Iranian Shahed, the scale and scope of threats have grown while the Army's capacity to defend far-flung bases has not kept pace. In April 2025, the Air Force published new doctrine on "Point Defense of Air Bases," assuming a more active role for Airmen in defending their air bases.

The lack of hardened shelters at most forward bases contributes to the Air Force's vulnerability. Investment in such structures and other passive defenses has often ranked low among budget priorities, compared to aircraft and major research initiatives.

Deptula maintains that the Air Force has long been under-funded and that vulnerabilities are the result of calculated risk and budget choices.

"How come hardened aircraft shelters weren't in place at Prince Sultan Air Base? How come the command-and-control facility at Al Udeid—that the joint force air component commander has been operating from since 2001—wasn't built underground?" Deptula said. "The answer is money, because it costs more money. The United States military took the risk, understanding that there were threats out there, they were willing to take the risk and not to spend the money to build hardened aircraft shelters, to build underground facilities."

Now that "the threat has shown itself to be highly capable," he added, "resources are going to have to be allocated to increase our ability to defend our bases."

Air Mobility Command boss Lt. Gen. Daniel H. Tulley said he was encouraged by Wilsbach's decision to establish a new career field to develop point defense specialists. Wilsbach said the Air Force will start designating Airmen with the new specialty within two years. The Air Force announced it was standing up the new career field in late June after the Corona meeting. As a short-term fix, USAF has established point defense flights, specialized units of roughly 20 Airmen each, trained to rapidly deploy to hotspots and defend air bases against drone attacks.

Tulley saw how unprotected Al Udeid was when he commanded the 379th Air Expeditionary Wing there from 2019 to 2021.

"When I was at Al Udeid, this problem was widely recognized," Tulley said. "The Air Force has been going after it, but I think our sense of urgency has dramatically increased—which it needs to. We've all seen what Operation Spiderweb did in Russia. How do we prevent the same sort of thing, and maintain the sense of urgency?"

The Air Staff and Point Defense Task Force, working with the Pentagon's Joint Interagency Task Force 401, or JIATF 401, is making headway to identify technologies and field new weapons to counter the drone threat. But it will take years for the service to build up an adequate point defense capability.

"Would I like to get there a lot faster—yes, but I think we're getting there," Tulley said. "I'd like to look back in two years and say, 'We're done,' but I don't know if we'll quite be there yet."

The Air Force relies primarily on the Small Unmanned Air Defense Systems (SUADS) for countering drones. The system is capable of identifying and tracking enemy missiles or drones of multiple sizes, and downing incoming drones with an electronic warfare weapon. To stop missiles, it uses both electronic warfare and kinetic effectors. It can also interface with commercial counterdrone systems and other air defense systems, depending on the needs of a commander.

It's available in two variants, one for fixed air bases and one that can be deployed on a pallet for rapid response missions. The Air Force has requested more than $1.5 billion for SUADS in the fiscal 2027 budget, with most of the funding allocated for the system's missile defense components, according to budget documents.

What remains unclear is how much money is being spent on additional counterdrone systems for the Air Force, which are being acquired with the assistance of JIATF 401. Those buys are difficult to track since they are not listed in the bud-get request. Both Air Force and JIATF 401 officials declined to provide funding details.

During the conference, leaders said the Air Force is working on initiatives to gain more oversight over the acquisition process to more efficiently manage its counterdrone acquisitions.

Globally, the market is expanding rapidly, The current global counterdrone market is valued at roughly $9 billion and is projected to reach about $30 billion by 2031.

JIATF-401 Director Army Brig. Gen. Matthew Ross cited that figure in a talk with industry members Sept. 15. The U.S. portion of the counterdrone market is currently valued at roughly $2.5 billion and is expected to grow to roughly $8.6 billion by 2030, according to MarketsandMarkets.com a business intelligence firm.

"What that means is that demand is going up really quickly," said Ross adding that his agency is acquiring "additional arrows to put into the quiver of our warfighters," but "our supplies just aren't there yet."

Meink said the service is also looking at establishing a senior portfolio acquisition executive (PAE) to manage the point defense enterprise. PAEs are a new construct, introduced during recent Pentagon acquisition reforms to get more authority into the hands of fewer leaders in order to maximize acquisition success. The idea is to combine several programs within a single mission area and give PAEs authority to move funds between programs and adjust requirements based on evolving needs. The Department of the Air Force currently has 26 PAEs—17 in the Air Force, nine in the Space Force.

Currently, the Air Force PAE for Electronic Systems oversees counterdrone acquisition efforts and the service's PAE for Intelligence, Surveillance, Reconnaissance & Special Operations Forces manages offensive drone acquisitions, said Lea Kirkwood, the Air Force PAE for Electronic Systems.

The Pentagon recently stood up the new Direct Reporting Portfolio Manager for Unmanned Systems (DRPM UxS) with the goal of accelerating the development, procurement, and fielding at scale of autonomous capabilities.

"There's a lot of considerations across mission areas," Kirkwood said, adding that the Department of the Air Force is "looking at how do we need to look at our structure to say 'how can we best support the [Pentagon], the DRPM UxS, and then also within the DAF, both from the offensive and the defensive perspective'—you know, what's the best way to get after this?"

The Air Force is also creating a "point defense weapon system," Wilsbach said during his speech. The new system will be designed to formally manage multiple counterdrone systems that range from sensors, radars, and command and control architecture to kinetic and nonkinetic effectors for disabling or destroying incoming drones.

"The point defense weapon system is a way for us to consolidate these capabilities under a single umbrella," Michael Sheehy, director of future operations under the Air Force deputy chief of staff for operations said during the JIATF 401 industry meeting.

The Air Force is currently writing a program action directive for the weapon system. "That way it's not this ad-hoc approach to this, where it is buying some, trying some pieces of parts and

then kind of making up who's operating the system. … The other thing that it does is it creates a single point for funding within the Air Force," Sheehy added. "Now I have a program element code for this weapon system, and as funding's coming in, it's going to that as opposed to kind of going all over the place."

Sheehy noted that there was a "vast difference" in the amount of counterdrone innovations on the show floor at the AFA conference this year compared to prior shows.

"There's a lot of counter-UAS capability that is being developed out there, and … we need to have a more enterprise-level approach to doing this," he said. The Air Force "owes it to our wing commanders to provide that kit, provide that training, provide that organization that is professionalized to get after this really difficult problem."

AIR

USAF Offers Another New Fighter Plan

By Stephen Losey

A new Air Force report details revised plans for growing the F-35A fleet, both in total and as a share of the fighter force. And landmark new 10-year framework agreement between the Pentagon and prime contractor Lockheed Martin offers a foundation for fulfilling the plan.

The new fighter force structure report, submitted to Congress on Oct. 16, estimates the Air Force will grow from 1,288 combat-coded fighters in 2027 to 1,509 by 2035 based on a "moderate risk" assessment. The F-35 would grow from 30 percent of combat-coded fighters to 40 percent during that time.

The new 2035 number shows an increase over last year's report, which projected a need for 1,369 combat-coded fighters by 2030. In an Oct. 20 briefing with reporters, Lt. Gen. David Tabor, deputy chief of staff for plans and programs, said the data used for the previous report was "pretty old" and the revision includes newer information—but is not driven by lessons from the Iran war.

Combat-coded aircraft include those in the primary mission aircraft inventory, backup inventory, and attrition reserve; it does not include test and training aircraft. The total inventory of fighters is just above 1,900 in fiscal 2027 and projected to grow a net 120 aircraft by 2031—the F-35 fleet is projected to grow from 618 to 765 airframes, about 30 aircraft per year.

The report did not include the projected total aircraft inventory for 2035.

The Air Force's analysis was based on reported requirements from geographic combatant commanders at a "moderate risk" level. A "low-risk" inventory would be 15 percent greater, the report shows.

Getting to the new 2035 goal depends on two key factors falling into place, Tabor said: Funding from congress and production from industry.

Top Air Force officials have for years said the service needs to buy 72 new fighters each year simply to replace jets aging out of service. The fiscal 2027 budget request did not reach that level, however, despite reaching a record scale. The Air Force proposed 38 new F-35s and 24 F-15EXs, for a total of 62.

Tabor said those purchases can "ramp over time" to hit the numbers the Air Force needs.

"The question is, can industry produce at those levels?" Tabor said Oct. 20. "They've assured us that they can, and we believe them, but we also actually need to see it manifest."

On Oct. 22, the Pentagon and Lockheed Martin announced a framework agreement under which Lockheed would build 156 F-35 jets per year for both U.S. and international customers. The U.S. military would buy at least 850 of those 1,560 aircraft in the 10 years covered by the agreement, plus spare parts and modification kits.

Lockheed Martin has also agreed to invest at least $7 billion of its own money to support the F-35 program. But the deal, touted by both parties as a first of its kind, depends on Congress granting the Pentagon authority to negotiate a multiyear agreement.

Those authorities are written into drafts of the House and Senate versions of the 2027 National Defense Authorization bill, but the measures are currently stalled. Without those authorities, pricing and schedules cannot be set for the two programs lawmakers have in mind: F-35 and F-15EX.

Also unclear: the breakdown of F-35 variants under the agreement. The Air Force flies the F-35A, the Navy flies the C, and the Marine Corps as Bs. Production of the B-variant may be nearing an end.

Lockheed said if Congress does grant multiyear procurement authority and the necessary appropriations in the next few months, it would work with the F-35 Joint Program Office to finalize contract terms, pricing, and schedules through a formal award.

The potential benefits of these kinds of framework are financial stability, enabling Lockheed, Boeing and their suppliers to expand and stabilize production. Resulting efficiencies will save the government billions of dollars, thanks to "long-term pricing and industry volume discounts."

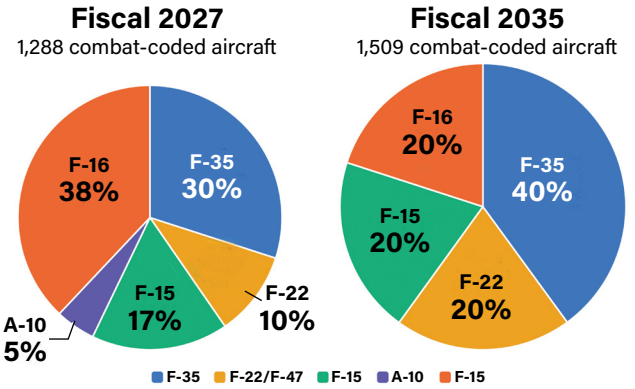
Lockheed also predicted improved parts availability as a result, with the payoff being higher mission-capable rates. Annual deals, by contrast, strain the industrial base.

In an Oct. 22 earnings call, Lockheed CEO Jim Taiclet said at least 60 percent of an F-35's content comes from suppliers, including major components from Northrop Grumman and BAE Systems, which make the center and aft sections of the jets' bodies, respectively.

"We want them to have production stability, just as we would like to have it," Taiclet said.

Combat-Coded Fighters

The Air Force plans to increase the number of combat-coded fighters in its inventory over the next decade, during which time F-35s will become its dominant platform, making up 40 percent of the fighter fleet.



Sources: Air Force fiscal 2027 budget request; Air Force force structure report.

OBITUARY

Michael Wynne, Dead at 82

By Tobias Naegele

Michael Wynne, the 21st Secretary of the Air Force, died Oct. 17. He was 82 years old.

Wynne was Secretary from 2005 to 2008, a stretch of time when the U.S. military was struggling to quell insurgencies in Iraq and Afghanistan and the Army was struggling to simultaneously man occupation forces in two theaters. Roadside bombs and insurgent attacks were killing U.S. troops, and the Air Force was under intense pressure to support its sister service with increased intelligence, surveillance, and reconnaissance coverage and manpower and force cuts to ease the Army's burden.

The Air Force was also fighting to protect its modernization efforts at the time, especially the F-22 Raptor program, which was less than halfway to its objective of 750 planes, new tankers (which would ultimately become the KC-46), and a future bomber (which would eventually yield the B-21).

In 2006, an Air Force B-52 took off from Minot Air Force Base, N.D., and flew to Barksdale Air Force Base, La., its crew unknowingly carrying nuclear weapons on board, a so-called "bent spear" incident. The discovery kicked off an investigation, recriminations, self-examination, and subsequent organizational, procedural, and cultural changes across the nuclear community.

The incident added to the tension between the Air Force and then-Secretary of Defense Robert Gates, who saw the service and particularly then-Chief of Staff Gen. T. Michael "Buzz" Moseley as recalcitrant in their pushback over budget, manning, and modernization. Seeing Wynne and Moseley as a close knit tandem, Gates fired both in June 2008, beheading the service—the first-ever simultaneous removal of a service chief and secretary.

Wynne hailed from a military family and followed in his father's footsteps to attend the U.S. Military Academy at West Point.

Instead of joining the Army, however, Wynne joined the Air Force, reporting for Active duty in August 1966. That same day, his brother Maj. Patrick Wynne, USAFA Class of 1963, was shot down over Vietnam. He was declared missing and remained so until 1977. He is buried at the Air Force Academy.

The younger Wynne served seven years in the Air Force, was an assistant professor of astronautics at the Air Force Academy, and left to work for General Dynamics. For the next 26 years, he was a defense executive there and with Lockheed Martin.

In 2001, Wynne joined Defense Secretary Donald Rumsfeld's Pentagon leadership team. He was Principal Deputy Undersecretary of Defense for Acquisition, Technology, and Logistics, and in 2003 became Acting Undersecretary.

In June 2005 he was named Air Force Secretary. As Air Force Secretary, Wynne opposed efforts to consolidate and adopt joint basing, having come to embrace the Air Force's explanation that many of its units operate and fight from their home bases rather than deploy to forward theaters.

"The Air Force has a very different concept of operations," he told Air Force Magazine in 2008, weeks after his departure. Putting Air Force bases under the control of other services would undermine combat effectiveness, he said, adding, "I'd probably get fired again over my objection to the way the joint basing is happening."



Ms. Donna Parry

Defense Secretary Robert Gates (left) fired Michael Wynne as Air Force Secretary to get his way on the F-22, joint basing and more.

Wynne was a visionary, said Richard Andres, a professor at the National War College who worked with Wynne in government. Wynne's ideas presaged numerous future defense initiatives, Andres said: "His vision of linking sensors and weapons across military domains anticipated today's Joint All-Domain Command and Control. He was first to champion cyberspace as a warfighting domain.

After Gates replaced Rumsfeld in 2006, he and Wynne butted heads over joint basing and the F-22. "He was willing to put his position on the line," Andres said. "He understood that the demands of the wars we were fighting could not excuse neglecting the wars we might have to fight next."

On June 5, 2008, Wynne and Moseley were en route to a Corona meeting of Air Force leaders at Wright-Patterson Air Force Base, Ohio, when Gates dropped the bombshell, dismissing both.

Moseley, in an interview, recalled his close working relationship with Wynne as "a privilege and a gift." The two tried to meet daily and they shared a perspective both in terms of their duty and vision for the service. They also became friends.

When the decision came down to fire them, both were at Scott Air Force Base, en route to Dayton for a planned Corona meeting of Air Force leadership at Wright-Patterson Air Force Base, Ohio. Moseley was ordered back to Washington, where Chairman of the Joint Chiefs Adm. Mike Mullen delivered the news. In Dayton, Wynne was told to stand by for an unscheduled visit from Deputy Secretary of Defense Gordon England, who was flying in. Was England coming to discuss Moseley's successor, someone wondered. "No," Wynne said. "He's coming for me."

Two weeks later, Wynne departed the Pentagon at an official ceremony presided over by Gates, with Moseley at his side. What had been a very public firing was glossed over for public consumption as Gates pinned a medal on Wynne's chest. At the ceremony, Wynne expressed love for the service. "But it is the people of the Air Force that make the Air Force," he added, "so in loving the Air Force, we love the people."

Back to Contents



Jud McCrehin/staff

Gen. Douglas Schiess, Chief of Space Operations, acknowledging his service's orbital weapons, said the Space Force faces "determined and credible adversaries" and must "make disciplined and responsible choices about how we build and sustain our combat advantage, which means scaling our ability to respond to threats."

SPACE FORCE

GROWING—AND ARMED IN SPACE

USSF Breaks Its Silence on Orbital Weapons.

By Greg Hadley

NATIONAL HARBOR, Md.—

Thousands more Guardians. Hundreds of new satellites. Newly disclosed on-orbit weapons.

At AFA's Air, Space & Cyber Conference in September, Space Force leaders laid out how the service is in the process of transforming from a small, secretive pocket of the Pentagon into a swaggering, muscular warfighting organization, ready for battle.

It started with Air Force Secretary Troy E. Meink's revelation during his keynote that the Space Force has "on-orbit space control weapons capable of defending the joint force against hostile adversary action." While not completely shocking to those who closely follow the service—officials have hinted at "counter-space" capabilities and "space fires" in recent years—the plainspoken declaration was a first and generated headlines around the globe, from People magazine to Chinese state media.

A day later, Chief of Space Operations Gen. Douglas A. Schiess made the case that after years of Space Force officials warning about "dogfighting" satellites and novel space weapons from China and Russia, the U.S. disclosing it has its own weapons will help deterrence.

"At this point, we are trying to say that we also need capabilities to not only defend the joint force from space-enabled attack, but defend our assets," he said. "And so, I think it was time that within the Department of War we talked about it, and it's time to talk about that we have the capabilities to make sure that we can do what the joint force needs."

Both Meink and Schiess declined to discuss more specifics about what these on-orbit weapons are. But they indicated more are on the way, driven by the threat.

"We face determined and credible adversaries who are building and fielding counter-space systems at incredible speeds to target directly the United States space advantage," Schiess said. "We will make disciplined and responsible choices about how we build and sustain our combat advantage, which means scaling our ability to respond to threats."

Space Force leaders group these capabilities under the new mission of "space control." Lt. Gen. Gregory Gagnon, head of Combat Forces Command (CFC), told reporters on

the sidelines of the conference that the Space Force will need to expand its existing units for missions it expects will grow in the coming years, including space control.

ADDING SATELLITES

The need to control the space domain is driven by how much the entire U.S. military now relies on space to operate—and that reliance is picking up pace, officials said. There is both added demand for missions the Space Force already performs like satellite communications and missile warning and the shift of new missions to space like interceptors via the Golden Dome missile defense shield and target tracking. This demand is fueling an explosion in the number of satellites on orbit.

As recently as 2021, the Space Force had about 70 satellites in orbit that it publicly disclosed. By 2025, it was past 140—though the true number is certainly higher with classified systems.

Gagnon, noted in a discussion at the conference that the scale of growth is only accelerating.

"In the next three years, with our budget funding, we will command and control over 500 percent more," he added. "That's a fivefold increase in the amount of kit that will be in outer space."

That increase is driven mostly by the new proliferated satellite constellations the Space Force is deploying in low-Earth orbit. The Space Development Agency's Proliferated Warfighter Space Architecture will provide both data transport and missile warning, while the Space-Based Air and Ground Moving Target Indication programs will track targets of all kinds.

Meink revealed during the conference the first of those AMTI satellites were set to launch in September. Gagnon said a new GMTI capability called Resilient Radar System-Ground will follow in the next year or so, building on the initial capability fielded by the National Reconnaissance Office.

Amid the rush to field all these new satellites, the Space Force is looking for assurance from the space industrial base that they can meet the moment. In April, the head of Space Systems Command Lt. Gen. Philip Garrant said a significant portion of the Space Force's historic $19 billion procurement budget for fiscal 2027 would go toward contracts for new satellite lines and an expansion of existing constellations.

"If a company is nominally making 10, we want you to be prepared to make 40," he said at the time. "We want industry to make the investments in capitalization and facilitization, and in return you're going to get these large production contracts."

Garrant and others, including Meink, have said the service is weighing multiyear procurement deals for satellites as well as production framework agreements, similar to the deals signed with companies like Lockheed Martin and RTX for munitions. The munitions agreements, which weren't initially backed by funding, are meant to send a demand signal to industry so they can confidently spend their own capital to increase production capacity and be ready to deliver when the contract awards come.

That push comes amid a broad increase in private investment in the space industry; according to a new report from British investment firm Seraphim and Relm Insurance, global investment has doubled in the last year, hitting $23 billion in June. However, that funding hasn't necessarily been directed at manufacturing capacity. A March 2026 report from the Aerospace Industries Association and Pricewaterhouse- Coopers noted hesitance among manufacturers to fund new facilities, workforce, and tooling without guarantees of long-term demand.

The Space Force's new space acquisition executive, Erich Hernandez-Baquero, told reporters Sept. 16 the service is also considering ways to solidify the space industrial base for components and subsystems that have proven difficult to produce at scale.

"What we're seeing is we need to scale our production capability around satellites in general," Hernandez-Baquero told reporters. "There are lower, subtier elements of that



Dave Grim

Demand for space capabilities ranging from satellite communications to electronic warfare is growing, and with it the need for Guardians to support global military operations.



Isaac Blancas

U.S. Space Force trainees salute during a Coin and Retreat Ceremony at Joint Base San Antonio–Lackland, Texas, in 2025 which marks the transition from trainee to Guardian, with Military Training Instructors presenting the coveted coin that signifies the completion of Basic Military Training.

supply chain that crosscut different mission areas that we may want to look at because those are bottlenecks."

ADDING PEOPLE

The planned fivefold increase in the number of Space Force satellites is driving another need: more personnel to operate them.

Early this year, Space Force leaders started talking about doubling the size of the force in the next five years. At AFA, officials detailed just how they're planning to grow so much so quickly—and it goes beyond doubling.

As things stand, the Space Force has less than 11,000 uniformed Guardians and around 5,000 civilian employees. Senior leaders said their goal is to reach 25,000 uniformed and 12,500 civilian Guardians—a combined increase of about 134 percent. A service spokesperson confirmed the plan is to reach those numbers by fiscal 2031.

Brig. Gen. Christopher Fernengel, former director of plans and programs on the Space Staff, had laid out those numbers earlier this year, but talk of doubling the force led many to assume the service was aiming for 20,000 uniformed Guardians by 2030.

Lt. Gen. David N. Miller Jr., the service's top planner, reaffirmed the higher numbers during a panel discussion at the conference—and suggested those still might not be high enough.

"As much as I know we need 25,000 Guardians in the next five years, as much as I know we need about 12,500 civilians in the Space Force in the next five years, the actual requirement, I could argue, is more," said Miller, who serves as deputy chief of space operations for strategy, plans, programs, and requirements.

Gagnon said his command, which presents forces to combatant commanders around the globe, is already seeing "exponentially" more demand for space capabilities.

"Of the six geographic combatant commands, all of them are asking me for help," he said. To meet that demand, he added, two-thirds of the Space Force's planned growth will reside within CFC and will go toward generating "more combat crews and more force elements" for commanders.

That includes new units to support new missions, like AMTI and GMTI. In late July, Combat Forces Command activated the 77th Surveillance Squadron within Space Delta 7, tasking it with delivering air and ground tracking intelligence and delivering it to decision-makers.

In discussions about growing, officials have no concern about attracting enough people—after all, the service has easily met its recruiting goals every year of its existence and has even had to turn away thousands of interested recruits and transfers. The service has so much interest, Chief Master Sergeant of the Space Force John F. Bentivegna and others have taken to saying the Space Force doesn't recruit new members—it "scouts" them.

In order to meet its growth goals in a "sustainable" way, the service needs to be strategic, said Deputy Chief of Space Operations for personnel Katharine Kelley.

"It is arguably easier to just say, 'I need this many new Guardians,'" said Kelley. "It is much harder to say, 'I need to seed all of that talent inside the service that already exists and not create an imbalance in an up-or-out promotion system.'"

Too many new Guardians with little experience entering at the lowest ranks could wreak havoc on the service's grade structure, she noted.

"We're trying to balance not having all of our accessions be brand-new in terms of experience," she said. "We're looking for ways to make sure that we can kind of balance this as a sourcing model and a sustainment model for people."

One way is direct commissioning, allowing civilians with relevant space experience to join the service at a higher rank and grade, Kelley said. Another way is interservice transfers—the Space Force just opened its application window for such transfers from the Army, Navy, Air Force, and Marine Corps in fiscal 2027.

Inevitably, though, the makeup of the force will likely change, said Bentivegna—the Space Force has always been unique among the services given its high proportion of officers to enlisted, and while it's unlikely to approach the ratio of the Air Force or Marine Corps, the coming growth

is expected to favor the enlisted side.

"We're going to grow more enlisted than we are going to grow officer," Bentivegna said. "I think just a couple years ago it was almost a flat 50/50. Now we're 53 percent enlisted, and I think that will continue to grow."

GROWING THE PIPELINE

No matter what, every new Guardian that the Space Force accepts will have to go through training of some sort. That means a huge influx for Space Training and Readiness Command.

In 2027 alone, STARCOM boss Maj. Gen. James E. Smith said, his command will have to train up:

- Three times as many total Guardians as 2026: 1,000 to 3,000
- Twice as many enlisted: 700 to 1,400
- Four times as many officers: 400 to 1,600

Smith called that growth "a huge, huge scaling problem." In response, STARCOM has raced to add around 75 new instructors at its various schools and courses.

The Space Force has always relied on the Air Force for support functions, and it will do so even more with the increased training workload, Smith said. But at the same time, the service has to continue to carve out its own identity of "Guardianship" and ensure the training is Space Force-centric.

"It's not just enough to create a pipeline to create more Guardians," Smith said. "We've got to have Guardians have the right skill sets to execute these new missions."

Part of that, Smith said, is continuing an effort that was a top priority under former Chief of Space Operations Gen. B. Chance Saltzman: improving the service's test and training equipment.

"There are some pieces still missing in our recipe. One of them is a fully constructed live, virtual, and constructive environment in order to do both tests, but also to do training," Smith said.

This March, the Space Force issued a request for proposals for a physical test and training range that will feature a mix of ground and space-based systems. Officials have said they are looking to identify near-term gaps in test and training ranges and quickly field capabilities to address them.

ADDING INFRASTRUCTURE

Test and training ranges are just some of the infrastructure needs the Space Force must address with its coming expansion.

Kathryn Kolbe, assistant deputy chief of space operations for installations and logistics, said the service still faces "significant infrastructure shortfalls" and is trying to address them through expanded military construction.

"For the [fiscal 2027] budget, we submitted the largest investment in MILCON in Space Force history," Kolbe said. "If appropriated, we would receive $2.2 billion."

Almost half of that, $1 billion, would go toward building four new space operations centers at bases around the country. The service is also seeking an undisclosed classified total for five new tactical electronic warfare centers to be based in the U.S. and abroad.

Officials have said they want those hubs to support resilient operations for missions like space control, space-based sensing and targeting, and data transport. While geographical distribution through resilience is one way to meet that requirement, Chief of Space Operations Gen. Douglas Schiess said Iran's targeting of U.S. space and missile defense systems in Operation Epic Fury has highlighted the need to better protect personnel and the systems they operate. The service and the broader joint force are also looking at ways to make them more mobile, and is even eyeing underground facilities for forward-deployed operations, he told reporters Sept. 15.

Leaders have also been investing billions of dollars in infrastructure to support more launches at its ranges on Cape Canaveral Space Force Station, Fla., and Vandenberg Space Force Base, Calif. That work is expected to ramp up over the next few years as the ranges make room for more launch complexes and support infrastructure, and the Space Force plans to request funding for the effort in its fiscal 2028 budget request.

All this construction will take time, though, and the personnel growth is coming fast.

"In the meantime, we're building temporary facilities for our operational units, for our training units, and for other requirements as they arise, as we plan, program, design, and construct our long-term facilities and infrastructure," Kolbe said.



Dave Grim

Mission Delta 3 Guardians operate a Ground Multi-band Terminal and Quad-band Large-Aperture Antenna at Peterson Space Force Base, Colo. The systems deploy regularly to support SATCOM requirements for joint operations worldwide.



David Dozoretz/USSF

A U.S. Space Force Guardian assigned to Combat Delta 1-5 monitors a space effects command and control display at the Combined Space Operations Center (CSpOC), Vandenberg Space Force Base, Calif., in 2026. Members of Combat Delta 1-5 and the CSpOC maintain continuous watch to synchronize and deliver critical space-enabled effects to the joint force.

The Space Force Goes to War

By Chris Gordon

The Space Force has spent the past few years preparing for war. Now, it has fought one.

The U.S. military has chronicled its strikes by sea and air on Iranian military sites in Operation Epic Fury, as well as its extensive efforts to intercept Tehran's persistent missile and drone attacks.

Underpinning all that activity was space.

"When the order came for Epic Fury, the Space Force was a part of the decision calculus on whether we executed the joint campaign at all," Chief of Space Operations Gen. Douglas Schiess said. "The joint force made it clear: Without the Space Force's capabilities, the joint force could not—and would not—move forward."

As in other campaigns, the Space Force's Global Positioning System satellites enabled U.S. forces to carry out precision strikes against Iran's missile forces, defense industry, and a broad array of targets. But before the U.S. Navy unleashed Tomahawk cruise missiles from the sea and the Air Force and carrier-based warplanes dropped air-launched cruise missiles and guided bombs from the sky, America's space operators opened up the operation from the heavens, using electronic warfare to disrupt Iranian air defenses and clear a path for U.S. strike aircraft.

Space operators, noted Chairman of the Joint Chiefs of Staff Gen. Dan Caine, were the "first movers" in the campaign.

The Space Force also nominated targets to the Combined Air Operations Center, which ran the strike campaign under Air Forces Central, focusing on Iranian satellite communications nodes and Iranian jammers, among them some that targeted Air Force MQ-9 Reaper drones.

"Guardians, what are we providing: just look at our doctrine, and it'll tell you everything," said Chief Master Sergeant of the Space Force John F. Bentivegna during the AFA's Air, Space & Cyber Conference in September. "It's all things that underpin the lethality of the joint force. So all the Guardians were involved."

ADVERSARIES NOTICE

Iran, which suffered the result of the Space Force's work, took note, which is why U.S. space and missile defense assets have been prime targets for Iranian missiles and drones. Iran proved more effective than many imagined in striking and damaging radar sites, communications, and command and control nodes throughout the region.

"If the past few months have taught us anything—if current overseas operations have taught us anything—it's that our adversaries are targeting space and missile defense assets like never before," said Gen. Stephen Whiting, the head of U.S. Space Command, in August. "Let's be blunt and specific: Iran is a medium-sized military power, and they're choosing to fire at space and missile defense targets. When bullets cost so much, you take great care with your aim. You only shoot at your adversaries' most valuable targets."

As head of Army Space and Missile Defense Command, Lt. Gen. John Rafferty said his service helped with "setting the conditions for space to be thrust into the starting lineup."

While the Space Force suffered no fatalities, Soldiers specializing in space operations did. Army Sgt. Benjamin N. Pennington, of the Army's 1st Space Battalion, 1st Space Brigade—part of U.S. Army Space and Missile Defense Command, the service's component to U.S. Space Command—was injured and later died from wounds suffered in Iran's March 1 retaliatory attacks on U.S. forces at Prince Sultan Air Base, Saudi Arabia.

Notably, Iran has also used space in its attacks, along with cyber and electronic warfare. It used Chinese commercial satellite imagery to aid in its targeting, U.S. Space Command concluded in a report on space warfighting, and used its cyber and electronic warfare systems to attack U.S. communications and navigation and interfere with precision-guided weapons. "Iran [employed] asymmetric capabilities to disrupt U.S. space capabilities—far beyond what its limited presence in orbit would suggest," the report stated.

Iran also leveraged commercial space systems to attack U.S. forces, SPACECOM said: "Iran's reported use of commercially sourced, AI-enhanced satellite imagery, including imagery provided through Chinese commercial entities, to improve targeting against U.S. positions reflects how commercially accessible imagery, automated analysis, and publicly available data are eroding precision-strike advantages once held primarily by major powers."

In May, the State Department announced sanctions against four companies it said provided Iran satellite imagery that "enables Iran's strikes against U.S. forces in the Middle East."

China's use of commercial space to target the U.S. is a game changer.

"That was a capability that we took for granted for all those years," Rafferty said of air defense. U.S. forces "operated under the protection of [U.S. missile defense] and nobody ever tested it."

Rafferty said his command has worked hard to improve its missile defenses over the past few months, and Schiess said the Space Force sees missile warning as a solemn duty.

"The folks that are doing that each and every day are incredible, and they are saving lives," Schiess said of Guardians conducting missile warning.

For the Space Force, the challenge of protecting its assets has raised an interesting question: How can the Space Force better protect its terrestrial assets?

"I think the whole joint force is learning a lot from Operation Epic Fury," Schiess said in a press event at AFA's Air, Space & Cyber Conference. "What needs to be in underground facilities? What maybe can we do from remote locations? ... Obviously, sometimes we have to be within the footprint of the satellite, and so that's why Guardians go into harm's way. But we are taking those lessons and looking at them across the board. You could also look at what can we do from space," reducing the number of Guardians needed to operate in war zones.

Coming under attack in a combat theater was new for USSF, Bentivegna said. "As a service, reconstitution in a combat environment ... is something we kind of hadn't really worked on before."

CENTRAL ROLE

Key to U.S. efforts to use space to wage war against Iran was Space Forces Central, known as SPACECENT, the Space Force's component at U.S. Central Command, MacDill Air Force Base, Fla., and deployed to U.S. bases in the Middle East. Less than 4 years old, SPACECENT remains relatively small, comprised of dozens of Guardians.

"Your Space Force is in the fight," said Brig. Gen. Todd Benson, SPACECENT commander and the Combined Forces Space Component Commander for CENTCOM. "We're in harm's way. We're doing all the things that any other service would do. We're defending. We're attacking."

Space experts have had a presence at the Combined Air Operations Center under Air Forces Central for decades. In the old construct, notable space leaders held key roles as Director of Space for Air Forces Central. These included then-Col. John Hyten (2006), who went on to be the four-star Vice Chairman of the Joint Chiefs of Staff; then-Col. John "Jay" Raymond (2006-2007), the first Chief of Space Operations after the Space Force was established; and then-Col. David Thompson (2009-2010), who went on to be Raymond's deputy as Vice Chief of Space Operations. Schiess (2015) also held the job. Other Space Force component commanders also served in the old Director of Space Forces role in CENTCOM.

Schiess' predecessor as CSO, Gen. B. Chance Saltzman, established the space component commands, beginning with Space Forces Pacific in late 2022.

Saltzman was the two-star Deputy Combined Forces Air Component Commander at CENTCOM and deputy commander of AFCENT, a role no Guardian is likely to ever hold again. It was after becoming the three-star Deputy CSO for Operations, or S-3, that Saltzman argued that the Space Force needed a better way to present forces to the combatant commands, and set about creating a parallel structure to those of the other military services.

CENTCOM was quick to get on board. Its commander at the time, Marine Corps Gen. Kenneth McKenzie, advocated for a Space Force component and wanted one established during his tenure, people familiar with the matter said. After McKenzie retired in April 2022, he handed the reins to Gen. Michael "Erik" Kurilla, who also supported establishing a Space Force service component in CENTCOM.

Space Forces Central was established on Dec. 2, 2022, only about a month after Saltzman became CSO. Col. Christopher Putman was the inaugural commander, having previously been Director of Space Forces for Air Forces Central.

Since Space Forces Central's commander also serves as the Combined Forces Space Component Commander and Space Coordinating Authority for CENTCOM, this officer can issue Space Tasking Orders, direct capabilities, and coordinate space operations without routing requests through the air component.

"Now you have a space component commander solely focused on space," Benson said in an interview with Air & Space Forces Magazine. "We want to remove the ability for the adversary to have any space capabilities, and we're going to use every domain possible."

With CENTCOM in off-and-on conflict since Hamas' Oct. 7, 2023, attack on Israel, with operations against the Houthis in Yemen, defending Israel from Iranian drone and missile attacks, and supporting Operations Midnight Hammer and Epic Fury against Iran, Space Forces Central had to rise to the occasion.

"There was a moment in time between December and April where no one on our team had a single day off for over 100 days in a row—averaging 12 to 15 hours [of work] a day," Benson said in an interview. "That's how we had to do it. It's just brute force and grit. It's no magic recipe. A lot of learning by fire, figuratively and literally."

Benson estimated SPACECENT has scaled its operations "10- to 20-fold" over the past year, though he declined to say

how big the component currently is. Eventually, he wants to grow his command more permanently in the next few years—around five times the size SPACECENT is now.

"We've grown a lot and have a lot more assets at play than we did when we were a fledgling service," said Benson, who commands SPACECENT from CENTCOM headquarters at MacDill Air Force Base, Fla. "I walk through our ops floor, and I can see one or two Guardians commanding and controlling many forces downrange. And by the way, they're not all Space Force forces—because we have that joint hat, and they're 24/7." In addition to Guardians, there are Soldiers, Marines, and Airmen who fall under the space component.

But the command is still small. At one point, SPACECENT had just two Guardians represented in a targeting process involving some 1,000 personnel, Benson said.

Space operators play a role in both offense and defense, and coordination is essential because actions taken to support one combat element can impact others.

"Whether it's air, land, sea, maritime or cyber, they're able to support me with their domain to meet our objectives. If there's a space issue out there, an adversary's capability, I leverage the other components, asking them if they can support our objectives. Now we're not only providing them what they need, but also, they're providing things that help us achieve our goals."

When it comes to space assets, SPACECENT must also work within the Space Force, getting support from Space Forces Space and its counterpart components in the Pacific, Europe, and Africa.

"Space is a global capability and can be specifically a regional capability," Benson said, declining to discuss many of those operational capabilities.

Space-based electronic warfare has disrupted Iranian air defenses, while the positioning, timing, and navigation satellites help U.S. GPS-guided weapons hit their targets, U.S. officials have said. Satellites also help transmit voice and data transmissions, enabling aircraft to communicate beyond the horizon.

Space-based sensors have detected incoming Iranian missiles, providing critical minutes of warning to allow service members to escape to cover and helping base air defenders to be ready to combat the threats with Patriot and THAAD ballistic missile interceptors.

"You don't have to think too hard to understand what it is that Guardians are bringing to the fight," Saltzman said in April. "All of the missions that we do—missile warning, satellite communications. The links are vital. Over-the-horizon communications is as important now as it has ever been."

But increasingly, Space Force contributions include disrupting integrated air defense systems—offensive activity not previously acknowledged.

"The adversary is using satellite communications to synchronize their situational awareness, and if we can disrupt that, then we can help create envelopes of protection for people going into harm's way—whether that's extracting pilots that are on the ground or protecting assets that are going into an IADS," Saltzman told Air & Space Forces Magazine in one of his final interviews as CSO, referring to Operations Epic Fury, Midnight Hammer, and Absolute Resolve in Venezuela. "If we weren't there, it would have gone far differently."

Added Schiess in September: "In the electromagnetic warfare area, we have both offensive and defensive [capabilities], and so we have both of those systems out there."

GPS, satellite communications, and missile warning systems have been used by the U.S. in the Middle East since Operation Desert Storm 35 years ago. But today, adversaries have means to try to counter those advantages and seek to deny them to U.S. forces. For years, U.S. specialists focused on protecting space capabilities from high-end threats posed by China, notes retired Space Force Col. Charles Galbreath, now the Director and Senior Resident Fellow for Space Studies at AFA's Mitchell Institute's Spacepower Advantage Center of Excellence.

"But the far more likely, and now proven, threat is a country like Iran leveraging foreign-provided space-based intelligence to target and attack our space capabilities," Galbreath said.

The ubiquity of satellite imagery makes hiding and deception far harder than in the past, what Benson calls "hyper-transparent warfare."

"Nothing you do today is without being seen," Benson said. "You just can't hide anymore, and so that's great for us for our advantage. But you have to assume that any adversary will find some way to access imagery. So we have to use that, and we have to operate knowing that we can be seen."

"You don't have to be a national world power to be a spacefaring nation; everybody's got access. Everyone can see everything that everyone is doing in the world," Benson said. "We cannot be under the belief that somebody's not watching us, and the adversary as well has to know they can't hide."

That transparency has put U.S. service members and Guardians at risk, but has also given them newfound credibility with other services.

"Guardians on the front lines, in body armor, taking fire, and then staying on their posts to be able to do effects that protect the joint force," Benson said. "You wouldn't believe how far that goes with the other services. Now they know what we do, and we show them."

That has led to practical lessons too.

"We're learning some of the lessons that other services have learned over decades, if not centuries, to start to learn how to do logistics and sustainment," Benson said. "They're starting to think a little bit more about warfighting. It became pretty real. It's unusual for us to say in our community that they've led their troops in combat operations. It's more true than you'll ever know."

To help rally his Guardians, SPACECENT has held what he calls "Benson's Bunker Talks" with Guardians deployed in the Middle East.

"We go there and we sit there because it's hot, it's uncomfortable, and you talk about real-life things about what's going to happen in war," Benson said.

GUARDIAN POWER

During a speech at AFA's Air, Space & Cyber Conference in September, Schiess shared a dramatic example of the Space Force's electronic warfare efforts.

A Guardian he referred to only as Specialist Gray was deployed to the Middle East with the 42nd Electronic Warfare Detachment in the opening hours of Operation Epic Fury.

"She received a priority target package with one critical objective: Reconfigure her weapon system and execute critical nonkinetic fires," Schiess said.

Gray continued to operate this key electronic warfare capability even as Iranian missiles targeted her unidentified base, forcing fellow service members to take cover.

"Even as Alarm Red sirens were blaring and incoming missiles targeted her site," Schiess said, "she courageously held the line—protecting forces, denying adversary capability, and delivering space effects until her commander had to literally pull her from the console to safety."



Mitchell Institue

To move targeting and other data at relevant operational rates, the Space Force's future data transport constellation must adopt optical links as well as conventional radio spectrum, the author argues.

By Col. Jennifer Reeves, USAF (Ret.)

Modern warfare depends on the ability to move, integrate, protect, and exploit data at speed and scale. Yet operational timelines continue to compress, and military sensors, autonomous systems, and proliferated satellite constellations are generating increasing volumes of data.

Designed for an era characterized by lower data volumes, more predictable communication flows, and uncontested access to space and the electromagnetic (EM) spectrum, yesterday's information architecture is inadequate for today's data demands under the strains of a contested environment.

The answer is a hybrid RF-optical communications architecture that combines RF's resilience and ubiquity with the far greater transport capacity and security of optical communications.



Adapted from War at the Speed of Information: Data Transport, Decision Advantage, & the Future of Military Space Communications. The author is a fellow at the Mitchell Institute's Spacepower Advantage Center of Excellence.

Historically, military space systems supported mission sets such as missile warning, strategic communications, and positioning, navigation, and timing. Data volumes were modest, and communications were largely linear and centralized. As a result, architectures prioritized reliability and global coverage over scalability, flexibility, and rapid data integration.

Today, however, demand for the Space Force's Satellite Control Network exceeds industry standards and much of the infrastructure is aged; its newest major ground station was completed in 1991. Back then, fewer than 2,000 operational satellites existed worldwide; today, there are more than 17,000 satellites on orbit, with tens of thousands more satellites planned. An architecture operating near capacity is inherently vulnerable, less able to absorb disruptions during conflict.

Modern networks must enable forces to detect, process, and act on information faster than an adversary. To be effective, they must be able to



Tech. Sgt. Ted Nichols

RF transmissions will remain crucial to satellite communications enabled by antennas like the AF2040 high-gain, ultra-high-frequency antenna shown here. But laser-transmissions promise additional, wider-band faster connections.

distribute large volumes of data quickly, securely, and reliably across the force. Information that cannot reach commanders or weapons systems in minutes or even seconds rapidly grows obsolete. Indeed, latency can be an operational liability. Adversaries target communications using electronic warfare, cyberattacks, and signal interception. Russian operations in Ukraine target communications to degrade command and control and reduce operational effectiveness.

In future conflict, nations that move, protect, and exploit data more effectively will gain decision advantage and the strategic initiative. This is why the Space Force included billions of dollars for the development of its Space Data Network (SDN) in its fiscal 2027 budget request. The initiative seeks to integrate military, commercial, and proliferated space capabilities into a hybrid architecture capable of rapidly transferring large volumes of data across domains.

ARCHITECTURE VULNERABILITIES TODAY

RF communications are inherently observable and easily contested. Unlike wired or physically isolated communications pathways, RF transmissions propagate openly through the atmosphere, exposing them to detection, interception, geolocation, interference, and exploitation. The Space Force's Future Operating Environment projects that future conflicts will treat the EM spectrum as contested terrain, where competition extends beyond platforms to the signals themselves. Recent operations demonstrate that electronic attack, spectrum denial, and signal exploitation are already routine features of modern warfare.

Ukraine serves as a modern case study. Russian electronic warfare activities have repeatedly degraded drone operations, communications, and battlefield coordination. Collaterally, GPS interference in the Baltic region has disrupted aviation and navigation.

As military forces increasingly rely on networked command and control and rapid data exchange, disruptions to communications can degrade coordination and slow decision-making. The more systems are interconnected, the greater the risk of disruptions having cascading effects on command and control, targeting, navigation, sensing, logistics, and distributed decision-making.

Optical communications can reduce this vulnerability. Unlike RF transmission, whose energy spreads over distance even when transmitted through directional antennas, optical communications concentrate energy into extremely narrow beams that remain tightly focused over long distances. They are harder to detect, intercept, geolocate, and disrupt, and because they operate at the speed of light, enable substantially greater data transport capacity. Simply put, optical links provide a more discrete and resilient pathway for moving large volumes of mission-critical data between satellites, ground nodes, and operational forces.

Yet optical communications should be seen as a complement to—not a replacement for—RF. Optical technology carries its own technical and environmental challenges, particularly for atmospheric transmission. Future military networks should combine the strengths of both technologies to create more resilient communications architectures.

THE DATA ABSORPTION PROBLEM

Emerging operational concepts such as Joint All-Domain Command and Control (JADC2) are dependent on continuously connected networks linking sensors, decision-makers, and operational forces across multiple domains in near real-time.

Central to this concept is the explosive growth in the number of satellites supporting these missions. Unlike earlier architectures that relied on relatively few highly capable satellites, modern proliferated architectures operating in low-Earth orbit distribute sensing, communications, and networking functions across many interconnected platforms. The Space Development Agency's (SDA) planned data transport layer, for example, is forecast to have more than 100 satellites in LEO by 2027.

At the same time, orbiting sensors are generating dramatically

larger datasets: The National Academies of Sciences notes that improvements in sensor resolution, persistence, and revisit rates have driven a 200-fold increase in data output over the past 20 years, straining communications architectures already operating near capacity. A single high-resolution satellite image can exceed 2 GB.

Existing RF links operate within a finite, regulated, and shared spectrum and cannot simply be expanded to match demand. Spectrum availability, transmission power limitations, orbital coordination requirements, and shared access constraints collectively impose hard ceilings on transport capacity.

In practice, this requires a hierarchical means of prioritization. Missile-warning and command-and-control traffic might trump imagery transmission, delay delivery and/or require data compression.

Incremental improvements such as adaptive waveforms, spectrum sharing, and more efficient RF management can mitigate, but will not solve this mismatch between rapidly growing data production and finite transport capacity.

A NEW STRATEGIC COMPETITION

Not surprisingly, therefore, space communications are now a central arena for strategic competition. China is also developing proliferated constellations, advanced networking systems, and laser communications capabilities to its own data-intensive military operations. In the race for communications advantage, the early mover promises to gain disproportionate influence over the standards, interoperability frameworks, and integration pathways that define future systems. This is especially true as regards to optical links from space to ground stations.

The 5G experience offers a cautionary example. China's early and coordinated push into 5G, spectrum policy, and international standards gave it significant influence over the technical and commercial environment in which future commercial cellular networks would operate. Although the United States remained a leader in telecommunications innovation, China's muscle and scale gave it advantages in the standards ecosystem and international cellular market.

Similar dynamics will shape the market for optical terminal interfaces, crosslink standards, data-relay architectures, and allied interoperability. Failure to lead therefore risks more than a technological disadvantage: It could ultimately force the United States to operate within communications architectures and standards shaped by competitors.

HYBRID RF-OPTICAL COMMUNICATIONS

Optical communications use frequencies thousands of times faster than those used in traditional RF systems. This enables a "step-change" improvement—particularly for space-to-space applications without having to pass through the Earth's atmosphere.

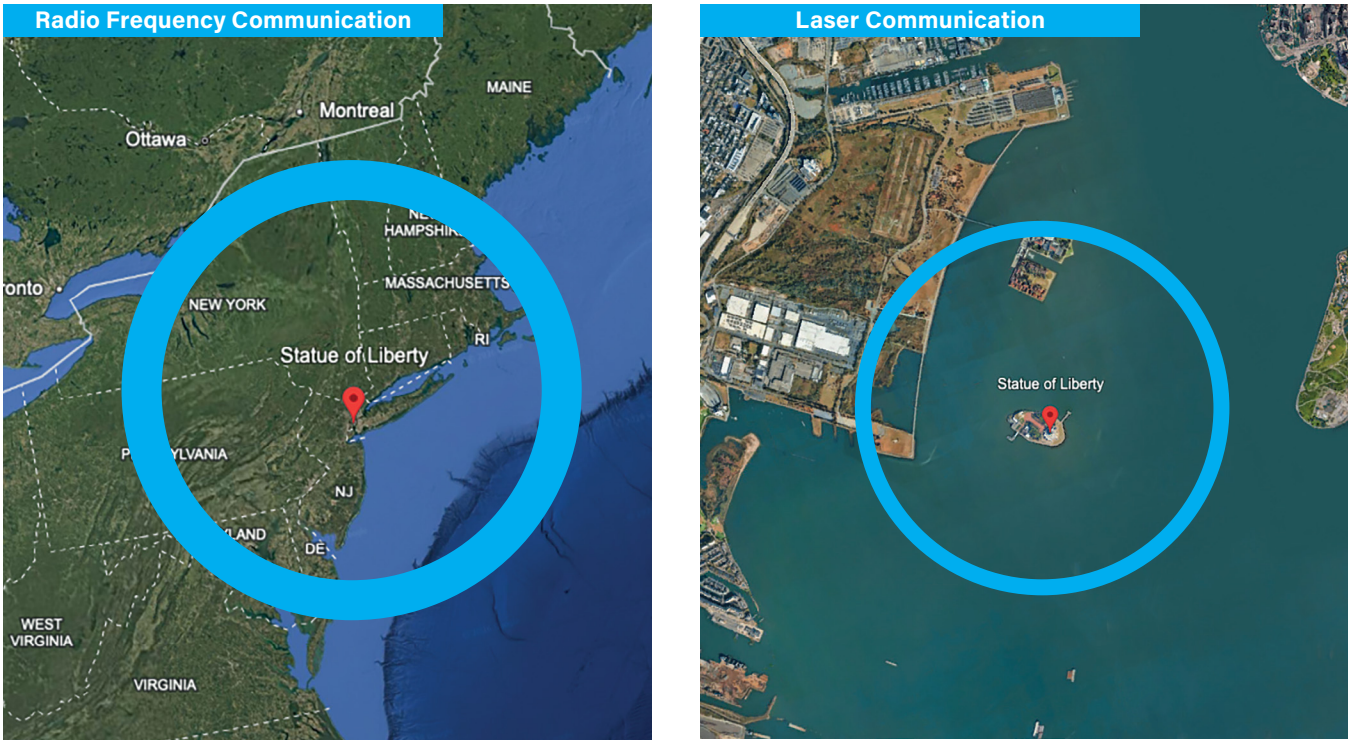
Optical crosslinks between satellites enable data transfers across proliferated constellations using through networks similar to mesh-style Wi-Fi networks on the ground. Rather than routing information through terrestrial infrastructure for redistribution, optical networks can dynamically move data across multiple satellites until it reaches the most effective downlink station to reach operational users. Dependence on fixed ground infrastructure is reduced while resilience, routing flexibility, and continuity of operations is enhanced.

Amazon's Project Kuiper has demonstrated optical intersatellite data transmission at 100 gigabits per second over approximately 1,000 kilometers without relying on ground relays.

Defense programs are demonstrating similar maturity. In 2025, SDA has made intersatellite links foundational to its future transport architecture. General Atomics Electromagnetic Sys-

RF vs. Optical Beams

A satellite beaming a radio frequency communications link to the ground effectively broadcasts across thousands of square miles. By contrast, an optical link is more focused, and therefore harder to intercept or disrupt.

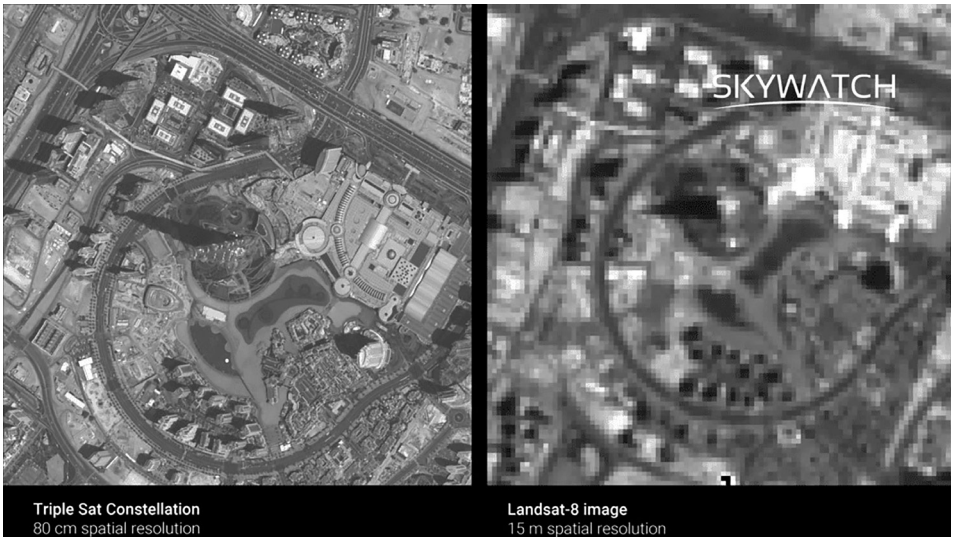


Google Earth images; Graphic by Eric Lee/staff

tems demonstrated an interoperable air-to-space optical link using an SDA-compatible terminal and a commercial satellite, validating a multivendor laser communications architecture supporting the Proliferated Warfighter Space Architecture.

Optical communications also offer advantages in contested electromagnetic environments. Operating outside traditional spectrum constraints, they not only offer faster transmission, but also greater security: Their narrow beams are substantially more difficult to detect, intercept, geolocate, or jam than traditional RF signals.

By combining the strengths of both optical and RF communications, future space architectures can take advantage of the best of both worlds. RF provides broad-area coverage and all-weather communications, while optical links offer higher throughput, lower probability of intercept, and efficient movement of large data volumes. Optical communications can therefore relieve pressure on congested RF pathways while improving overall network resilience and scalability.



The proliferation of high-resolution satellite imagery and other space-based sensing magnifies demand for downlink capacity. On-board data compression and processing can reduce bandwidth requirements, but faster transmission speeds are essential.

Commercial developments reinforce this concept. SpaceX's Starlink constellation has deployed intersatellite links at unprecedented scale. In 2024 began, SpaceX began offering optical terminals to third-party satellite operators. Muon Space subsequently announced plans to integrate these terminals into its Halo architecture, enabling connectivity to Starlink's optical mesh network at data rates up to 25 gigabits per second. According to Muon, this could increase network availability from just 10 to 30 percent to 70 to 80 percent, while reducing data delays from 20 minutes to near real-time.

For the Pentagon, therefore, the question is no longer whether this technology will work but how quickly it can make it part of the resilient, integrated networks the joint force needs to fight.

MOVING LESS DATA FASTER

A growing set of technologies, including onboard processing, AI-enabled analytics, data compression, and on-orbit data management, can further reduce transmission requirements while preserving the operational value of time-sensitive data. Onboard processing and artificial intelligence can reduce the volume of data transmission by analyzing data at or near the point of collection, determining whether data must be transmitted immediately, which can be compressed or delayed, and which can be discarded.

Recently, the European Space Agency's Phisat-2 demonstrated how to reduce communications demands with its wildfire-detection application, developed by Thales Alenia space. The application identifies fires directly from satellite imagery, prioritizing mission-relevant information before downlinking it to Earth. Rather than transmitting massive amounts of raw imagery for later analysis, this approach could deliver actionable information faster while reducing the burden on communications networks.

AI is well suited to data filtering, anomaly detection, sensor cueing, and information prioritization, while more complex operational decisions involving adversary deception, ambiguous conditions, or the use of force should continue to rely on human oversight.

Data compression and advanced encoding techniques can relieve network congestion by reducing redundancy and maximizing the amount of usable information transmitted within each link. European Space Agency's ROSE-L radar satellite, for example, is projected to generate approximately 20,000 gigabytes of data per day, illustrating the enormous volumes modern sensing systems generate. Onboard compression and processing can help reduce bandwidth required for transmission and accelerate delivery of the most valuable information.

Commercial firms and defense planners are also exploring orbital data centers and distributed architectures that process, store, and route information directly within space-based networks rather than continuously transmitting raw data to Earth. By reducing unnecessary transport and enabling analysis closer to the point of collection, these architectures can reduce latency and accelerate sensor-to-decision timelines in an age of maneuverable hypersonic weapons.

SpaceX's Starlink constellation employs distributed data management in orbit, while services such as Microsoft's Azure Orbital Cloud Access seek to connect space assets directly with cloud infrastructure. Together, these developments demonstrate architectural principles that could help future military networks move less data overall but move the data that matters faster.

OPTIMIZING RF PERFORMANCE

RF communications, meanwhile, remain crucial to support today's command and control, navigation, sensing, targeting, missile warning, and distributed coordination missions. The Department of Defense's Electromagnetic Spectrum Superiority Strategy emphasizes that future systems must be capable of operating even as adversaries attempt to disrupt, degrade, or deny electromagnetic access through jamming, interference, spoofing, and other forms of electronic warfare.

The challenge, therefore, is not replacing RF but improving its survivability, adaptability, security, and efficiency while

integrating it into higher-capacity hybrid architectures.

Anti-jam and resilient waveform approaches, including spread-spectrum techniques, frequency hopping, low-probability-of-intercept/low-probability-of-detection (LPI/LPD), adaptive modulation, and advanced coding, complicate adversary targeting and improve communications survivability. Protected Tactical Waveform (PTW), for example, employs many of these techniques to maintain connectivity during active jamming. Emerging capabilities such as cognitive radio and dynamic spectrum management can help systems avoid interference, use bandwidth more efficiently, and adapt to congested and contested environments.

Proliferated downlink architectures are another means of improving RF performance. Expanding data transport across geographically dispersed stations, relay pathways, and interconnected communications assets can reduce congestion, distribute network loads, and provide alternate pathways when individual nodes become unavailable.

Meanwhile, data security must be ensured. Distributed architectures can reduce single points of failure, but by increasing the number of nodes, pathways, and interfaces in the network, they also can create new opportunities for cyber intrusion and data exploitation. Thus, encryption, secure transmission protocols, hardened network architectures, and protected data-handling procedures are required to ensure operational information remains trustworthy and usable in contested environments.

BUY, BUILD, STANDARDIZE

The Space Force's communications modernization efforts must be seen as a long-term operational imperative, and should be resourced accordingly. Stable, sustained investment, adaptive acquisition approaches, and deliberate integration of legacy and emerging capabilities are all central requirements to field resilient hybrid RF-optical architectures at operational scale.

The Department of Defense and the U.S. Space Force should begin by accelerating operational integration of hybrid RF-optical communications architectures. Hybrid architectures must be incorporated into operational concepts, training, exercises, network management, and day-to-day force employment and must become operational capabilities rather than promising technical concepts. Leaders should leverage relevant commercial capabilities and lessons from proliferated and distributed commercial communications architectures already in use.

Finally, the Department of Defense and the Space Force should assert a leadership role in shaping interoperability standards, integration frameworks, and partnership models to help define the future of military communications ecosystems. The United States must act now to shape these frameworks to accelerate innovation, enable interoperability across military, allied, and commercial networks, and to strengthen collaboration with commercial providers. Vendor-agnostic and pathway-diverse architectures should be encouraged to reduce dependence on singular links, providers, or technical solutions.

Leading the development of standards and frameworks can strengthen coalition effectiveness, accelerate innovation, and shape the communications environment in ways that favor U.S. and allied operations.

LAST WORD

Competitors are already investing in proliferated networks, advanced transport architectures, and data-centric concepts designed for contested environments. The United States cannot afford to treat communications modernization as a supporting technical issue because is something much bigger: a warfighting imperative. The decisions made now about what is funded, what gets built, and which standards are selected will determine whether U.S. forces gain decision advantage at the speed of war.



U.S. Space Force photo illustration by Robert Mason

A Falcon 9 rocket carrying the Starlink 10-24 mission lifts off from Space Launch Complex 40 at Cape Canaveral Space Force Station, Fla., in April 2026. The mission added 29 more satellites to SpaceX's constellation of more than 10,000. SpaceX has begun adding optical links to its architecture.

Back to Contents



Senior Airman Brooklyn Golightly

A Navy F/A-18 Super Hornet takes on fuel from an Air Force KC-135 Stratotanker during operations in the Middle East this summer. The Navy uses contracted refuelers in training because the Air Force does not always have enough tankers to support training requirements. Contract refueling offers a potential solution, but only if obstacles can be overcome.

The Future of Civil Contract Air Refueling

By Robert C. Owen

For over two decades the United States Navy has been contracting for commercial air refueling services for itself and a other users, including the U.S. Marines Corps, U.S. Air Force, and the air arms of at least five partner militaries. The scale of these operations is tiny compared to the daily operations of USAF's Air Mobility Command, but these contract air refueling (CAR) operations have proved safe, economical, and reliable. Customers have consistently expressed satisfaction with the two CAR providers, Omega Air Refueling Services and Metrea Air, and with the competence and professionalism of their crews, most of whom are retired U.S. military personnel.

Naturally, given these successes, the Air Force has considered whether to leave CAR as a fringe Navy activity or to effectively expand it as a component of the national air refueling fleet. To date, the military has balked. Understandable concern about the quality, availability, and dependability of contract air refueling, especially for critical and high-risk combat operations, continue to curb enthusiasm for the concept. But, given the rising cost of recapitalizing the Air Force's aging air fleet, the concept is ripe for renewed study.

Contract air refueling ... "doesn't burden the Navy with acquisition, long-term personnel costs, and permanent basing expenses."
—Capt. Jason Pettit, NAVAIR PMA-226 program manager

HISTORY OF CONTRACT REFUELING

Naval aviation leaders became interested in large Air Force tankers in the late 1970s, when they found themselves facing a Soviet Union "engaged in a serious, steady, and sustained effort which ... could make it the dominant military power in the world," as stated in the Pentagon's 1978 annual report. "Neither the high quality of U.S. technology and weapons nor the considerable talents and skills of the men and women of the armed forces will continue to make up for the quantitative advantages of such an adversary." The Navy's response to this new strategic environment was the Maritime Strategy, which envisioned a 600-ship fleet aggressively postured on the global periphery of the Soviet empire. For Naval Aviation, taking a global posture entailed preparations to shift and support the fleet and its air operations over long distances and to conduct



Staff Sgt. Halley Knoble/ANG

The bulk of the Air Force tanker fleet is made up of KC-135s that date back to the 1960s. Contract refueling is one way to ease the burden on these older aircraft and their crews.

nuclear and conventional strike operations deep into enemy territories. Those missions, in turn, required air refueling support from Air Force tankers, something naval aviators had not previously considered to be part of their normal operations. Even during the Vietnam War, the Navy never scheduled Air Force air refueling for its strike operations, as noted in official histories from that war. The new strategic environment, however, demanded greater use of tankers and, indeed, one of the graphics in the Maritime Strategy document was of a Navy F-14 refueling from an Ohio Air National Guard KC-135.

Hedging its bets, the Navy requested funds in 1986 to begin acquiring its own small fleet of large, land-based tankers to support training and at least some strike operations. Congress initially appropriated $110 million for the project, but later withdrew the money when Air Force analysis showed the Navy fleet was neither cost effective nor needed, given the availability of Air Force assets. Unhappy with that conclusion—and convinced that the Air Force would favor its own operational requirements and fail to support Navy training requirements, such as qualifying carrier pilots before deployments, as noted in a 2004 General Accounting Office critique of the Pentagon's refueling strategy. By then, the Navy had already been using contract air refueling on a limited basis for several years.

Entrepreneurs Ulick and Desmond McEvaddy were the commercial providers of air refueling services. They began the practice by working with the Naval Air Systems Command at their own expense to help with the engineering needed to convert a Boeing 707 airliner into a refueler. (The Air Force KC-135 Stratotanker is based on an earlier version of the same aircraft.) The Navy certified the Boeing 707-300 and it began operations in 2001.The McEvaddys' new company, Omega Air Refueling, subsequently acquired 10 DC-10s from Japan Airlines in 2007, three additional Boeing 707s in 2011, and two KDC-10s from the Dutch Air Force in 2019, according to Thomas Swiderek, President of OMEGA Air.

Meanwhile, in 2016, Metrea activated iMetrea Strategic Mobility to respond to a Navy request for proposals to provide refueling services and by acquiring four KC-135s from the Singapore Air Force and 14 KC-135Fs from the French Air Force. Metrea uses some aircraft for refueling, while reserving others for parts, according to James "Slim" Morgan, president of the Metrea Strategic Mobility.

Between them, these two companies have since provided refueling services to the U.S. Navy, the U.S. Air Force, the U.S. Marine Corps, and international air forces from Australia, Germany, Canada, India, and the Netherlands, all leveraging the Navy's contract to acquire refueling services. The U.S. Air Force started using Metrea in 2023 to support a few combat aircraft refuelings for F-16s, F-35s, and bombers. In April 2025, according to Air Force statements, the 62nd Air Mobility Wing at McChord Air Force Base, Wash., contracted for a single proof-of-concept air refueling of a C-17 by an Omega KDC-10. AMC staff officers note that this was a local, not AMC initiative, the operation demonstrates Air Force interest, since the wing commander would not have undertaken the operation without higher-level permission.

CONTRACT AIR REFUELING TODAY

All CAR contracts for the Navy and other users are managed by or through the Adversary and Special Aircraft Program Office (PMA-226) of the Naval Air Systems Command (NAVAIR). To assure quality and safety, PMA-226 employs Navy and civilian contract personnel to routinely inspect commercial refueling aircraft to confirm that they are properly maintained at appropriate government safety and operational standards, according to Navy Capt. Jason Pettit, director of PMA-226. Omega, Metrea, and Navy contract managers treat CAR cost data as proprietary, so do not disclose the data publicly. But all three assert that the two companies negotiate flat rates per flight hour with the Navy at scale, "comparable" to what Air Mobility Command charges for its services. A February 2026 memo from the Pentagon Comptroller lists the reimbursable rate for Air Force KC-135Rs at $20,959 per flight hour.

Pettit suggested in a 2025 interview that the program's cost effectiveness goes beyond the equivalency of flight hour rates, because CAR "doesn't burden the Navy with acquisition, long-term personnel costs, and permanent basing expenses." The availability of Omega and Metrea tankers also allows Pettit and his organization to satisfy foreign military sales requests for training support to reduce wear and tear on their own refueling aircraft. As a result, contracted refueling hours have risen from around 2,500 to 4,200 flight hours per year over the last several years, he said.

Omega and Metrea achieve their cost effectiveness through disciplined exploitation of the economics of being a commercial operator. First, they bought their fleets, along with parts stocks, and ground equipment at bargain basement prices. Next, they keep their aircraft flying by hiring skilled aircrew and ground support personnel, with extensive military experience. Metrea also employs a small percentage of currently serving Air Force Reserve and National Guard pilots. Under current arrangements, reservist pilots working for a commercial air refueling operation are perfectly proper, so long as everyone understands that their military obligations will have priority over their corporate jobs during mobilizations. Should the commercial air refueling industry expand and adopt more formal, CRAF-like arrangements with the military, its reservists would present a conflict of interest during mobilizations, and the Air Force likely would not allow CRAF member airlines to count them against their contracted mobilization obligations.

Regarding the salaries, the companies pay pilots a "competitive" hourly wage for travel and the hours they fly. Maintenance and staff positions are, likewise, filled full or part time as required by its operations. In contrast to military tankers returning to their home bases between missions, the commercial operators hold down flight hours by parking their tankers wherever scheduling gaps find them, then flying crews home commercially until they are needed again. These and other operational techniques help contain costs, keeping the services attractive to the Navy and other users.

Metrea and Omega operate at levels of safety and reliability equivalent to those of the airlines and the military. The Navy's Pettit said he employs Navy, government, and contract personnel to inspect flight and ground procedures and equipment in accordance with the aircraft manufacturers, the Navy, and FAA guidelines. The reliability and availability rates claimed by both operators are over 90 percent—well above Air Force rates for its refuelers. For fiscal 2024, the last date for which the Air Force released mission capable rates for its aircraft, KC-135s were mission capable only about 63 percent of the time, according to Air & Space Force Magazine's 2025 USAF & USSF Almanac.

The Federal Aviation Administration does not certify the Metrea and Omega aircraft for commercial operations, Pettit said. Metrea's military KC-135s never had commercial-type ratings, and the FAA removed the certifications of Omega's converted Boeing 707s when they received their air refueling equipment. In general, the FAA views the specialized equipment, different maintenance procedures, and perceived lack of a commercial mission of these aircraft as obviating certification for commercial operations under Part 121 (airlines) or Part 135 (charter) of the Federal Aviation Regulations. So, current CAR aircraft fly with experimental certificates between jobs; as public aircraft sponsored by the Navy during U.S. military refueling operations; and as state aircraft when deploying overseas to service allied customers. But, while the certification of CAR aircraft is complex, the Navy's inspection procedures, user testimonials, and company policies indicate these tankers are well-maintained, safe, and generally more available than the equally aged KC-135 tankers in the Air Force's fleet.

TO EXPAND OR NOT TO EXPAND

The existing Civil Reserve Air Fleet (CRAF) program provides the starting point for assessing the potential of CAR for expansion. Since the early 1960s, the CRAF has been the least



Senior Airman Megan Geiger

An Omega Air KDC-10B prepares to off-load fuel to a C-17 Globemaster III over California in 2025. Unlike the Civilian Air Reserve Fleet, commercial tankers lack a ready nonmilitary use. Omega Aerial Refueling Services provides air-to-air refueling services to U.S. military and allied customers under a U.S. Navy contract.



Sgt Channelle Smith

Inside the cockpit of an Omega C-707, the civilian crew navigates to an air-to-air refueling rendezvous off the coast of California.

expensive source of wartime mobilization capacity among the other components of the airlift system. Moreover, the Air Force incentivizes selected commercial carriers to participate in the CRAF by awarding contracts for peacetime and contingency services at competitive "fair and reasonable" rates guaranteeing at least modest profits. In general, CRAF operations allow U.S. Transportation Command (USTC) to slow down the wear and tear on aircraft provided by Air Mobility Command (AMC) by flying them only enough to maintain the readiness of the airlift system rather than their full capacity to generate flying hours.

To the extent possible, all other flying, including individually ticketed travel by government employees, is awarded to CRAF carriers. CRAF military managers also oversee the distribution of flying hours to help maintain military readiness, incentivize civilian participation, and to maximize the mobilization margin of the member airlines. In concept, this approach allocates only enough flying hours to the military fleet to keep its flying and support assets practiced and ready for war. CRAF carriers get what's left, which is enough to incentivize around 25 carriers to commit some 450 aircraft to the program.

Additionally, CRAF carriers in routine operations receive military contracts for a fraction of the flying hours available from their committed aircraft. They are thus obliged to apply the rest of their available aircraft hours to commercial passenger or cargo business to fill their schedules. Consequently, when the military demands expansion margin during a contingency, the airlines can redirect these commercial-dedicated hours to fulfill military requirements.

Given the current composition and operations of the CAR program, it does not lend itself to integration into the CRAF or a CRAF-like program. The key challenges to integrating CAR into a CRAF-like program is the absence of a commercial market for air refueling, and the fact that tanker aircraft do not hold FAA certificates to conduct commercial passenger or cargo flights. The absence of commercial certification obliges CAR carriers to limit their fleets to the number of aircraft they can more or less fill with military business. When mobilized, consequently, CAR aircraft will tend to have a smaller "mobilization margin" of uncommitted flight hours than CRAF airliners whose unmobilized flight schedules are burdened with a much smaller percentage of military contract hours. Commercial passengers and cargo shippers carry by far the major cost of keeping the CRAF available for mobilization, leaving the military to incentivize the program by paying slightly padded rates for a restricted number of peacetime contracts with CRAF member airlines. The CRAF, in summary, is a very good deal for the U.S. military, and it makes sense to seek a way to integrate CAR into it.

The obvious solution to the otherwise fatal absence of a commercial air refueling market would be to equip at least a part of the CAR fleet with aircraft holding commercial certificates and able to compete for civil or other public passenger or cargo operations. This is easier said than done. Federal aviation regulations, namely, type certificate data sheets for specific aircraft, permit the conversion of military surplus transport aircraft to commercial applications, but even if the aircraft were derived from a commercial design, the process involves review of all maintenance documents, evaluation of all modifications and repairs through the entire life of the aircraft, compliance with all civil airworthiness directives, removal of items not approved by the FAA—including air refueling systems—installation of commercially required items, and other actions.

For these reasons and perhaps habits of institutional mindsets, accepting commercial operations by aircraft equipped for air refueling would be a major policy hurdle for the FAA, and the military. Still, there are several options for acquiring aircraft suited to the CAR mission. In broad terms, an aircraft chosen for this mission should be able to conduct air refueling safely, effectively, and efficiently. It also should be able to compete within some niche of the commercial market, whether air cargo or passenger operations. The first option for the Air Force would be just to leave the Navy in control of a small program to support training and

some noncombat operations and let the corporate providers worry about acquisition costs and sustaining whatever second-hand aircraft they can acquire.

While this is the least expensive option, it would guarantee that CAR remains a niche capability. A second alternative would be for the Air Force and CAR partners to seek commercial type ratings for the KC-135s and KDC-10s presently in the CAR fleet. This approach would avoid significant acquisition costs, but the modifications and recertification process for these old aircraft would be expensive and dependent on the FAA agreeing to allow air refueling aircraft to perform commercial cargo or passenger operations. In all likelihood, these recertified aircraft would not be commercially competitive, due to age, efficiency, and other reasons; relevant to earlier departures from the marketplace log ago.

A third option would be to attempt to commercialize the KC-10s now under the care of the 309th Aerospace Maintenance and Regeneration Group (309th AMARG), the so-called boneyard at Davis-Monthan Air Force Base, Ariz. Retired only a few years ago to make way for new KC-46s joining the fleet, these aircraft still have years of flying hours left in them and could be competitive in specialized commercial applications, such as transoceanic air cargo operations, support of allies, government cargo operations, and more. In addition, the costs to return these jets to service might be less than to do the same for older KC-135s. They also would face the same challenge of satisfying FAA commercial certification requirements.

A fourth option might be for the Pentagon to underwrite the acquisition of KC-46s by civilian CAR providers. While the acquisition cost of these aircraft is high—about $160 million each for the Air Force and $250 million for non-U.S. customers, according to media reports, these jets offer long-term advantages, because they already hold FAA commercial-type certificates for the basic aircraft and their refueling equipment, according to Boeing, the jets' manufacturer. If the FAA or the Air Force still balked at conducting commercial and contract passenger and cargo operations with KC-46's still carrying their refueling booms and pods, there could be management techniques for operating a mixed fleet of active and inactive tankers efficiently. CAR Carriers operating KC-46s could potentially operate as CRAF carriers do today, by financing their mobilization margins through appropriate balances of military and commercial contracts, leasing arrangements, and other business models such as that of the Airlift Enhancement Program of the 1970s.

It is notable that the United Kingdom's Royal Air Force has already developed a civil-military partnership to provide tanker capacity and mobilization margins at reduced costs. The RAF entered into a lease agreement with AirTanker Ltd., a consortium of major European aviation companies, in 2008 to privately finance a tanker force until 2035. AirTanker purchased fourteen Airbus A330 MRTTs (Multi-Role Tanker Transports), from which it would maintain a "core" fleet of nine tankers operated by the RAF and five in a "surge" increment managed by AirTanker. Under the agreement, AirTanker is free to manage the surge fleet increment on a commercial basis, subject to RAF priorities and operational needs.

AirTanker's commercial projects have included numerous short-term passenger and cargo contracts, a multiyear lease of one aircraft to the Thomas Cook Group travel airline, humanitarian missions, and episodic provision of passenger, cargo, and air refueling support to augment the core increment. Another innovation is the use of "sponsored" reservists to fill many of the crew positions in the surge or commercial increment. These reservists are paid by AirTanker. Symbolically, these crews often fly wearing RAF flight suits sporting the patch of 10 Squadron, one of the two A330 MRTT Voyager squadrons, along with 101 Squadron. This arrangement, AirTanker states, asserts the continuities of their civil and military roles and retains aircrew coverage under the Geneva Conventions.

Though operating in a statutory and commercial environment different from that of the USAF and the U.S. commercial air carrier industry, the RAF's strategic tanker program at least indicates the potential of a civil-military contract air refueling program. Quantifying that potential into a fleet plan will require analyses of issues like aircraft certification requirements, industry interest, financing, the roles of reserve personnel, mobilization and employment procedures, command and control, and so on. But given the potential savings and enhancements that an enlarged CAR program could bring to the air refueling fleet, such analyses should be undertaken.



U.S. Navy

An Omega K-707 tanker refueled a Navy X-47B refueling drone over the Chesapeake Bay in 2015.

Finding Basher 52

USAF Pilot T.O. Hanford Followed his Hunches, and Never Gave Up.



AP Photo/Luca Bruno

Air Force Capt. Thomas T.O. Hanford comforts Capt. Scott O'Grady as they listened to a recording of their initial radio contact call after O'Grady had evaded capture for five days in hostile territory. Hanford's personal persistence led to O'Grady's rescue.

By Colin E. Kimball

The first Friday of the month was usually a welcome break for the pilots of the 510th and 555th Fighter Squadrons, both part of the 31st Fighter Wing at Aviano Air Base in northern Italy. The pilots and families would gather, share food and stories at a cookout, enjoying the unique, reinforcing camaraderie of the wing.

But Friday, June 2, 1995, was no typical first Friday: Earlier that day, during Operation Deny Flight, a UN peacekeeping mission over Bosnia, Serbian forces had shot down an American F-16 piloted by Capt. Scott O'Grady. No one was sure if O'Grady had survived.

Capt. Thomas "T.O." Hanford headed to the monthly cookout unaware of what had happened. He was among the most experienced fighter pilots in the wing, a graduate of the U.S. Air Force Fighter Weapons School, and the wing's tactical expert on air combat and weapons employment. Hanford counted O'Grady as a friend, and when he learned what happened, he was crushed.

Hanford had lost other friends to training accidents, but this was a combat loss, and the fate of his friend was undetermined. With all that at play, the cookout was canceled and the families headed home to commiserate. There was nothing else they could do.

THE SHOOTDOWN

Early the next day, Hanford sought Capt. Robert "Wilbur" Wright, the flight lead on the prior day's mission. Wright related the mission, its location, the aerial refueling, the less-lethal SAM radars they registered looking at them periodically. None of that was unusual.

O'Grady and Wright were flying in a spread formation about 1.5 miles abreast when O'Grady called out indications of an SA-6 missile site. Wright immediately saw the SAM, flying up between their formation, closely followed by a second missile, which flew straight into the belly of O'Grady's jet.

There was no time to react. Wright saw the impact and the explosion that followed, watched the two enflamed halves of O'Grady's jet separate and begin to tumble down into the clouds below. What he didn't see was a parachute.

Around the unit, there was talk of a memorial service, but it was not clear what had happened, and plans were set aside.

By Monday, there was new information: BBC Television aired footage of the crash site filmed by local news crews. This was evidence, and intelligence analysts and the Aviano pilots studied the images frame by frame, searching for clues. The wreckage was catastrophic, but details were scant nonetheless. No conclusion could be drawn on O'Grady's fate.

ALIVE!

Unknown to the Americans, O'Grady had managed to eject, and now he was desperately trying to survive. Unlike his fellow countrymen, Serbian forces had seen his parachute coming down—and they had raced to locate him. But the Serbs had been no more successful in doing so.

Having seen a Serbian vehicle tracking his descent as he floated down to Earth, O'Grady landed in hostile territory near the town of Mrkonjic Grad in western Bosnia. For five days, he concealed himself in mud and vegetation, surviving on insects and rainwater. He had with him a small survival radio, but used it sparingly for fear it might betray his location to the enemy. He transmitted only brief signals at intervals.

NATO aircraft flying overhead did detect occasional faint emergency beacon signals, but they were inconsistent and weak, and far from the location where they believed he might be. Some analysts worried Serbian forces were broadcasting false signals in hopes they could lure rescue aircraft into missile traps.

In fact, the radio's short range and the mountainous terrain hindered clear transmissions. U.S. forces, concerned about Serbia's clearly capable mobile missile threat, kept search flights over the Adriatic Sea to guard against further shootdowns.

NOT LETTING GO

On the evening of Wed., June 7, the fifth day after the shootdown, Hanford was preparing for a Deny Flight mission, a routine combat air patrol (CAP) mission, this time over the Adriatic Sea instead of over land due to concerns about surface-to-air missile threats like the one that had shot down O'Grady.

Hanford remained bothered by the lack of information on O'Grady's status. If O'Grady had been captured or even found dead, he figured, the Serbs would have paraded him or his body in front of the cameras, seeking political leverage. But since he remained missing, Basher 52—O'Grady's call sign from the June 2 mission—might very well be on the run.

Before departing that evening, Hanford checked his survival radio frequency, discovering that the frequency programmed into O'Grady's survival radio the day he was shot down was not the same. Frequencies were changed routinely as a security procedure, and while rescue forces were sure to have had the correct frequency, pilots flying CAP did not.

Hanford sent his wingman, 1st Lt. Clark "Griz" Highstreet, to retrieve O'Grady's frequency from the squadron vault; he wanted to have it with him when he was flying that night, along with the eight-digit secret word of the day that O'Grady had flown with. Armed with that information, the two pilots set out on their Deny Flight mission.

Hanford's call sign that night was BASHER 11.

LAST CHANCE

Hanford and Griz took off in their F-16s and began their mission over the Adriatic, flying a routine Deny Flight CAP mission controlled by a NATO Airborne Early Warning and Control (AWACS) aircraft using the call sign "MAGIC."

Before O'Grady's shootdown, the CAP positions had been inland over Bosnia and Croatia, but after his loss, the CAPs were moved westward over the Adriatic. This kept the aircraft out of the SA-6 threat ring but also put them farther from O'Grady's position on the ground and hindered O'Grady's ability to communicate

Unfamiliar Territory

Air Force jets flying Operation Deny Flight missions flew out of Aviano Air Base in northern Italy, but Air Force rescue teams operated from Brindisi, in Southern Italy. Once Capt. Scott O'Grady was found near where he was shot down, in Bosnia, the closest rescue team was aboard the USS Kearsarge, operating in the Adriatic Sea.





AP Photo/Luca Bruno

F-16 fighter pilot Capt. Scott O'Grady raises his arms during a news conference at Aviano Air Base Italy on June 9, a week after being shot down during an operation "Deny Flight" mission.

with his survival radio due to its limited line-of-sight range. After about 45 minutes of patrol, they took a brief break to air refuel and returned to their assigned CAP position over the Adriatic.

After refueling, Hanford checked in with MAGIC.

"BASHER 11, you are cleared to RTB," the AWACS crew said, short for "return to base."

Hanford declined. "BASHER 11 will remain on station until our replacements arrive," he said. Now MAGIC replied: "There are no replacements." NATO was closing the mission for the night.

"BASHER 11, you are cleared to RTB."

It was now about 1:15 in the morning. With a full load of fuel, Hanford was surprised and upset that NATO was abandoning their 24-hour air presence. Turning north toward Aviano, as directed, Hanford had a nagging feeling his friend was out there, fighting for his life. So he turned back south to the CAP area.

NATO might have given up on finding O'Grady, but Hanford would not. Back on the radio, Hanford advised MAGIC he wanted "15 minutes of play time."

Knowing radio waves travel farther at night due to lack of interference from solar radiation, Hanford thought there would be no better time to listen for O'Grady's low-powered radio signal. He tuned in to O'Grady's search and rescue frequency and turned off the squelch, increasing static noise but also the chance for a weak broadcast to come through.

With Griz Highstreet holding on MAGIC's frequency and keeping an open mic back to Hanford on their intra-flight channel, Hanford shut off MAGIC and began making radio calls on the rescue frequency, "This is BASHER 11 looking for BASHER 52 on Alpha," he said, and then listened for a response. He repeated the process every 30 to 45 seconds.

Now it was 0130 local time, and MAGIC was again itching to call it a night. When Griz transmitted on the inter-flight radio "BASHER 11, MAGIC wants to know if we're ready to RTB," Hanford said no.

"Tell MAGIC we have another 15 minutes of play time."

Hanford resumed his radio calls, repeating himself every 30 to 45 seconds: "This is BASHER 11, looking for BASHER 52 on Alpha." He was not about to abandon his search while he still had fuel to burn.

At 0145, MAGIC again urged Hanford to RTB. Hanford again called for another 15 minutes.

At around 0200, Hanford began noticing something—a pattern in the radio static that seemed to change slightly after he made his transmissions, as if someone were trying to answer him. He closed his eyes and tried to listen. "What is that noise?" he asked himself.

Now Griz came on the radio for the fourth time, "MAGIC wants to know if we are ready to RTB." Frustrated as the distraction broke his concentration, Hanford switched over to MAGIC's frequency: "MAGIC, this is BASHER 11. I will tell you when we are ready to RTB." Then he adjusted his course toward the Croatian coastline.

BREAKING THE RULES

Approaching land, the signal Hanford sensed seemed to grow stronger, but getting closer still would violate orders. NATO aircraft were not to enter Croatian airspace. MAGIC warned Hanford they were over restricted territory and ordered him and Griz to turn back.

Hanford began a turn back, then abruptly reversed back toward restricted airspace. The pattern he detected in the faint responses to his broadcasts could not be ignored. "The mission to find O'Grady was more important than any risks from Serbian anti-aircraft activity," Hanford would later recall.

At 0207, time was running out. The audible voice warning in Hanford's F-16 announced "BINGO, BINGO," meaning his

fuel was low and he had to return to base. But simultaneously, through the static, Hanford heard what sounded like a very tired human voice. Hanford keyed his microphone: "This is BASHER 11. Say your call sign."

For a moment, there was silence. Then the voice returned, weak but unmistakable: "BASHER 52 … this is BASHER 52."

Hanford estimated he was 85 miles away from the area of the shoot-down when he received the broadcast,which was near the upper limits of the line-of-sight broadcast range of the PRC-112 survival radio O'Grady was using.

But Hanford was skeptical nonetheless. The words were clear, but he didn't recognize O'Grady's voice.

"Understand, you are BASHER 52?"

"Roger that. This is BASHER 52. I'm alive!"

Hanford wanted an extra level of confirmation to be sure he wasn't being played. Knowing that, years earlier, O'Grady had been assigned to Kunsan Air Base, Korea, with the 80th Fighter Squadron, also known as the Juvats, Hanford fished for an answer no Serb would know: "What was your squadron in Korea?"

O'Grady responded immediately: "JUVATS, JUVATS … I'M ALIVE!"

Hanford had all the confirmation he needed. Trying to mask his emotions, he excitedly replied, "COPY THAT, YOU'RE ALIVE. GREAT TO HEAR YOUR VOICE!"

BASHER 52, missing in action for five days, was alive!

HOLDING THE LINE

O'Grady transmitted a series of letters that Hanford wrote down on his kneeboard. Hanford understood this would be a code, but he couldn't figure out how it was encrypted. He told O'Grady to lie low and conserve his batteries and departed the area to refuel.

Hanford and Highstreet headed south, reporting to MAGIC on a secure frequency that he had made "positive radio contact with BASHER 52."

"Say again?" MAGIC responded.

Hanford repeated his radio call, and MAGIC agreed to vector a tanker north so BASHER 11 could refuel. It was now 0220, Thurs., June 6.

Flying at 500 mph over a pitch-black Adriatic Sea toward the promised tanker, Hanford agonized over the encrypted message, holding a flashlight over the letters on his kneeboard, trying to decipher the message. What he didn't know was that O'Grady and Flight Lead Wright had developed this cypher on their own, so it was up to Hanford to decipher it. After some trial and error, he turned the eight-letter word into numbers, realizing that O'Grady had revealed his coordinates. He was only a few miles from the crash site, in a wooded area near Mrkonjic Grad.

"THAT'S WHERE HE IS!" Hanford said to himself, poking a hole in his paper map with a pen to mark the location. Hanford passed the coordinates to MAGIC via a separate secure frequency.

After refueling, Hanford and Highstreet continued to relay information between O'Grady and MAGIC. Rescue forces were being assembled, he was told, but there was not much he could relay to O'Grady other than telling him to "lie low, turn his radio off, and check back in on 15-minute intervals."

The sun would be coming up soon, and Serbian search teams again would be moving through the area. Hanford worried his radio communications might have alerted the Serbs.

Now MAGIC had a message, telling Hanford to "ask BASHER 52 his condition and tell him the word 'mañana," which Hanford interpreted as notification that the rescue would take place tomorrow. (Hanford later recalled the incident with irony, noting, "It's a secure code word because obviously the Serbs don't speak Spanish.")

"BASHER 52, what is your condition?" Hanford asked O'Grady.

"I'm OK, I'm OK."

"BASHER 52, they want me to pass you the word, 'mañana.'"

"NEGATIVE, I need to get out tonight!" O'Grady responded.

With no more to go on than gut, Hanford told O'Grady, "Hang in there and turn off your radio for another 30 minutes." Then he radioed MAGIC.

"MAGIC, where are the rescue forces?"

"They're waking up the generals now," came the response.

Time ticked by slowly. After about 40 minutes, Hanford again returned to the tanker, the fourth time he would refuel. O'Grady's voice conveyed disappointment.

"Understand they are going to get me tomorrow?"

Organizing a rescue in hostile territory is not an instant endeavor. All across Italy and the region, units were being alerted and directed: Close air support, electronic countermeasures, Suppression of Enemy Air Defense (SEAD)—all in addition to rescue crews. O'Grady would learn later that some A-10 pilots arrived at their planes before their crew chiefs, forcing them to start their aircraft without their ground crews.

Hanford did his best to keep O'Grady calm.

"The whole world is behind you!" Hanford said. "We're going to get you out! Now just turn your radio off, save your batteries, and I'll be back in 30 minutes."

The sun was coming up over the horizon when Hanford checked in with MAGIC next.

"The rescue forces are airborne," MAGIC said.

Now, at last, Hanford had good news to report. Switching to O'Grady's frequency, he called, "BASHER 52, are you up?"

Yes.

"They're coming to get you!"

Now Hanford had to get O'Grady ready for rescue. "If you're on a mountain, get to flat ground and look for a good landing spot for a helicopter," he told him. "Have your signaling devices ready and turn off your radio for another 15 minutes."

THE RESCUE

The Air Force rescue assets operating under NATO Command were headquartered at Brindisi, Italy, far down the Adriatic Coast in the "heel" of the boot of Italy. They were part of a Joint Special Operations Task Force (JSOTF) and flew MH-53 Super Jolly Green Giants, crewed by four aircrew (two pilots and two gunners), with a complement of two pararescuemen (PJs), a combat controller, and five shooters, either Army Special Forces or Navy SEALs.

But other forces were closer. The 24th Marine Corps Expeditionary Unit (MEU) Tactical Recovery of Air Personnel (TRAP) team was deployed on the USS Kearsarge, LHD-3, which had taken up a position off the Croatian coast earlier in the week. The Kearsarge had moved there to support a possible recovery operation and as a contingency in the event any additional aircraft went missing. The MEU, having been monitoring the developing situation through the night, had begun preparing for a possible tasking and the TRAP team was trained for just such a mission. Although a daylight mission would entail greater risk, the Marines were ready, capable, and closer than NATO forces in Brindisi.

Two giant CH-53E Super Sea Stallion helicopters carrying a platoon of Marine mortarmen turned rescuers launched from the Kearsarge, speeding toward Bosnia, escorted by two AH-1 Cobra gunships and four AV-8B Harrier attack aircraft.

Joining them in what was becoming cramped airspace were

Air Force tankers, fighters, and surveillance platforms coordinating the operation.

Hanford, running low on fuel again, requested another tanker and was directed to a Navy refueler. But that plane was not equipped to refuel his F-16, and when Hanford asked MAGIC for another tanker, he was refused.

"The general says he knows he is your bud, but you have to go home!" Magic said. Hanford and Highstreet finally returned to base, landing at Aviano around 0700. Still in their flight gear, the two tired pilots crowded around the squadron's operations desk with dozens of their squadron mates, where the 31st Wing commander was monitoring the rescue mission radio broadcasts and sharing play-by-play with the assembled pilots.

The Marines flew directly into hostile territory to O'Grady's position, which Hanford had correctly deciphered. Within minutes after landing, the Marines had O'Grady aboard, and began the race back to Kearsarge. Serb forces had engaged, with fire from small arms, anti-aircraft guns, and shoulder-launched missiles. Three of four helicopters were hit.

NATO rules of engagement didn't help. The Marines had to egress along the same corridor they had taken in, a predictable route that made it easier to target them. But all successfully evaded the worst of the fire and they returned safely to the ship at sea.

Back at Aviano, the tension increased as the wing awaited word of O'Grady's fate. Finally, the commander broke the silence: "They got him on the boat!"

Chaos erupted. Grown men yelled and hugged, emotions raw enough that some fought back tears.

THE AFTERMATH

Aboard USS Kearsarge, O'Grady received medical treatment for burns, dehydration, and exhaustion. He was instantly a national sensation.

At the White House, President Bill Clinton awarded O'Grady a Bronze Star for Valor for successfully evading capture and a Purple Heart for his injuries.

Hanford, meanwhile, received an Aerial Achievement Medal—his second—for his singular role in finding and locating O'Grady. In 1996, he was inducted into the Aviation Week and Space Technology Laureate Hall of Fame at the Smithsonian Institution's National Air and Space Museum in Washington, D.C., for his involvement in O'Grady's rescue.

Eight years later, during the first three weeks of Operation Iraqi Freedom, Hanford earned two Distinguished Flying Crosses for valor, including one for saving the lives of 15 Special Forces Soldiers who were pinned down by enemy fire. He retired from the Air Force in 2006 after 20 years in uniform, and remains part of the F-16 community today, as an instructor for new F-16 pilots at Holloman Air Force Base, N.M.

What he learned that June night over Bosnia underpins the warrior philosophy he tries to pass on to the aspiring F-16 pilots he teaches.

"Preparation matters —initiative matters—loyalty knows no distance, and duty has no time limits," Hanford says. "Despite risks, the mission is paramount. Sometimes the difference between failure and success comes down to one person refusing to give up, despite personal risks."

When speaking to young Airmen, Hanford likes to paraphrase Winston Churchill: "Maybe once in your life, someone will tap you on the shoulder and ask you to do something great," he says. "Wouldn't it be a shame if you were not prepared?"

To this day, O'Grady credits Hanford's singular determination with saving his life. The two remain close friends three decades later.



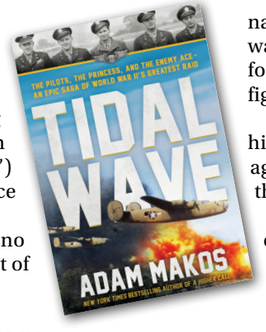
First Lt. Donald "Mac" MacDonald in his P-51 Mustang faced off in a classic air battle against Romanian Ace Lt. Constantin "Bâzu" ("Buzz") Cantacuzino during a June 6, 1944, raid in Romania, the same day as the Allies invaded Normandy. The fight did not end as either might have expected.

Art by Gareth Hector

BOOK EXCERPT

OPERATION TIDAL WAVE
A Sporting Encounter

By Adam Makos



Having lost territory to Stalin in 1940, then sided with Hitler to win it back, Romania landed itself on the wrong side of World War II. For fighting men like Lt. Constantin "Bâzu" ("Buzz") Cantacuzino, there was seemingly little choice but to serve to the bitter end.

An ace with thirty aerial victories, Buzz was no ordinary aviator. He was a prince, a descendant of one of Romania's oldest aristocratic families.

Buzz seemed born for adventure.

Dashing, fearless, and larger than life, at 38 he was already a national hockey champion and an internationally renowned aerobatic pilot. Before the war, he had made headlines when he reported for duty in Romania's reserves and became a fighter pilot.

By war's end, he would be Romania's top ace, his extraordinary journey having pitted him against not one enemy but three: the Soviets, the Americans, and the Germans.

Yet one of the most revealing moments of his career came high above Romania on June 6, 1944, when an American P-51 Mustang filled his gunsight...

The following is excerpted from "Tidal Wave" by Adam Makos.

The Sportsmen
June 6, 1944

EASTERN ROMANIA

The skies were bright and cold at 19,000 feet as the squadron of Romanian fighter planes climbed toward the American bombers. It was about 10 a.m. Buzz peered through the bulletproof windscreen, his goggle-covered eyes locked on a distant target. His oxygen mask made his breath sound raspy. Crisp frost clung to the canopy glass, refracting the sunlight in a dazzling glare. He wore his black leather jacket and a fabric helmet against the bitter temperature.

Around Buzz and his wingman, a dozen Romanian Me-109s flew upward in tight formation. The prince was flying in the 9th Fighter Group now, an outfit formed from the best of the nation's remaining pilots and known as "the spearhead" of the air force. Buzz and around 30 other aces had been drawn together into one group in a final attempt to stave off the nation's slow, inevitable defeat.

The silver bombers, about a hundred in all, were still 4,000 feet above, flying away from the Romanians. Their contrails raked a white path across the sky, leading the eye straight to them. They were B-17s, the Liberator's more rugged cousin, streamlined, with a single tail and a reputation for taking punishment.

And this was only a fraction of the American fleet in the air. On the same day the Allies were storming the beaches of Normandy, the 15th Air Force was unleashing its own invasion on Romania. Five bomber streams—B-17s and B-24s, nearly 500 planes in all—were making an all-out blitz,



Dénes Bernád collection

A Romanian ground crewman helps Lt. Constantin "Bâzu" ("Buzz") Cantacuzino with his straps before a mission.

sending a message to Antonescu: Your days are numbered.

Buzz spotted something between him and the bombers. Tiny glimmers, a series of silver specks sparkling like tinsel, drifted in a downward slope in his direction.

ESCORT FIGHTERS

"Motociclisti!" a Romanian pilot called. Motociclisti—motorcyclists—was their code word for American escort fighters.

The glimmers were larger now, and beginning to look like airplanes. Buzz estimated as many as 30 enemy escort fighters were roaring down toward him and his comrades. Bold and fearless, the unpainted, bare aluminum planes made no attempt at camouflage. If Buzz could have heard the American radio channel, he would have heard a voice coursing through the airwaves: "Burglar to Ripple 2, we're engaging enemy aircraft." The two formations were on a collision course.

Buzz's breathing quickened and he nudged the power forward. His fighter's Daimler-Benz motor surged. Buzz lowered his chin and held his climb. The lift was effortless—once again the '109 climbed "like an elevator." The Romanians' only hope was to hold formation and stay the course. Maybe, just maybe, they could joust through the American escorts and reach the bombers before the fighters peeled back around for another go.

Four-plane flights of Americans came at him. Their combined closing speed topped 700 miles per hour. Guns blazed. Silver fighters ripped past Buzz, wave after wave, as Axis and Allied fighters clashed at more than 20 thousand feet above the Earth. Buzz tracked them over his shoulders as they went by, each a silver streak smeared in brash warpaint, red noses and black-and-yellow checkerboard tails. He'd never seen such colorful planes. Spotting their distinctive belly scoops, Buzz realized what kind of escorts these were: P-51 Mustangs. No wonder they weren't camouflaged. This was the machine with nothing to hide from.

There'd be no pursuing the bombers now. Romanian '109s peeled off in every direction, "forced to engage" the escorts. A massive dogfight began. Buzz broke from his climb to join the fight. Mustangs filled the sky wherever he looked, slicing this way and that, crisscrossing. Faster, more maneuverable, two Mustangs chased every Romanian fighter. Every gun on their wings fired. The Mustangs of the 325th Fighter Group, the "Checkertail Clan," were out for blood and Buzz's earphones were alive with calls from one Romanian to another, pilots urging, "Check your tail!"

Taking evasive action, Buzz racked his fighter one way, then another, always looking for a target while trying not to become one. His Messer groaned under heavy Gs. In the violent maneuvering, Buzz lost track of his wingman. His Revi gunsight flickered, then died—of all the times! Any unit cohesion was gone. The small Romanian force was outnumbered by more than 2-to-1, and this wasn't even taking account of all the Mustangs in the dogfight. The Americans had so many planes that a dozen Mustangs remained over the bombers as top cover.

The Romanians couldn't win. More than one pilot sensed it now. Buzz saw other Me-109s running for their lives. To stay was suicide. As one Romanian put it: "We were compelled to disengage." It was every man for himself.

Buzz turned to the tactic he used whenever he was cornered. He racked the stick sidelong, threw the Messer on its back, and then dove. His plane plunged, its frame shuddering under the pressure. Buzz knifed through the sky at a ferocious speed. The altimeter needle spun backward: Nineteen thousand feet. Eighteen thousand. Seventeen thousand. His fighter groaned, the controls turned heavy. At 466 miles per hour, his airspeed indicator crossed the red line. But Buzz knew there was more to give. 480. 490. The aircraft screamed in protest. It was no comfort knowing that each wing was held on by large bolts, a Messerschmitt design feature. Somewhere around 530, the plane would come apart.

Reaching his limit, Buzz pulled back on the stick. The Messer trembled violently, then began to level out around 16 thousand feet, about 4,000 feet below the mêlée. He gave his gunsight a slap, hoping to bring it back to life. No luck. A roar of engines shattered Buzz's respite. A quick glance around told him everything. Messerschmitts and Mustangs were cutting through the sky around him. The dogfight was spiraling downward. He broke hard, trying to latch on to a Mustang, anything to throw off their pursuit of a comrade. But before he could line up a shot, orange tracer bullets slanted down from above, slicing past his canopy. He glanced over his shoulder, above and behind. More Mustangs, guns blazing. They dove, targeting him with dogged persistence. Their pilots' fearlessness and apparent bloodlust concerned him.

This was just not his day.

Buzz peeled over into another dive. He spotted a wide patch of cumulus clouds at 6,500 feet and steered toward them. Again, the altimeter needle spun backward as the Messer threatened to shake itself apart. He punched through the cloud layer and emerged into a hot, hazy summer morning. As he leveled off at 6,000 feet, the cockpit became thick with heat, steamy air from outside. Buzz tore off his oxygen mask. He saw fields stretching in every direction, plus some roads and villages. The clouds above his head hid his whereabouts for now.

It was discouraging to think how quickly his squadron had been overwhelmed. They hadn't even been able to put up much of a fight.

Then he saw it: a lone Mustang, off to the side and a little ahead. A glint of bare metal gave it away. The pilot hadn't seen him yet. He looked lost.

Buzz's eyes locked on the threat. His instincts, carefully honed since 1941, kicked in, and he broke violently in the Mustang's direction. There was only one rule that mattered: Shoot him before he shoots you.

Buzz went in for the kill.

At the controls of the Mustang was a man Buzz would have had something in common with. First Lieutenant Donald "Mac" MacDonald, 24, was a sportsman too. His narrow face, brown hair, and blue eyes matched his lanky frame, all arms and legs, perfect for his life back home. In Wayzata, an upscale suburb of Minneapolis, MacDonald had been the tennis pro at Woodhill Country Club, teaching lessons to kids, seniors, and everyone in between. His picture hung on the wall there, his personality captured in a wide grin.

A veteran pilot with 45 missions under his belt, MacDonald wasn't smiling now. He leaned side to side in his cockpit, scanning the skies above and below. He had been separated from his wingman, Second Lieutenant John Mumford, 22, of St. Petersburg, Fla. They had chased two Me-109s in a spiraling dogfight, and MacDonald had shot one down. But something had happened to Mumford. The last time MacDonald saw him, he was diving into the clouds at a steep angle. Maybe his radio had gone out, maybe his wounded plane was limping around somewhere, or maybe, God forbid, smoke was already rising from a crash site.

MacDonald was so focused on searching for his wingman that he didn't notice the gray shadow slipping in behind him. Another sportsman, but this one played for the opposing team. MacDonald glanced over his shoulder. It was like seeing a ghost.

Buzz had the Mustang right where he wanted him. As he closed the gap, his Messer bucked in the wake of the enemy fighter, jolted by turbulence. He had him dead to rights.

Stalking from the tail like a predator, Buzz got a closer look at the P-51. He knew the shape by now, the long, streamlined nose, narrow tail, and muscular fuselage perched atop sharp, square wings built for speed. A machine of deceptive beauty, the Mustang was crafted for one purpose: to destroy other airplanes.

Buzz's gunsight was dark, only a blank pane of glass where an illuminated aiming circle and cross hairs should be. He would need to fire by feel. He aimed the nose at the Mustang's vitals, the belly scoop beneath the cockpit, where the radiator sucked in air to feed its powerful speed. With his thumb, Buzz pressed the trigger.

The cannon in the nose hammered and belched flame. Brass shell casings poured down in a rain of spent ammunition. Fragments of metal skin flew off the Mustang and flung themselves back in a slipstream. Buzz's 20 mm shells found their mark. The belly scoop ruptured, and the Mustang's coolant system vented a hissing white cloud. It was a mortal blow to a liquid-cooled engine. The engine would soon overheat, and the machine would seize up.

The American was going down.

Inside the P-51, MacDonald shook off the shock of being hit, forcing himself to focus on survival. A 20 mm shell exploded behind his armored seatback. Fragments and the force of the blast punched forward, grazing his head and knee. He had been lightly wounded. His plane was not so lucky.

One glance at his instruments told him everything. Temperature was rising fast. His engine was melting into a solid block. He had to jump.

MacDonald pulled the emergency canopy release on the right side of the cockpit. Nothing. He yanked it again. Still nothing. Frantic, he tried the manual hand crank, hoping for

About this Book

Operation Tidal Wave—the daring Aug. 1, 1943, low-level strike against Hitler's oil refineries at Ploesti is often seen as a disaster. Flying B-24s from Libya to Romania, the U.S. lost 53 bombers and some 500 Airmen on the mission, making it among the most costly operations of World War II in Europe.

Adam Makos' vivid new history, "Tidal Wave: The Pilots, the Princess, and the Enemy Ace–A True Story of Courage and Survival in WWII," tells the story of Lt. Ernie Poulson, a B-24 copilot shot down behind enemy lines; Princess Catherine Caradja, who risked her life to protect captured American fliers; King Michael I, the young monarch secretly plotting to free his nation from Nazi control; and Prince Constantin Cantacuzino, Romania's leading fighter ace.

Drawing on years of research, diaries, letters, and family archives, Tidal Wave reveals a forgotten chapter of World War II.



Photo courtesy MacDonald family

First Lt. Donald "Mac" MacDonald.

the best, but the canopy was jammed shut by enemy shellfire.

He was trapped.

The Messerschmitt loomed behind him. There was nothing to do now but tuck into his shoulders, pray, and wait for the death blow.

Buzz held his thumb over the trigger of the 20 mm cannon. One pound of pressure, one more burst, and the Mustang would be finished. He could shear off a wing, send it tumbling in a helpless spiral, or walk the shells into the fuel tank for a fiery explosion.

But why?

This fight was over. His opponent was clearly defeated. Buzz lifted his finger from the trigger, letting the moment settle. Now that the other pilot could no longer hurt him, he saw the plane in a different light. Up close, it was beautiful. The red nose, the checkerboard tail—it looked more like a race car than a fighter plane. And it was fresh from the factory, barely worn in. The 325th had taken their Mustangs into combat just the week before. Buzz couldn't help but admire it. The undisputed hot rod of the skies.

WHAT WOULD IT BE LIKE TO FLY THAT MACHINE?

A realization hit him. They were about 60 miles behind the front lines. If the American pilot didn't bail out, that Mustang was coming down in Romanian territory. Could this be true? He had a chance to capture the American wonder weapon. Not to study it—what would that accomplish at this stage in the war? Buzz wanted to fly it. His mind worked fast. They could fix it, like the B-24 they'd patched up, and bring it back to the air. If he could get behind the controls of a Mustang and take it up for a spin, just once, it would be a career-defining move for a man who loved airplanes more than almost anything else.

Buzz slipped out from behind the tail and edged forward, almost parallel with the Mustang. Staying behind the wing, he flew with it "as if providing cover" from anyone who'd think to harm it.

Don't jump! he urged the Mustang pilot. That would ruin everything.

The American pilot lowered his nose toward the ground: He was bringing the plane in. Three thousand feet. Two thousand. One thousand. The two planes descended in tandem. The Mustang pilot steered for a freshly plowed field. Buzz was delighted. There was no softer place to land wheels-up.

But at 500 feet, the Mustang's propeller suddenly came to a stop. The engine seized. All four blades froze. At any moment, the P-51 would lose speed, stop flying, and fall like a rock.

Put her down! Buzz urged.

The American had no choice. Quickly he forced the plane down. The Mustang was still doing more than 200 miles per hour when it hit the soil. The plane skipped and wobbled, flew again, launched over a line of small trees, then bellied in and skidded to a quick stop. A good crash landing. Pilot and plane were intact.

Buzz banked around for a closer look. His relief turned to alarm. Smoke was rising from the Mustang. No, no, no! His prize was catching fire, and worse, the canopy was still shut. Smoke poured from every seam. Buzz was horror-struck. The plane was on fire and the pilot was still inside. Get out!

In the smoke-filled cockpit, MacDonald groggily lifted his head. Blood seeped from his forehead where he'd smacked against the gunsight. He coughed, then looked around. The plane was on fire. Heat rose from the floor and behind his seat. He struggled to unlatch his seatbelt, but the clip wouldn't give. He tried to wrestle his way out, but the seatbelt held fast. He pulled and tugged, but the clip would not release.

Burning to death was every pilot's worst fear.

Desperately, MacDonald reached down with both hands to where the seatbelt was secured to the seat. He pulled with his arms, pushed with his legs, and stood with all his might, tearing the seatbelt from its mountings. The engineers at North American Aviation would have been amazed. It was "actually an inhuman feat."

MacDonald pried at the canopy with both hands until it gave way, and then his boots hit the soil. He staggered away from his burning plane, half walking, half limping toward the nearest tree line. He had made it about 75 yards into a field when a sound from the sky stopped him in his tracks: the smooth purr of a Daimler-Benz engine. The Messerschmitt that shot him down was circling back around, most likely positioning for a strafing run.

And he was the target.

MacDonald saw no sense in running. He'd only die more exhausted than he already was. There was nowhere to hide, not in the middle of a field. Everything he'd overcome—the jammed canopy, the crash landing, the seatbelt—had it all led to this? MacDonald turned to face death head on.

At the far end of the field, the Me-109 leveled its wings in his direction. As the plane bore down on him, the flickering disc of its props looked like a buzzsaw. Over the engine roar came the scream of fast-moving air over intakes. MacDonald saw the dark gray aircraft had yellow markings on its wings. Romanian. He braced himself.

Then, much to his surprise, the flaps dropped from the 109's wings. The enemy pilot slowed, and the fighter's right wing dipped in his direction. It was as if the Romanian was making an air-show pass for an audience of one.

As the '109 flew past him, MacDonald looked up. The Romanian pilot looked down and made the simplest of human gestures.

He waved.

MacDonald was dumbstruck. Should he wave back? They didn't give instructions for this in the officer's manual.

The fighter flew past without firing. The sounds faded, and the plane entered a graceful left turn. Whoever he was, the pilot wasn't out to kill him.

Now that MacDonald had been shaken from his stupor, his thoughts turned again to his survival. He was still behind enemy lines. He resumed running toward the distant patch of woods. But as the downed American crossed the field, the '109 made several protective orbits overhead before it departed and flew west. When MacDonald reached the woods, he looked back and questioned what he'd just lived through.

They would never believe this at the Woodhill Country Club.

A short time later, a Fieseler Storch observation plane landed in the field near the smoldering P-51. The German-built plane with its high-set wings and long, spindly landing gear looked more like an insect than a flying machine, but it made easy work of the bumpy terrain. Already the local police chief, some gendarmes, and a few curious locals had gathered at the wreckage. The Mustang had burned to the ground in its center.

Out from the observation plane stepped Buzz, followed by the pilot, and a Romanian public relations officer with a camera. The locals were surprised. Romania's fighter pilot prince himself, here?

Buzz looked around. Where was the American pilot?

The police chief said the American had last been seen moving east toward the Dniester River on the Romanian border, trying to reach the Russians.

Buzz was crestfallen. Didn't he know being a Romanian prisoner was far better than being a German prisoner? That was why Buzz had hitched a ride back to the wreckage. There was no salvaging the Mustang, but Buzz hoped to meet the pilot, if only to talk. He'd always had an affinity for Americans, dating to before the war, back when he'd faced them on the ice, as the captain of the Romanian national hockey team.

At the 1931 World Ice Hockey Championships in the mountain resort town of Krynica, Poland, Romania suffered a brutal thrashing, 15–0, at the hands of the Americans.

When the final whistle blew and the teams skated toward their locker rooms, Buzz did not follow his teammates. Instead, the prince glided to the bench where the coaches were packing up and asked for the score sheet. On the back, he wrote a short note in English, then skated it over to the referee.

Inside the American locker room, the celebration was loud, boisterous, unfiltered. The referee entered, brushing ice from his jodhpurs, and handed the note to the American captain.

He read it aloud.

The laughter ebbed. A strange silence settled over the room as the players absorbed the note's deeper meaning. It offered neither surrender nor excuse for the defeat. Instead, it marked something higher, a gesture of true nobility.

"We thank you sincerely," the prince had written, "for giving us the opportunity to learn something [from this game]—and to play with America."

"Let's get a photo!" The PR officer of the Military Propaganda Section had ridden along for this moment. Buzz approached the Mustang. He stood near the cowling and studied the melted cockpit. Smoke was still rising, and the metal was so hot he could only linger a moment.

Click.

Buzz stepped out of frame and stood alone, lamenting the loss of the Mustang and everything the war had come to stand for. The Romanian side had lost five planes that day, and destroyed two Mustangs. For what? They never even touched the bombers. To Buzz, all the violence felt foolish, immoral, and even criminal. Antonescu and his acolytes were intent on ushering Romania to its doom. They wanted to drag out the combat to the last day, hour, and man. And it was happening. The Royal Romanian Air Force was being ground down to nothing. When the Americans had first shown up over Bucharest on April 4, 1944, Romania had 115 fighters in service. By the end of the present month—June 1944—they would have fewer than 50, and this was not to mention the 33 pilots put in the ground. Romania was fighting to the bitter end, but for what? They soon wouldn't have any pilots left. Buzz's conscience couldn't take it much longer.

Seeing the burned-out Mustang, Buzz wondered about the man who got away. The prince had always told himself he had no choice but to "fight who's in front of me." But being enemies was a choice. He'd never been a friend of the Axis powers, and he was certainly no friend of Antonescu and the fascists. They'd put his girlfriend, Nadia, and him through hell. Romania had joined forces with the Germans only as a survival tactic. At the time, it had seemed better than being flattened by the Soviets. But now, standing next to a smoldering P-51, fighting Americans, the unpleasant truth ate at him.

Romania was playing for the wrong team.

But what could one man possibly do about it?

Buzz's encounter with MacDonald was only the beginning. Ahead lay a mission that would test the prince's courage as never before, one in which the lives of more than 1,100 American Airmen would hang in the balance.

Discover the full story in the new book, "Tidal Wave," available wherever books are sold.

AFA ALMANAC

◄ Back to Contents

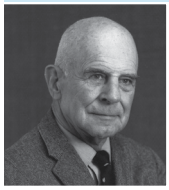
By Chequita Wood

THE AIR FORCE ASSOCIATION'S 12 FOUNDERS

John S. Allard Bronxville, N.Y.	**Edward P. Curtis** Rochester, N.Y.	**W. Deering Howe** New York	**Sol A. Rosenblatt** New York	**James M. Stewart** Beverly Hills, Calif.	**Cornelius Vanderbilt Whitney** New York
Everett R. Cook Memphis, Tenn.	**Jimmy Doolittle** Los Angeles	**Rufus Rand** New York	**Julian B. Rosenthal** New York	**Lowell P. Wicker** New York	**John Hay Whitney** New York

AFA CHAIRS OF THE BOARD[1]

Jimmy Doolittle, President 1946-49



Edward P. Curtis 1946-47

Thomas G. Lanphier Jr. 1947-48, 1951-52

C. R. Smith 1948-50

Robert S. Johnson 1949-51

Carl A. Spaatz 1950-51

Harold C. Stuart 1951-53

Arthur F. Kelly 1952-54

George C. Kenney 1953-55

John R. Alison 1954-56

Gill Robb Wilson 1955-57

John P. Henebry 1956-58

Peter J. Schenk 1957-59

James M. Trail 1958-59

Howard T. Markey 1959-61

Julian B. Rosenthal 1959-60

Thos. F. Stack 1960-62

Joe Foss 1961-63

John B. Montgomery 1962-63

W. Randolph Lovelace II 1963-65

Jack B. Gross 1963-64

Jess Larson 1964-71

Robert W. Smart 1967-69

George D. Hardy 1966-67, 1969-72

Martin M. Ostrow 1971-75

Joe L. Shosid 1972-76

George M. Douglas 1975-79

Gerald V. Hasler 1976-79

Victor R. Kregel 1979-82

Daniel F. Callahan 1979-81

John G. Brosky 1981-84

David L. Blankenship 1982-85

Edward A. Stearn 1985-86

Martin H. Harris 1984-88

Sam E. Keith Jr. 1986-90

Jack C. Price 1988-92

Oliver R. Crawford 1990-94

James M. McCoy 1992-96

Gene Smith 1994-98

Doyle E. Larson 1996-2000

Thomas J. McKee 1998-2002

John J. Politi 2000-04

Stephen P. Condon 2002-06

Robert E. Largent 2004-08

Joseph E. Sutter 2008-10

S. Sanford Schlitt 2010-12

George K. Muellner 2012-14

Scott P. Van Cleef 2014-16

F. Whitten Peters 2016-19

Gerald R. Murray 2019-22

Bernard "Bernie" Skoch Chair, 2022-2025



Kathleen Ferguson, Chair, 2025-

[1]The Chair of the Board is a volunteer position and has been known by different titles over AFA's history. It was titled President until 2006.

AFA PRESIDENT & CEOS[2]



Willis S. Fitch Executive Director 1946-47

James H. Straubel 1948-80

Russell E. Dougherty 1980-86

David L. Gray 1986-87

John O. Gray 1987-90

Charles L. Donnelly Jr. 1988-89

Monroe W. Hatch Jr. 1990-95

John A. Shaud 1995-2002

Donald L. Peterson 2002-06/07

Michael M. Dunn 2007-12

Craig R. McKinley 2012-15

Larry O. Spencer 2015-19

Bruce A. Wright 2019-24



Burton Field President-CEO 2024-

[2]The title of President & CEO is the chief executive running the AFA organization. The job has been titled as Executive Director among other titles over AFA's history.

VICE CHAIR, FIELD OPERATIONS

Chris Canada, Vice Chair, Field Operations 2023-



- **Joseph E. Sutter** 2006-08
- **James R. Lauducci** 2008-10
- **Justin M. Faiferlick** 2010-12
- **Scott P. Van Cleef** 2012-14
- **David A. Dietsch** 2014-16
- **F. Gavin MacAloon** 2016-20
- **Jim Simons** 2020-23

NATIONAL SECRETARIES

Paul Hendricks, National Secretary 2024-



- **Sol A. Rosenblatt** 1946-47
- **Nathan H. Mazer** 1970-72
- **A. A. "Bud" West** 1985-87
- **William D. Croom Jr.** 1997-2000
- **Edward W. Garland** 2011-14
- **Michael J. Liquori** 2021-24
- **Julian B. Rosenthal** 1947-59
- **Martin H. Harris** 1972-76
- **Thomas J. McKee** 1987-90
- **Daniel C. Hendrickson** 2000-03
- **Marvin L. Tooman** 2014-15
- **George D. Hardy** 1959-66
- **Jack C. Price** 1976-79
- **Thomas W. Henderson** 1990-91
- **Thomas J. Kemp** 2003-06
- **John T. Brock** 2015-17
- **Joseph L. Hodges** 1966-68
- **Earl D. Clark Jr.** 1979-82
- **Mary Ann Seibel** 1991-94
- **Judy K. Church** 2006-09
- **Ross Lampert** 2017-18
- **Glenn D. Mishler** 1968-70
- **Sherman W. Wilkins** 1982-85
- **Mary Anne Thompson** 1994-97
- **Joan Sell** 2009-11
- **Richard W. Hartle** 2018-21

NATIONAL TREASURERS

Mike Maxwell National Treasurer 2026-



- **W. Deering Howe** 1946-47
- **Samuel M. Hecht** 1953-57
- **George H. Chabbott** 1981-87
- **Steven R. Lundgren** 2005-10
- **Steven R. Lundgren** 2016-20
- **G. Warfield Hobbs** 1947-49
- **Jack B. Gross** 1957-62
- **William N. Webb** 1987-95
- **Leonard R. Vernamonti** 2010-14
- **Charles L. Martin Jr.** 2020-2026
- **Benjamin Brinton** 1949-52
- **Paul S. Zuckerman** 1962-66
- **Charles H. Church Jr.** 1995-2000
- **Nora Ruebrook** 2014-16
- **George H. Haddock** 1952-53
- **Jack B. Gross** 1966-81
- **Charles A. Nelson** 2000-05
- **Charles L. Martin Jr.** 2016

VICE CHAIR, EDUCATION

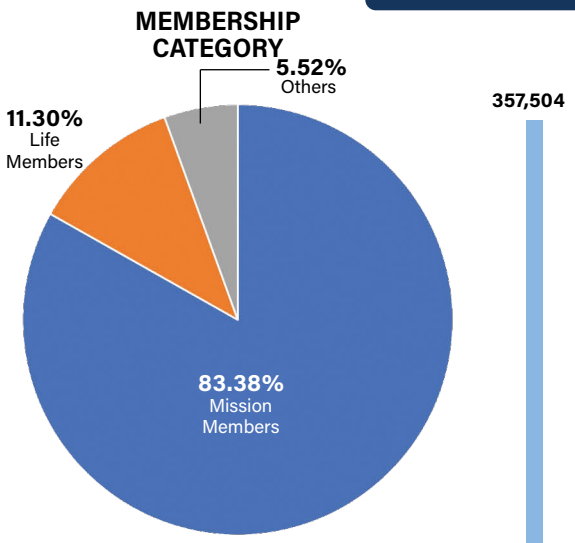
Gary Copsey, Vice Chair, Education 2024-



- **L. Boyd Anderson** 2006-07
- **Richard B. Bundy** 2015-18
- **S. Sanford Schlitt** 2007-10
- **James T. Hannam** 2018-21
- **George K. Muellner** 2010-12
- **Stephen K. Gourley** 2021-24
- **Jerry E. White** 2012-15

AFA MEMBERSHIP

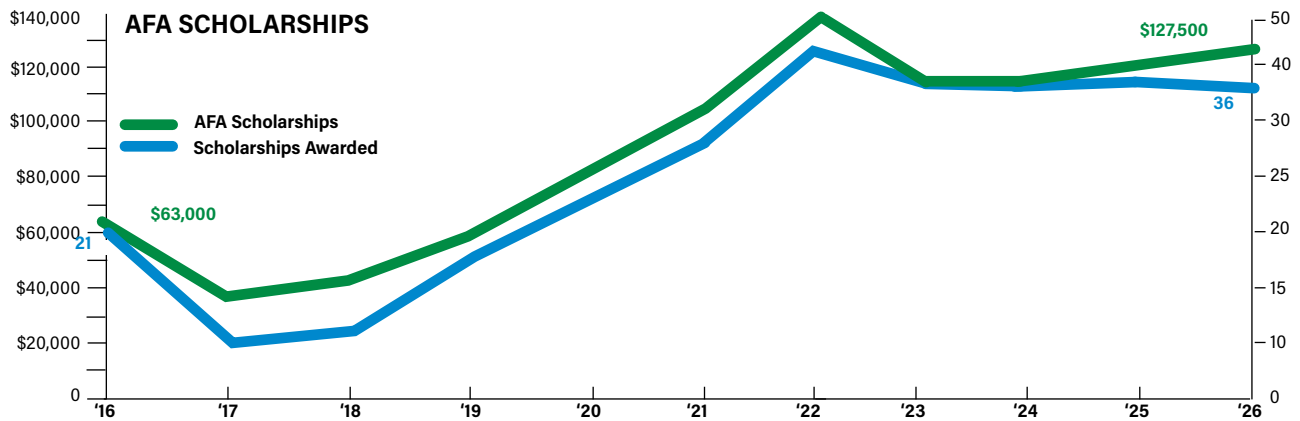
AFA launched a revised membership model in 2026, creating a new free tier encompassing everyone who engages with the association by attending an event, making a donation, subscribing to a newsletter, or otherwise supporting the AFA mission. The response and engagement soared as AFA added more than 225,000 new **"Mission Members,"** a new record in the 79-year history of the association.



AFA Membership Over The Years

SCHOLARSHIPS

AFA awards **scholarships** to aspiring college students backed by funds from generous organizations and individuals.



◄ Back to Contents

NATIONAL AEROSPACE AWARDS

H.H. ARNOLD AWARD

Named for the World War II leader of the Army Air Forces, the H.H. Arnold Award has been presented annually in recognition of the most outstanding contributions in the field of aerospace activity. Since 1986, it has been AFA's highest honor to a member of the armed forces in the field of national defense.

Year	Award Recipient(s)
1948	W. Stuart Symington, Secretary of the Air Force
1949	Maj. Gen. William H. Tunner and the men of the Berlin Airlift
1950	Airmen of the United Nations in the Far East
1951	Gen. Curtis E. LeMay and the personnel of Strategic Air Command
1952	Sen. Lyndon B. Johnson and Sen. Joseph C. O'Mahoney
1953	Gen. Hoyt S. Vandenberg, USAF (Ret.), former Air Force Chief of Staff
1954	John Foster Dulles, Secretary of State
1955	Gen. Nathan F. Twining, Chief of Staff, USAF
1956	Sen. W. Stuart Symington
1957	Edward P. Curtis, special assistant to the President
1958	Maj. Gen. Bernard A. Schriever, Cmdr., Ballistic Missile Div., ARDC
1959	Gen. Thomas S. Power, CINC, SAC
1960	Gen. Thomas D. White, Chief of Staff, USAF
1961	Lyle S. Garlock, Assistant SECAF
1962	A. C. Dickieson and John R. Pierce, Bell Telephone Laboratories
1963	The 363rd Tactical Recon. Wing and the 4080th Strategic Wing
1964	Gen. Curtis E. LeMay, Chief of Staff, USAF
1965	The 2nd Air Division, PACAF
1966	The 8th, 12th, 355th, 366th, and 388th Tactical Fighter Wings and the 432nd and 460th TRWs
1967	Gen. William W. Momyer, Cmdr., 7th Air Force, PACAF
1968	Col. Frank Borman, USAF; Capt. James Lovell, USN; and Lt. Col. William Anders, USAF, Apollo 8 crew
1969	No Award
1970	Apollo 11 team (J. L. Atwood; Lt. Gen. S. C. Phillips, USAF; and astronauts Neil Armstrong and USAF Cols. Buzz Aldrin and Michael Collins)
1971	John S. Foster Jr., Dir. of Defense Research and Engineering
1972	Air units of the allied forces in Southeast Asia (Air Force, Navy, Army, Marine Corps, and the Vietnamese Air Force)
1973	Gen. John D. Ryan, USAF (Ret.), former Chief of Staff
1974	Gen. George S. Brown, USAF, Chm., Joint Chiefs of Staff
1975	James R. Schlesinger, Secretary of Defense
1976	Sen. Barry M. Goldwater
1977	Sen. Howard W. Cannon
1978	Gen. Alexander M. Haig Jr., USA, Supreme Allied Commander, Europe
1979	Sen. John C. Stennis
1980	Gen. Richard H. Ellis, USAF, CINC, SAC
1981	Gen. David C. Jones, USAF, Chm., Joint Chiefs of Staff
1982	Gen. Lew Allen Jr., USAF (Ret.), former Chief of Staff
1983	Ronald W. Reagan, President of the United States
1984	The President's Commission on Strategic Forces (Scowcroft Commission)
1985	Gen. Bernard W. Rogers, USA, SACEUR
1986	Gen. Charles A. Gabriel, USAF (Ret.), former Air Force Chief of Staff
1987	Adm. William J. Crowe Jr., USN, Chm., Joint Chiefs of Staff
1988	Men and women of the Ground-Launched Cruise Missile team
1989	Gen. Larry D. Welch, Chief of Staff, USAF
1990	Gen. John T. Chain, CINC, SAC
1991	Lt. Gen. Charles A. Horner, Cmdr., CENTCOM Air Forces and 9th Air Force
1992	Gen. Colin L. Powell, USA, Chm., Joint Chiefs of Staff
1993	Gen. Merrill A. McPeak, Chief of Staff, USAF
1994	Gen. John Michael Loh, Cmdr., Air Combat Command
1995	World War II Army Air Forces veterans
1996	Gen. Ronald R. Fogleman, Chief of Staff, USAF
1997	Men and women of the United States Air Force
1998	Gen. Richard E. Hawley, Cmdr., ACC
1999	Lt. Gen. Michael C. Short, Cmdr., Allied Air Forces Southern Europe
2000	Gen. Michael E. Ryan, Chief of Staff, USAF
2001	Gen. Joseph W. Ralston, CINC, EUCOM
2002	Gen. Richard B. Myers, USAF, Chm., Joint Chiefs of Staff
2003	Lt. Gen. T. Michael Moseley, Cmdr., air component, CENTCOM, and 9th Air Force
2004	Gen. John P. Jumper, Chief of Staff, USAF
2005	Gen. Gregory S. Martin, USAF (Ret.), former Cmdr., AFMC
2006	Gen. Lance W. Lord, USAF (Ret.), former Cmdr., AFSPC
2007	Gen. Ronald E. Keys, Cmdr., ACC
2008	Gen. Bruce Carlson, Cmdr., AFMC
2009	Gen. John D. W. Corley, Cmdr., ACC
2010	Lt. Gen. David A. Deptula, USAF Deputy Chief of Staff, ISR
2011	Gen. Duncan J. McNabb, Cmdr., TRANSCOM
2012	Gen. Norton A. Schwartz, USAF (Ret.), former Chief of Staff
2013	Gen. Douglas M. Fraser, USAF (Ret.), former Cmdr., SOUTHCOM
2014	Gen. C. Robert Kehler, USAF (Ret.), former Cmdr., STRATCOM
2015	Gen. Janet C. Wolfenbarger, USAF (Ret.), former Cmdr., AFMC
2016	Gen. Mark A. Welsh III, USAF (Ret.), former Chief of Staff
2017	Lt. Gen. Christopher C. Bogdan, USAF (Ret.), former PEO, F-35 Prgm
2018	Gen. Herbert J. Carlisle, USAF (Ret.), former Cmdr., AFMC
2019	Gen. Ellen M. Pawlikowski, USAF (Ret.), former Cmdr., AFMC
2020	Gen. David L. Goldfein, USAF (Ret.), former Chief of Staff, USAF
2021	Gen. John W. "Jay" Raymond, USSF, Chief of Space Operations
2022	Gen. Tod D. Wolters, USAF (Ret.), former Cmdr., USEUCOM and NATO SACEUR
2023	Gen. Glen D. VanHerck, Cmdr., NORTHCOM/NORAD
2024	Gen. David Thompspn, USSF (Ret.), former Vice Chief of Space Operations
2025	No Award
2026	Gen. B. Chance Saltzman, USSF (Ret.)



Jud McCrehin/staff

AFA's 2026 H.H. Arnold Award goes to Gen. B. Chance Saltzman, the second-ever Chief of Space Operations, for his leadership in developing the Space Force's warfighting culture and in defining new doctrine.

W. STUART SYMINGTON AWARD

AFA's highest honor to a civilian in the field of national security, the award is named for the first Secretary of the Air Force.

Year	Award Recipient(s)
1986	Caspar W. Weinberger, Secretary of Defense
1987	Edward C. Aldridge Jr., Secretary of the Air Force
1988	George P. Schultz, Secretary of State
1989	Ronald W. Reagan, former President of the United States
1990	John J. Welch, Asst. SECAF (Acquisition)
1991	George Bush, President of the United States
1992	Donald B. Rice, SECAF
1993	Sen. John McCain (R-Ariz.)
1994	Rep. Ike Skelton (D-Mo.)
1995	Sheila E. Widnall, SECAF
1996	Sen. Ted Stevens (R-Alaska)
1997	William Perry, former SECDEF
1998	Rep. Saxby Chambliss (R-Ga.) and Rep. Norman D. Dicks (D-Wash.)
1999	F. Whitten Peters, SECAF
2000	Rep. Floyd Spence (R-S.C.)
2001	Sen. Michael Enzi (R-Wyo.) and Rep. Cliff Stearns (R-Fla.)
2002	Rep. James V. Hansen (R-Utah)
2003	James G. Roche, SECAF
2004	Peter B. Teets, Undersecretary of the Air Force
2005	Rep. Duncan Hunter (R-Calif.)
2006	No Award Given
2007	Michael W. Wynne, SECAF
2008	Gen. Barry R. McCaffrey, USA (Ret.)
2009	Sen. Orrin G. Hatch (R-Utah)
2010	John J. Hamre, Center for Strategic & International Studies
2011	Rep. C. W. "Bill" Young (R-Fla.)
2012	Gen. James L. Jones, USMC (Ret.)
2013	Michael B. Donley, SECAF
2014	Ashton B. Carter, former Deputy SECDEF
2015	William A. LaPlante, Asst. SECAF (Acquisition)
2016	Jamie M. Morin, Director, Cost Assessment & Prgm Evaluation
2017	Lisa S. Disbrow, Undersecretary of the Air Force
2018	Deborah Lee James, former SECAF
2019	Heather Wilson, former SECAF
2020	Will Roper, Asst. SECAF (AT&L)
2021	Barbara Barrett, former SECAF
2022	Sen. Jim Inhofe, Ranking Member, SASC
2023	Frank Kendall, former SECAF
2024	Dr. Derek Tournear, Director, Space Development Agency
2025	Sen. Roger Wicker (R-Miss.)
2026	Rep. Mike Rogers (R-Ala.), Chairman HASC

◄ Back to Contents

JOHN R. ALISON AWARD

AFA's highest honor for industrial leadership.

Year	Award Recipient(s)
1992	Norman R. Augustine, Chairman, Martin Marietta
1993	Daniel M. Tellep, Chm. and CEO, Lockheed
1994	Kent Kresa, CEO, Northrop Grumman
1995	C. Michael Armstrong, Chm. and CEO, Hughes Aircraft
1996	Harry Stonecipher, Pres. and CEO, McDonnell Douglas
1997	Dennis J. Picard, Chm. and CEO, Raytheon
1998	Philip M. Condit, Chm. and CEO, Boeing
1999	Sam B. Williams, Chm. and CEO, Williams International
2000	Simon Ramo and Dean E. Wooldridge, missile pioneers
2001	George David, Chm. and CEO, United Technologies
2002	Sydney Gillibrand, Chm., AMEC; and Jerry Morgensen, Pres. and CEO, Hensel Phelps Construction
2003	Joint Direct Attack Munition Industry Team, Boeing
2004	Thomas J. Cassidy Jr., Pres. and CEO, General Atomics Aeronautical Systems
2005	Richard Branson, Chm., Virgin Atlantic Airways and Virgin Galactic
2006	Ronald D. Sugar, Chm. and CEO, Northrop Grumman
2007	Boeing and Lockheed Martin
2008	Bell Boeing CV-22 Team, Bell Helicopter Textron, and Boeing
2009	General Atomics Aeronautical Systems Inc.
2010	Raytheon
2011	United Launch Alliance
2012	Boeing
2013	X-51A WaveRider Program, Boeing, Aerojet Rocketdyne, and Air Force Research Laboratory
2014	C-17 Globemaster III, Boeing
2015	F-22 Raptor, Lockheed Martin
2016	SpaceX
2017	Northrop Grumman
2018	Skunk Works, Lockheed Martin
2019	Draken International
2020	Marilyn Hewson
2021	Tory Bruno, CEO, United Launch Alliance
2022	Jeff Babione, COO, Sierra Space
2023	Neal Blue, Chairman/CEO, and Linden Blue, Vice Chairman, General Atomics
2024	Victus Nox (Space Sys. Command, Millennium Space, and Firefly Aerospace)
2025	BAE Systems
2026	Palmer Luckey, Founder, Anduril Industries

AFA FIELD AWARDS

GOLD LIFE MEMBER CARD

Awarded to members whose AFA record, production, and accomplishments on a national level have been outstanding over a period of years.

Name	Year	Card No.
Gill Robb Wilson	1957	1
Jimmy Doolittle	1959	2
Arthur C. Storz Sr.	1961	3
Julian B. Rosenthal	1962	4
Jack B. Gross	1964	5
George D. Hardy	1965	6
Jess Larson	1967	7
Robert W. Smart	1968	8
Martin M. Ostrow	1973	9
James H. Straubel	1980	10
Martin H. Harris	1988	11
Sam E. Keith Jr.	1990	12
Edward A. Stearn	1992	13
Dorothy L. Flanagan	1994	14
John O. Gray	1996	15
Jack C. Price	1997	16
Nathan H. Mazer	2002	17
John R. Alison	2004	18
Donald J. Harlin	2009	19
James M. McCoy	2013	20
George M. Douglas	2014	21
John A. Shaud	2016	22
Mary Anne Thompson	2018	23
Bill Croom	2023	24
Kenneth Goss	2026	25



Jud McCrehin/staff

Ken Goss has been affiliated with AFA since before he began his Air Force career. Joining AFA during Gen. Russ Dougherty's tenure as president, he held numerous staff positions including leading AFA's legislative work, while taking on a sideline that he continued for a record 42 years as AFA's on- and off-stage master of ceremonies. He joins an exclusive club as AFA's 25th Gold Life Member Card.

A1C WILLIAM PITSENBARGER FULL MEASURE AWARD

The award recognizes the most outstanding commitment to education, service, and the mission of the Air & Space Forces Association.

Year	Award Recipient(s)
2026	**Sgt. Momomi M. Atkinson**, Guardian, 68th Cyberspace Squadron



Jud McCrehin/staff

Sgt. Momomi Atkinson, USSF (right) with AFA Chair of the Board Kathleen Ferguson and Chief Master Sgt. of the Space Force John Bentivegna.

AFA LIFETIME ACHIEVEMENT AWARD

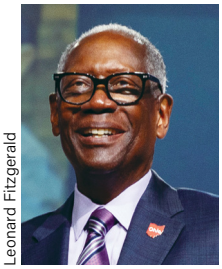
The award recognizes a lifetime of work in the advancement of aerospace.

Year	Award Recipient(s)
2003	Maj. Gen. John R. Alison, USAF (Ret.); Sen. John H. Glenn Jr.; Maj. Gen. Jeanne M. Holm, USAF (Ret.); Col. Charles E. McGee, USAF (Ret.); Gen. Bernard A. Schriever, USAF (Ret.)
2004	Gen. Russell E. Dougherty, USAF (Ret.); Florene Miller Watson
2005	Sen. Daniel K. Inouye; William J. Perry; Patty Wagstaff
2007	CMSAF Paul W. Airey, USAF (Ret.)
2008	Col. George E. Day, USAF (Ret.); Gen. David C. Jones, USAF (Ret.); Harold Brown
2009	Doolittle Raiders; Tuskegee Airmen; James R. Schlesinger
2010	Col. Walter J. Boyne, USAF (Ret.); Andrew W. Marshall; Gen. Lawrence A. Skantze, USAF (Ret.); Women Airforce Service Pilots
2011	Natalie W. Crawford; Lt. Gen. Thomas P. Stafford, USAF (Ret.); Gen. Larry D. Welch, USAF (Ret.); Heavy Bombardment Crews of WWII; Commando Sabre Operation-Call Sign Misty
2012	Gen. James P. McCarthy, USAF (Ret.); Vietnam War POWs; Berlin Airlift Aircrews; Korean War Airmen; Fighter Pilots of World War II
2013	Maj. Gen. Joe H. Engle, USAF (Ret.); US Rep. Sam Johnson; The Arlington Committee of the Air Force Officers' Wives' Club—"The Arlington Ladies"
2014	Brig. Gen. James A. McDivitt, USAF (Ret.); Civil Air Patrol—World War II veterans; American Fighter Aces
2015	R. A. "Bob" Hoover; Eugene F. "Gene" Kranz; Gen. Michael V. Hayden, USAF (Ret.)
2016	Maj. Gen. Claude M. Bolton Jr., USAF (Ret.); Lt. Col. John T. Correll, USAF (Ret.); Gen. Charles A. Horner, USAF (Ret.); Lt. Gen. James M. Keck, USAF (Ret.); Gen. Richard B. Myers, USAF (Ret.)
2017	Gen. Ronald R. Fogleman, USAF (Ret.); Col. Clarence E. "Bud" Anderson, USAF (Ret.); Elinor Otto; Lafayette Escadrille Memorial Foundation
2018	Maj. Gen. Alfred K. Flowers, USAF (Ret.); Dan Friedkin; Air Force Scientific Advisory Board; Air Force Enlisted Village; Air Force Aid Society
2019	Gen. John A. Shaud, USAF (Ret.); Gen. T. Michael Moseley, USAF (Ret.); Dr. Benjamin Lambeth
2020	Gen. Lloyd "Fig" Newton, USAF (Ret.); Gen. John M. Loh, USAF (Ret.); Maj. Gen. Michael Collins, USAF (Ret.)
2021	CMSAF James M. McCoy, USAF (Ret.)
2022	Gen. Lance W. Lord, USAF (Ret.); Brig. Gen. Wilma Vaught, USAF (Ret.)
2023	Dr. Paul Kaminski, Chairman/CEO Technovation, Inc.; Pioneers of the Red Flag, presented to Lt. Gen. Glen "Wally" Moorehead, USAF (Ret.)
2024	Norman Augustine, Aerospace Businessman
2025	Gen. Philip M. Breedlove, USAF (Ret.); Gen. Kevin P. Chilton, USAF (Ret.); Gen John P. Jumper, USAF (Ret.); Gen. Gregory S. Martin, USAF (Ret.)
2026	Gen. John Hyten, USAF (Ret.); Gen. Lester Lyles, USAF (Ret.); Phillip Meilinger



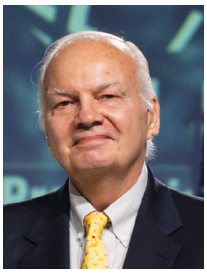
Leonard Fitzgerald

Gen. John Hyten



Jud McCrehin/staff

Gen. Lester Lyles



Jud McCrehin/staff

Phillip Meilinger

AFA awarded three Lifetime Achievement Awards in 2026: Gen. John Hyten was recognized for his contributions to space and strategic defense; Gen. Lester Lyles for his contributions to technology and materiel leadership; and Col. Phillip Meilinger for his extensive contributions as a historian and analyst focusing on airpower.

JEROME O'MALLEY SPACE VISIONARY LEADERSHIP AWARD

The award recognizes the importance of vision, risk taking, and innovation needed to deliver unparalleled Space Force capabilities.

Year	Award Recipient(s)
2021	U.S. Space Force
2022	Lt. Gen. Bill Liquori, Deputy Chief of Space Operations for Strategy, Plans, Programs, Requirements, and Analysis
2023	Maj. Gen. Shawn Bratton, special assistant of the Chief of Space Operations
2024	Gen. B. Chance Saltzman, Chief of Space Operations
2025	No Award Given
2026	No Award Given

◄ Back to Contents

AFA MEMBER OF THE YEAR AWARD

State names refer to recipient's home state at the time of the award.

Year	Award Recipient(s)
1953	Julian B. Rosenthal (N.Y.)
1954	George A. Anderl (Ill.)
1955	Arthur C. Storz (Neb.)
1956	Thos. F. Stack (Calif.)
1957	George D. Hardy (Md.)
1958	Jack B. Gross (Pa.)
1959	Carl J. Long (Pa.)
1960	O. Donald Olson (Colo.)
1961	Robert P. Stewart (Utah)
1962	No award
1963	N. W. DeBerardinis (La.) and Joe L. Shosid (Texas)
1964	Maxwell A. Kriendler (N.Y.)
1965	Milton Caniff (N.Y.)
1966	William W. Spruance (Del.)
1967	Sam E. Keith Jr. (Texas)
1968	Marjorie O. Hunt (Mich.)
1969	(No presentation)
1970	Lester C. Curl (Fla.)
1971	Paul W. Gaillard (Neb.)
1972	J. Raymond Bell (N.Y.) and Martin H. Harris (Fla.)
1973	Joe Higgins (Calif.)
1974	Howard T. Markey (D.C.)
1975	Martin M. Ostrow (Calif.)
1976	Victor R. Kregel (Texas)
1977	Edward A. Stearn (Calif.)
1978	William J. Demas (N.J.)
1979	Alexander C. Field Jr. (Ill.)
1980	David C. Noerr (Calif.)
1981	Daniel F. Callahan (Fla.)
1982	Thomas W. Anthony (Md.)
1983	Richard H. Becker (Ill.)
1984	Earl D. Clark Jr. (Kan.)
1985	George H. Chabbott (Del.) and Hugh L. Enyart (Ill.)
1986	John P.E. Kruse (N.J.)
1987	Jack K. Westbrook (Tenn.)
1988	Charles G. Durazo (Va.)
1989	Oliver R. Crawford (Texas)
1990	Cecil H. Hopper (Ohio)
1991	George M. Douglas (Colo.)
1992	Jack C. Price (Utah)
1993	Lt. Col. James G. Clark (D.C.)
1994	William A. Lafferty (Ariz.)
1995	William N. Webb (Okla.)
1996	Tommy G. Harrison (Fla.)
1997	James M. McCoy (Neb.)
1998	Ivan L. McKinney (La.)
1999	Jack H. Steed (Ga.)
2000	Mary Anne Thompson (Va.)
2001	Charles H. Church Jr. (Kan.)
2002	Thomas J. Kemp (Texas)
2003	W. Ron Goerges (Ohio)
2004	Doyle E. Larson (Minn.)
2005	Charles A. Nelson (S.D.)
2006	Craig E. Allen (Utah)
2007	William D. Croom Jr. (Texas)
2008	John J. Politi (Texas)
2009	David R. Cummock (Fla.)
2010	L. Boyd Anderson (Utah)
2011	Steven R. Lundgren (Alaska)
2012	S. Sanford Schlitt (Fla.)
2013	Tim Brock (Fla.)
2014	James W. Simons (N.D.)
2015	James R. Lauducci (Va.)
2016	David T. Buckwalter (Texas)
2017	James T. Hannam (Va.)
2018	Russell V. Lewey (Ala.)
2019	Susan Broderick Mallett (Ala.)
2020	Mark Tarpley (Okla.)
2021	Gabrielle "Gabbe" Kearney (Alaska)
2022	Linda McMahon (Va.)
2023	Roberta "Bobi" Oates (Nev.)
2024	Janelle Stafford (Okla.)
2025	Gavin "Mac" MacAloon (Fla.)
2026	Charles L. "Chuck" Martin (S.C.)

DAVID "BUCK" BUCKWALTER DISTINGUISHED SUSTAINED AEROSPACE EDUCATION (DSAE) AWARD

Presented to an individual AFA member whose record overwhelmingly demonstrates distinguished sustained service in any support of the educational mission of the Air & Space Forces Association over a period of years.



Jud McCrehin/staff

Wally Saeger receives his Buckwalter award from AFA Chair Kathleen Ferguson, Vice Chair for Aerospace Education Gary Copsey, and outgoing Vice Chair for Field Operations Chris Canada. Saeger was recognized for his two decades of contributions and for raising $35,000 annually for STEM teacher grants for the AFA Utah State Aerospace Education Foundation.

Year	Name
2008	Richard Ortega
2009	Marry Anne Thompson
2010	No Award Given
2011	Susan B. Mallett
2012	Gregory Bruce White
2013	Bonnie B. Callahan
2014	No Award Given
2015	L. Boyd Anderson
2016	Jack C. Price
2017	No Award Given
2018	Bill Croom
2019	David T. "Buck" Buckwalter
2020	Regina "Gina" Giles
2021	Richard "Dick" Bundy
2022	No Award Given
2023	Jim Hannam
2024	No Award Given
2025	Stephen Gourley
2026	Wally Saeger

AFA CHAIR'S AEROSPACE EDUCATION ACHIEVEMENT AWARD

For long-term commitment to aerospace education, making a significant impact nationwide.

Year	Award Recipient(s)
2009	ExxonMobil Foundation
2010	*USA Today*
2011	The National Science Foundation
2012	The Military Channel
2013	The Civil Air Patrol Aerospace Education Program
2014	Department of Defense STARBASE Program
2015	Northrop Grumman
2016	Harry Talbot
2017	Analytical Graphics, Inc.
2018	Project Lead the Way
2019	Air Force Junior Reserve Officer Training Corps.
2020	Bernard K. "Bernie" Skoch
2021	The Mitchell Institute for Aerospace Studies
2022	Arnold Air Society and Silver Wings
2023	Rolls-Royce
2024	No Award Given
2025	Daniel P. Woodward
2026	No Award Given

Chair, AFA Board of Directors Citation Award

Awarded to those individual AFA members whose distinguished contribution to AFA in a specific field has improved and elevated the effectiveness of the Association in a national sense.

Vance Clark
Carol Holland
Linda McMahon
Robin Rand
Joan Sell
Jackie Trotter

DONALD W. STEELE SR. MEMORIAL AWARD

Air & Space Forces Association Unit of the Year.

Year	Award Recipient(s)
1953	San Francisco Chapter
1954	Santa Monica Area Chapter (Calif.)
1955	San Fernando Valley Chapter (Calif.)
1956	Utah State AFA
1957	H. H. Arnold Chapter (N.Y.)
1958	San Diego Chapter
1959	Cleveland Chapter
1960	San Diego Chapter
1961	Chico Chapter (Calif.)
1962	Fort Worth Chapter (Texas)
1963	Colin P. Kelly Chapter (N.Y.)
1964	Utah State AFA
1965	Idaho State AFA
1966	New York State AFA
1967	Utah State AFA
1968	Utah State AFA
1969	No Award
1970	Georgia State AFA
1971	Middle Georgia Chapter
1972	Utah State AFA
1973	Langley Chapter (Va.)
1974	Texas State AFA
1975	Alamo Chapter (Texas) and San Bernardino Area Chapter (Calif.)
1976	Scott Memorial Chapter (Ill.)
1977	Thomas B. McGuire Jr. Chapter (N.J.)
1978	Thomas B. McGuire Jr. Chapter (N.J.)
1979	Brig. Gen. Robert F. Travis Chapter (Calif.)
1980	Central Oklahoma (Gerrity) Chapter
1981	Alamo Chapter (Texas)
1982	Chicagoland-O'Hare Chapter (Ill.)
1983	Charles A. Lindbergh Chapter (Conn.)
1984	Scott Memorial Chapter (Ill.) and Colorado Springs/Lance Sijan P. Chapter (Colo.)
1985	Cape Canaveral Chapter (Fla.)
1986	Charles A. Lindbergh Chapter (Conn.)
1987	Carl Vinson Memorial Chapter (Ga.)
1988	Gen. David C. Jones Chapter (N.D.)
1989	Thomas B. McGuire Jr. Chapter (N.J.)
1990	Gen. E. W. Rawlings Chapter (Minn.)
1991	Paul Revere Chapter (Mass.)
1992	Central Florida Chapter and Langley Chapter (Va.)
1993	Green Valley Chapter (Ariz.)
1994	Langley Chapter (Va.)
1995	Baton Rouge Chapter (La.)
1996	Montgomery Chapter (Ala.)
1997	Central Florida Chapter
1998	Ark-La-Tex Chapter (La.)
1999	Hurlburt Chapter (Fla.)
2000	Wright Memorial Chapter (Ohio)
2001	Lance P. Sijan Chapter (Colo.)
2002	Eglin Chapter (Fla.)
2003	Hurlburt Chapter (Fla.)
2004	Carl Vinson Memorial Chapter (Ga.)
2005	Central Florida Chapter
2006	Enid Chapter (Okla.)
2007	Central Oklahoma (Gerrity) Chapter
2008	Lance P. Sijan Chapter (Colo.)
2009	Paul Revere Chapter (Mass.)
2010	C. Farinha Gold Rush Chapter (Calif.)
2011	Lance P. Sijan Chapter (Colo.)
2012	Hurlburt Chapter (Fla.)
2013	Paul Revere Chapter (Mass.)
2014	D.W. Steele Sr. Memorial Chapter (Va.)
2015	Lance P. Sijan Chapter (Colo.)
2016	Paul Revere Chapter (Mass.)
2017	Enid Chapter (Okla.)
2018	Langley Chapter (Va.)
2019	Wright Memorial Chapter (Ohio)
2020	Mile High Chapter (Colo.)
2021	Paul Revere Chapter (Mass.)
2022	Mel Harmon Chapter (Colo.)
2023	Gen. Bernard A. Schriever Chapter (Calif.)
2024	Wright Memorial Chapter (Ohio)
2025	Paul Revere Chapter (Mass.)
2026	Gen. Charles A. Gabriel Chapter (Va.)

Aerospace Education Achievement Award

Presented to chapters for outstanding achievement in aerospace education programming.

Ak-Sar-Ben Chapter, Neb.
President Chris Canada

Charleston Chapter, S.C.
President Makenzie Guerra

Cheyenne Cowboy Chapter, Wyo.
President Scott Fox

Gen. David C. Jones Chapter, N.D.
President Rodney Wilson

East Georgia Chapter, Ga.
President Laurie Orth

Fort Meade Chapter, Md.
President Izeck Kohler

Hurlburt Chapter, Fla.
President Dann Matizza

Lance P. Sijan Chapter, Colo.
President David Geutling

Lincoln Chapter, Neb.
President Kenneth Brownell

Martin H. Harris Chapter, Fla.
President Sharon Branch

Mel Harmon Chapter, Colo.
President Michael Sumida

Mile High Chapter, Colo.
President Cliff Klein

Montgomery Chapter, Ala.
President Scott Key

Northeast Texas Chapter, Texas
President Zachary Hill

Paul Revere Chapter, Mass.
President Michael Harm

Red Tail Memorial Chapter, Fla.
President Ben Langer

Robert E. Huyser Chapter, Colo.
President Michael Peterson

Salt Lake City Chapter, Utah
President Frances Bradshaw

Swamp Fox Chapter, S.C.
President David Hanson

Tucson Chapter, Ariz.
President Walter Saeger

Waterman-Twining Chapter, Fla.
President William Yucuis

Aerospace Education Excellence Award

Presented for excellence in aerospace education programming. To qualify, a chapter must have received the Aerospace Education Achievement Award this year.

Small Chapter
Robert E. Huyser Chapter, Colo.
President Michael Peterson

Medium Chapter
Lincoln Chapter, N.D.
President Kenneth Brownell

Large Chapter
Northeast Texas Chapter, Texas
President Zachary Hill

Extra-Large Chapter
Mile High Chapter, Colo.
President Cliff Klein

STEM PROGRAMS

CyberPatriot Awards



CyberPatriot

CyberPatriot Mentor of the Year

Byron Jean
CAP—Okinawa Cadet Squadron
(Okinawa, Japan)

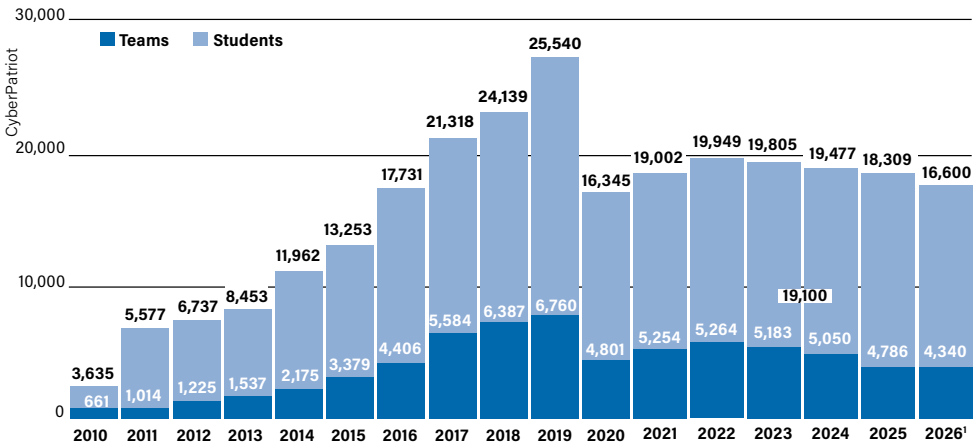


CyberPatriot Coach of the Year

Pei Zhang
Sunshine Elite Education
(Beaverton, Ohio)

AFA'S CYBERPATRIOT PROGRAM

CyberPatriot is the National Youth Cyber Education Program created by AFA to inspire K-12 students toward careers in cybersecurity or other science, technology, engineering, and mathematics (STEM) disciplines.



¹Estimated—our competitor registration deadline is early November.

StellarXplorers

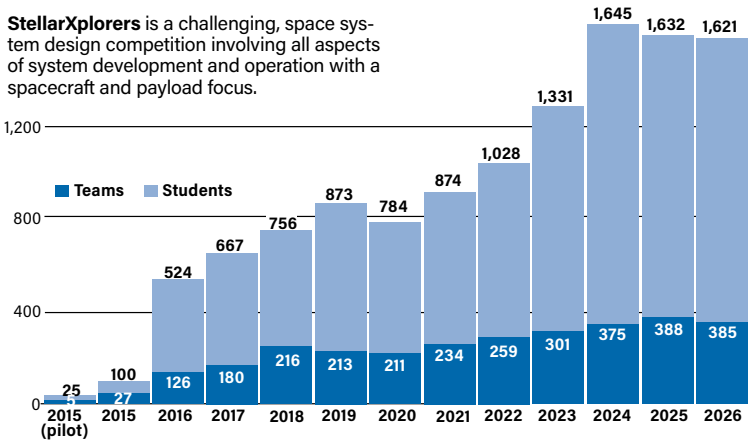


Jud McCrehin/staff

Competition Day
StellarXplorers National Finals were held in Greenwood Village, Colo., on May 23, 2026.

AFA'S STELLARXPLORERS PROGRAM

StellarXplorers is a challenging, space system design competition involving all aspects of system development and operation with a spacecraft and payload focus.



AFA's 2026 Teacher of the Year Award

AFA named **Lisa Werner** the 2026 Teacher of the Year sponsored by Rolls-Royce North America Defense. The annual award recognizes exceptional teachers who inspire their students through innovative approaches to science, technology, engineering, and math (STEM) education.



Steve Boxall

Lisa Werner, seen above experimenting with Zero gravity was recognized for her innovative STEM approach by connecting music, science, technology, engineering, mathematics, and aerospace. Werner created a nationally recognized program demonstrating that aerospace education can thrive in every classroom—even music education.

Storz Individual Award

Presented to the AFA member who is recognized as being a champion for membership growth, increased chapter engagement, and for fostering connections across generations.

Janelle Stafford

Outstanding State Organization

VIRGINIA

Outstanding Chapters by Size

Small Chapter
Mel Harmon Chapter, Colo.
President Michael Sumida

Medium Chapter
Lincoln Chapter, Neb.
President Kenneth Brownell

Large Chapter
Charleston Chapter, S.C.
President Makenzie Guerra

Extra-Large Chapter
Mile High Chapter, Colo.
President Cliff Klein

Unit Exceptional Service Awards (ESA)

ESA United Forces & Families
East Georgia Chapter, Ga.
President Laurie Orth

ESA Best Single Program
Wright Memorial Chapter, Ohio
President Jacob Porter

ESA Best Single Event
Alamo Chapter, Texas
President Holly Olson

ESA Communications
Mile High Chapter, Colo.
President Cliff Klein

ESA Community Partners-
-Small Chapter
Fairbanks Midnight Sun Chapter, Alaska
President Jeff Putnam
-Medium Chapter
David C. Jones Chapter, N.D.
President Rodney Wilson
-Large Chapter
Northeast Texas Chapter, Texas
President Zachary Hill
-Extra-Large Chapter
Hurlburt Chapter, Fla.
President Dann Mattiza
-Over 1,100 Chapter
Thunderbird Chapter, Nev.
President Roberta Oates

ESA Community Relations
Hurlburt Chapter, Fla.
President Dann Mattizza

ESA Overall Programming
D.W. Steele Memorial Chapter, Va.
President Darian Padilla

ESA Veterans Affairs
Lance P. Sijan Chapter, Colo.
President David Geuting

ESA Unit AAS/SW Integration
Mile High Chapter, Colo.
President Cliff Klein

ESA Heritage
Waterman-Twining, Fla.
President William Yucuis

ESA AIMS
(Advocates Inspiring Military Service)
-Small
Mel Harmon Chapter, Colo.
President Michael Sumida
Medium-Not Awarded
Large-Northeast Chapter, Texas
-Extra-Large
Alamo Chapter, Texas
President Holly Olson

ESA Advocacy
-Small-Not Awarded
-Medium-David C. Jones Chapter, N.D.
President Rodney Wilson
-Large-Cheyenne Cowboy Chapter, Wyo.
President Scott Fox
-Extra-Large-Not Awarded

Jack Gross Award

Presented to the chapter in each size category with the highest number of new members as a percentage of chapter size at the beginning of the membership year. A minimum of 10 is required.

Small Chapter
Brig. Gen. Bill Spruance Chapter, Del.
President Donald Wentzien

Medium Chapter
Golden Triangle Chapter, Miss.
President Richard Johnson

Large Chapter
Northeast Texas Chapter, Texas
President Zachary Hill

Extra-Large Chapter
Tucson Chapter, Ariz.
President Walter Saeger

Chapter Size Larger Than 1,100
Gen. Charles A. Gabriel Chapter, Va.
President Mike Winters

Community Partner Awards

GOLD AWARD

Presented to chapters whose Community Partners represent at least 6 percent of overall chapter membership, with a minimum number of Community Partners. The minimum number is determined by chapter size.

-Fairbanks Midnight Sun Chapter, Alaska
-Altus Chapter, Okla.
-Gen. David C. Jones Chapter, N.D.
-Northeast Texas Chapter, Texas
-Mel Harmon Chapter, Colo.
-Meridian Chapter, Miss.

ACHIEVEMENT AWARD

Presented in the field to chapters whose Community Partners represent at least 3 percent of overall chapter membership, with a minimum number of Community Partners. The minimum number is determined by chapter size.

Lincoln Chapter, Neb.
Meridian Chapter, Miss.

◄ Back to Contents

Individual Awards by Region

Presented for outstanding service.

Medal of Merit

Awarded for exceptional services in local, regional, or national fields and shall denote great initiative on the part of the recipient for specific achievements.

Exceptional Service Award

Presented to those individual AFA members who have performed exceptional services for AFA in local, regional, or national fields.

Central East

Medal of Merit

Chip Campbell
Samuel Dennis
Jack Diamond
Don Dougherty
Tony Frazier
Mike Gannon
Frank Lobash
Dick McCarthy
Darian Padilla
Martha Ryder
Vicki Swingle
Tim Tanbonliong
Robin Thompson

Exceptional Service Award

Kevin Eastland
Tyler Johnson

Far West

Medal of Merit

Bill Bramer
Raymond Coughlin
Jennifer Krolikowski
Christy Puttmann
Emily Torio

Exceptional Service Award

Thomas "Tav" Taverney—Advocacy

Florida

Medal of Merit

Jo Finstad Bohn
Meredith Coleman
Frederick Gross
Steven Hughes
Randall Kitchens
Miguel Lezaun
Joseph Muhlberger

Exceptional Service Award

Emily Farkas

Mid America

Medal of Merit

Joni Ahlers
Brenda Baker
Tyler Johnson
Frank Merrill
Tim Wasmund
Jeff Wepner
Eric Wong

Exceptional Service Award

Carl Shofner

Midwest

Medal of Merit

Diane Bartels
Gary Chambers
John Chapman
Stephen Keysey
Doug Schwaab

Exceptional Service Award

Lang Anderson
Joe Brownell

North Central

Medal of Merit

Stephen Kolcinski
Rodney Wilson

Exceptional Service Award

James Bowman
Janelle Gates
George Masters

Northeast

Medal of Merit

Martin Capriglione
Theodore Freeman
James King
Alfred Smith
William Stratemeier

Northwest

Medal of Merit

Sarah Ballard
George Cargill
David Stookey

Rocky Mountain

Medal of Merit

Cathy Barker
Neil Burroughs
Scott Fox
David Geuting
Brent Sawicki

Exceptional Service Award

Cliff Klein
Patricia Swan

South Central

Medal of Merit

Joe Bryant
Marty Coffman
Scott Key
Paula Penson
Ken Philippart

Southeast

Medal of Merit

Bill Clark
Mayreather Willis

Exceptional Service Award

Makenzie Guerra
Laurie Orth—Advocacy

Southwest

Medal of Merit

Alan Berg
Floyd Cisco
Elizabeth Fleming
William Goodall
Fred Harsany
Nicholas Johnsen

Exceptional Service Award

Bryan Foulk—Advocacy
Bobbi Oates
Edward Ryder

Texoma

Medal of Merit

Laurie Chambers
David Estep
Billy Gilliland
Rick Pena
Joe Sommers
Anthony Weedn
Lance Winner

Exceptional Service Award

Ahna Arcturus
Donald Johnson
Patrick Nugent
Stephen Yelbert

These distinguished individuals have demonstrated outstanding commitment and dedication, contributing significant their communities and organizations. Their leadership and perseverance serve as inspiring examples to others, embodying the true spirit of service through their exceptional achievements and unwavering support.



Jud McCrehin/staff

AFA Illinois State President Rickey Oeth asks a question during a National Convention workshop.

◄ Back to Contents

Special Recognition Membership Awards

STATE GROWTH This state has realized a growth in total membership from June 2025 to June 2026:

Alaska	Alabama	Arizona	Arkansas	Colorado	Delaware	District of Columbia
Florida	Georgia	Hawaii	Iowa	Idaho	Louisiana	Maryland
Michigan	Mississippi	Missouri	Montana	Nevada	New Jersey	New Mexico
New York	North Carolina	North Dakota	Oklahoma	Oregon	Pennsylvania	South Carolina
Tennessee	Texas	Utah	Virginia	Washington	Wyoming	

REGION GROWTH This region has realized a growth in total membership from June 2025 to June 2026:

Central East Region	European Region	Far West Region	Florida Region	Midwest Region
New England Region	North Central Region	Northeast Region	Northwest Region	Pacific Region
Rocky Mountain Region	South Central Region	Southeast Region	Southwest Region	Texoma Region

CHAPTER GROWTH These chapters have realized a growth in total membership from June 2025 to June 2026:

Abilene Chapter, Texas
Alamo Chapter, Texas
Albany-Hudson Valley Chapter, N.Y.
Albuquerque Chapter, N.M.
Altus Chapter, Okla.
Ark-La-Tex Chapter, La.
Austin Chapter, Texas
BG Frederick W. Castle Chapter, N.J.
BG Harrison R. Thyng Chapter, N.H. Big Sky Chapter, Mont.
Blue Ridge Chapter, N.C.
Bob Newman Cape Fear Chapter, N.C.
Brig. Gen. Bill Spruance Chapter, Del.
Capt. Eddie Rickenbacker Memorial Chapter, Ohio
Carl Vinson Memorial Chapter, Ga.
Central Maryland Chapter, Md.
Central Oklahoma Gerrity Chapter, Okla.
Charlemagne Chapter, Germany
Charleston Chapter, S.C. Cheyenne Cowboy Chapter, Wyo.
Col. Bud West Chapter, Fla.
Columbia Gorge Chapter, Ore.
Columbia Palmetto Chapter, S.C.
Cochise Chapter, Ariz.
Concho Chapter, Texas
David D. Terry Jr. Chapter, Ariz. Del Rio Chapter, Texas
Delaware Galaxy Chapter, Del.
Dobbins Chapter, Ga.
Dolomiti Chapter, Italy
Donald W. Steele Sr. Memorial Chapter, Va.
East Georgia Chapter, Ga.
Edward J. Monaghan Chapter, Alaska
Eglin Chapter, Fla.
Enid Chapter, Okla.
Everett R. Cook, Tenn.
Fairbanks Midnight Sun Chapter, Alaska
Falcon Chapter, Fla.
Florida West Coast Chapter, Fla.
Fort Meade Chapter, Md.
Frank Luke Chapter, Ariz.
Gen. James R. McCarthy Chapter, Fla.
Gen. Bernard A. Schriever LA Chapter, Calif.
Gen. Bruce K. Holloway Chapter,Tenn.
Gen. Carl A. Spaatz Chapter, N.Y. Gen. Charles L. Donnelly Jr. Chapter, Texas
Gen. Charles A. Gabriel Chapter, Va.
Gen. David C. Jones Chapter, N.D.
Gen. Doolittle LA Area Chapter, Calif.
Gen. H. H. Arnold Memorial Chapter, Tenn.
Gen. Robert F. Travis Chapter, Calif.
Gen. Russell E. Dougherty Chapter, Ky.
Gold Coast Chapter, Fla.
Golden Gate Chapter, Calif.
Golden Triangle Chapter, Miss.
Harry S. Truman Chapter, Mo.
Hawaii Chapter, Hawaii
Hurlburt Chapter, Fla.
Inland Empire Chapter, Wash.
Joe-Walker-Mon Valley Chapter, Pa.
Keystone Chapter, Japan
Lake Superior Northland Chapter, Mich.
Lance P. Sijan Chapter, Colo.
Langley Chapter, Va.
L.D. Bell Niagara Frontier Chapter,N.Y.
Llano Estacado Chapter, N.M. Lloyd R. Leavitt Jr. Chapter, Mich. Long Island Chapter, N.Y.
Lt. Col. B.D. Buzz Wagner Chapter, Pa.
Lt. Erwin R. Bleckley Chapter, Kan.
Maj. Gen. Oris B. Johnson Chapter, La.
Martin H. Harris Chapter, Fla.
McChord Field Chapter, Wash.
Mel Harmon Chapter, Colo. Meridian Chapter, Miss.
Miami-Homestead Chapter, Fla.
MiG Alley Chapter, Korea
Mile High Chapter, Colo. Montgomery Chapter, Ala.
Mount Clemens Chapter, Mich.
Nation's Capital Chapter, D.C.
Northern Utah Chapter, Utah
Ramstein Chapter, Germany
Red River Valley Chapter, N.D.
Richard I. Bong Chapter, Minn.
Richmond Chapter, Va.
Robert H. Goddard Chapter, Calif.
Rushmore Chapter, S.D.
Salt Lake City Chapter, Utah
San Diego Chapter, Calif.
San Jacinto Chapter, Texas
Sam Johnson Chapter, Texas
Scott Berkeley Chapter, N.C.
Scott Memorial Chapter, Ill.
Scott Van Cleef Chapter, Va.
Snake River Valley Chapter, Idaho
South Alabama Chapter, Ala. South Georgia Chapter, Ga.
Space Coast Chapter, Fla.
Spangdahlem Chapter, Germany
Stan Hryn Monterey Bay Chapter, Calif.
Steel Valley Chapter, Ohio
Swamp Fox Chapter, S.C.
Tennessee Ernie Ford Chapter, Calif.
Tennessee Valley Chapter, Ala.
The Red Tail Memorial Chapter, Fla.
Thomas W. Anthony Chapter, Md.
Thunderbird Chapter, Nev.
Tucson Chapter, Ariz.
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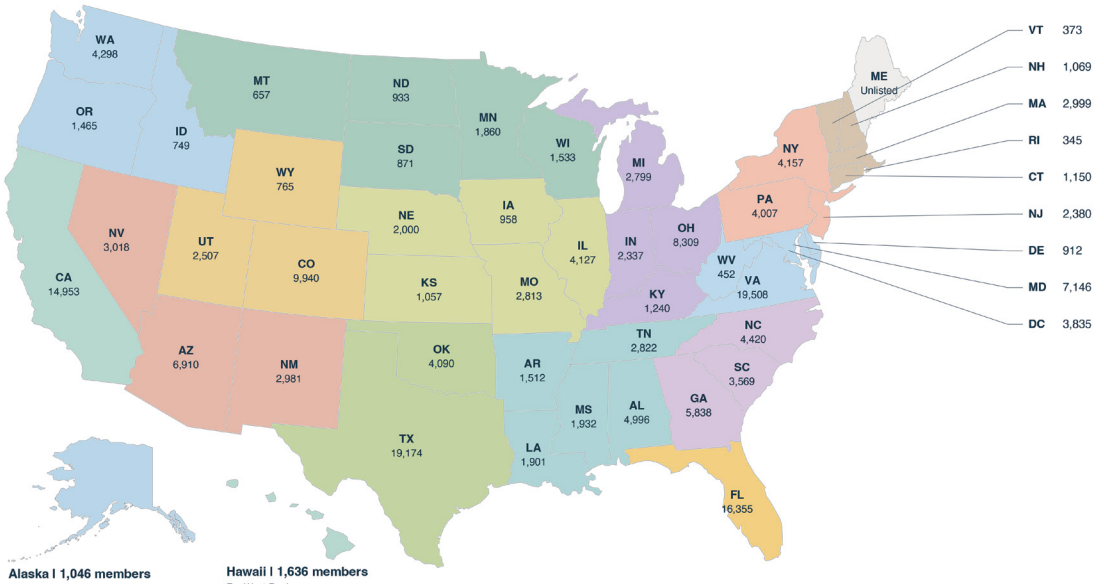

OVERSEAS CHAPTERS

2,513

U.S. Air Forces in Europe

1,644 members

Germany	1,093
Italy	288
United Kingdom	263

Pacific Air Forces

869 members

Japan	425
South Korea	444

Country totals combine the chapters listed in the source.

Eric Lee/staff

By Patrick Fish

Gulf War Air Campaign Map Featured in New Smithsonian Exhibit



Patrick Fish/staff

Lt. Gen. David Deptula, USAF (Ret.), dean of the Mitchell Institute for Aerospace Studies, with the Desert Storm air campaign map he created as a lieutenant colonel. The map now hangs in his office at AFA headquarters.

A map pinned to the wall in a basement 36 years ago will go on display in November at the Smithsonian's National Air and Space Museum.

The map, used to identify strategic targets across Iraq in the fall of 1990, was used in the planning of Operation Desert Storm, and will be included in the museum's new "Modern Military Aviation" gallery in Washington, D.C., tracing advances in airpower from the Korean War to the present.

The exhibit seeks to expose visitors to the advances that changed the nature of warfare.

The map is one of two created at the time by now-retired Lt. Gen. David Deptula, dean of the Mitchell Institute for Aerospace Studies. Deptula was the principal air attack planner for Operation Desert Storm—identifying strategic targets across Iraq and developing the blueprint for the coalition air campaign.

Two Gulf War maps remain in Deptula's possession, and both are on display at AFA's headquarters in Arlington: one depicting Baghdad hangs in AFA's Heritage Hall, while a larger map of Iraq hangs in Deptula's office, surrounded by other mementos and artifacts from throughout his career.

A reproduction of the map will be displayed as a large-format graphic panel at the Smithsonian. Dr. Michael Hankins, the Smithsonian's Curator of U.S. Air Force, Navy, and Marine Corps post-World War II Aviation, learned about the maps during a chance conversation with Mitchell Institute Executive Director Doug Birkey. Hankins was aware the maps had existed, but did not know they had been carried back from Saudi Arabia after the war.

Hankins immediately recognized the narrative the maps could tell and saw them as a perfect bridge for the exhibit he was creating, one that could help tell the story of the evolution from conventional airpower to the age of stealth and precision bombing that has defined military strike operations ever since.

Given the map's fragility and size, Hankins decided a reproduction would be more accessible to visitors at the Smithsonian.

"As we were planning the layouts for some of these different labels, we had an opportunity, particularly in that section, to have a large-scale photo as an introduction to the Desert Storm section of the gallery," Hankins said. "What better visual image to use than this to speak to that? ... [It shows] how the thought process of using military aviation was different in 1991 than it might have been in previous conflicts."

THE MAP, DEPTULA, AND THE BLACK HOLE

While the map tells the story of Operation Desert Storm, it is also a pivotal artifact in the career of the officer who led the planning of that operation over countless 20-hour days in a basement room in Riyadh, Saudi Arabia, that came to be

known as "the Black Hole." On Aug. 2, 1990, Iraqi forces under dictator Saddam Hussein invaded neighboring Kuwait and conquered the country within days. In response, a coalition led by the United States was formed to eject Saddam's forces from Kuwait.

Deptula, then a lieutenant colonel working in the Office of the Secretary of the Air Force, was pulled into a Pentagon strategic planning cell known as "Checkmate," led by Col. John Warden III. The Checkmate team had been developing a new strategic air doctrine for the post-Cold War era when it was tasked to create an operational concept for countering Iraq's invasion with airpower. They dubbed their plan "Instant Thunder." After briefing Army Gen. Norman Schwarzkopf, who as commander of U.S. Central Command would oversee the operation, as well as Gen. Colin Powell, then the Chairman of the Joint Chiefs, Warden, Deptula and a couple of others flew to Saudi Arabia to brief Gen. Chuck Horner, the top air commander for the theater, on the plan.

Horner, unconvinced of Warden's ability to lead the actual planning, accepted Warden's concept, but sent Warden back to Washington, while retaining the others. Among them, only Deptula stayed long term, becoming the principal target planner for the entire campaign.

Based in the Royal Saudi Air Force headquarters basement, their "Black Hole" office was defined by secrecy, the sensitive political nature of American forces planning offensive operations on Saudi soil, and the punishing hours demanded of its occupants—and, Deptula recalled, once "someone was allowed to come into it, they were never allowed to go out."

Here Deptula created his map and the Master Air Attack Plan that would ultimately orchestrate every strike of the campaign. On the map, Deptula and his team pinpointed strategic targets, coded by category: air defense, leadership, military bases, Scud ballistic missile launchers, command and control systems, and electricity and telecommunications networks.

The map helped planners to identify relationships between targets, coordinate force packages across multiple objectives simultaneously, and find gaps in Iraqi defenses that a list of coordinates alone could not reveal. For example, the map revealed a gap in Iraqi border monitoring stations that allowed Deptula to safely route F-15E attack aircraft to strike Scud launchers in western Iraq before they could fire on Israel. "It wasn't just a pretty map that hung on the wall in our planning cell," Deptula said. "That's what the visualization of a map does that a bunch of target coordinates and names doesn't."

Underlying the Instant Thunder concept was the conviction that airpower could systematically dismantle Iraq's war-making ability. Each mark aimed to take a specific capability off the table. It was a deliberate break from what Deptula called "an attritional, intelligence-based philosophy" that had defined air campaigns in Vietnam, where success was measured by the percentage of damage inflicted rather than by what capability had actually been removed.

Using the F-117 Nighthawk's stealth capability to lead the attack, and precision munitions to ensure rapid success, coalition air forces disabled Iraq's command and control almost instantly, and took away other war-making capabilities within weeks—all while greatly minimizing overall infrastructure damage across the country.

By targeting electrical transformer yards, rather than power plants, planners saw they could shut down the electrical grid while keeping reconstruction manageable. In some cases, Deptula recalled, Iraqi power plant managers switched off their facilities, and the coalition chose not to strike them.

"By the third night of the war, there hadn't been an electron flowing in the Iraqi power grid," said Deptula. "So that's the objective." For Hankins, the map illustrated the evolution of airpower in a way no other artifact could. He said, "I think the



Smithsonian Institution

A rendering of the Modern Military Aviation gallery at the Smithsonian's National Air and Space Museum in Washington, D.C. The gallery is scheduled to open on Veterans Day, Nov. 11, 2026.



Lt. Gen. David Deptula, USAF

Then-Lt. Col. David Deptula, right, briefs (from left) then-Lt. Gen. Chuck Horner, then-Brig. Gen. Buster Glosson, and Gen. Norman Schwarzkopf in the "Black Hole" in Riyadh, Saudi Arabia, 15 hours before the first bombs fell on Iraq.

map shows that in an interesting way, because you can see who's targeting what, what kinds of things they are able to target, what kinds of things they were successful at. It's different than something you would see in the sections on the Korean War or the Vietnam War."

Serving as the visual introduction, the map opens the gallery's Desert Storm section, which focuses on the new technologies that defined the conflict: a scale model of an F-117 stealth fighter and an interactive display explaining how stealth technology works and why it proved so decisive.

Separately, the museum's Steven F. Udvar-Hazy Center near Dulles Airport received an original F-117 in October, so Washington visitors can see the real thing up close.

The Desert Storm section will also serve as a bridge to the conflicts of the Global War on Terror that the United States has fought over the past three decades, including the Predator drone Deptula would later help pioneer as an armed platform. After the September 11 attacks, Deptula was directing the Combined Air Operations Center for the opening of the Afghanistan campaign when the United States fired a Hellfire missile from an RQ-1 Predator at al-Qaeda targets, the first combat use of an armed remotely piloted aircraft.

For Deptula, the map's display at the Smithsonian represents an acknowledgment of a turning point in how America wages war and as validation of the campaign itself. "I think it's recognition of the significance of the operation," Deptula said. "It was the birth of how we conceive air operations."

For Hankins, the map's greatest value may be what it teaches visitors who know nothing about the Gulf War. "It's not just let's launch a bunch of airplanes and go drop a bunch of weapons," he said. "It's much more careful than that. It takes a lot of people a lot of time."

The Modern Military Aviation gallery, the final chapter of the Smithsonian's eight-year renovation, is scheduled to open to the public on Veterans Day, Nov. 11, 2026.

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

Gen. Chuck Horner, Fighter Pilot

The Calm Before the Storm.

Chuck Horner is the most successful air commander since World War II. In the summer of 1990, Saddam Hussein invaded Kuwait and overran the country in two days. President George H.W. Bush declared Iraq's aggression would not stand and began building a global coalition to contest Hussein's invasion.

U.S. Central Command, led by Gen. Norman Schwarzkopf, was given a disappointing and dangerous war plan to liberate Kuwait—a frontal assault by ground troops into the heart of Iraqi defenses. Schwarzkopf turned to the Air Force and asked for an air alternative.

The story of how that air plan, "Instant Thunder," developed is well known, but in truth, the plan was merely that—a proposal on paper. The air commander on the spot had to translate ambitious thoughts and predictions into a workable operation—that was Lt. Gen. Chuck Horner, who would serve as the Joint Force Air Component Commander in charge of all American and coalition combat aircraft in the theater.



Illustration by Dash Parham/photo resource; USAF

When Desert Storm kicked off on Jan. 17, 1991, Horner had crafted a brilliant strategy that relied on airpower to gain air superiority, destroy the Iraqi Army in Kuwait, cut off its logistic supplies, and blank out command and control between fielded forces and their superiors in Baghdad. In six weeks, the air campaign decimated enemy forces—army, air force and navy. Over 87,000 Iraqi soldiers surrendered, virtually without a fight, and it is estimated another 80,000 deserted during the relentless air campaign. In late February when coalition ground forces finally moved, the enemy was already defeated, so the result was a largely unopposed advance. Turning military history on its head, Desert Storm saw ground forces supporting the dominant air campaign.

Horner was born in Iowa in 1936 and his young years were spent on a farm where he learned discipline, responsibility, and fundamental values: these would stick with him. He had his first airplane flight in 4th grade and became an avid fan of World War II stories. A lackluster student, he earned the minimum GPA to enter the University of Iowa, joined Air Force ROTC, and graduated in 1958 as a new lieutenant. He promptly married his hometown sweetheart, Mary Jo, and the couple was off to pilot training. From there it was F-100s. Following a near-death experience in Libya while on a gunnery range, his naturally fatalistic attitude took on a more religious tone. He had been saved for something significant.

In June 1965, he went to Vietnam in the F-105, and later returned for a second tour in "Wild Weasels." These were deeply frustrating experiences. Like thousands of others in uniform, it was never made clear to him why he was there or what he was trying to achieve. He flew 111 combat missions to drop bombs and shoot rockets with little notion of the air strategy behind it, which was determined by those in Washington thousands of miles distant. He resented this fatal disconnect: "I was never going to let that happen if I ever got in charge, because it's not right. If you want to know whether war is going to be successful or not, just ask where the targets are being picked. If they say, 'We picked them in Washington,' get out of the country. Go to Canada until the war is over because it is a loser."

He internalized those negative lessons. He bridled at the thought of a war strategy devised by those far away who did not understand. He was especially bitter at air superiors who knew the strategy was a losing proposition, but sent their men out to fight it anyway. He would remember.

As a result of Vietnam, the nation and its military changed dramatically. For the Air Force it meant control passing from the bomber pilots who had been in charge for three decades, to the fighter pilots who had fought the longest, flew the most, and suffered the greatest casualties in Southeast Asia. Horner would slowly climb the ranks.

After tours as a squadron, wing and air division commander, Horner pinned on his third star and took over Ninth Air Force, which also meant he was commander of CENTCOM's air component and all coalition airpower in theater.

Schwarzkopf sent him forward to Saudia Arabia to bed down the massive air assets flowing into the region. He gathered an outstanding staff around him and began detailing an air campaign plan to defeat Iraq. The combination of stealth, precision guided munitions, space assets, intelligence, and solid leadership led to one of the most lopsided military victories in modern times. Horner attributed victory to having learned the negative lessons of Vietnam: the importance of clear political goals, adequate assets, and a strong coalition.

Afterward, Horner was promoted to general and took over Space Command, retiring from that position in 1994.

His memoirs were written with noted novelist Tom Clancy, titled ***"Every Man a Tiger,"*** and John A. Olsen has written a new biography, ***"The Generalship of Chuck Horner."*** Both are outstanding.

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