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# AIR & SPACE FORCES

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# INSTANT THUNDER

## PLANNING OPERATION DESERT STORM

First in a Series.
37

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# AIR & SPACE FORCES

January/February 2026, Vol. 109, Nos. 1 & 2 airandspaceforces.com

Gwendolyn Kurzen

A Falcon 9 rocket launches the X-37B Orbital Test Vehicle into space in August 2025. Dynamic space operations requires more than rapid launch and repositioning.

## DEPARTMENTS



## FEATURES



## ON THE COVER

USAF

**A 401st Tactical Fighter Wing F-16C Fighting Falcon aircraft prepares to take off on a mission during Operation Desert Storm.**

## STAFF



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EDITORIAL

By Tobias Naegele

# Deterring Now Costs Less than Winning Later

In a period of seven months, the United States executed two extremely different, yet equally devastating military operations on two sides of the world.

In June's Operation Midnight Thunder, seven U.S. B-2 bombers destroyed most of Iran's nuclear production capacity in an overwhelming demonstration of the U.S. Air Force's unique ability to execute both global reach and global power. Then in January, the U.S. applied its unique stealth, cyber, special operations, and space assets to execute a joint mission to capture Venezuelan dictator Nicolás Maduro and his wife, plucking them from the presidential palace in a flawlessly executed midnight raid.

As President Donald Trump rightly stated, no other country on Earth could have pulled off these missions. Each demonstrated the exceptional capabilities the U.S. military has honed over the past 50 years. And yet these successes also shine a bright light on what our military lacks today and what must be done to fix that.

This is no time to rest on past laurels.

America's ability to execute complex military operations may be second to none, but our capacity to fight a prolonged war is in doubt. Our unique technological advantages are eroding, as rivals strive to counter them and catch up. Worse, our defense in depth—that is, the forces we have at our disposal—is shrinking. China already has a larger Navy than the United States and it is on pace to overtake the size and scale of our Air Force, as well.

Size alone does not guarantee competence, of course. For that, we need look no further than Russia, which squandered its size advantage in Ukraine. But force structure enables deterrence, strengthens resilience, and makes it possible to reconstitute and repeat an action when necessary.

**America's ability to execute complex military operations may be second to none, but our capacity to fight in a prolonged war is in doubt.**

In Midnight Hammer, the Air Force employed more than half of its 19 B-2 bombers, sending seven jets forward and using three in an elaborate deception. More than 125 aircraft took part in the operation, including stealthy F-35A fighters that led the way in and out of Iran. Tankers and other assets also contributed.

The mission may have been flawless, but could USAF have repeated the mission a day or week later? The B-2s are 30 years old, and the Eisenhower-era tankers that refueled them are twice that age. Older planes, like older people, require more recovery time. Operation Absolute Resolve, the code name for the Maduro extraction, was also highly taxing. This time, some 150 aircraft took part, including about 20 percent of the entire U.S. F-22 force, along with Air Force and Marine Corps F-35s, Navy F/A-18s and E/A-18s, plenty of tankers, and a variety of unmanned aircraft.

If a single eight-hour mission against a crumbling South American dictatorship requires a fifth of its air superiority fighters, one has to wonder if our Air Force lacks the material depth to execute a sustained campaign against a peer adversary.

These two missions were effectively one-offs, like prize fights for which a champion has months to prepare. By contrast, a peer fight with a competitor is more like an Olympic relay race, in which each successive runner must hand off the baton to a teammate with the talent and energy to achieve victory. If any one of them drops the baton, the whole team loses. Successful relay teams have depth.

Operation Desert Storm, fought some 35 years ago, offers a clear and valuable lesson for planners today. That war, fought by generals who spent their formative years fighting in Southeast Asia and their entire careers in the context of the Cold War, was premised on a commitment to apply overwhelming force to ensure overwhelming victory.

Having once fought a war in which their hands were tied by policymakers, those generals had no intention of letting that happen again. Using forces built and trained to counter and defeat a larger Soviet peer in an existential contest, they went to war against Iraq with a disproportionate advantage, and they intended to use it to the fullest.

When Saddam Hussein invaded Kuwait in August 1990, it was only months after communist regimes in the former Soviet bloc collapsed like dominoes in the fall of 1989. One by one, Poland, Hungary, East Germany, Czechoslovakia, Bulgaria, and Romania fell. Indeed, unthinkably, the Soviet Union itself would cease to exist in December 1991.

Freed from the threat of a Soviet invasion in Europe, U.S. military planners threw everything they had against Saddam's Iraqi army, then the fourth largest in the world: more than half a million troops, some 1,300 aircraft, and a sizable naval armada.

Planners had the luxury to draw from ample capacity, building strike packages on a scale not seen since World War II and not repeated since. Aircraft carriers crowded into the Persian Gulf. And when air ops slowed, Navy Tomahawk cruise missiles kept the pressure on the enemy.

Today, however, the U.S. Air Force lacks the aircraft, the weapons reserves, and the training they had in 1990. We can execute bespoke operations like Midnight Hammer and Absolute Resolve, but can USAF sustain a multiday attack plan?

President Trump appears to understand the problem and the necessary fix. In early January, he announced his intent to invest $1.5 trillion in defense in fiscal 2027, the first volley in what will surely be a hotly debated 2027 budget. If approved, that would be a 50 percent budget increase, a percentage not seen since 1951. In pure dollar terms (not adjusting for inflation) that increase alone is about what the entire Department of Defense spent in all of 2011.

Whether that $1.5T is a negotiating starting point or a serious figure is hard to know right now. But either way, it seems likely that the 2027 budget will be larger than today's nearly $1 trillion, opening the possibility that, for the first time in decades, the Air Force and Space Force could gain the kind of investment that would begin to fix long-festering shortfalls in people, planes, parts, and training.

The prospect of buying dozens more F-35 and F-15EX jets each year, accelerating and increasing orders for B-21 bombers, completing the purchase of new E-7s, and accelerating development of the F-47, Collaborative Combat Aircraft, and perhaps a new mobility aircraft is highly motivating. So is finally solving the chronic pilot shortage and rebuilding morale in the fighting forces.

Few doubt that America still has the best military capabilities in the world. The question is whether we have enough capability and capacity—including trained and ready personnel—to deter a peer from risking a protracted fight with us. Experience shows it is better to invest now in deterrence than to pay the price in blood and treasure for an all-out war later.

Tell your representatives in Washington: Increasing defense spending is not just a "nice to have." It's an imperative to secure America in the future.

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# LETTERS

## Long Overdue

I would like to express my deep appreciation to you and Matthew Cox for publishing "Prepare to Abandon the Aircraft" [September/October 2025, p. 34]. As one of two on-scene forward air controllers who witnessed the shoot down of Stinger 41, I believe that Matt's article is an excellent and factual account that captured the horrific nature of what happened over 53 years ago. Along with former Secretary of the Air Force F. Whitten Peters, Col. Roy Davis and other combat veterans, I believe that the USAF should recognize the heroism demonstrated by the whole crew on that fateful afternoon.

The original submission for the awards to individual crew members was lost during the final days of combat as the AC-119Ks were transferred to the Vietnamese Air Force and the 18th Special Operations Squadron flag was cased. In spite of two detailed submissions, each one with increasing fidelity replicating the original awards package, the Air Staff has denied both.

As a sanity check, I contacted 24 general officers who during their careers were in a position to approve the awards as recommended in the original submission. All agreed that they would have approved the recommendations for award. Our bureaucratic process has failed these Airmen and their families.

My hope is that our Air Force will review this issue and correct this oversight. Our heroic Airmen and their families deserve nothing less. If anyone is interested in supporting our cause, please go the Stinger41.com to join our efforts to contact the Secretary of the Air Force.

Lt. Gen. Tom Waskow,
USAF (Ret.)
Cornelius, N.C.

## Bearly Noticed

Great article "Defending the Northern Flank," in the November/December issue [p. 35]. I was stationed at an intelligence-gathering squadron at Kadena Air Base, Japan, in the late '70s. We monitored Soviet Air Force activities, including their tracking of the weekly TU-95 flights from Petropavlovsk to Cam Ranh Bay. We worked with the 18th Wing and set up a "Bear Hunt."

With a couple of F-15s deployed to Clark Air Base, Philippines, a predicted best intercept point for the Bear was passed, the Eagles intercepted a very surprised Bear, and took photos. The wing's intelligence officer and the pilots brought us a photo of an F-15 flying with the TU-95 signed by the pilots. They also showed us a photo of the top of the Bear and said it would not be seen by the general public. The photo was taken from the F-15 flying inverted over the TU-95.

Maj. Pete Siegel,
USAF (Ret.)
San Antonio

## Evolution of War

I'm old enough to remember that in order to become the USAF Chief of Staff, you essentially needed to be CINCSAC (Command in Chief, Strategic Air Command) before stepping up to lead the force. Having just read the November/December edition of Air & Space Forces Magazine it's totally clear that the Fighter Mafia has a firm grip on senior leadership in today's Air Force.

You acknowledged in Gen. David Allvin's farewell article [p. 6] that he, and Gen. Norton Schwartz, have been the only nonfighter pilots to be Chief of Staff since the Vietnam era. This issue also included former Chief of Staff

## WRITE TO US

Do you have a comment about a current article in the magazine? Write to "Letters," *Air & Space Forces Magazine*, 1201 S. Joyce St., C6, Arlington, VA 22202-2066 or email us at letters@afa.org. Letters should be concise and timely. We cannot acknowledge receipt of letters. We reserve the right to condense letters. Letters without name and city/base and state are not acceptable. Photographs cannot be used or returned.

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Gen. Merrill McPeak's view [p.2] on—(surprise!) more flying time for fighter pilots.

If it hasn't occurred to our senior USAF leadership yet, the next war will not be a fighter-centric conflict. The Russian-Ukraine war has demonstrated vividly that the next war will be a drone swarm war controlling the air space above the tactical battlefield. Special Operations and strategic/tactical airlift complement and support this new vector of warfare. Ukraine is producing over 2 million drones per year, are we? The USAF solution? Fighter controlled collaborative combat aircraft cost billions of dollars while the average cost of Ukrainian drones are a few hundred dollars.

Priorities and leadership counts. We need leadership that understands special operations and asymmetric warfare incorporating the lessons of Ukraine. The great biography of Maj. Gen. Edward G. Lansdale on the last page of this issue is dispositive. We are headed in the wrong direction. Yogi Berra once said, "We're lost, but we're making good time."

Color me worried.

Maj. Jarold B. Gilbert,
USAF (Ret.)
Tampa

## Preventative Measures

This was an excellent article ["Realistic Expectations for Golden Dome by 2028," November/December, p. 29]. Rather than relying only on massive retaliation, I think deterrence would be stronger by relying on both defense and attack. It would certainly be more effective against terrorists or a terrorist nation that wasn't worried about retaliation.

However, I think there would be another benefit to come from Golden Dome which is deterrence of a conventional war. SpaceX has been awarded a $2 billion contract to develop satellites to track missiles. This is just a start. My guess is that this is the beginning of a constellation of SAR (synthetic aperture radar) satellites, which I would estimate to number about 600, a small number compared to the 9,000 Starlink satellites.

Such a constellation could give the U.S. the ability to use radar to look at any place in the world. Of course, the entire world couldn't be scanned continually. The system could just look at limited areas, ... but those areas could be anywhere in the world.

A potential war that such a system might deter would be an invasion of Taiwan by Communist China. If the system can track missiles, it would be able to track ships very easily and aircraft as well. Xi Jinping has repeatedly threatened an invasion, and he might try it with 25,000 ships and 1,500 aircraft. But if a constellation of 600 SAR satellites could track the location of every ship and every plane at even 5-minute intervals, it might be possible to destroy most of them ... as was done with the Iranian missiles/drones sent to attack Israel.

If Xi realized this, he might be deterred from attacking. The probable cost of an invasion attempt could easily be $1 trillion. My guess is that the satellite constellation will cost $30 billion—so it would be a bargain.

William Thayer
San Diego

## For Your Consideration

In light of the Army moving forward with the MV-75 series of aircraft from Bell/Textron, the Air Force needs this airframe. With the problems coming from the V-22 series of rotary wing aircraft I can understand some hesitancy. I am not well versed on the security plans for defending the fixed silos of the nuclear triad either.

A quick look, though, and this aircraft

offers a cruising speed rated at well past the MH-139A series of utility helicopters. This could offer a quick return flight or less flight time and possibly increased load to respond to remote sites.

This will offer the landing capability of a helicopter with the airspeed greater

Bell Textron

**A Bell V-280 in flight above and the CV-22 Osprey below. The MV-280 is comparable in capacity to an HH-60, which can carry about half as many troops as an Osprey. The main difference between the two tilt-rotor aircraft is in the engineering. The CV-22's entire engine pivots when it transitions to vertical flight, while the V-280 engine remains static, and only the rotors pivot.**

1st Lt. Richard Caesar

**CV-22**

then some small planes. I am not an expert though. The Air Force should work to gain authorization for purchase of some of these, free of the Army, and possibly improve mission capability with fuel tanks for extended range and enhance internal layout for medevac variations. This should be a viable replacement for the V-22's without losing a unique mission capability.

Cpl. Jesse Reagan,
USA
Union, Ore.

## Targeting Policy

There are several levels of targeting starting with the commander in chief, who establishes the policy that will eventually lead to the actual destruction of a target. The policy initially drives intelligence-collection requirements and service operations training and readiness objectives for nuclear, conventional, and other missions.

The Secretary of War must have all services trained and prepared to execute all targeting missions. The Joint Chiefs of Staff (Chief and Service Chiefs) will determine which service or COCOM would be best available and capable to accomplish a specific mission.

The tasked commander of the COCOM or subunified command will have developed a campaign plan to accomplish the specific overall mission and would establish the objectives for any portion of the plan.

The supporting air component or its air operations center (AOC) will publish the air tasking order (ATO) to execute the campaign plan and identify the specific unit and weapon system and munition(s) that will be used.

The AOC target officers may identify specific aimpoints and convey them to the tasked unit(s). This may or may not be in the ATO. At the unit, the pilots or aircrews will be designated to attack the target and may be advised how many aircraft and bombs would be required to damage or to destroy the target.

Pilots and aircrews would plan and deconflict with other support functions their tactics depending on the target area terrain and defenses and decide whether they will drop one or more bombs on a single pass or perform several passes.

Based on the intelligence available at the time, if the basic target in question is a facility, equipment or function, generally speaking, the people who may be injured or killed are "collateral damage." On the open battlefield or in urban warfare, personnel combatants could be the primary targets, of which facilities, equipment, and functions could become the collateral damage. In either case, it is only realistic to understand, good or bad, that collateral damage could occur.

Unfortunately, this is a part of the "fog of war."

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

## It's the Real Thing

Retired Gen. Merrill McPeak nailed it! [See "Guest Editorial: More Flying Hours: Build Skills & Loyalty," p. 2.] As a fighter pilot in the '60s, '70s and '80s, I totally agree. There is no substitute for stick and rudder time. I realize that modern sims are state of the art, but they cannot replace the sweat and adrenalin of the real thing.

Combat ready pilots should fly every day.

Lt. Col. Jim Webster,
USAF (Ret.)
San Diego

Gen. Merrill McPeak is right on target. The reason I know is that I started my 30-year career in an odd way to be commenting on the subject. Twenty-eight of my 30 years were spent as an Air Force physician. So, what the [heck] do I know about flying?

My first two years were served at Nellis Air Force Base, Nev., as the Disaster Preparedness Officer (DPO) picking up the pieces of F-4s and other aircraft that had "departed controlled flight" during Red Flag combat drills.

I spoke to a lot of pilots because I loved walking down to the flight line from the DPO that was in the basement of a VOQ (Visiting Officers' Quarters) next to the "Bomb Shelter"—the Officers' Club stag bar—and engaging with them and the ground crews. They flew hard. They flew constantly.

They each believed that they and their wingman were the hottest damned combat pilots on Earth, and God help the suckers in the mock (and sometimes real) Russian airframes they flew against on the North Range.

When they weren't landing after blowing lines of excessed jeeps to pieces or defeating sharp-as-nails Red Force pilots they were doing carrier landings in the club.

It was the constant honing of those skills and that attitude that made them fearsome opponents in the air. I respected that. Then, somehow timidity driven by the increasing cost of aircraft and the fear of having a crash—or worse, the loss off an Airman-in-training—led to less and less flying, excused by the highs cost of avgas.

By the time I retired, squadron commanders were having to explain why they couldn't get more flying hours for their sky-hungry crews.

Some say AI-augmented drones will replace pilots, costing less per downed aircraft, less fuel and less lives. I think that's bull. Drones will certainly play a role in future air wars, but the core of battle success will be the combat pilot who lives to be in the air drilling and fighting.

Thank you, general, for pointing that out. I hope someone is listening.

Col. Terrence Jay O'Neil,
USMC (Ret.)
Londonderry, N.H.

By John A. Tirpak

# Telling USAF's Story is a Critical Mission

USAF

**The Air Force has a great story to tell says John Tirpak—shown here interviewing then-Chief of Staff Gen. David Goldfein in 2016—but leaders are usually reticent to share that story publicly.**

*Retiring after 40 years of aerospace and defense journalism—31 years with Air & Space Forces Magazine—John Tirpak offers observations and advice on how to tell the Air Force's continuing story.*

Over the past few decades, the Air Force's cumulative budget has lagged that of the Army and Navy to the tune of more than $1 trillion. Why? They clearly do a better job telling their story. It's past time for the Air Force to step up and do a better job making its case for a bigger share of the military budget. Its leaders shouldn't be afraid to do so.

In 40 years covering the Air Force, I've found it frustratingly allergic to telling its own story. It has a good story to tell, but remains excessively modest with the press and general media. Too many times I've seen the Air Force teed up to explain how it accomplished major military miracles, only to kick at the ground and wave it away with an "aw shucks, we just did our bit."

The other services have no such reluctance in touting their roles and showcasing their contributions to national defense, arguing effectively that they deserve all the money the nation can throw at them.

## STOP BEING SO PURPLE

The Air Force's default communication strategy is, laudably, to emphasize jointness. But in doing so it dilutes the message that it is most often "the first force"; the one that underwrites and enables all others. USAF sets the conditions for victory by denying an enemy the ability to hide or operate without being observed and attacked.

Consider this missed communication opportunity from Operation Inherent Resolve (OIR), in which the Air Force led and sustained the bulk of the anti-ISIS campaign. While small teams of special operators engaged on the ground, the Air Force carried out the majority of the strikes and, overall, 70 to 80 percent of the sorties; a combination of ISR, resupply, tanking, fighter cover, and close air support.

Meanwhile, the Navy embarked a conga line of journalists aboard the aircraft carrier USS *Harry Truman*, where they were told that the aircraft carrier was the "nerve center" of the fight, launching the bulk of the anti-ISIS attack sorties. This was the account that made it to American living rooms; the Air Force's role remained largely invisible.

NBC News anchor Lester Holt took a film crew to a forward Air Force base, where an impressive photo op was staged with an F-22 Raptor, an RQ-4 Global Hawk ISR drone, and bleachers filled with Airmen. In front of them, Holt asked the provisional wing commander what the Air Force was doing in the war.

It was a tailor-made opportunity for the Air Force to tout its lopsided contribution to the fight, but instead the officer played it

down, replying, "We're just part of the team."

Perhaps he'd been instructed not to get into details, due to host-nation sensitivities. Maybe NBC told him to keep his answer under 10 seconds. But in any case, the real story didn't get out, and as it happened, few other such opportunities arose during the conflict. The Air Force's central role in the OIR victory went largely unsung and unnoticed.

This mindset often comes down from on high.

In 2012, in an exit interview with the departing Chief of Staff, Gen. Norton Schwartz, I asked if he thought he'd been a strong advocate for the Air Force during his tenure. He replied that the service's accomplishments make their own case.

"There is still wisdom in your performance speaking for your institution," he said. Schwartz had made a "conscious choice," he said, not to be a cheerleader for the service. And while he acknowledged that budgets are a "competitive environment," and that it's important for "decision-makers, both on the policy and resourcing side, to appreciate the contributions of their Air Force," he preferred to leave it to the next Chief to decide whether to "change that formula."

Here's an observation: If you keep telling people you're nothing special, eventually they'll believe you. Corollary: If you are silent and let the other services talk about why they need resources and you don't, their story gets heard and they get the funding. Out of sight, out of mind … out of money.

## TELL THE STORY: LOUDLY AND OFTEN

The Air Force—and airpower—drove victory in the wars the U.S. and its allies have won over the past 40 years. Without control of the air, you don't fly your ISR and support aircraft wherever and whenever you want, and you don't get to hit the enemy at the time and place of your choosing. Without air dominance, the situation on the ground remains chaotic and unresolvable.

In 1991, six weeks of applied airpower whittled down the Iraqi military—then the fourth-largest in the world—to a level where the U.S. Army and coalition allies could mop up in four days. The Army likes to promote Desert Storm as the "100-hour war," but it was the preceding two months of strategic bombing and "tank plinking" that made that 100 hours possible.

Airpower alone forced Serb forces to quit their "ethnic cleansing" campaign in Kosovo, with no U.S. or NATO ground forces ever committed to the fight.

For a current example, look at Ukraine, where neither side has control of the air. Nearly four years into this grinding war of attrition, neither side has a decisive edge. Absent airpower, winning is elusive. We learned this in World War II and have relearned it in every conflict since.

Dominant airpower won the fights in Iraq, the former Yugoslavia, Libya, Syria, and Iran. The Air Force needs to make this point, simply and loudly, until the public and Congress recognize it as the maxim it is: You can't win without control of the air. And control of the air requires investment.

## REACT QUICKLY

Bad news—or wrong news—can't be ignored, and it gets worse with age. In a 24-7 news cycle, you've got to head off bad news by meeting it head-on. You have to trust your public affairs people to know their business and to provide a good, fast response. Too often, the Air Force hedges and falls behind the news cycle.

One example of many: In the 1990s, the absurd notion was spread that the B-2's stealth treatments were so delicate that they "melt in the rain." Rather than instantly moving to shut down this insinuation, Air Force leaders held back, trying to formulate a perfect response. But by the time USAF came out with its well-reasoned rebuttal, it was too late. The baseless charge had become conventional wisdom. Even now, 30 years later, you still hear this canard.

Did it hurt? Probably. How many B-2s did the nation wind up buying? Just 21. Other factors also led to that outcome, but the object lesson remains: If you dither, you miss your chance to shape the conversation.

## CELEBRATE YOUR SUCCESSES

By all accounts, the B-21 bomber—the first new bomber in 30 years—is performing well: It's on schedule and on budget. But when the time came for its first flight in November 2023, no media event was scheduled. The only photos taken were by private photographers, who had camped out at the end of the runway. It took weeks for a couple of official images of the B-21 in flight to be released. What was gained by this reticence? If the decision rested with defense officials at higher echelons of command, did the Air Force fight hard enough to argue its case? This was yet another lost opportunity to tell a really positive Air Force story.

The recent Operation Midnight Hammer, which set Iran's nuclear weapons ambitions back significantly, was a mostly Air Force mission. USAF B-2 bombers delivered the central punch, while its F-35s deftly executed one of their first combat missions. Many other Air Force assets played key roles, as well. Chairman of the Joint Chiefs of Staff Gen. Dan Caine offered an authoritative account appropriately emphasizing the jointness of the operation. But a repeatedly promised, more detailed and airpower-centric press briefing has, regrettably, yet to take place.

Lesson: If it's a good news story, tell it. If someone wants to hide it, fight for your voice.

## YES, THERE'S RISK—BUT COURAGE IS PART OF THE JOB

Airmen know risk is part of military service. Every time they step to the aircraft or outside the wire they know there's danger ahead, no matter how safe and professional they are. Risk can never be eliminated, and the courage to face risk is part of the job. They do it because they know: It's worth it.

In the lead-up to Operation Desert Storm, then-Chief of Staff Gen. Mike Dugan told reporters how airpower could deliver victory through attacks on command and control, leadership and other key targets. He knew that airpower, properly applied, could save the lives of thousands of ground troops. But his frank talk discomfited the Defense leadership, and Dugan was fired after just 79 days on the job.

Of course, airpower wound up winning that war just as Dugan predicted. His revelations seem not to have helped the Iraqis in the slightest.

Dugan's successor, Gen. Tony McPeak, briefed the press after the war to explain the Air Force's singular contribution in Desert Storm, only to be criticized by the other services and many in the media for executing a parochial stunt. They derided him for claiming the war had been won by USAF alone, though he never said that.

"All the services made a very important contribution, and of course, all our allies, as well," he said. The air campaign was simply "my piece … to talk about."

McPeak said airpower set the conditions for victory by inflicting, by far, the greatest amount of destruction on the enemy, and the enemy's ability to coordinate its own defense. All true.

The Army howled at McPeak's assertion that Desert Storm marked "the first time in history that a field army has been defeated by airpower." That service ignored his next comment: While "it was a remarkable performance by the coalition air forces … there are some things airpower can do and does very well, and some things it can't do … that is, move in on the terrain and dictate terms to the enemy. Our ground forces did that. … I think they did a magnificent job."

Similar criticism was later leveled at Lt. Gen. Mike Short, who led the NATO airpower-only campaign against Serbia in Operation

USAF

**When the B-21 program took flight after years of development, the Air Force missed the opportunity to celebrate this achievement and released no public photos. Official photos would not be released until months later.**

Deliberate Force in 1999. In postwar comments, Short asserted that airpower alone had dislodged an entrenched ground force. But he added that it wasn't "tank-plinking" Serb armored vehicles that achieved the war's goals—but strategic airstrikes on Slobodan Milosevic's "centers of gravity" in Belgrade that did the trick. Only airpower could strike those targets, pressuring the Serb leadership, and Short felt it was important to highlight how modern warfare was changing.

Perhaps the most notorious modern-day case of leaders slapped down for airpower advocacy came in 2008, when both Chief of Staff Gen. T. Michael "Buzz" Moseley, and the Secretary of the Air Force, Mike Wynne, were fired by then-Defense Secretary Robert Gates. He blamed them for incidents of lax handling of nuclear weapons and for blocking drone technology, but clearly, neither charge was true: The record shows both were deeply involved in correcting post-Cold War nuclear neglect, and in rapidly advancing unmanned systems.

The real reason, as Gates alluded to in his memoir, was that Wynne and Moseley campaigned for dominant future airpower: specifically, for continuing F-22 production. Gates, locked in counterinsurgency campaigns in Afghanistan and Iraq, viewed the F-22 as an irrelevant, "exquisite" system, ill-suited to the fights on his plate. Moseley and Wynne suffered from "Next-War-itis," he charged, arguing that China wouldn't come up with anything comparable to the Raptor for 20 to 25 years.

Gates was wrong. Wynne and Moseley correctly saw that the F-22 would be a linchpin of future conventional deterrence. Today, China has twice as many J-20s—its answer to the Raptor—as the Air Force has combat-ready F-22s. This reality strongly affects the calculus of any Pacific theater war. Wynne and Moseley were right.

The Air Force has always had to fight to get its views accepted. But doing so puts you in good company: Billy Mitchell set us this model a century ago, in 1925. Air Force leaders have to be willing to fight for what they know to be true.

## FIX THE PRESS-PHOBIC CULTURE

We raise our Airmen to believe in meritocracy. It's considered bad form for an Airman to get his name in the newspaper, as if this is showing off. The institution warns: "you don't have to tell us you're good. If you are, we'll notice you, and you'll get promoted."

This works just fine at the enlisted and junior officer levels. But what happens when junior officers move up, and it's crucial that they advocate for their wing, their mission, their program? They've been trained to avoid the press, decline the interview. Their unit, program or system goes unexplained, unjustified and unsupported, and some other service, better at advocacy, gets the funding.

A Public Affairs officer once asked if I would be willing to interview the then-new Vice Chief of Staff. When he pitched the interview to the general the next day, saying, "Sir, I'd like to get you started doing some media," the conversation-ending response was, "now why in the world would I want to do that?"

Media-shy four-star generals have actually said to me, "that's out of my lane" or "that's above my paygrade." Pro tip: if you're at that level, you're expected to know, and to be able to talk with fluency about all Air Force issues. If you don't speak up for the service, who will?

I once gave a ride to a couple of young Marine infantrymen in Arlington, Va., who were looking for the Marine Corps Memorial; the statue depicting the iconic raising of the flag on Iwo Jima. When the conversation turned to aviation, they were fully versed in the V-22 tilt-rotor: how many their service wanted, why, what it cost, and why they thought it was worth it. An Airman would never have ventured such comments. The Marines, at least, don't have the Air Force's shyness problem.

At all levels, Air Force education should emphasize that it's every Airman's and Guardian's job to be an ambassador for the Department of the Air Force—its capabilities, its primary needs, and why it gives excellent value for the resources it gets. This is essential at a time when fewer and fewer Americans have any direct connection with the U.S. military. Who else is going to tell the Air Force and Space Force story?

My colleagues at the Mitchell Institute for Aerospace Studies have gone hoarse warning that today's Air Force is smaller and older than it's ever been. Readiness overall is way down, pilot flying hours are brutally low, and the service is at least a decade behind the power curve in modernization.

This is why the Air Force needs to get better at telling its own story, now: to make the compelling argument for the equipment and manpower it needs to carry out the nation's critical missions. If it doesn't, its steady decline in readiness will almost certainly continue. Sooner rather than later, "making do" won't cut it any longer, and an operational failure will be inevitable.

The Air Force has had good evangelists for aerospace power—Billy Mitchell, Curt LeMay, Bennie Schriever and Dave Deptula come immediately to mind. The service needs to tell its story; while backing up and promoting those that do it well. It's a critical part of the mission of ensuring it has the resources needed to secure air superiority in the future.

When a Space-X Falcon 9 rocket carried a Starlink mission into space from the Kennedy Space Center, Fla., in December, it was one of the last among a record 165 Falcon 9 launches in 2025—more launches by that one system than by any other country worldwide. In all, U.S. rocket makers attempted 193 launches last year, and that number will rise in 2026. But Falcon 9 launches are expected to level off, as Space-X begins to shift to its newer Starship and as Blue Origin's New Glenn and United Launch Alliance's Vulcan increase flight rates at America's two primary spaceports.

Gwendolyn Kurzen

An HH-60W Jolly Green II takes on fuel off the California coast during the joint exercise Steel Knight 25 in December. The Air Force is replacing its HH-60G Pave Hawks with HH-60Ws, which feature a digital glass cockpit, improved hot weather/high-altitude performance, onboard self-defenses for higher-end threats, more cabin space, and twice the internal fuel capacity of the HH-60G. About two-thirds of a planned 96-helicopter fleet have been delivered so far.

Master Sgt. Darius Sostre-Miroir

An F-16 Fighting Falcon from the 175th Fighter Squadron, South Dakota Air National Guard, takes off from Joe Foss Field, S.D., in December. With well over 4,600 F-16s produced to date, and some 3,000 or more still operational, no other fighter was built in volumes even close to the Fighting Falcon in the modern era. The Air Force still has more than 800 in its inventory, and it will be years before the F-35 surpasses the Viper in volume.

Master Sgt. Luke Olson

# VERBATIM

## FRIENDS ...

World Economic Forum/ Ciaran McCrickard

"A world of fortresses will be poorer, more fragile and less sustainable. And there is another truth. If great powers abandon even the pretense of rules and values for the unhindered pursuit of their power and interests, the gains from transactionalism will become harder to replicate."

**—Canadian Prime Minister Mark Carney** at the Davos World Economic Forum, calling for the middle powers to work together to build a more resilient world [Jan. 20].

Shealah Craighead

## ... Or Frenemies?

"Canada gets a lot of freebies from us, by the way. They should be grateful also ... . I watched your Prime Minister yesterday, he wasn't so grateful. They should be grateful to the U.S., Canada. Canada lives because of the United States. Remember Mark, the next time you make your statements."

**—U.S. President Donald Trump** at the Davos World Economic Forum in response statements made by Canadian Prime Minister Mark Carney.

Zhang Youxia photo/Kremlin

## China Watch

"This is the most stunning development in Chinese politics since the early days of Xi's rise to power when he purged the General Officer Corps of those he feared would oppose him. He now has only one officer remaining on the powerful CMC. This is like the U.S. Joint Chiefs of Staff with only one general. You cannot run the PLA this way. He has to appoint successors."

**—Dennis Wilder,** former head of China analysis at the CIA, on the removal of Gen. Zhang Youxia, the most senior military official in China and his subsequent investigation on suspicion of corruption.

## What About Putin

Press Service of The President of Ukraine/YPV2026

"President Trump led an operation in Venezuela, and Maduro was arrested. And there were different opinions about it, but the fact remains, Maduro is on trial in New York. Sorry, but Putin is not on trial. And this is the fourth year of the biggest war in Europe since World War II and the man who started it is not only free, he is still fighting for his frozen money in Europe. And, you know what, he's having some success."

**—Ukrainian President Volodymyr Zelenskyy** at the World Economic Forum in Davos [Jan. 22].


Airman 1st Class Carson Jeney

## Patching Up

"They're Back Baby."

**—Chief Master Sergeant of the Air Force David A. Wolfe,** in a Jan. 9 Facebook post announcing the return of duty identifier patches–spice brown and olive drab patches that indicate an Airman's career field or responsibilities via a few letters or numbers.

### First in Space

Mike Tsukamoto

"Once established, this warfighting platform will optimize our already unmatched mission readiness and ensure the United States continues to lead and shape military spacepower. ... It is vital we remain the world's preeminent space power, ensuring that America's interests are protected in the high frontier. ... We must guarantee that there is never a day without space."

**—Commander of Space Command Gen. Stephen N. Whiting,** Dec. 12 at the unveiling of signs at Redstone Arsenal in Alabama marking the future home of U.S. Space Command.

## DIRECT INVESTMENT

"We are fundamentally shifting our approach to securing our munitions supply chain. ... By investing directly in suppliers we are building the resilient industrial base needed for the arsenal of freedom, ... replenishing stockpiles, rebuilding our military and reestablishing deterrence by ensuring the availability of critical components."

—**Michael Duffey,** undersecretary of defense for acquisition and sustainment, announcing a $1 billion investment.

# FACES OF THE FORCE

Staff Sgt. Brooke Rogers

U.S. Air Force **Maj. Andre "Guns" Golson**, a 31st Operations Support Squadron F-16 fighter pilot at Aviano Air Base, Italy, earned the Lt. Gen. Claire Lee Chennault Award for advancing Air Force weapons and tactics through innovation and leadership. During a 2024 CENTCOM deployment, Golson helped pioneer the air-to-air employment of the low-cost AGR-20 Falco against unmanned aerial threats, dramatically reducing engagement costs while protecting forces and allies. His achievements reflect a competitive drive rooted in excellence, teamwork, and service. Looking ahead, Golson aims to grow as a leader while prioritizing his role as a husband and father.

Airman 1st Class Heather Amador

**Senior Airman Makenna Greenlee** has transformed a lifelong passion for sports into a foundation for leadership and service in the U.S. Air Force. Raised in a large Texas family and shaped by years of competitive athletics, Greenlee brings discipline, teamwork and resilience to her role as a food services journeyman while excelling as a member of the Air Force Rugby team. Her dedication recently led her to represent the United States in an international rugby tournament in New Zealand. For Greenlee, athletics and service are inseparable, strengthening both her mission readiness and personal growth. "Athletics and service aren't two separate parts of my life; they're interconnected, and they both push me to be the best version of myself," Greenlee said.

Senior Airman Jasmyne Bridgers-Matos

A missed FaceTime call changed everything for **Staff Sgt. Joshua Schul**, a 355th Civil Engineer Squadron unit deployment manager selected for the Air Force's highly competitive Senior Leader Enlisted Commissioning Program–Officer Training School. Chosen by Air Combat Command Commander Gen. Adrian Spain, Schul's selection marks the culmination of years of determination, mentorship and personal growth. After earning his degree and discovering a passion for aviation through the Rated Preparatory Program, he is now on track to become a special operations pilot. For Schul, the opportunity reflects both teamwork and the courage to pursue ambitious goals.

Tech. Sgt. Alexander Frank

At the Oregon Air National Guard's 142nd Wing, "Brothers in Arms" is more than a saying—it's a family reality. **Senior Airman Eithan Rush**, **Airman 1st Class Wyatt Rush,** and **Airman Jayden Mancilla** serve side by side, each maintaining different components of the wing's F-15 fleet. Rooted in a multigenerational tradition of military service, the brothers bring their shared values of teamwork, pride and accountability to their roles. While friendly rivalry remains, their close bond strengthens their effectiveness as wingmen and maintainers. Together, they embody how family ties can reinforce mission success. "As a wingman, you do the same thing, but we're just wearing a uniform now," Wyatt said.

Karen Abeyasekere/USAF

After years of struggling with alcoholism, **Master Sgt. Timka Peltonen** of the 488th Intelligence Squadron at RAF Mildenhall, U.K., reached a breaking point that threatened both his career and personal well-being. What began as stress-fueled drinking early in his Air Force career evolved into dependency—affecting his work, marriage, and sense of self. By voluntarily seeking help through the Air Force's Alcohol and Drug Abuse Prevention and Treatment program, Peltonen took the first difficult steps toward recovery. With supportive leadership and treatment, he began reclaiming control of his life and rediscovering hope. "The whole ADAPT program was about giving me the tools to succeed and me using my hands to move them," Peltonen said.

Master Sgt. Sarah Loudon

U.S. Air Force **Master Sgt. Sarah Loudon** is forging a new path from military medicine to civilian care as part of the University of Minnesota's inaugural Military Medic to Medical School program. The one-year program recognizes the leadership, adaptability, and critical-care expertise of combat medics and prepares them for medical school through tailored coursework, mentorship, and Medical College Admission Test [MCAT] support. A former flight medic, Loudon balanced deployment and test preparation while translating her operational experience into civilian clinical practice. As she begins medical school, she aims to serve rural and underserved communities while continuing her military service through a future commission.

Senior Airman Greydon Furstenau

As the 39th Force Support Squadron fitness assessment cell manager, **Airman 1st Class Jasmine Perez** helps Turkey's Incirlik Airmen stay fit, ready, and confident in meeting Air Force standards. A lifelong athlete and nationally qualified bodybuilder, Perez brings discipline, consistency and encouragement to her role, overseeing fitness testing and training unit fitness leaders across the base. Her commitment to physical readiness supports not only performance but also mental resilience and leadership by example. "You don't have to be perfect," Perez said. "Just ask questions, show up and be willing to learn. You'll be surprised where it can take you."

Senior Airman Grace Bynum

Air National Guard's **131st Bomb Wing,** Whiteman AFB, Mo., won the inaugural Air Force Historical Foundation (AFHF) Award for Superior Unit Performance for their role in Operation Midnight Hammer, which targeted Iran's nuclear facilities in 2025. Working alongside Missouri's 509th Bomb Wing, planning and executing the 36-hour-long mission, this marked the first time the ANG participated directly in a nuclear deterrence strike of this scale. Operating B-2 Spirit bombers and delivering 30,000-pound GBU-57 MOP bombs, the 131st played a pivotal role in displaying integrated and decisive combat power. This new award is similar to the AFHF's Jimmy Doolittle Award for joint operations in high-stakes environments, which will be awarded to the 509th.

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


Staff Sgt. Madelyn Keech

**Following the successful Operation Absolute Resolve to capture Venezuela's Nicolás Maduro, President Donald Trump promised to raise the defense budget in 2027 to $1.5 trillion, a 50 percent increase over 2026.**

# Trump Promises a $1.5 Trillion Defense Budget

## What a 50% Spending Boost Might Mean for the Air Force and Space Force.

**By Courtney Albon**

President Donald Trump was so impressed with the military's successful Operation Absolute Resolve in Venezuela Jan. 3 that he soon took to social media to assert his plans to increase defense spending dramatically: to $1.5 trillion in fiscal 2027.

A $1.5 trillion budget would equal just under 5 percent of 2025.

It the President follows through—and Congress agrees—both major "ifs" at this stage—the 2027 budget would be about $500 billion over and above anticipated 2026 spending levels, an increase unseen in more than 70 years.

"This will allow us to build the 'Dream Military' that we have long been entitled to and, more importantly, that will keep us SAFE and SECURE, regardless of foe," Trump said in the Jan. 7 Truth Social post. He suggested the funding could come from tariff revenue. It was unclear if the President was mapping out a negotiating position or stating policy with the announcement, but he laid out his reasoning in his post.

GOP leaders in Congress were quick to praise Trump's commitment to raising the defense top line, led by Senate Armed Services Committee Chairman Roger Wicker (R-Miss.), a longtime advocate for raising defense spending to 5 percent of GDP—just as European NATO members have been asked to do by President Trump.

Wicker and House Armed Services Committee Chairman Mike Rogers (R-Ala.) said in a joint statement that raising the budget to $1.5 trillion would help accelerate key modernization programs across all the armed services.

"Increased investment will lead to tangible hard power: accelerated shipbuilding and aircraft production, a modernized arsenal, and innovative technologies that ensure our warfighters remain unmatched," the lawmakers said. "These efforts prioritize the needs of our men and women in uniform and deliver the 'Dream Military' President Trump has envisioned."

Analysts and former defense officials responded more cautiously. Exactly how the funding would be distributed among the services is unclear, at least until the White House releases its 2027 budget request in February or March. It is also possible the topline could shift between now and then. Also not clear is whether tariff revenue alone—which Trump has also earmarked for other administration goals, including reducing the federal debt and distributing rebate checks to middle-class Americans—would be sufficient to fund the increase.

Defense analyst Byron Callan of Capital Alpha Partners was pessimistic about Congress going along with such an increase in a Jan. 7 note to investors. While Republicans successfully passed an extra $150 billion in 2026 defense funding in the Big Beautiful Bill Act, using a procedural process called reconciliation, Trump's proposal comes at a politically charged time, in the midst of an election year.

Republicans hold a razor-thin margin in both the House and Senate, and fissures are beginning to show in the Republican coalition.

Callan questioned whether the Pentagon could even digest such an increase, noting that the U.S. defense industrial base is not equipped to absorb such rapid increases in spending. "It raises multiple questions about how funding would be spent and how this increase could be absorbed by the defense sector," he wrote.

## MODERNIZING THE AIR FORCE

Yet for the Air Force and Space Force, a massive injection of additional capital could help reverse years of shortfalls, accelerate their massive modernization portfolio, and ramp up aircraft and satellite production.

Balancing those new-build requirements with the needed investments in workforce, training, and industrial base support could be tricky, and risky without long-term, sustained budget growth.

The Air Force typically garners about 20 percent of the military's budget, although a sizable portion of that passes through the Air Force and is spent elsewhere. But assuming that portion remains consistent, the Department of the Air Force increase would be about $100 billion in 2027.

Retired Lt. Gen. Dave Deptula, dean of AFA's Mitchell Institute for Aerospace Studies and former Air Force deputy chief of staff for intelligence, surveillance, and reconnaissance, said he thinks the service should use the potential influx to rebuild aircraft inventories with new aircraft purchases to replace aging fleets, and to increase sustainment and flying-hour accounts to improve the service's combat readiness. The service could use some funds for F-47 and Collaborative Combat Aircraft, he said, but focusing on existing production lines will address the most pressing needs first.

"You can come up with all kinds of ways to spend the money," he told Air & Space Forces Magazine. "The most logical one from the Air Force's perspective is you just start increasing the procurement buys."

Todd Harrison, a senior defense and budget fellow at the American Enterprise Institute, suggested the Air Force would do well to focus any additional funding to cover cost overruns on programs like Sentinel, the long-delayed replacement to the Minuteman III intercontinental ballistic missile, and to accelerate the F-47 next-generation air dominance fighter and the recapitalization of its aerial refueling fleet.

"I would not count on this being a sustained increase in funding, so I would avoid increasing force structure," Harrison said. "It would make more sense to buy down the acquisition bow wave as much as possible while the money is available."

Deptula and Mark Gunzinger, the Mitchell Institute's director of future concepts and capability assessments, in a policy paper published at the start of the Trump administration, proposed a

$45 billion budget increase for the Air Force. The paper outlined a plan to acquire an extra 32 F-35As, 24 F-15EXs, and 10 B-21s annually, as well as a fleet of at least 26 E-7 early-warning and battle-management jets.

They also called for funding a Next-Generation Aerial Refueling System program to be able to start production in the mid-2030s and advocated for fully funding the Sentinel program. Deptula also said the ground-based air defense mission, flying hours, and weapon systems sustainment should also be top priorities for the service, and could be funded with an increase in the $100 billion range.

But Deptula emphasized that one-time boosts are far less valuable than sustained annual funding. "Key to this increase will be that this level for defense spending cannot only be a one-time shot," he said. "It needs to be a re-leveling for future multiyear defense appropriations."

## MEETING DEMAND FOR SPACE CAPABILITIES

The Space Force has the smallest budget share of all the military services, around 3 percent of total Pentagon spending, or $26 billion in fiscal 2026—though reconciliation increased that to about $40 billion. If its portion of a $500 billion defense increase were proportionate, it would receive an additional $15 billion in 2027.

But both Deptula and Charles Galbreath, senior resident fellow for space studies at the Mitchell Institute, argued that the Space Force should receive a greater than proportionate share of the increase to help it add personnel and meet the increasing demand for space-dependent missions, such as space-based moving target indicators, and to increase its space superiority and counterspace capabilities.

Harrison was skeptical of this approach, arguing for his part that the Space Force is "flush with cash" for current obligations, due to reconciliation funding. More resources could help address unmet mission needs like building out its data transport layer, he said, but he argued that USSF should focus on delivering existing programs before launching new ones.

"The challenge for the Space Force is more about execution on programs than funding," Harrison said.

The Space Force will play a major role in the Pentagon's Golden Dome missile defense architecture, which is envisioned as a multilayered missile defense shield that will combine existing sensors and missile tracking capabilities alongside advanced intercept technology. Galbreath suggested increased funding could speed development and scale production of existing sensors.

"There's certainly a layer of sensors that has to be increased and expanded," he said. "The C2, synthesizing all of that information, is also critical. There is progress that's being made on that front, so I would expect additional funding to help accelerate the delivery."

For the more challenging developmental elements of Golden Dome—space-based and ground-based interceptors—additional funding could allow the Space Force and other agencies to spread contracts among more companies, increasing competition to reduce risk and accelerate development.

"If you've got today three companies that are pursuing space-based interceptors, maybe you increase that to seven or 10 if you've got additional funding, knowing that some of them are simply going to fail," Galbreath said. "And then once you've

got winners, you're going to put a whole lot more money into those to scale them to meet the threat environment."

Beyond program increases, Galbreath suggested funding could be used to enhance the Space Force's training enterprise and to increase the workforce it will need to manage acquisition programs and operate new systems. He cautioned, however, that the service should focus on sustainable investments initially, in case funding levels aren't maintained in future years.

"You don't want to buy 20 weapon systems if you only have personnel or sustainment funds for 10 in the out-years," he said. "You've got to manage your growth in a realistic way."

### EXECUTION CHALLENGES

Both Galbreath and Deptula said they expect the defense industrial base is well positioned to take advantage of additional funding—whether to expand production lines or fill personnel gaps created by significant government cuts over the last year. "We're not talking about inventing new stuff," Deptula said. "We're talking expanding what is either already on the books or on the drawing boards. … With sustained funding, the production lines that are already in existence can increase output at meaningful rates."

Similarly, Galbreath said the space industry is ready and waiting for a demand signal from the department. But a significant increase in production demands could pose challenges for the growing space industrial base.

"The big question I have is supply chain and pace," he said. "Will we be able to produce the quantities of capability at the rate the government needs to match the spending profiles as well as the operational demand signal we see from an emerging threat? President Trump when he unveiled the $1.5 trillion, he said we're looking at the threats and that number is based off of a realization of how significant those threats are. We have to meet them."

# New Defense Strategy Prioritizes Western Hemisphere

**By Matthew Cox and Greg Hadley**

The Pentagon released its new National Defense Strategy Jan. 23, emphasizing a new commitment to the Western Hemisphere. But while that focus garnered most of the headlines, the strategy's subtle shifts on China raise questions about how the Trump administration aims to leverage U.S. military power in the Indo-Pacific. The 2026 National Defense Strategy says the U.S. will practice "realistic diplomacy," emphasizing "deconfliction and deescalation" in its relations with China so that the two economic rivals and their trading partners in the Pacific can "enjoy a decent peace."

"Our goal in doing so is not to dominate China; nor is it to strangle or humiliate them," the strategy states. "Rather, our goal is simple: to prevent anyone, including China, from being able to dominate us or our allies."

The United States will erect "a strong denial defense" along the first island chain, the strategy explains, referring to the Pacific islands that include Japan, Taiwan, portions of the Philippines, and Indonesia. It will ensure the U.S. military can conduct "devastating strikes and operations against targets anywhere in the world, including directly from the U.S. homeland."

But the unclassified version of the strategy released to the public leaves the term "denial defense" undefined.

"We will be strong but not unnecessarily confrontational," the strategy concludes. "This is how we will help to turn President [Donald] Trump's vision for peace through strength into reality in the vital Indo-Pacific."

Airman 1st Class Arnet Tamayo

**The new National Defense Strategy prioritizes defense of the U.S. homeland, security in the Western Hemisphere, and a denial strategy to ensure U.S. forces can operate throughout the first island chain in the Pacific.**

### PIVOTING EAST

Beginning in 2011, successive U.S. administrations have sought to reorient U.S. defense priorities from Europe and the Middle East to a greater focus on China and Asia. President Barack Obama's administration coined the term "pivot," but with combat operations in Afghanistan, Iraq, and Syria, never fully made the shift. The first Trump administration's 2018 NDS leaned further toward China, coining the term "long-term, strategic competition" in which the U.S. and other great powers, including China, were facing off economically, technologically, and militarily. When the Biden administration published its NDS in 2022, it dubbed China "the "overall pacing challenge for U.S. defense planning."

The 2026 NDS still cites deterring China as a top priority, but defense analysts see a clear rhetorical shift in the new document. It is an "acknowledgment that we're probably not going to establish superiority vis-à-vis China," said Michael O'Hanlon, who directs foreign policy research and the Center for 21st Century Security and Intelligence at Brookings. "We're not looking to defeat China or change its regime. We're not looking even to chase the elusive goal of military supremacy against China, because we think that's not really attainable."

By giving up the "pacing challenge" language from the 2022 document, a former Air Force official argued, the new document "will be read as a weaker position that the United States is taking in terms of deterrence and resolve."

Retired Air Force Lt. Gen. David A. Deptula, dean of AFA's

Mitchell Institute for Aerospace Studies, disagreed. "I don't see any surprises in [the new NDS]," he said. The focus on the Western Hemisphere does not reduce concerns about China, he added: "I think the way people interpret homeland defense is sometimes a miss."

References to "denial defense" inside the first island chain are critical, Deptula said.

"The best way to achieve homeland defense is by deterring any adversary from shooting at our homeland, and the way you deter them is by ensuring that we have a very well-established power projection force that can crush them if they were to engage in any type of aggression against the United States," Deptula said. "If you want to deter China, you make sure they understand that they're not going to be able to operate from a sanctuary, and that from the first instance of aggression on their part, their homeland is coming under attack," Deptula added. "We're not going to let their missiles freely launch against us. That is some-thing that often times people overlook. They think, oh, homeland defense—we need to supply more catcher's mitts so we can catch those missiles that they shoot at us."

But defending the homeland has both defensive and offensive components, he said.

Elaine McCusker, a senior fellow at the American Enterprise Institute who was the Pentagon Comptroller during the first Trump administration, said it's clear that investments in such weapons as the F-47 Next-Generation Air Dominance fighter, the B-21 Raider long-range bomber, and the Golden Dome missile defense shield are all intended to "deter China or compete with China or see China as a pacing challenge."

Not spelling that out specifically could itself be strategic. How the U.S. develops its strong denial defense against China will be telling. Deptula said the denial defense should include equipping airbases in the first island chain with long-overdue passive defense capabilities like robust reinforced hangars and facilities that can endure an attack.

"You can expect Pacific airpower to be judged by whether it can survive the opening salvo attack," Deptula said. Hardened aircraft shelters, the ability to disperse forces and use deception to make it more difficult for enemy forces to mount accurate attacks on U.S. bases will be key, he said.

A recent RAND study recommended that the Air Force invest in rapid runway repair capabilities, blast-resistant shelters, and other passive measures to ensure fighter sorties can launch despite repeated bombardment.

Historically, Deptula said, "These things have not been funded. You've got to be able to generate sorties. … We need to be able to sustain our attacks."

The denial defense portion of the strategy will lean on the Air Force's agile combat employment concept (ACE), pushing it from an "operational concept to an operating system," Deptula said. ACE envisions small teams of Airmen setting up ad-hoc airfields in remote locations, dispersing airpower and making it more difficult to target.

"If you're going to disperse to a variety of airfields in the Pacific … it needs to be dozens, and those dozens of airfields need to be pre-positioned [with the] weapons, fuel, command and control required to allow them to contribute to a viable campaign," Deptula said. "But [the Air Force] needs to be funded to do that." O'Hanlon said the details not laid out in the NDS will likely show up in budget requests, including "purchases of munitions" and "to increase submarine production" or B-21 bomber production. Former Air Force Global Strike Command boss Gen. Thomas A. Bussiere told the Senate Armed Services Committee in May that he supported expanding the requirement for B-21s from 100 to 145.

O'Hanlon said the real tell will be in classified documents and budgets. "I would look in the classified budgets for things like radiation hardened satellites, anticipating the possibility of nuclear detonations in space, by any great power that was losing a conventional war and wanted to find a place to go in between conventional war and all out nuclear war."

How the U.S. views its allies in the Pacific is also telling in the new NDS, which suggests South Korea is capable of taking primary responsibility for deterring North Korea.

The Trump administration has "been fairly clear in telegraphing" it plans to adjust its forward posture in Europe and on the Korean Peninsula. "That that leads to questions in terms of the U.S. ability to address threats to the homeland before they manifest here at home," the former Air Force official said. "It's worrisome in terms of the total deterrence posture and being able to leverage our alliance architecture in the Indo-Pacific."

Deptula again disagreed, arguing that U.S. forces have been adjusting force posture in South Korea by moving Air Force units from Kunsan Air Base to Osan Air Base.

"Quite frankly, there's already a transition occurring in the context of how U.S. force posture is on the Korean Peninsula," Deptula said. "The South Koreans themselves have become a very capable force. … I think what you're going to see is that U.S. airpower is going to still remain a principal element when it comes to operations with the South Koreans, but it is going to need to be supplemented more with longer-range capabilities so that force presentation necessary for deterrence doesn't dip or slack off."

Still, the former Air Force official said the new strategy's use of a "strong denial defense" of the first island chain "makes me worry that there are trade-offs being made for other types of capabilities and concepts that are important for deterring Chinese aggression in theater."

President Trump's plan to increase the defense budget top line to $1.5 trillion in fiscal 2027—a potential boost of more than $500 billion above anticipated 2026 spending levels—deserves scrutiny in light of the NDS, the former Air Force official said. "Where is the $1.5 trillion going? How is the U.S. military preparing to demonstrate combat credibility for that deterrence, and how is that driving military modernization? Those questions are left unanswered, at least in the unclassified version of the strategy." At the same time, the former official questioned what a greater focus on the Western Hemisphere suggests. Strategically, it could mean focusing on keeping China and its Belt-and-Road initiative out of South and Central America, and reducing China's influence in critical locations like the Panama Canal.

But it could also mean changing the mix and design of U.S. forces, the former Air Force official suggested. Might more operations in the Western Hemisphere require different capabilities? "Does that then lead to the need for a high-low mix for the joint force overall?" the official wondered. "And are we back … in the post-911 era, where we know we need to be modernizing the military for contested environments and the demands of a China-like war fight, but the force is being used day-to-day in these low-intensity ways that require a different mix of capabilities?" The Trump administration has said little about the strategy beyond releasing the document. But the President is gearing up for a State of the Union speech in February, and a budget that should follow no later than March. Those two releases should shed more light on how the administration intends to leverage the strategy to shape its future investments.

# Compromise Defense Bill Adds Funds for Fighters, E-7

By Greg Hadley

Richard Gonzales

Congress rebuked plans to cancel the E-7 Wedgetail after a score of retired generals and the Air & Space Forces Association pressed to restore the program.

Congress is looking to add $900 million to save the E-7 airborne early warning and control aircraft from cancellation and $500 million aircraft from cancellation and $500 million to address "emerging needs" for the F-47 Next-Generation Air Dominance fighter in the fiscal 2026 appropriations bill released Jan. 20.

The bill also funds the Air Force to buy a dozen or so more airplanes this year, including six C-130Js, two Compass Call electronic warfare aircraft, and one more F-15EX fighter, along with some $401 million to address "economic" factors impacting the F-35 program.

The appropriation passed the House and was expected to clear the Senate and be signed into law at press time Jan. 30. It includes a total $17 billion over and above the Pentagon's top-line request of $832 billion for defense, according to analyst Byron Callan of Capital Alpha Partners, not counting $156 billion approved last year by Congress as part of the Big Beautiful Bill Act reconciliation package.

If passed and signed into law, Air Force procurement would increase by $3 billion to $57.3 billion, from its request of $54.2 billion. But funding for operations and maintenance would decline by $1.4 billion and investment in research, development, test, and evaluation would decline by $887 million. Personnel spending would also decline, by $373 million, for a net increase of $401 million.

## WEDGETAIL FIGHTERS

Lawmakers successfully protected the E-7 Wedgetail pro-gram, which the Trump administration had sought to cancel in the 2026 budget. Furious pushback from former Air Force leaders and the Air & Space Forces Association appear to have swayed lawmakers, who included $900 million for E-7, bringing total 2026 investment to $1.1 billion, to "continue E-7 rapid prototyping activities and transition to engineering and manufacturing development aircraft," according to the joint congressional statement.

Lawmakers did not increase the number of Air Force F-35As to be purchased, as they have in years past, instead funding the Air Force request for 24 F-35As and 23 F-35B and C-models for the Navy and Marine Corps. The "economic factor" appears to address projected "price increases in the Lot 18 production contract" tied to supply chain issues. The F-35 Joint Program Office and contractor Lockheed Martin finalized Lot 18 and 19, covering 296 airplanes between them at a total cost of $24.29 billion. Negotiations on Lot 20 are ongoing.

The Air Force's request for 24 F-35As in '26 was its smallest ask in years—half as many as requested in 2025. The thinking when the ask was made was to limit procurement until the forth-coming Block 4 upgrade is ready, and Congress went along with that plan.

Separately, however, lawmakers added $140 million for spare parts for the jets' F135 engines and $80 million more for airframe parts in an effort to increase readiness. Congress also included $531 million in advance procurement to support future buys in its spending bill.

Lawmakers added $115 million to pay for an additional F-15EX Eagle II, increasing the 2026 buy to 22 jets.

Still, the biggest spending increases in the fighter jet category were reserved for the sixth-generation F-47. Lawmakers raised spending by $500 million, from $2.57 billion to $3.08 billion, as part of a package of plus-ups it said were "to address Department-identified needs after passage of [reconciliation] and emergent requirements."

They also added $897 million in funding for the Navy's next-gen fighter, the F/A-XX. In a joint statement accompanying the bill, appropriators directed the Navy to use the funds "to continue F/A-XX development" and award an engineering, manufacturing, and development contract "to achieve an accelerated Initial Operational Capability."

## MORE NEW AIRCRAFT

Congress members put up $976 million to acquire six new C-130J transports for the Air National Guard and $194 million to buy a new LC-130J "Skibird," a C-130 adapted for landings in the Arctic and Antarctic to replace old H models.

Also added: $494 million for two EA-37 Compass Call electronic warfare aircraft, which would bring the total fleet size to 12, matching the original program requirement, and $250 million to buy a new C-40 executive transport jet. Finally, the measure adds $100 million for an unspecified number of additional HH-60W helicopters. Air Force budget documents suggests that would cover two aircraft at $40 million per air-frame, plus other costs.

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# Air Force Revises Deployment Model—Again

**By Greg Hadley**

The Air Force is revising once again its deployment model, scrapping its plans for "deployable combat wings" and revamping the Air Expeditionary Wing with a new AEW 2.0 model.

The new AEW won't return to the pick-up game AEW model of the 1990s, but will instead "form approximately 18 months prior to deployment so that its teamed, capabilities-based components can train and certify as a cohesive unit," according to a release.

In canceling deployable combat wings (DCW), the Air Force is abandoning yet another of the initiatives launched as part of 2024's "re-optimization for great power competition." Other elements previously canceled include a planned "Integrated Capabilities Command," the downgrading of major commands, and the renaming of Air Education and Training Command as Airman Development Command.

AEW 2.0 retains the objectives of the Deployable Combat Wing while changing key elements of that approach. DCWs resource the personnel and equipment needed for a deployment ahead of time, so that Airmen could train, exercise, deploy, and reset as a collective unit. Central to each DCW was a command element, or "A-Staff;" a mission element, such as a fighter, bomber, or airlift squadron; and support elements to run the air base or airfield and care for the needs of wing personnel.

Airman 1st Class Samantha Melecio

**U.S. Air Force Airmen return from a five-month deployment with the 11th Air Task Force at Davis-Monthan Air Force Base, Ariz., in December. Now a new deployment model is in play.**

Like that model, the AEW 2.0 seeks to minimize the number of "unit type codes," or UTCs, needed to fill out a wing, an Air Force spokesperson told Air & Space Forces Magazine. UTCs define capabilities that comprise multiple Airmen; it take hundreds of UTCs to fill out a force package.

"The AEW will be comprised of significantly fewer UTCs than the legacy deployment construct," the spokesperson said. The new model starts with a "core UTC" that covers both the command and control element and a base operating support element. The C2 element will not be an "A-staff," however, but a wing operations center, the spokesperson said.

"The forces comprising the AEW Core UTC are sourced from predominantly one [major command], from as few additional bases as possible, and early in the deployment cycle to promote unit cohesion as they prepare, train, and certify together," the spokesperson said.

The new wings will still be "modular," with the Core UTC able to work with a wide variety of Mission Generation Force Elements, which comprise the operational forces.

"The MGFE are selected to provide expertise as required so the group and wing commanders are equipped to command effectively," the spokesperson said. "Each wing will have its own unique set of demands that require a commander-driven employment plan that is base- and mission-specific."

When DCWs were first introduced, commanders at the major command level objected to the construct because they thought it failed to recognize core differences between the major commands and their particular expertise. With the Air Force now under new leadership—specifically Air Force Chief of Staff Gen. Kenneth Wilsbach, who headed Air Combat Command when the DCWs were conceived—the concept has now been revised.

AEW 2.0 "will be implemented in fiscal year 2027," which starts Oct. 1.

It has been nearly five years since the Air Force unveiled the Air Force Force Generation Model, or AFFORGEN, in an effort to better manage Air Force deployment rotations. AFFORGEN established a 24-month cycle, with four phases designed for units to prepare, certify, deploy, and reset. The goal was a predictable rhythm for presenting forces to combatant commanders and a clearer means of projecting and assessing risk and operational tempo.

What followed were a series of evolutionary changes, be-ginning in October 2023 with "Expeditionary Air Base" teams or XABs, that included a core nucleus of Airmen who trained together beforehand, plus additional personnel that joined the group in theater. Next came six Air Task Forces, or ATFs, which were built around teams of several hundred Airmen that came together a year before deploying; those teams then drew from a handful of bases when they deployed. The first ATF deployed in September 2025.

Deployable Combat Wings were envisioned as the culmination of that evolution. But the new AEW construct scales back on some of the biggest changes embodied in the DCW model, including interchangeable air staffs regardless of expertise and eliminating group commands.

The Air Force spokesperson said AEW 2.0 preserves "capacity to fulfill the in-garrison mission and defend the homeland," acknowledging that the DCW concept could have left some bases undermanned.

# Golden Dome's Director Guetlein Focuses on Command, Control, and Interceptors

**By Courtney Albon**

The Pentagon's Golden Dome director said Jan. 23 his top priorities for the advanced homeland missile defense shield over the next two years are establishing a baseline command and control capability and integrating interceptors into that system. The vision for Golden Dome—initially cast by President Donald Trump's administration in the early days of his second term—is a sprawling network of sensors, satellites, and interceptors designed to protect the United States from missile threats. In a speech at Space Systems Command's Industry Days Conference in Los Angeles, Golden Dome Director Gen. Michael Guetlein offered new insight into how the program hopes to make progress toward delivering on that vision in the next few years, with the goal of demonstrating an initial capability by 2028 and an "objective architecture" by 2035.


Eric Dietrich

**Gen. Michael Guetlein , director of the Golden Dome missile defense system, is aiming to demonstrate initial operational capability by 2028 and achieve an "objective architecture" by 2035.**

First on the list is to develop an integrated command and control system by this summer. Guetlein described the system as a "glue layer" that will connect all of the tactical C2 capabilities that will contribute to Golden Dome. Since July, Guetlein's team has been working with a consortium of six companies to integrate new and existing C2 capabilities into that system.

"Those six partners, and they are partners, are working together and holding each other accountable through peer pressure to deliver what they said they're going to deliver on the timeline they said they're going to deliver," he said. "We have to have that delivered this summer and demonstrate the C2 capability in front of the president."

In 2027, the program's focus will shift toward integrating interceptors into that architecture, a task Guetlein hopes to achieve by that summer. It's not clear how many or what types of interceptors will be part of that initial effort. The Space Force is working with industry to prototype space-based interceptors that can take out enemy missiles in the boost and midcourse phases of flight. In late November, the service awarded contracts to 18 companies for boost-phase interceptor designs.

## SECURITY CONCERNS

As Guetlein and his team—which now consists of 52 personnel but will soon grow to 100—get after the program's technical goals, they've also been managing a barrage of security threats since the program's inception.

Those threats started in July, just after Guetlein was confirmed to lead the office, he said.

"I was confirmed July 18," Guetlein said. "On the 20th of July, they started hacking our defense industrial base."

Guetlein didn't expand on the sources or scope of the "hacking" but said it raised enough concern that Pentagon leadership directed the program to "go silent."

That silence about a program that's expected to cost $175 billion over the next three years—and much more beyond that—has drawn scrutiny from the public, members of Congress, and some in industry. Defense appropriators, in their draft of defense spending legislation released Jan. 20, called for more insight into the program's budget.

Guetlein acknowledged the program's secrecy and defend-ed it—saying that the threats from adversaries demand the Pentagon protect information about the program.

"We have been quiet," he said. "I've not been talking to industry consortiums. I've not been talking to the press. I've not been talking to the think tanks. And it wasn't until September I was allowed to even start talking to the Hill. That is why we're not talking much, because we need to preserve this capability to defend this nation from our adversaries."

Because of the threat, Guetlein has been limited to classified briefings on the Golden Dome architecture, meeting one on one with members of industry. To date, he's briefed more than 350 firms, including all of the major defense primes. Asked when the program would have another industry day—the first and only was held in August—Guetlein said it's not likely to happen in the near term. The program became "too exposed" after its first industry day, he said, possibly referring to briefing slides that leaked within days of the event.

To give more companies access to contracting opportunities, particularly small businesses, the program plans to establish an industry touchpoint, similar to Space Systems Command's Front Door, that companies can use to engage with program officials and address concerns about security vulnerabilities. That should be active by next month, Guetlein said.

"The approach we are taking on security with our industry partners is very collaborative," he said. "I have a team that is focused on working directly with you to talk to you about your vulnerability points and how you might be able to fill them, trying to let you know what could be happening to you—and in some cases, what is happening to you—and then working collaboratively with you to close those."

# At F-35 Factory, Hegseth Makes Acquisition Reform Case and Says Lockheed Will 'Step Up'

**By Courtney Albon**

Defense Secretary Pete Hegseth foot-stomped the Pentagon's push for acquisition speed and contractor accountability in a Jan. 12 speech at Lockheed Martin's production hub in Fort Worth, Texas—the heart of the department's biggest acquisition program, the F-35.

"We're changing the game to incentivize speed, to incentivize efficiency, competition, open architecture at cost—ensuring that big companies like this one, and small ones, can compete," Hegseth told employees who work at the plant.

The factory floor has become a sort of stage for Hegseth in recent weeks as he travels the country to defense firms large and small as part of his "Arsenal of Freedom" speaking tour, which started Jan. 5 at an HII shipyard in Newport News, Va. The campaign comes as both the Defense Department and the White House push for reforms across the defense industry, targeting waste in the Pentagon and the companies it buys from.

Hegseth in early November released a sweeping acquisition reform strategy meant to restructure Pentagon organizations and processes and inject more competition and accountability into weapon development programs. On Jan. 7, President Donald Trump issued an executive order that seeks to bar underperforming defense contractors from issuing stock buybacks and tie executive compensation to program execution. The order bemoans "years of misplaced priorities" by defense contractors and states that prioritizing "excessive dividends" over on-time capability deliveries harms military readiness and "betrays the American people."

The F-35 is perhaps one of the most cited examples of a troubled DOD acquisition program with an estimated lifetime cost of $2 trillion, and Lockheed has drawn criticism for development delays and cost overruns. Hegseth acknowledged in his speech that he has "had some pretty tough words to say" about defense primes in recent months as he pushes for change in the acquisition system.

But he also struck a conciliatory tone toward Lockheed leadership. He highlighted the company's recent successes—a record 191 F-35 deliveries in 2025, and a recent agreement with the Pentagon that could triple the firm's delivery of Patriot Advanced Capability-3 missiles for the U.S. and its allies—and said he believes Lockheed will "step up" to meet the Defense Department's demands.

DOD

**Defense Secretary Pete Hegseth told Lockheed employees that "if you create the best and the fastest at cost ... you're going to win."**

"If you create the best and the fastest at cost on behalf of taxpayers and the warfighters, you're going to win," he said. "I hope, based on what Lockheed Martin can do, that you win a lot. Because you make incredible, exquisite platforms." Hegseth's acquisition reforms call for more competition within the defense industrial base, opportunities for nontraditional vendors and adoption of commercial buying practices. The objective, he said, is to deliver systems that service members need on time and with less waste, not to displace larger defense firms.

"We ultimately don't care what the name is on the side of the missile or the plane or anything that's made at the War Department," he said, using the alternate title for the department authorized by Trump. "We just want the best. And our expectation is that every company competes and every company competes on a level playing field."

SPACE

# Space Force Looks Beyond Earth's Orbits

**By Courtney Albon**

The Space Force's small size has limited its capacity to consider what role it will play in future operations on and around the moon. That needs to change, according to Vice Chief of Space Operations Gen. Shawn Bratton.

The service is in the midst of distilling its future operating needs into an "objective force" that lays out what platforms, support structures, and manpower will be required to maintain space superiority between now and 2040. That document should be released sometime this year, and during a Jan. 21 event at Johns Hopkins University's Bloomberg Center in Washington, D.C., Bratton said a plan for cislunar operations needs to be part of that discussion.

"We're thinking about that a little bit, but we should be thinking about it a lot right now," he said. "Some of that is capacity; we're small, and we're focused on first things first.

... But we should be thinking about cislunar."

Much of the U.S. government's moon ambitions have centered on NASA and its Artemis program. The agency plans to launch a crewed lunar landing mission in mid-2027 as well as several moon-orbiting missions in the meantime. The first of those is slated to launch in February and will send four astronauts on a 10-day flight around the moon.

The Defense Department and the Intelligence Community have largely focused their attention on developing domain awareness and navigation capabilities to better understand cislunar space, the vast region between geosynchronous orbit and the lunar surface. The Space Force's Oracle program, run by the Air Force Research Lab, plans to launch several space situational awareness satellites in the coming years. And the National Geospatial Intelligence Agency is working with the Space Force and NASA to create the mapping infrastructure for a GPS-like capability to support lunar navigation.

Jud McCrehin/Staff

**The Space Force is small today, but needs to think bigger, urged Vice Chief of Space Operations Gen. Shawn Bratton. "We should be thinking about Cislunar."**

Bratton said the Space Force should expand its cislunar planning and he challenged the companies supporting NASA and pursuing their own commercial moon endeavors to con-sider how DOD could leverage their work.

"There are a lot of companies going to the moon right now," he said. "What is the national security implication of your work? And what do you need from the Space Force? Start to demand that, or at least help us think through that."

AFA's Mitchell Institute for Aerospace Studies, argued in a 2024 report, that cislunar space is akin to the first island chain in the Pacific—strategically relevant to securing space for all. "DOD must establish an infrastructure for the cislunar regime, extending the types of services and capabilities currently in operation closer to Earth, such as space domain awareness, high-bandwidth communications, and cislunar navigation technologies," the report argued.

## BEYOND CISLUNAR

Besides cislunar operations, Bratton highlighted two other areas the Space Force's objective force will need to address: satellite refueling and the implications of Guardians one day operating in orbit.

The service has for years been weighing how to invest in refueling capabilities, and Bratton said it's still having active discussions about whether the military should lead the way or lean on industry.

"We have a really good hand on the cost curve of when it becomes economically beneficial to start refueling a constellation," he said. "It has to do with the size of the constellation and the cost of each spacecraft. And so, we're getting really good information on when it makes sense for economic reasons. I don't know that that's the exact same thing as military advantage."

The Space Force and other DOD agencies have four missions slated to launch this year to demonstrate satellite refueling, servicing, and repair capabilities that will inform the service's ongoing analysis.

In contrast to refueling and mobility, USSF talks very little about when and if it may one day need to have Guardians operating in space. While there are "some corners where people are writing papers about it," Bratton said there should be more open discussion within the service.

"Where are we going with that? I don't have the answer to that," he said. "It would be tragic if that didn't happen someday. Is that day 2030, 2040, 2050? I don't know. We owe work on that.

# Space Force Activates SOUTHCOM Component

By Greg Hadley

The Space Force celebrated the activation of its component under U.S. Southern Command in a Jan. 21 ceremony—though it did reveal the organization became operational Dec. 1, 2025, presumably meaning it contributed to Operation Absolute Resolve, the Jan. 3 mission to capture Venezuelan President Nicolás Maduro and take him to the U.S. for trial.

Chief of Space Operations Gen. B. Chance Saltzman, Air Force Undersecretary Matthew Lohmeier, and acting SOUTHCOM Commander Air Force Lt. Gen. Evan L. Pettus were all on hand for the activation ceremony at Davis-Monthan Air Force Base, Ariz. Col. Brandon P. Alford leads the new organization, Space Forces Southern, which will be co-located alongside Air Forces Southern.

"This new organization reaffirms our commitment to address local threats of all shapes and sizes, ranging from malign state actors to violent extremist organizations and to transnational criminal organizations," Saltzman said at the ceremony. "Space Forces Southern will continue to be a force for good in the region, using space to maintain peace and stability, and defend the homeland."

Components serve as organizational links between the services and combatant commands, presenting forces for operations.

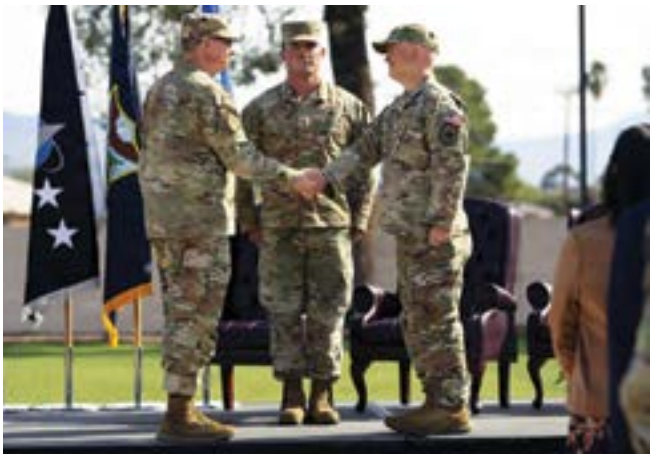
In late 2022, the Space Force made a point of establishing its first component under U.S. Indo-Pacific Command, reflecting the strategic focus on the "pacing challenge" of China. Since then, the service has established components for sub-unified combatant commands in Korea and Japan, a component for

U.S. Central Command, and a combined component for U.S. European Command and U.S. Africa Command.

Plans have been in the works to create Space Forces Southern for some time now, but they likely gained new urgency after the release of the Trump administration's National Security Strategy in November, which places a greater priority on the Western Hemisphere.

"The activation of Space Forces Southern affirms a simple and powerful idea: we are one hemisphere, stronger together," Alford said at the ceremony. "Bound together by geography, values, and a shared future above us—connected by shared challenges and shared opportunity."

U.S. Southern Command as a whole has seen a major increase in activity in recent months as part of Operation Southern Spear, the mission to combat drug trafficking and pressure the regime of Maduro, and Operation Absolute Resolve.



Tech. Sgt. Rachel Maxwell

**U.S. Air Force Lt. Gen. Evan L. Pettus, left, U.S. Southern Command acting commander shakes hands with Col. Brandon Alford, right, U.S. Space Forces Southern commander during an activation ceremony for U.S. Space Forces Southern at Davis-Monthan Air Force Base, Ariz., Jan. 21, 2026.**

Space assets have played a role in all this; according to photos taken Dec. 4 and released a few weeks later, Guardians deployed to Puerto Rico during the buildup of U.S. military forces in the Caribbean. Chairman of the Joint Chiefs Gen. Dan Caine specifically noted that U.S. Space Command contributed to Operation Absolute Resolve. He did not explain how, exactly, and officials have largely declined to elaborate, citing operational security. "Space-based capabilities such as Positioning, Navigation and Timing and satellite communications are foundational to all modern military activities. As such, to protect the Joint Force from space-enabled attack and ensure their freedom of movement, U.S. Space Command possesses the means and willingness to employ combat-credible capabilities that deter and counter our opponents and project power in all warfighting domains," a SPACECOM spokesperson previously told Air & Space Forces Magazine.

Saltzman also referenced recent events in South America and the Caribbean.

"As we clearly saw in recent operations in the SOUTHCOM [area of responsibility], without space, kill chains don't close, our strategic advantage evaporates, and we can't complete our joint missions," Saltzman said.

While SPACECOM is responsible for providing effects from orbit, it still needs to coordinate with SOUTHCOM and Space Forces Southern.

# On-Orbit Satellite Servicing—4 Missions in 2026

By Shaun Waterman

Four satellite missions will launch in the coming year to demonstrate on-orbit refueling, servicing, and repair capabilities to extend the lives of military satellites. Funded by different Department of Defense entities, each will also entail commercial efforts.

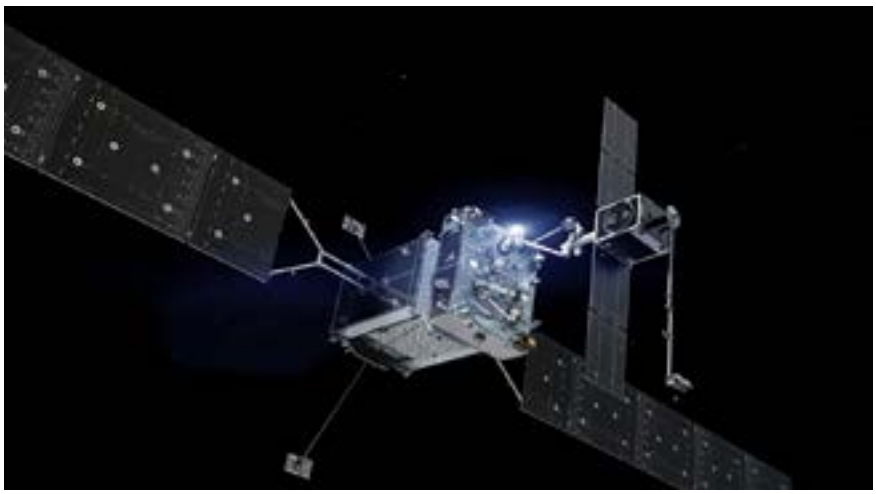
The missions are critical for the Space Force, according to officials and industry executives, which sees dynamic space operations—the ability to maneuver satellites as needed to either approach or avoid adversary space systems—as crucial to its ability to fight and win a space conflict. Without that ability, every maneuver that expends a satellite's fuel effectively shortens its life.

China, which operates a smaller space fleet, appears a step ahead in this regard. In June, two Chinese satellites docked in geosynchronous Earth orbit, performing the first-ever on-orbit refueling mission in GEO. The U.S. Defense Advanced Research Projects Agency (DARPA) demonstrated on-orbit years ago with satellites in low-Earth orbit and special refueling equipment in

2007. But standards for refueling satellites have changed little since then.

The Space Force is betting the private sector can provide these capabilities, and all four missions scheduled for 2026 aim to demonstrate not just the technology but the business case, as well.

The four planned operations will all be in GEO, more than 22,000 miles above the Earth's surface. Operating from a fixed point in the sky relative to the ground, GEO offers consistent communications and coverage, with more than 500 high-end, large satellites performing crucial telecommunications and broadcasting functions. These highly engineered spacecraft, developed at great expense and intended to have a useful life measured in decades for both government and commercial customers, are prime opportunities for life-extending services.



Northrop Grumman's Space Logistics

**An artist's rendering of the Mission Robotic Vehicle with a Mission Extension Pod.**

Rob Hauge, president of SpaceLogistics, a Northrop Grumman company, said the opportunity is huge. "Every year about 10 to 20 reach their end of life because they run out of fuel," he said.

Without having been designed to take on additional fuel in flight, the question becomes how to retrofit that capability to an existing system. One solution: Add a new component to the existing satellite bus, a so-called "Mission Extension Pod (MEP)."

SpaceLogistics has developed its own Mission Robotic Vehicle (MRV) to bridge service satellites in GEO. Equipped with an autonomous robot arm developed by the Naval Research Laboratory, and funded with DARPA money, Space Logistics will launch an MRV next year to demonstrate Robotic Servicing of Geosynchronous Satellites (RSGS). Under that program, MRV will recover a satellite and reposition it in orbit, and then, using its robotic arm, capture and install a Mission Extension Pod, attaching it to the existing satellite and giving the satellite a new lease on life, with freedom to maneuver.

Hauge said once in space, the MRV can "do that again and again and again," extending the profitable life of aging satellites. The MRV can also be used for "anomaly resolution," said James Shoemaker, DARPA program manager for RSGS. In other words: it can repair systems.

About three times a year, something unknown goes wrong with a satellite in GEO, Shoemaker said. "You'll have a partial deployment of a solar array where, perhaps the hinge just gets a little stuck," or an antenna deployment doesn't go as planned, he said. Operators on the ground can try various measures to resolve the problem, but as they "try to rock the satellite" to shake a stuck part loose, they also are expending some of its limited fuel. Often, when something goes wrong, operators are basically in the dark, Shoemaker said. MRV can maneuver near the satellite to provide "a picture and a close inspection of what exactly is wrong," making it "a lot easier for them to figure out a solution." It's notable, Shoemaker said, that RSGS is the second DARPA program to demonstrate on-orbit refueling and servicing capabilities.

"Typically, DARPA does things first to prove you can do them, and then we hand them off and start doing something different," he told Air & Space Forces Magazine. Revisiting a challenge is "somewhat unusual," he said, but the earlier Orbital Express in 2007 was in LEO, where the economics of servicing and repair are very different. Satellites in LEO are typically smaller and less costly, making repair not necessarily worth the cost.

In GEO, where satellites operate in a single orbital plane above the equator, the satellites are larger and more costly, with much wider areas of coverage. And in GEO, Shoemaker explained, "changing your angle of inclination takes a lot of delta V, a lot of fuel."

Greg Richardson, executive director of the Consortium for Space Mobility and In-Space Servicing, Assembly, and Manufacturing Capabilities, or COSMIC, a professional association that works to promote on-orbit capabilities, said the economics of on-orbit servicing just don't add up in LEO.

So while 2007's Orbital Express "was a great demonstration of technology—it showed what's possible," he said, "If we're going to make on-orbit refueling routine, reliable, and safe, the primary place where that's going to happen is where there are lots of clients: in the GEO orbit."

In GEO, "refueling infrastructure can support many clients … and that's the key to bringing down costs," Richardson said.

Essentially, he sees solutions like MRV and MEPs as akin to the economics of a gas station compared to having to build out your own fueling infrastructure outside your home. "When you go and fill up, you don't have to buy an entire gas station to fill up your car," he explained. "You buy the gas that you need, and some fraction of that cost pays the overhead and fixed costs. … That's what you want to do in orbit."

The COSMIC community, which brings together representatives from government, industry, and academia, sees on-orbit refueling of satellites in GEO as the most commercially viable use case.

But the Pentagon is not limiting its research and development to that one regime. Its other three satellite mission-extending operations this year are:

■ **Astroscale U.S. Refueler.** A commercial refueling satellite developed by the U.S. subsidiary of Tokyo-based Astroscale Holdings, this program is funded by the Space Force's Space Systems Command. Scheduled to launch next summer, it will conduct the U.S.'s first hydrazine refueling operation in GEO, refueling a U.S. military satellite on orbit.

■ **Tetra-5.** A Space Force partnership with the Air Force Research Laboratory, this program aims to demonstrate autonomous rendezvous, proximity operations and docking along with an on-orbit inspection and refueling operation.

■ **Kamino.** Funded through the Defense Innovation Unit, this effort will put a satellite system on orbit carrying hydrazine fuel intended for transfer and delivery to refuel other satellites in GEO.

# Gene Smith, Former POW and AFA Chair, Dies at 91

**By Tobias Naegele**

Lt. Col. Richard "Gene" Smith, who overcame five and a half years as a prisoner of war in the notorious Hanoi Hilton from 1967 until 1973, died Jan. 16. He was one day short of his 91st birthday.

"Gene Smith was an American hero, whose honor endured torture and who came home as a shining example of enduring selfless service," said retired Lt. Gen. Burt Field, AFA's President and CEO. "We celebrate a life well lived and mourn his loss."

Smith was on his 33rd mission in the F-105 Thunderchief on Oct. 25, 1967, when he was redirected to strike the Paul Doumer Bridge over the Red River near Hanoi, North Vietnam. The bridge, built by the French and later renamed Long Biên Bridge, was a vital connection between Hanoi and the port of Haiphong.

Mike Tsukamoto

**Retired Lt. Col. Gene Smith addressing AFA's Warfare Symposium in 2023 recalled his Vietnam experiences almost 50 years to the day after his release following more than five years in captivity. Behind him is an image of Smith prior to his shootdown and capture in 1967.**

"That's the longest bridge in Southeast Asia [and] one of the most heavily defended positions in the history of aerial warfare," he recalled in a 2017 Air Force interview. It was a beautiful day, visibility was 30 miles or better, but as they got close in, they came under heavy flak; he went into a 40-degree dive and descended to drop his load, and just as he pulled off, he felt the flak hit his aircraft.

"It sounded like someone hitting a wash tub. … Next thing I know the airplane tumbled," he recalled.

In an interview with the Mitchell Institute for Aerospace Studies recorded in 2022, Smith recalled telling himself, "I'm not going to die in this son-of-a-bitch," and struggling to pull the ejection handle as his airplane tumbled through the sky. "And I started floating down, took inventory."

He could see bone through a hole in his flight suit near his ankle. He could see people below him, and began to shed his gear: two radios and a service weapon. As soon as he hit the ground, a North Vietnamese soldier ripped two AK-47 rounds through his legs, the bullets miraculously tearing only flesh, not bones. "God had something else for me to do that day," Smith recalled. "I'm a very lucky man."

The people stripped him to his shorts, cutting his clothes off, hands wired together behind him, loaded on a truck, and taken to the infamous Hỏa Lò Prison, known today as the Hanoi Hilton. Smith had completed survival training in 1964, but that experience hadn't really made a difference.

"Do you know when you start learning how to be a POW—if that ever happens to you?—it ain't in survival school," he said in the Mitchell interview. "It starts with your parents, or it starts with a coach, or it starts with a preacher, or a teacher, to instill in you what is right, and what America is all about. And you are very fortunate if you had a God-fearing family that exposed you to God. Because I can't imagine going through that stuff and being in prison without God."

The training he had received, such as giving no more information than name, rank, and serial number, went out the door in the first few seconds, Smith said. "They ask you what kind of airplane you were flying, and you say, 'I can't tell you that,' and the next thing you know I was knocked all the way across the room. And then I was put in a ball, inspecting parts of my body that I'd never seen before, with my arms behind me and an iron bar with some cloth and some filings on it in my mouth, and they put a rope around it and just pulled tighter and tighter. And then he left, and I said, 'Hell, maybe I'll die.'"

But Smith did not give up. Enduring some 1,967 days in captivity, he learned to make up answers when interrogated, but also to remember those answers so he couldn't be caught in a lie. Asked once who his commanding officer was, he offered "Bart Starr," the star quarterback of the Green Bay Packers, whom Smith had known as a fellow ROTC cadet during their college days. The captors never caught on.

A friend and fellow POW, Lee Ellis, lived in the same camp and shared a cell with Smith for close to two years. They remained close in the decades after their incarceration.

"Gene was a great cellmate and has been a wonderful friend over the 52 years since we came home," Ellis recalled. "He was tough and kind and a great example of how the Vietnam POWs resisted, survived, and returned with honor."

Following his release in 1973, Smith became an instructor

pilot for the 50th Flying Training Squadron at Columbus Air Force Base, Miss., beginning in November 1973. He held a series of jobs there before his final tour, as director of operations for the 14th Flying Training Wing. Smith retired from the Air Force in 1978.

For his exceptional bravery and leadership, Col. Smith was the recipient of two Purple Hearts, the Silver Star, the Distinguished Flying Cross with Valor, the Bronze Star with Valor, and the Air Medal.

Retired Maj. Gen. John Borling, who like Smith was shot down over North Vietnam and endured six-and-a-half years as a prisoner, paid tribute to his fellow Airman. "Gene Smith was a leader, during and after Vietnam, in two important groups," Borling said. "The 'never quits' and the 'keep marching' gang. He attacked life to the utmost, no dress rehearsals required."

Once back in civilian life, Smith was Executive Director of the Golden Triangle Regional Airport from 1979 to 1999. He was the volunteer National President of the Air Force Association from 1994 to 1996 and then AFA Chairman of the Board from September 1996 to September 1998. In those days, the day-to-day operations of the association were managed by a full-time executive director, and the President and Chairman were volunteer roles.

Richard E. "Gene" Smith was born in 1935 in Marks, Miss., and grew up in Tunica, Miss., where he made Eagle Scout at the age of 13. He was commissioned through the Air Force ROTC program at Mississippi State University on July 13, 1956, and two months later went on Active duty, completing Navigator Training in December 1957 and the Radar Intercept Officer Course in July 1958.

He was a Radar Intercept Officer on F-89 Scorpions and F-101B Voodoos with the 445th Fighter Interceptor Squadron at Wurtsmith Air Force Base, Mich., from then until October 1961, then went to Undergraduate Pilot Training at Williams Air Force Base, Ariz., where he earned his pilot wings in October 1962. After completing F-102 Delta Dagger Combat Crew Training, Smith served 30 months with the 82nd Fighter Interceptor Squadron at Travis Air Force Base, Calif., and then two years with the 496th Fighter Interceptor Squadron at Hahn Air Base, West Germany. He asked to fly F-4s but was turned down and assigned to fly F-105s.

Smith's wife of 45 years, Rae, preceded him in death in 2003. He later remarried and is survived by his wife, Lynn, three children from his first marriage—Kelly Lucas, Rick Smith, and Stacy Kellum—and two stepdaughters—Stacey Miears and Erin Holland—along with 10 grandchildren and seven great grandchildren.

PERSONNEL

# Air Force Basic Training's Mock Airfields

Artist's rendering courtesy of 2nd Air Force

**The Air Force intends to build a new expeditionary Air Base Training Range at Joint Base San Antonio-Lackland, Texas, this year to enhance the realism of Basic Military Training.**

**By Matthew Cox**

Second Air Force officials plan to inject more realism in Basic Military Training this year by building two mock airfields where Airmen will get hands-on training with real combat aircraft.

By October, BMT officials at Joint Base San Antonio-Lackland, Texas, hope to complete the first air base training range outfitted with a mock concrete runway, two C-130 Hercules Aircraft, and an F-16 Fighting Falcon aircraft, they told Air & Space Forces Magazine. Trainees will practice basic airfield support skills such as arming and refueling aircraft, repairing bomb-damaged runways, and loading casualties into a cargo aircraft for evacuation.

A second, more expeditionary air base training range that features dirt airstrips and possibly additional aircraft is scheduled to be completed by the end of the year. It will be designed to add a new level of realism for Airmen going through PACER FORGE, the final field exercise introduced in 2022 that simulates operations at makeshift air bases that trainees might experience conducting agile combat employment operations.

The effort is part of the next phase of the 2nd Air Force's sweeping transformation of basic training. The new phase, known as BMT 3.0, is scheduled to begin in April and follows on the launch of BMT 2.0 last October, which added more physical fitness training and an emphasis on teaching young Airmen how to operate in small teams to keep an air base operational during a war with a peer adversary such as China. BMT 3.0 will add additional training curriculum but mainly will focus on creating a realistic training environment to convert trainees into multicapable Airmen, 2nd Air Force Commander Maj. Gen. Wolfe Davidson told Air & Space Forces Magazine.

"This is about providing that basic context of what it takes to sustain airpower; we call it DOGS—defend, operate, generate, and sustain airpower," Davidson said. "That is the basic concept of how Airmen fight from an airfield."

In BMT 2.0, "we started with going to smaller teams, trying to do more practical events, less classroom work," Davidson added. "Those practical events will only increase with 3.0… but some of those events, you can't do until you actually get the training range; you can't actually put bombs on an airplane unless you have an airplane."

A large portion of the $30 million investment, spread be-tween the fiscal 2025 and 2026 defense budgets, will go toward building a training range that resembles a permanent air base that's a little larger than a football field on Lackland located near the drill pads where BMT is conducted, Davidson said. "We are moving really fast to put this thing up, but we have a longer-term plan which would be a military construction effort to formalize that base and make it more permanent, about twice as large and have more training environments," Davidson said, adding that he doesn't anticipate the long-term effort "going over $100 million," a funding request that he hopes to put into a fiscal 2028 request.

The permanent air base training range will be outfitted with an F-16 and two C-130s that were being used to train maintainers at Sheppard Air Force Base, Texas, said Maj. Chris Sweeney, director of logistics, infrastructure, and force protection for the 2nd Air Force. These low-functioning aircraft are on "their third life," he said.

"Their flying days are over," Sweeney said. "They've been transferred for training purposes for us to use."

The F-16 will be the first to arrive in April along with two containerized training modules that will be used for familiarizing Airmen with how to arm a fighter aircraft, Sweeney said. "The armament stations and the F-16 are the proof-of-concept for us to get some of the bugs worked out of the curriculum, to get the instructors some repetitions, and then also to get that excitement spread throughout the Air Force that we're doing something we've never done."

Construction of the short concrete runway, electrical work, and the rest of the tarmac will begin in the May-June time frame before the two C-130s and the rest of the training stations arrive in late summer, Sweeney said.

The plan is to have 16 containerized training stations on the permanent mock air base that train eight key tasks:

- Arming fighter aircraft
- Refueling
- Casualty transfer and evacuation
- Cargo loading
- Post-attack and repair
- Aircraft marshaling
- Aircraft familiarization
- Air base entry control.

"We'll have two of every station to maximize how many students we can push through," Sweeney said. "These are meant to be 45-minute familiarization sessions. The point is that we will evaluate them on those soft skills like teamwork, interpersonal communication, delegation, feedback, and analysis."

Trainees will get hands-on experience loading inert AIM-9 missiles on the F-16's wingtips, Sweeney said, adding that they will also be able to load the "under-wing rocket pods with the individual rockets, and then load the chaff and flare buckets on the sides of the aircraft."

The fueling stations will feature a weighted hose, so Airmen get the feel of dragging a heavy hose over to the aircraft and attaching it with a universal coupling adapter, Sweeney said.

For the post-attack and repair station, Airmen will assess simulated bomb damage to the runway and go through the steps of patching it.

"Our plan for that is to have mats that roll out over the concrete that have different damage printed on the mats," Sweeney said. "Then they'll go back to the container and based on what they assess, they will go with their guidebook of this is what we observed, these are the items we need, and they'll retrieve those items."

One option is to have Airmen use Air Force AM2 Matting, a ruggedized Lego-like system that clips together and provides a hard shell over the ground, meant to distribute the weight, Sweeney said.

"If you think in the crawl, walk, run aspect—this is the walk, because they've gotten the crawl as a small lecture," Sweeney said, adding that the run portion will take place at the expeditionary air base training range during PACER FORGE "where it's a multiday scenario, and … that post-attack repair will involve filling in holes with a mixture and it'll be far more intensive."

Currently, the simulated air base at PACER FORGE consists of some hard structures that allow Airmen to practice skills such as perimeter defense. The new expeditionary air base training range will have two dirt assault strips, but 2nd Air Force officials have not decided on the type of aircraft that would be out at the site. Trainees will leave the fixed-air base approach and "they'll go to a dirt, expeditionary-type environment," Davidson said.

"We call this going from the drill pad to the airfield, meaning you'll come into BMT and you start out on the drill pad, just like all the services do, but … then you need to transition to apply them to the Air Force mission of generating airpower," Davidson said. "We don't have those training environments yet. That's what we're transitioning to as we develop those environments here over the next year."

Even as Airmen go onto learn their Air Force specialty, the training they receive at these new air base training ranges will instill an "understanding that 'hey, I'm an Airman, and I am tied to the mission because I know what we do in the Air Force. I know how we defend, operate, generate and sustain airpower, and I accept my role in the execution of that mission."

# New Legislation Aims to Protect Guard, Reserve Benefits

**By Matthew Cox**

Lawmakers in Congress have introduced legislation aimed at fixing a complex system that has many times prevented Airmen serving on Air National Guard and Reserve duty status from getting the same benefits as their Active-duty counterparts. The bipartisan Duty-Status Reform Act—sponsored by Reps. Gil Cisneros (D-Calif.) and Jack Bergman (R-Mich.)—would streamline the number of Guard and Reserve duty statuses from 30 to just four main categories, a move that former Air National Guard Director Lt. Gen. Michael A. Loh said could be the "game-changer" needed to fix an overly complicated management system that often shortchanges Guard and Reserve members of benefits such as Tricare.

"To finally have the congressional sponsorship of duty-status reform is absolutely awesome," Loh, now retired, told Air & Space Forces Magazine. "It's absolutely necessary for our Guard and Reserve."

Loh has been longtime advocate for streamlining the dozens of duty statuses that Guard and Reserve members are placed on for taskings ranging from drill weekends to disaster-relief missions. On top of that are mobilizations to support real-world missions like Operation Midnight Hammer, the bombing raid on Iran's nuclear sites, and Operation Absolute Resolve, the recent mission to capture Venezuelan President Nicolás Maduro

"This gets hugely complicated," Loh said, adding that there have been past attempts to push duty-status reform legislation through Congress, but efforts have never gotten this far.

The 30 separate duty statuses in place currently are the "result of patch fixes done by Congress spanning from World War II to the Global War on Terror," according to a fact sheet on the legislation. "The current framework is confusing, difficult to administer, and results in unnecessary administrative burdens," the document states. "Most importantly, it fails to provide equitable benefits and does not align with the needs of our Guard and Reserve units." The four proposed duty status categories in the act are:

- Category I: Contingency Duty that involves missions such as military operations and national emergencies such as natural disasters. This also covers post-deployment activities.
- Category II: Training and Support activities that include required training, administrative assignments and other support missions.
- Category III: Reserve Component Duty Blocks of time that involve partial-day duty and are dedicated to readiness training and support to prepare individuals and units to be ready for future use and mobilization. This category would include training periods, flight training, administrative activities, and support activities such as funeral honors.
- Category IV: Remote Assignments that involve online learning and individually assigned duties that are completed virtually.

"Efforts to simplify the complex duty status system began over two decades ago. We owe it to our service members to deliver this much-needed change and ensure they are receiving equitable pay and benefits," Cisneros, a Navy veteran and former Under Secretary of Defense for Personnel and Readiness, said in a news release on the effort. "This was my number one priority returning to Congress. Having worked on this issue during my time at the Pentagon, I learned about the complexity of the current duty status system and how it hurts our readiness and quality of life for service members."

Tech. Sgt. Juan Paz

**Changes to streamline Guard and Reserve duty statuses from 30 to just four are included in proposed legislation.**

To Loh, the Guard and Reserve members suffer the "biggest pain point" when they have to change from one status to another on back-to-back assignments such as ordering a Reservist to transition from training to support a real-world operation.

"They changed from one status to another, so it would kick them off in Tricare," Loh said. "They could be deployed, doing this over in Europe, the Middle East, or somewhere in the Pacific, and the next thing you know they're getting calls from their family saying 'Hey, I just got a medical bill, and they said we didn't have Tricare."

Bergman said the proposed legislation is a "common sense win" for Guard and Reserve members.

"It cuts through decades of red tape to make sure those who serve get consistent benefits, clear orders, and the support they've earned—whether they're responding to disasters at home or missions abroad," Bergman, a retired Marine Corps lieutenant general and former commander of Marine Forces Reserve, said in the release.

The bill is endorsed by a number of service associations that support the Guard and Reserve.

Retired Army Maj. Gen. Francis McGinn, president of the National Guard Association, praised the proposed legislation as a "long overdue step forward for our force and the nation."

Military Officers Association of America Director Jimmy Santos, who has served in the Air Force, the Air National Guard, and now the Air Force Reserve, pointed out that the reform act also "simplifies the Pentagon's access to the Reserve Forces, helping maintain mission readiness and enhancing force posture."

Loh made a similar point by saying he has spent "painstaking hours" trying to explain the different duty statuses of the Guard and Reserve to Active-duty commanders to ensure they have the right mix of personnel for a particular mission.

"It would be so confusing, they didn't understand," Loh said. To Loh, making it easier to access the Guard and Reserve is critical to maintaining force readiness. "The way you increase readiness is you make a much more simplistic system on how you access approximately 40 percent of the force because we need a Guard member that's ready to go and that doesn't have to think about what type of status they're on or what benefits their family members are going to get," Loh said. "We need them to focus on the mission.

White House photo

The make-shift operations center at President Donald Trump's Mar-a-Lago residence the night of the raid on Caracas, Venezuela, to capture former President Nicolás Maduro.

# Airpower and Absolute Resolve

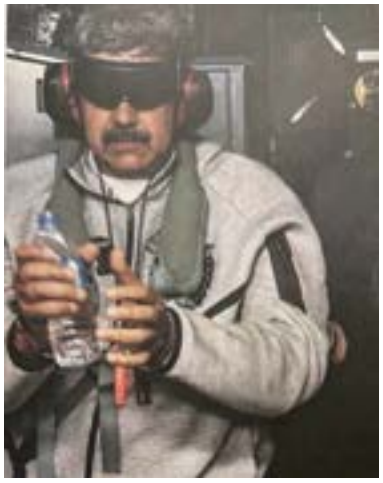
## How the Air Force Cleared the Way for Delta Force.

**By Chris Gordon and Greg Hadley**

The daring raid on Caracas, Venezuela, to snatch and grab Venezuelan President Nicolás Maduro may have been characterized by Secretary of State Marco Rubio as a law enforcement operation, but it had all the trappings of a high-stakes military operation when the surprise incursion was launched in the wee hours of Jan. 3.

More than 150 aircraft—including bombers, fighters, intelligence, reconnaissance, surveillance, and helicopters—participated in "Operation Absolute Resolve," Air Force Gen. Dan Caine, Chairman of the Joint Chiefs of Staff, told reporters the morning after.

B-1B Lancer bombers; F-22 Raptor, F-35 Lighting II, and F/A-18 Super Hornet fighters; EA-18 Growler electronic attack planes; E-2 Hawkeye early warning aircraft; numerous intelligence, surveillance, and reconnaissance aircraft; and untold drones were all airborne in support missions, as helicopters from the Army's elite 160th Special Operations Aviation Regiment descended on Maduro's location.



Trump on social media

Venezuelan President Nicolás Maduro in custody after his capture by Delta Force. Maduro was taken to the USS Iwo Jima, then flown to the United States.

"As the force began to approach Caracas, the Joint Air Component began dismantling and disabling the air defense systems in Venezuela, employing weapons to ensure the safe passage of the helicopters into the target area," Caine told reporters in a joint press conference with President Trump, Secretary of State Marco Rubio, and Defense Secretary Pete Hegseth at the president's Mar-a-Lago residence in Florida.

"The goal of our air component is, was, and always will be, to protect the helicopters and the ground force and get them to the target and get them home," Caine added.

U.S. Space Command, U.S. Cyber Command, and intelligence agencies, including the CIA, NSA, and the National Geospatial-Intelligence Agency, participated in the effort, Caine said. The mission included knocking out electricity in the capital.

The 160th flew in Delta Force special operators along with federal law enforcement personnel at an altitude of just 100 feet, skimming the water and the cityscape before reaching

USAF

**Air Force F-22 fighters were among the 150 planes that took part in Operation Absolute Resolve, with forces operating from Puerto Rico, the Dominican Republic, other Caribbean sites and the mainland United States.**

Maduro's well-defended compound at 1:01 a.m. Eastern time. Coming under fire, one helicopter was struck as was its pilot, who sustained at least two injuries, but managed to maintain control and complete the mission. Dozens of Venezuelan and Cuban protective forces were killed, but the U.S. forces suffered no such losses.

Among the weapons deployed was one President Trump would refer to later in January, in an interview with the New York Post, as "the 'discombobulator' weapon."

"I'm not allowed to talk about it," he said in the interview with the Post. "They had Russian and Chinese rockets, and they never got one off. We came in, they pressed buttons and nothing worked. They were all set for us."

Whether that was a sonic weapon or something else remains unclear and unproven.

What is clear is that by 3:29 a.m. Eastern time, Maduro and his wife, Cilia Flores, were embarked aboard the USS Iwo Jima amphibious assault ship, and would soon be taken to New York to stand trial for drug trafficking and related charges.

Poor weather delayed the operation over a period of days, but "last night, the weather broke just enough, clearing a path that only the most skilled aviators in the world could maneuver through—ocean, mountain, low cloud ceilings," Caine said.

The role of airpower was critical to the operation's success. Mark Montgomery, a retired Navy rear admiral and senior fellow at the Foundation for Defense of Democracies, said the "airstrikes on military targets serve two purposes: to create the space for Special Forces to conduct their capture operation, and to signal to the Venezuelan military that 'this is not a fight you want to take up.'"

The capture of Maduro on a moonlit night created a power vacuum in Venezuela, which Trump said the U.S. would fill until there is a "proper transition" to a new Venezuelan leadership.

Trump acknowledged the U.S. operation was risky. "This is an attack that could have gone very, very badly," Trump said. "We could have lost a lot of people last night. We could have lost a lot of dignity. We could have lost a lot of equipment."

Instead, the operation went off almost without a hitch, even as a "second wave" of forces stood by in case of trouble. "We're ready to go again if we had to," he added.

The U.S. forces deployed for the operation included 12 F-22s from Joint Base Langley-Eustis, Va. Publicly available imagery shows Air Force F-22s are on site at Roosevelt Roads Naval Station, Puerto Rico, alongside the Vermont Air National Guard F-35As—a unit that specializes in suppression of enemy air defenses—U.S. Marine Corps F-35Bs, and other U.S. military aircraft.

During the buildup of military forces in the region, the U.S. also used air bases elsewhere in Puerto Rico, the U.S. Virgin Islands, the Dominican Republic, and El Salvador, among other locations, and Navy aircraft operated from the aircraft carrier USS Gerald R. Ford and the amphibious assault ship USS Iwo Jima, as well as bases in the continental U.S.

The B-1 bombers appeared to have originated from Dyess Air Force Base, Texas, according to open-source analysis. Both F-22s and B-1s have flown south from their home bases in the U.S. in recent days, civilian flight trackers have observed. Those operations could have been a rehearsal mission, decoys, or even the start of operations that were later called off.

An RQ-170 Sentinel, a stealthy, flying-wing surveillance drone, was also spotted over Venezuela in videos posted on social media. Caine said U.S. aircraft deployed from 20 different locations in the Western Hemisphere on land and at sea during the operation to capture Maduro.

Neither the Air Force nor U.S. Southern Command would comment on operational movements and activities, so the RQ-170's participation in Operation Absolute Resolve remains officially unconfirmed. But experts interviewed by Air & Space Forces Magazine expressed no surprise that the unmanned aircraft had popped up near the Venezuela operation because it is well suited for a key component to the mission: stealthy intelligence, surveillance, and reconnaissance.

In Caine's debrief, he described the "months" of intelligence work that went into preparing for the operation, using a range of assets to monitor Maduro and "understand how he moved, where he lived, where he traveled, what he ate, what he wore, what were his pets."

Airborne intelligence in well-defended downtown Caracas

required a delicate touch. The Air Force's best-known ISR asset, the MQ-9 Reaper, lacks the stealth needed to evade Venezuela's relatively advanced air defenses, which include Russian S300 integrated air defense systems.

"You cannot park an MQ-9 over the capital of Venezuela and expect that thing to survive," said retired Brig. Gen. Houston Cantwell, a senior fellow at AFA's Mitchell Institute for Aerospace Studies, who commanded the 732nd Operations Group and its RQ-170s for two years in the mid-2010s. "But an RQ-170 has a much better potential to be able to surveil when there is an integrated air defense system that is also over the same piece of sky."

Besides simply surviving, the RQ-170's stealth makes it harder for those being surveilled to be aware of what's happening, noted veteran aviation reporter and aerospace analyst Bill Sweetman. "You might want to remain covert so people don't take precautions against being observed," he noted.

Airborne ISR complements space-based satellite ISR, Cantwell said. "You'll see the adversary change their patterns of life, because you can't change the revisit rate of a satellite. … And so they'll either hide capabilities or stop doing certain kinds of activities, knowing that space is going to be there," Cantwell said. "But when you throw in something like a 170, now there's an uncertainty. Now you can fill in some of the gaps that exist with space and allow a capability to revisit a target in an unpredictable manner."

Flying closer to the Earth's surface, air-based assets also provide different angles and can collect different kinds of signals, Cantwell added, making them useful for "battle damage assessment, as well as that battlefield preparation in advance."

In one of the few public disclosures about the RQ-170, the Air Force described an exercise at Nellis Air Force Base, Nev., in 2020 during which a Sentinel drone flew alongside many of the same platforms that would be used five years later to strike Venezuela, such as F-22s, F-35s, and Navy E/A-18 electronic warfare jets. The main objective was to test whether the F-35 could suppress enemy air defenses so platforms like the RQ-170 could penetrate contested airspace. This may have been the case in the Venezuela operation.

## SHROUDED IN SECRECY

First spotted by reporters at Kandahar Airfield in Afghanistan in the mid-to-late 2000s, the RQ-170 has always been shrouded in mystery, with the Air Force releasing precious few details about its capabilities and movements. Sweetman, one of the journalists who first reported on the RQ-170's existence, dubbed it the "Beast of Kandahar," a nickname that stuck, particularly after Iran captured one in 2011.

Years later, he and others have been able to surmise a few things about the drone. "From the size of it, it looks as if you'd carry perhaps one, or at most two payloads on it," Sweetman said. "The one that's been seen most has been electro-optical, but I wouldn't be surprised if you could swap that out for a radar. It's not very big. It doesn't have a lot of payload volume. So it's not the sort of thing that would be a multisensor payload, I think. It's certainly not new … and probably quite modest in range and altitude."

Over the past two decades or so, RQ-170s have reportedly been spotted flying near North Korea and Iran, but Cantwell said the aircraft are far more active than most people realize.

"The RQ-170 has been used constantly in multiple combatant commands since its inception," he said. "You just never hear about it because it is such a highly classified capability."

While much remains unconfirmed or unknown about the RQ-170, it is not entirely an enigma. The Air Force has acknowledged its existence and published at least one photo of it, and in 2011 Iran was able to seize control of one flying over the Middle East, putting it on display for the world to see.

Indeed, Sweetman noted that the service has capabilities that are even more secret and high-tech. In 2014, he reported on the existence of an RQ-180 drone—something the Air Force later briefly confirmed but has since said nothing about.

The Venezuela mission and the intelligence Caine referenced shows what specialized ISR can bring to the fight, Cantwell said.

"The value of stealthy ISR is so important, and it's been demonstrated time and time again," he said. "Whenever you have a high-value operation going on, the more intelligence you can have, both in advance and during the actual operation, the better chance you have of success. So these stealthy, penetrating ISR platforms really prove their worth during these real-world operations. It really shows that in the future, we have to continue to invest in this kind of penetrating ISR if we want to maintain that advantage in the future."

USAF

**U.S. Air Force crew chiefs watch as F-35A Lightning II's taxi following military actions in Venezuela in support of Operation Absolute Resolve. All forces returned safely after the operation concluded.**

35 YEARS SINCE DESERT SHIELD

# INSTANT THUNDER and the Roots of Desert Storm

## How a rogue planning cell engineered the most decisive air war in modern history.

USAF

**U.S. Air Force F-15Es spread out on a desert airfield during Operation Desert Shield. By the time offensive operations began in January 1990, more than 1,300 American jets were assembled and ready for war.**

**By Tobias Naegele**

When the exercise "Internal" Look kicked off at a mock command center at Eglin Air Force Base, Fla., in July 1990 no one knew quite how prescient the whole operation might be. Presaged with a series of fictional messages sent by Central Command Headquarters to participating Army, Navy, Air Force, and Marine Corps units, the exercise scenario was built around a 300,000-man Iraqi military force massing in preparation for an invasion of the Arabian Peninsula. But almost as soon as it began, those fictional messages started overlapping with actual message traffic describing very similar events taking place in real time. Planners had to stamp the fictional messages "Exercise Only" as life and art played out in parallel.

*This is the first in a multipart series about Operations Desert Shield and Desert Storm.*

Real life eventually interfered. Iraq's very real disputes with its neighbors over the price of oil, war debts owed to Kuwait from Iraq's lengthy war with Iran, and charges that Kuwait was pumping Iraqi oil out of wells drilled diagonally beneath the nation's borders had Saddam Hussein boiling mad. Intelligence and military analysts debated what would happen next.

By the end of July, a U.S. Navy "picket line" was in place in the Persian Gulf, the ships' radars trained on Iraq to provide early warning in case its air force launched an assault on its neighbors to the south. U.S. Air Force tankers flew in to exercise with the United Arab Emirates in a show of solidarity. Iraq continued to move men and equipment to its southeastern borders. Increasingly, the signs looked more like war than bluster.

Briefing Pentagon leaders in "the tank," Army Gen. Norman Schwarzkopf, commander in chief of U.S. Central Command, told Defense Secretary Dick Cheney he believed an attack was imminent. But Schwarzkopf said he expected Saddam to stop after seizing Kuwait's Rumaila oil fields. Following the briefing he bid goodbye to Cheney and Chairman of the Joint Chiefs of Staff Gen. Colin Powell and flew back to his headquarters in Tampa.

Schwarzkopf was climbing onto an exercise bike when Powell called later that night: Iraqi troops had crossed the border. It was soon apparent that Schwarzkopf's prediction had only been half right. Saddam's

USAF

**F-111F Pacer Strike and EF-111A Raven aircraft practice low-level maneuvers over Saudi Arabia during Operation Desert Shield. While the first U.S. Air Force jets arrived in early August, additional forces poured in over the following four months.**

forces didn't stop at Kuwait's oil fields, but flooded across the entire country. Three days later, the fighting was over.

Col. John Warden was enjoying a summer cruise Aug. 3 when he learned of Iraq's invasion. A strategic planner and director of Warfighting Concepts on the Air Staff, he oversaw several divisions in the Pentagon, including Checkmate, a planning cell originally conceived for combating the Soviet Union but more recently reoriented to look at other strategic challenges. Warden, a slim, intellectual type, was a favorite of new Air Force Chief of Staff Gen. Michael Dugan, who had taken over just a month before, a deep strategic thinker who had turned his National War College thesis into a published book on airpower.

Warden felt stuck. "My conclusion was the United States was almost certainly going to be going to war with Iraq," he recalled, and here he was trapped on a cruise ship for another couple of days.

A war with Iraq presented an opportunity to apply Warden's airpower theories in real life, and he turned the challenge over and over in his head. "I was sure we could use almost exclusively airpower to defeat Iraq and reverse the invasion," he thought.

Now all he had to do was get to Washington and convince the rest of the Department of Defense. He was a colonel in a place where 1-stars sometimes have to stand by to get the coffee. He hardly stood a chance.

Warden returned to work at the Pentagon Monday, Aug. 6, immediately calling in his division chiefs for a discussion. "Look, we've been thinking about how to use airpower better," he recalled saying, in a recent interview. "We know how to put something together that would defeat Iraq. So we're going to plan it. I don't know how we're going to convince anybody to do it, but let's just build it. And then we'll go from there."

Warden told his boss, Maj. Gen. Robert Minter Alexander, the Air Force director of plans (XOX), who in turn reported the conversation up the chain to Dugan and Vice Chief of Staff Gen. Mike Loh. Warden might have waited until he had more of a plan in place, but he didn't. It proved fortuitous.

Schwarzkopf and Central Command planners were knee-deep in logistics and the rapidly unfolding crisis. Cheney and Schwarzkopf had flown to Saudi Arabia to confer with Arab leaders, then left behind Chuck Horner, commander of the 9th Air Force, to represent him. Now Schwarzkopf wanted to keep Horner there while he attended to other planning in Tampa. U.S. Air Force jets were flying into Saudi Arabia, beginning with F-16s from Torrejon, Spain, but logistics were proving challenging otherwise. The U.S. had few forces in theater and it would take months to build up a ground force large enough to deter, let alone stop, Saddam from crossing south into Saudi Arabia.

Meanwhile, Iraqi forces kept pouring into Kuwait. Schwarzkopf needed a means to counter that advance and stop it if necessary. His overarching fear was that Iraq's army, then the fourth largest in the world—the U.S. Army was smaller, in fact, at No. 9—would drive down into Saudi Arabia and the Gulf states, led by its Republican Guard's Soviet-built T-72 tanks. Schwarzkopf needed options, in a hurry. And he was unimpressed by the ideas percolating up from air planners on his staff in Tampa.

A bear of a man, 6-foot-3 and 240 pounds, Schwarzkopf had played football at West Point. The son of an Army brigadier general, he had begged off a three-year assignment at West Point early in his career—good duty for those who could get it—to volunteer for duty in Vietnam in 1964. There, he earned three Silver Stars, valor awards for bravery and heroism in an ugly war. Now, a quarter century later, he was at the pinnacle of his career, and about to embark on a new war in a new context. President George H. W. Bush launched Operation Desert Shield on Aug. 6, and Schwarzkopf suddenly contemplated the idea that, as commanding general of a major military campaign, he was living through a significant moment in American history. Briefly, he conceded in his autobiography, "It Doesn't Take a

Hero," he imagined that he might find himself Army Chief of Staff one day.

Now, however, he had a problem. He knew it would take months to build up a formidable land force in the Middle East and he feared that Iraq would take advantage of that fact and push its forces forward. He needed a way to deter, and if need be counter that advance. He could worry later about what it would take to dislodge the Iraqi army from Kuwait, but he couldn't wait for a solution to stop their advance. After discussing the problem with Powell, another Vietnam veteran, he called the Air Force for help.

Chief of Staff Gen. Mike Dugan was out of the office giving a speech. A secretary patched Schwarzkopf over to the Vice Chief, Loh. The CENTCOM CINC asked first for clarity: Could he keep Horner in place? Horner's commander was Air Tactical Command boss Gen. Bob Russ, but Loh didn't pass the buck. He assured Schwarzkopf he could keep Horner, and promised to confer with Russ to make it so. But then the CINC hinted at something more.

"We have a decent plan for air/land operations," Schwarzkopf said, according to "Heart of the Storm," a history of the planning operation published by Air University after the war. "But I'm thinking of an air campaign and I don't have any expertise."

It was music to Loh's ears: an Army general calling the Air Staff for help in constructing a strategic air campaign. This was the stuff of dreams for an Airman. Army leaders saw their land forces as the nation's iron fist, a combination of armor, artillery, and gritty infantry that literally and figuratively ground out the nation's battles. But Schwarzkopf faced a massive logistical hurdle. He was up against a larger foe, had virtually no land forces in theater, and by his calculation, little time to work with. He needed a means to stop Iraq in its tracks, and he couldn't wait weeks or months for enough American GIs to assemble in theater. Airpower was his only viable alternative.

Loh and Dugan conferred. In the modern construct, as defined by the Goldwater-Nichols Act of 1986, Loh and Dugan had no place building war plans. Their responsibility was strictly to "organize, train, and equip" the Air Force; it was combatant commanders like Schwarzkopf who were responsible for developing and executing war plans. Even within the Air Force, the operational leaders were Russ and Gen. Jack Chain, commander of Strategic Air Command, not the Washington headquarters. But they reasoned the call had come to the Air Staff and the Air Staff was positioned to answer the need.

Asked for help with a strategic air campaign, the only question on their minds was who to direct it to. They already knew Warden was working the issue, and he was exactly the guy Dugan wanted for the job. The challenge would be dealing with all the other people whose noses might get out of joint because they weren't involved in the process.

That included Russ, at Air Tactical Command and Horner, whose de facto role as the top Airman under Schwarzkopf was to formulate and execute the air battle plan. But Horner had his hands full bedding down incoming fighters and support personnel and working out rules of engagement and lines of command with his Saudi hosts. Russ, who was technically Horner's boss, would only hand off the task to people on his staff. That's not what Loh had in mind, Loh told Russ, trying not to tick off a general who had once been his superior. "I've already got the Checkmate guys looking at this."

This was only partly true. Loh spoke with Warden and his boss, Maj. Gen. Robert Minter Alexander, *after* he got off the call with Russ. "Put together and brief a strategic air campaign for me, and let me see what you have," he told them. He had promised Schwarzkopf answers within the week. He gave Warden only days.

"So I took that back to Checkmate," Warden said. "And now we're no longer working this on a wildcatting basis, we have a

Sgt. Kimberly Yearyean

**Lt. Gen. Charles Horner, center, commander, U.S. Central Command Air Forces, gathers his staff for a planning conference during Operation Desert Storm. Horner was critical of Instant Thunder when first briefed, but ultimately adopted the concept to execute the air war.**

commission."

In fighter parlance, "fight's on." Warden cranked up the intensity and started casting around for additional talent. Loh got Chain at SAC to contribute some SAC expertise and Warden drafted Lt. Col. David Deptula, a tall, loquacious F-15 pilot who had worked for him previously. Deptula was then working directly for Air Force Secretary Don Rice and had spent the prior months drafting "Global Reach, Global Power," a future vision for the post-Cold War Air Force first published in June 1990.

Deptula was thrilled. "For me this was like manna from heaven," recalled Deptula, now Dean of AFA's Mitchell Institute for Aerospace Studies. "It was like, 'Holy, s---!' This was an opportunity to prove everything I'd just written about."

For a whole generation of flyers who joined the Air Force in the mid- to late-1970s and early 1980s, the call to arms that was Operation Desert Shield was an electrifying experience. They'd spent their entire careers training for a fight with the Soviet Union that had never come. Now in the past year, that threat had all but evaporated. So here, without warning, was a new opportunity to put their skills and their weapons—fourth-generation F-15 and F-16 fighters, secret F-117 stealth fighters, advanced laser-guided weapons and more—to the test.

In today's era, after 35 years of near constant combat operations that depleted the Air Force through constant use, it is hard to fathom what the Air Force of 1990 was like. For America more than 17 years had passed since the end of the Vietnam War and except for brief operations in Grenada in 1982, Libya in 1986, and Panama in 1989, the Air Force had seen virtually no combat beyond the continual vigilance that defined the Cold War years and the military expansion under President Ronald Reagan.

Now a full-scale war against a large, well-equipped military loomed ahead.

Loh wanted a joint plan, but Warden recoiled at the thought. In his view, the military had misconstrued the concept of jointness. He wanted Air Force planners to build the plan and plug in joint capability wherever it made sense, not the kind of muddy compromise that he was sure joint planning would deliver.

"Goldwater-Nichols had inculcated this idea that jointness was a good thing in itself—not joint operations or effective cooperation, but jointness in itself," Warden recalls. The problem with "jointness" in the Pentagon was that one service could never claim it could do something better than another service without being accused of being parochial and partisan, rather than "joint." The result was that instead of drawing the best of each service, jointness often delivered a sort of parallel togetherness, in which elements of each service were drawn into every application.

Warden thought planning the air campaign needed to be done by air campaign experts, who would incorporate other services' capabilities wherever there was advantage in doing so.

In a small conference room in the Pentagon basement, Checkmate planners defined Iraq's "centers of gravity," the key pillars that held up the regime, identified and prioritized targets that would need to be destroyed, determined the means necessary to destroy them, and built an operational plan to execute what Warden dubbed operation "Instant Thunder."

The name was a rebuke to Operation Rolling Thunder, the Vietnam War operation that sought to incrementally ramp up pressure on the North Vietnamese in an effort to force them to the negotiating table. It was the opposite of what Warden was trying to accomplish. "This is not your Rolling Thunder," he told the Checkmate team. "This is real war. ... This is not Vietnam. This is doing it right. This is using airpower!"

Preparing to brief Loh, Warden pulled together a list of "presidential objectives," carefully harvested from President Bush's speeches and public comments. They included Iraq's withdrawal from Kuwait; restoration of Kuwaiti sovereignty; securing the free flow of oil; and protecting U.S. lives. From these, he derived four military objectives: 1)Force Iraq from Kuwait; 2) degrade Iraq's offensive capability; 3) secure the region's oil facilities; and 4) render Saddam ineffective as an Arab leader.

When Warden briefed Loh on Aug. 8, the vice chief was enthused. "This is the No. 1 project in the Air Force!" he told Warden and Alexander. "You can call anybody, anyplace ... for anything."

At least, that's what Loh intended. Reality soon intervened. Alexander dialed up Maj. Gen. James Clapper, head of Air Force intelligence. "I need some of your best intel guys," he said. "General Loh wants us to put a strategic air campaign together."

There was a pause. Clapper wanted to know why Loh was getting involved in such a thing. "This is Horner's job," he said.

David Deptula

**Then-Lt. Col. David Deptula, right, briefs (l-r) Maj. Gen. Greg Olsen, Gen. Chuck Horner, Lt. Gen. Buster Glosson, and Gen. Norman Schwarzkopf 15 hours before the first bombs on Iraq during Desert Storm. Gen. Michael Loh called Schwarzkopf an "Airman in disguise" for his support of overwhelming airpower to lead off the operation.**

Master Sgt. Bill Thompson via National Archives

**Ground crews ready F-4G Wild Weasel aircraft for action at a base in Saudi Arabia on Jan. 18, 1991—the start of Operation Desert Storm. The F-4G airframes dated from the Vietnam era.**

Clapper had visited with Horner's 9th Air Force team, and they already had a strategic air campaign plan, he said. Clapper seemed to want no part in aiding an alternative plan. Russ and his TAC planners were also resistant. Antibodies were everywhere. But at Checkmate, work on the plan continued.

On Friday, Aug. 10, just eight days after the invasion, Alexander, Warden, and three lieutenant colonels headed to Tampa to brief an eager but skeptical Schwarzkopf. While there had been pressure to brief the plan to TAC first, or alternatively to fly to Hanscom Air Force Base, Mass., to brief the Chief of Staff, that wasn't in the cards. Dugan declined the briefing, telling Loh time was of the essence, then directed Loh to send the team to Schwarzkopf directly, bypassing TAC entirely.

Warden would give the brief and the CINC had done his homework. He'd been briefed on Warden's book, "The Air Campaign: Planning for Combat," which included a section headed "War Can Be Won from the Air," so Schwarzkopf had in mind a latter-day Gen. Curtis LeMay, single-mindedly convinced that airpower alone could achieve any objective at all. This, of course, was anathema to Army thinking. Both Schwarzkopf and Powell worried that airpower advocates would overpromise and underdeliver, distracting or confusing political leadership into thinking they could achieve their objectives in Iraq without committing ground forces to the fight. The two, career Army officers shaped and defined by their experiences in the Vietnam War, saw the "Air-Land Battle" doctrine as a truism, believing fundamentally that airpower needed to be subordinate to and in support of Army forces maneuvering on the ground.

Warden, on the other hand, thought Air-Land Battle fundamentally flawed, even "stupid." But that was not an issue now, as Schwarzkopf had sought out an air plan, and Warden's job was to deliver on that request. A Vietnam combat veteran himself, Warden had flown 266 OV-10 Bronco combat missions in Vietnam, and his views were no less shaped by Vietnam than the general's.

Warden presented Instant Thunder as a strategic answer to a strategic question. Iraq should be looked at as a "system," comprised of "centers of gravity," or power centers, such as military command and control, electrical power, oil refineries, railroads, the telephone network, TV and radio transmitters, and so on. The objective of the campaign was not to level Iraq, but to cut off the leadership from the rest of the system, to blind and isolate Saddam so that he could not leverage his centers of gravity to any effect.

It was exactly what Schwarzkopf was looking for. "For our purposes," Schwarzkopf would later write, "it was enough to silence Saddam, to destroy his ability to command the forces arrayed against ours. If he'd been killed in the process, I wouldn't have shed any tears." But there was no need to lay waste to the country, when the goal was to break its ability to fight. How long would it take to destroy Saddam's air defenses, airfields, munitions plants and the rest?

"Six to nine days," Warden said. But that clock wouldn't start until assets were in place, so Warden turned to logistics. He needed 500 aircraft and to get them in theater Schwarzkopf would have to change things up. A-10s were needed to threaten Saddam's tanks. B-52s, F-117s, and F-111s also needed to be in place.

"Do it," Schwarzkopf said. Up to then, he said, everyone had been leaning backward. "You're the first to lean forward," he told Warden.

The CINC had questions, though. What would it take to degrade Iraq's deployed forces by, say, 50 percent in preparation for a ground offensive? What about the Republican Guard—another center of gravity?

Warden went back to Checkmate to develop the plan further. The following day, a Saturday, Warden briefed Powell at the Pentagon. Again, it went well. Powell asked about the Iraqi ground forces, and Warden warned that once begun, the strategic air campaign had to play all the way through. And Warden argued against hitting Iraqi forces in Kuwait. Powell, however, had other ideas. "If we go this far in the air campaign, I want to finish it," Powell said. "Destroy the Iraqi army on the ground. ... I want to leave smoking tanks as kilometer posts all the way to Baghdad."

The following Friday, Aug. 17, Warden and Deptula and others were in Tampa briefing Schwarzkopf and a larger team this time.

"We'd worked very hard to put together this initial attack plan, and then we thought, OK, we're going to hand it over to him, and thanks very much for the opportunity to participate," Deptula recalled in an interview. "We thought we were done. But no, that's when Schwarzkopf says, '"OK, John, I want you and whoever you want to take, to take this over to Riyadh and brief General Horner."'

The following day, Warden, Deptula, and Lt. Cols. Ben Harvey and Ron Stanfill were wearing their flight suits, headed to Riyadh in the back of an RC-135 Rivet Joint.

It was a long trip from Andrews Air Force Base, Md., to Ri-

USAF

**U.S. Air Force Senior Airman Will Hover, of the 832nd Security Patrol Squadron, stands watch with a radio at an airfield during Operation Desert Shield. By the time the buildup was complete and the war began in January 1991, more than 500,000 American troops were in the region.**

yadh, with a brief stop in Greece. The driver sent to pick them up in Riyadh was expecting a single passenger, and didn't have room in his car, which was loaded full of gear, for all of them. He dumped them off at a hotel downtown, where rooms were not available. They slept on cots in a ballroom along with dozens of others. The next day they eventually found the location of the Air Force contingent. The initial brief got off late in the evening, and included Horner's staff, but not the general himself. It seemed to go well. The real test would be with Horner, at a meeting scheduled for 1330 on the second day.

This time, it didn't go so well. Warden had been told that lip balm and other comfort items were in short supply in the desert, and he carried over a couple of hundred dollars worth of supplies, which he brought along as a gift. He put the bag on the table where Horner was to sit, and waited as the rest of the room filled up.

When Horner arrived, his first move was to sweep the bag to the floor with a sharp expletive, setting the tone. Warden began the briefing, but Horner trolled him, interrupting and waving through the initial slides. When Warden was done, the questions started. One after another, too quick for Warden to answer, Horner criticized the planning, the targeting, the objectives. Perhaps it was performative, the field general showing his staff how to deal with a staff officer from Washington trying to tell them how to fight a war. Warden was thrown off but continued to try to win the general's favor for his plan, arguing forcefully, convinced he had the answer to the challenge. Eventually, Horner looked around the room and said, "I'm being very, very patient, aren't I?"

"Yes, sir," said someone on his staff.

"I'm being very, very tolerant, aren't I?" Horner asked.

"Yes, sir!"

But Horner wasn't being tolerant and Warden was clearly being sidelined. Soon after, Horner went around the table, asking the officers who had accompanied Warden if they could stay. None refused the three-star general.

Warden was sent home alone that same day.

Deptula went to work immediately, taking up residence in a conference space that came to be known as the Black Hole because officers who went in never came out, apparently held by an invisible force that sucked them into round-the-clock planning cycles. Information likewise went in, but with everything held at the highest levels of secrecy, little found its way out. For weeks, Deptula remained convinced that the plan had to be ready to kick off in days and the work was relentless, around the clock, continual updating and revising, with no notion that the timeline would be pushed out further. It would be weeks before he realized the timeline was much longer and the kickoff wouldn't come until after the new year.

Deptula called home and asked for some clothes to be sent over. He had only packed for a few days and his stay was indefinitely extended. A couple of weeks later a bag arrived, carried by a former boss: Gen. Mike Dugan, Air Force Chief of Staff. Dugan had flown to the desert to see how things were progressing, but it would prove to be his last trip as Chief. Days after returning in September, he was fired by Secretary Cheney for openly sharing his views with reporters that "airpower is the only answer available to our country in this instance," as David Broder reported in the Los Angeles Times.

Powell thought Dugan's comments usurped his authority, and that he was out of line for speaking so boldly. Cheney backed his Chairman. Dugan, who believed his comments were reasonable and reflective of reality on the ground and the Air Force doctrine that he believed in, asked to retire, effective the following January. He continued to go to work at the Pentagon, but was suddenly an invisible man in uniform.

Warden returned to Checkmate, where he remained in regular touch with Deptula, feeding intelligence, insights, and ideas into the Black Hole. "It turns out, that worked perfectly, with Dave and the guys in Riyadh, and me back in Washington," Warden said. Deptula became the principal target planner for the duration of the Operation, working closely with Horner and Brig. Gen. Buster Glosson, who became Deptula's immediate boss.

As the weeks ground on, the United States military continued to deploy forces into Saudi Arabia, a continuous flow for the next four months. By the time the planning was over and the war began on Jan. 16, 1991, some 500,000 U.S. personnel, 14,000 tanks, tens of thousands of trucks, 140,000 allied troops, and at least 1,400 aircraft had arrived in theater.

Instant Thunder was on a roll, and the gathering Desert Storm was brewing.

# Dynamic Space Operations

## To prevail in space, the Space Force must be able to challenge adversaries with multidimensional dilemmas.

Gwendolyn Kurzen

A Falcon 9 rocket launches the X-37B Orbital Test Vehicle into space in August 2025. Dynamic space operations requires more than rapid launch and repositioning, and ultimately encompasses every aspect of the U.S. space enterprise.

**By Col. Charles S. Galbreath, USSF (Ret.)**

Space is now a warfighting domain, with growing threats to and increasing operational demands on U.S. space capabilities. New systems and operational concepts that increase the resilience and effectiveness of the U.S. military space architecture are needed. Approaches that increase the flexibility and maneuverability of space capabilities can satisfy both objectives.

Space operations must move away from a construct optimized for static mission sets and energy-saving orbits and embrace dynamic space operations (DSO) in which satellite operators can frequently and rapidly change parameters to achieve mission effects. While "dynamic space operations" typically refers to repositioning satellites without regret for the fuel each maneuver expends, true dynamic space operations will require changes and practices associated with all segments of the U.S. space architecture. This encompasses orbital, terrestrial, link, and launch segments and will require new logistics infrastructure and concepts of operations as a foundation for future DSO. This broader application of DSO will increase the overall flexibility of the U.S. space architecture, thereby accelerating a greater application of long-standing principles of warfare, such as maneuver and surprise, which will in turn increase resilience and mission effectiveness. Furthermore, it will facilitate the employment of new missions and novel approaches to help U.S. forces maintain the initiative and create compounding problems for potential adversaries—ultimately strengthening the deterrent posture of the United States.

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Hesitancy to fully implement dynamic space operations at scale risks ceding valuable time and initiative to China. The Space Force must move decisively to embrace opportunities in this new operational paradigm. The Space Force is already moving ahead on many fronts, but now is the time to accelerate adoption of dynamic space operations holistically across the space enterprise.

### VULNERABILITIES OF EXISTING ARCHITECTURE

The criticality of today's U.S. space operations cannot be overstated. Current systems have fundamentally changed the way the United States operates its military and conducts operations in all domains. The space architecture the United States operates today, however, is tied to an assumption that space is a sanctuary, not a warfighting domain, and results in an architecture with orbital, terrestrial, link, and launch segments that are all highly predictable and

Tech. Sgt. Luke Kitterman/USSF

**Guardians in the Combined Space Operations Center at Vandenberg Space Force Base, Calif., monitor and coordinate military space activities around the clock. Dynamic Space Operations promises to render space systems more effective and resilient by making operations less predictable.**

therefore vulnerable to disruption.

Every element of the space architecture has vulnerabilities that the United States must minimize to prevent adversary exploitation. But the segment in greatest need of more flexibility and maneuverability is the space segment. Even today, satellites are launched into a specific orbit for the duration of their mission life. They follow a highly predictable elliptical path largely defined by their velocity, altitude, and the inclination into which they were launched—making them easily targetable by would-be adversaries.

The predictable paths of intelligence, surveillance, and reconnaissance satellites make it easy for adversary forces to know when they will be overhead. At the appropriate times, adversaries can utilize protective or defensive measures such as camouflage, concealment, and deception (CCD), or they can simply halt their operations to thwart U.S. intelligence collection efforts. All other satellites have similarly predictable paths, making it relatively easy for adversaries to find, fix, track, target, and engage them. The Geosynchronous Space Situational Awareness Program (GSSAP) represents perhaps the leading edge of satellite maneuverability within the United States' order of battle, but even GSSAP is easily tracked by potential adversaries due to a constrained maneuver profile driven by limited fuel.

On the terrestrial front, most of the space architecture today is heavily reliant on a few fixed ground stations used for command and control and the downlink of mission data from satellites, which are in fixed locations and potentially vulnerable to attack. Primarily located at Buckley and Schriever Space Force Bases in Colorado, the USSF's Space Operations Centers (SOCs) are where most Guardian operators perform their missions. The Space Force must plan to defend these locations should China or another adversary seek to use cyber or direct physical attacks against them or the infrastructure supporting them.

The link segment has its own set of sensitivities. The frequencies Guardians use to control and interact with satellites are fairly static and contained within well-established communications bands. The Satellite Control Network (SCN), the primary means to transmit and receive data from satellites, is a global network comprising 19 antennas at seven locations, some of which date back to the late 1950s. Like other terrestrial satellite infrastructure, these fixed sites will be likely targets in a potential conflict with China.

Finally, U.S. launch infrastructure vulnerabilities also arise primarily from predictability. Most U.S. launch capabilities are planned far in advance and governed by a launch-on-schedule manifest. Most spacecraft are launched from one of two bases, powered by boosters that take months and sometimes years to develop and field. There is little flexibility to replace payloads to meet urgent operational needs or respond to immediate threats. The entire infrastructure, including the launch systems supply chain, must be guarded against potential attack in the event of conflict.

## THE THREAT FROM CHINA

China has long recognized the asymmetric advantages the United States enjoys from operating successfully in space. As it develops its own capabilities to rival the United States and potentially create a kill web to enable and expand its anti-access/area-denial strategies, it is also developing terrestrial and space-based weapon systems designed to block the United States from delivering vital space effects.

Ever since 2007, when China used a direct ascent anti-satellite (ASAT) weapon to destroy one of its own defunct satellites, Chinese threats to U.S. and allied space systems has only grown. Today, China possesses ground-based direct-ascent ASATs, ground-based counter-space electronic warfare, ground-based lasers, and cyber and space-based weapons.

As China rapidly expands its space systems, it is pursuing methods to increase the maneuverability and flexibility of its own satellites. First, it has launched a series of satellites within the Shijian (SJ) family of spacecraft with maneuver, servicing, and counterspace capabilities. China has demonstrated the repositioning of a dead satellite to an alternate orbit using SJ-21, which is known to have a robotic arm.

Second, it is rapidly investing in technology to refuel and service existing satellites. Reports suggest that China's SJ-25 may have already conducted refueling of the SJ-21, which appears to have conducted the largest delta-V maneuver ever seen in GEO afterward.

Finally, China has demonstrated the ability to control five satellites simultaneously, maneuvering and engaging in operations among one another—what the U.S. Space Force and media describe as "space dogfighting." While it may be more akin to five dirigibles demonstrating warfighting tactics than a true aerial dogfight among 5th-generation fighters, it still demonstrates key technology required to conduct orbital warfare and establish a positional advantage.

These are all indications of China's intent to develop the most robust space architecture possible to confront the United States and supplant it as the world's leading space power. This will not only degrade the overall effectiveness of U.S. and coalition military operations in future conflicts, but it will also significantly diminish the U.S. led world order.

## PRINCIPLES OF WARFARE IN SPACE

Recognizing that space is indeed a warfighting domain means that space operations and the military architecture must now fully embrace the principles of warfare that each of the other operational domains have executed and matured over centuries of conflict. An architecture based on dynamic space operations, built on a foundation of in-space logistics, will facilitate the greater application of these principles—particularly surprise and maneuver. Applying these principles presents opportunities for the Space Force to create multiple and compounding challenges for potential adversaries

For example, surprise is one of the most fundamental principles of warfare. Just as Chief of Space Operations Gen. B. Chance Saltzman's theory of competitive endurance seeks to avoid operational surprise, the Space Force and U.S. Space Command must now seek to create surprise to catch their opponents off guard. The use of CCD to confound enemy understanding of a force's intentions and capabilities is a time-proven practice for achieving surprise. In numerous historic examples, deception, combined with movement and maneuver, created the necessary surprise for mission success. Essential to achieving the requisite movement and maneuver in space is the logistics support to enable and sustain dynamic operations.

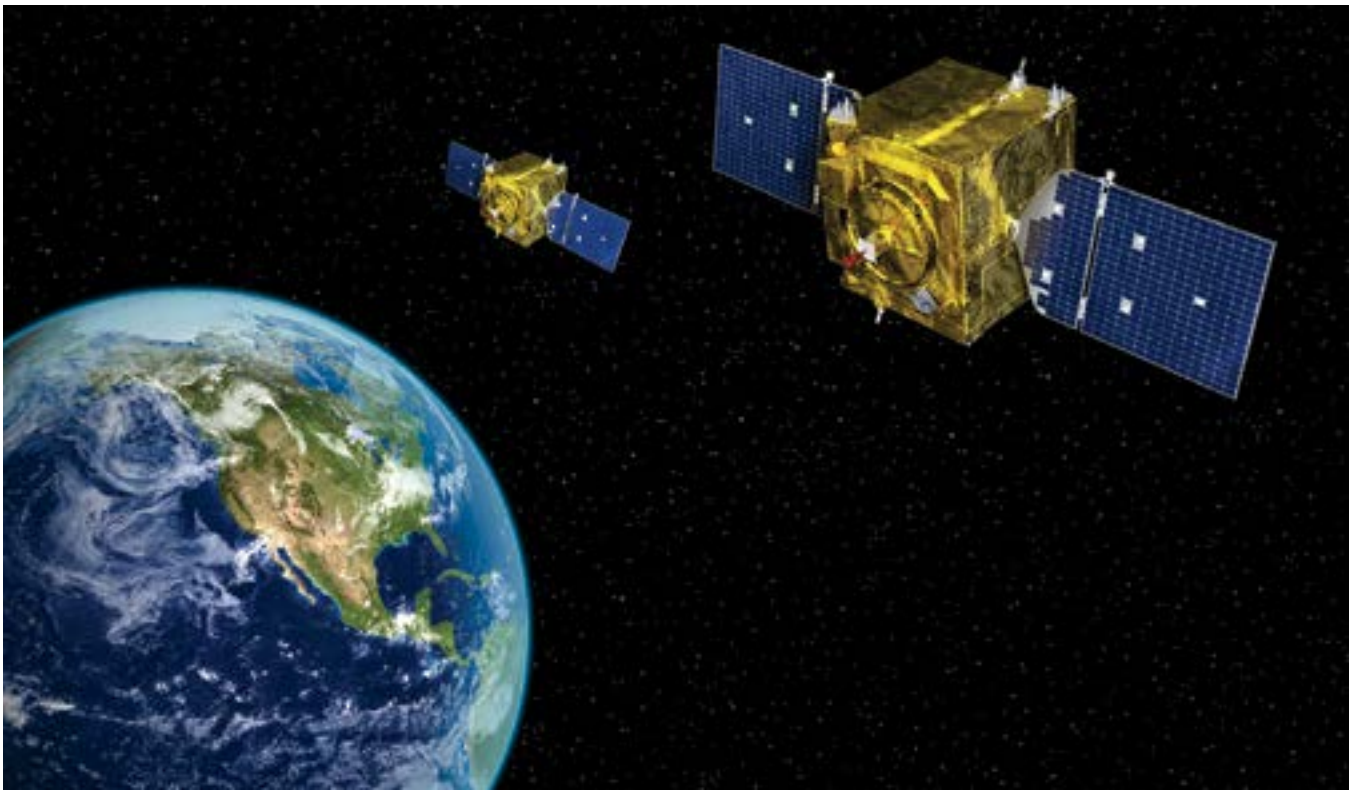
## ENABLING DSO

The Space Force is already pursuing capabilities that increase the dynamic nature of the satellite, ground, link, and launch segments of its operational architecture. The greatest opportunity for transformative change is in the orbital segment and includes increasing options for maneuver, servicing, and assembly on orbit. Technology demonstration efforts across the Department of Defense have proved the potential for increased operational flexibility and effectiveness of satellites through autonomy, rendezvous and proximity operations (RPO), docking/birthing, and refueling. In 2007, DARPA launched two satellites as part of the Orbital Express program to examine satellite refueling and reconfiguration. In addition to the prerequisite autonomous RPO and docking, the program successfully demonstrated two key technologies: refueling and component replacement.

Concepts associated with In-space Servicing, Assembly and Manufacturing (ISAM), as well as Space Mobility and Logistics (SML) create bountiful opportunities for the United States to enhance the resilience and effectiveness of its on-

U.S. Space Force

**The X-37B completes a mission in March 2025 at Vandenberg Space Force Base, Calif. The reusable orbital vehicle is USSF's most dynamic space asset today, providing a unique means to maneuver and experiment in space.**



Artist's rendering of GSSAP satellites

**Although limited by fuel capacity challenges, the Geosynchronous Space Situational Awareness Program (GSSAP) satellites provide a needed layer of space defense by acting as a watchdog in space.**

orbit architecture. These include standardized connections and interfaces, as well as modular design, which are fundamental to the supporting logistics of a dynamic space architecture.

Advanced propulsion systems, such as nuclear thermal and electric propulsion are alternative means to increase maneuverability that could potentially extend the utility of satellites. However, both still require the ejection of a mass to create thrust, meaning they use fuel that must eventually be replenished.

The adoption of modular designs is another way that satellites could gain flexibility. Traditionally, a satellite is unchanged throughout its operational life. If satellites can be serviced in space, that can change. The X-37B and the use of payload adapter rings to host modular payloads demonstrate existing capabilities that increase the versatility of spacecraft. The X-37B, in particular, has considerable maneuver capability and can host multiple payloads within its bay. Each payload can be swapped out after return to Earth, akin to reconfiguring a combat aircraft payload to carry a broad range of munitions, modular sensors, and fuel loadouts for specific desired effects. The inherent flexibility of a system like the X-37B, which is only a test vehicle, could be operationalized to significantly expand the dilemmas that the United States could present to potential adversaries.

The U.S. Space Force also currently hosts payloads on secondary adapter rings, connecting satellites to boosters. SSC's Rapid On-Orbit Space Technology Evaluation Ring (ROOSTER) program allows payloads to remain attached to the ring or be deployed as free-flying satellites. By hosting multiple, diverse payloads on a single ROOSTER, this modular approach creates operational flexibility because each payload can perform different or complementary missions. The ROOSTER program and its predecessor—the Long Duration Propulsive EELV Secondary Payload Adapter (LDPE)—are already seeing widespread employment to advance technologies.

The Space Force has launched or plans to launch at least three LDPEs and at least five ROOSTER missions. ROOSTER-5 will be an integral part of the Tetra-5 mission, demonstrating on-orbit refueling. The flexibility of the X-37B and ROOSTER programs also enables the Space Force to obfuscate the true mission and capabilities of individual spacecraft. Operational planners can use this feature to induce an element of surprise in the minds of potential adversaries.

Taken to an extreme, modularity could facilitate the ability to swap or upgrade components of a spacecraft's subsystems rather than replacing entire satellites. This would enable upgrades, mission extension, and mission change without incurring the cost of replacing the entire satellite.

Software also provides opportunities to change capabilities after deployment. With software-defined radios, for example, Guardians could reprogram a satellite to fundamentally change its mission even after launch. A communications satellite could be reprogrammed to deliver positioning, navigation, and timing signals, or potentially even transmit at higher power levels to generate disruptive jamming effects. While major mission changes via software may be years away, smaller changes, such as enhancements within a single mission, are almost here. The Air Force Research Laboratory (AFRL) will use a reprogrammable signal generator in its Navigation Technology Satellite 3 (NTS-3) demonstrator as a key element of the system.

In the terrestrial segments, the Space Force is making significant progress in transforming the traditional architecture of bespoke ground station and operations centers for each satellite family into a system with more dynamic, web-enabled operations. The fundamental role of the terrestrial segment is to command and control the vehicles in the orbital segment. Periodic, brief contacts with a satellite as it orbits the Earth are just enough to ensure that it is continuing to perform its mission and operate safely, and for some satellites to upload

commands, execute payload operations, and receive the data coming from those payloads. But while this works in a peaceful environment, intermittent contacts would prove intolerable in a dynamic warfighting construct. The Space Force is therefore pursuing alternate methods to increase its connectivity between the terrestrial segment and the orbital segment.

One alternative approach is web-based command and control that can speed the delivery of capabilities and provide a more standard interface for operators. Web-based cloud infrastructure like the Rapid Resilient Command and Control (R2C2) program will enable Guardians to operate multiple satellites from any location and with the appropriate security measures. Phased array antennas that can contact multiple satellites simultaneously offer another means to change the way satellite C2 is performed, increasing connectivity with vital assets and minimizing the periods between contacts. R2C2 will employ phased array antennas under the Space RCO's Satellite Communications Augmentation Resource (SCAR) program. SCAR antennas are transportable and capable of communicating with satellites as they maneuver on orbit. Mobile ground terminals will also increase the flexibility and maneuverability of the terrestrial segment.

Since all military space operations involve the transmission of data between the satellite and terrestrial segments, the link segment cannot be ignored. The link segment enables Guardians to operate satellites and their payloads, execute C2 functions, direct payload employment, and download mission data. One of the oldest methods of preserving connectivity through jamming is frequency hopping. Rather than using a static frequency for all communication, frequency hopping randomly moves between various frequencies. This approach can prevent an adversary from maintaining a lock on the link signal and intruding or jamming it.

Frequency hopping, which dates to WWII, provides secure, jam-resistant communications for a host of uses, including national command and control and NC3 systems such as Milstar and Advanced Extremely High Frequency (AEHF) satellites. While it is not standard practice on all satellites, it is a proven and applicable technology that could be operationally expanded.

Launch, while not traditionally included as part of the space system architecture, remains another area of vulnerability. The impact of predictable launch locations, boosters, schedules, and cost on the resulting space operations cannot be ignored. The entire U.S. military space enterprise currently operates out of two primary launch sites, Cape Canaveral, Fla., and Vandenberg Space Force Base, Calif. Additional launch sites in diversified locations would increase the resilience of the overall architecture by eliminating the risk of damage, degradation, or destruction at any one site, whether by natural events or cyber or physical attacks.

Limited launch sites add to the rigidity of today's launch schedules, typically planned years in advance. But manifest planning does not need to be a multiyear process. With more frequent opportunities made possible by additional launch sites, the potential for rapid satellite deployment increases. Similarly, standardizing design tolerances so that satellites can match a wider range of launch profiles, could also reduce the limiting factors in manifest planning, further enabling dynamic space operations.

## OBJECTIVE ARCHITECTURES & CONOPS

The Space Force is already exploring dynamic space operations by employing alternative methods of satellite delivery, operations, and sustainment to create multidimensional dilemmas for potential adversaries. But USSF must now take proactive steps to fully implement these concepts operationally.

Progress moves at the rate it is resourced, and constrained budgets have become a barrier to fully adopting DSO. The Space Force must be resourced to field space systems that can evolve beyond the current state of static launch, orbits, frequencies, and missions, all of which are easily understood and exploited by potential adversaries. Failing to do so puts America's space-power advantage at risk.

The broad application of dynamic space operations in the U.S. Space Force and U.S. Space Command should consider the following principles that increase the flexibility of the U.S. military space architecture and present challenges to adversaries from multiple aspects of their own space operations:

**1.** Fielding proliferated constellations significantly expands missions beyond a single or very few satellites to track and target. This approach to increasing architectural resilience is already in progress with the Space Force's PWSA and must continue.

**2.** Enabling frequent maneuvers adds unpredictable trajectories, making it harder for adversaries to track and target satellites and their users.

**3.** Broadly employing frequency hopping, laser communications, and path-agnostic communications employs the principle of maneuver and resilience to the electromagnetic spectrum and will increase the resilience of the link segment.

**4.** Proliferating ground-mobile, phased-array antennas and web-based satellite command and control will increase the resilience and maneuverability of the terrestrial segment.

**5.** Making satellites more modular and enabling remote reprogramming will add mission flexibility, introduce further uncertainty in adversary planning, and help create operational surprise.

**6.** Employing a logistics-based space architecture enables resupply, refueling, augmentation, and the use of CCD techniques such as decoys.

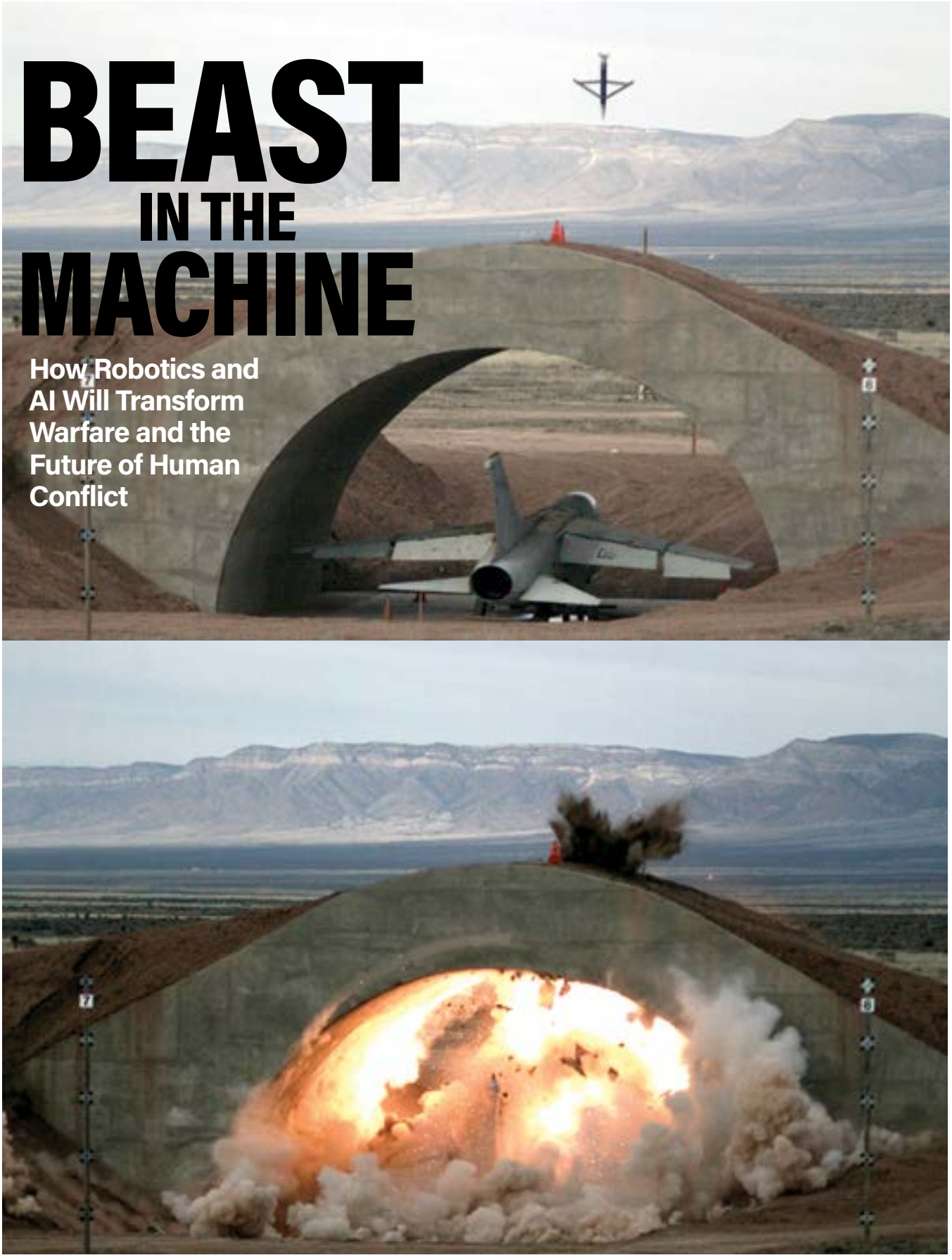
**7.** Adopting dynamic launch manifesting and launch diversification will increase resilience and responsiveness to emerging operational demands.

Injecting these dimensions into U.S. space operations will support increased resiliency in the U.S. space architecture and provide increased mission capabilities, ultimately enabling new missions and presenting a compounding set of challenges to potential adversaries. The questions will undoubtedly arise, "How many dilemmas is enough?" and, "Is the incremental value of adding another dilemma worth the additional cost?" These are reasonable, but it is important to remember that the entire space architecture is required to deliver needed effects, and a failure or vulnerability in any one area could undermine the entire architecture and threaten mission success.

The Space Force must appreciate and embrace the fact that these approaches to improve the dynamic nature of space operations increase both the resilience and effectiveness of mission execution. Dynamic space operations can impose significant costs on an adversary's system development and operations by creating a compounding set of problems for adversaries to calculate. The flexibility of a DSO architecture allows U.S. forces to withstand attack and simultaneously complicate an adversary's understanding of U.S. systems, capabilities, assigned missions, and intent. These cumulatively help deter an adversary attack in the first place. All of this hinges on the Space Force decisively embracing the concepts of flexibility and logistics in its future force designs in a manner that will achieve DSO.

# BEAST IN THE MACHINE

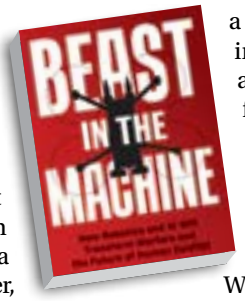
## How Robotics and AI Will Transform Warfare and the Future of Human Conflict



Capt. Louis Ruscetta

**Beginning in the 1990 Gulf War, the U.S. used precision munitions to destroy aircraft in concrete shelters. Today, advancing technology allows ever smaller and less expensive precision weapons to destroy large, expensive, and heavily protected targets, a trend with major implications for combat in the age of robotics and AI.**

By Col. George M. Dougherty, USAF




**Robotics and artificial intelligence are accelerating the rate of change and the lethality of military weapons. In "Beast in the Machine," author George Dougherty traces both the history and future of autonomy on the battlefield. This excerpt is reprinted by permission of the author and his publisher, Ben Bella Books. Buy the book from your favorite bookseller.**

The first wave of the robotic revolution is underway: smart, precision-guided weapons are proliferating into every corner of war. The big cruise missiles and laser-guided smart bombs that revolutionized air campaigns in operation Desert Storm and thereafter were only a prelude. Today, precision is rapidly migrating to smaller, cheaper, and more plentiful classes of weapons and may soon be practically universal. The idea of "one shot, one kill" will become the standard for almost every class of weapon, large and small. By understanding the consequences of universal precision, we can see how this first wave of the robotic revolution will cause all the changes that follow.

When one missile, shell, or bullet produces the intended effect that previously required hundreds or thousands, weapon lethality increases by a hundred or even a thousand times. Such a huge increase not only offers tremendous advantages in combat, it alters the power relationship between weapons and targets and the fundamental dynamics of battle. The battlefield becomes a vastly more lethal place. The proliferation of precision robotic weapons will have major consequences for the shape of future forces, the tempo of battle, the role of information, and the need for combat AI. This first wave of robotic change, already rising, will drive and shape the subsequent waves, because the traditional military tactics and systems that worked in the past cannot survive on a battlefield ruled by universal precision.

## A REVOLUTION IN LETHALITY

How significant will the consequences of this transition be? In 1964, military historian Trevor N. Dupuy introduced the concept of weapon lethality as a means for analyzing the effects of advancing weapon technologies through history. At the time, most military thinkers measured weapons by firepower, which was their output in terms such as rounds per minute, or by the throw weight of artillery shells per hour. Instead, Dupuy focused on their effects on the enemy. He defined weapon lethality as "the inherent capability of a given weapon to kill personnel or make materiel ineffective in a given period of time." He proposed a universal "lethality index" that allowed weapons from different periods to be compared against each other. The smoothbore musket of the Napoleonic period received a lethality index score of 47. The late 1800s breech-loading rifle received a 229. The World War II-era machine gun received a lethality score of 17,980, due to its high rate of fire. The World War II 155 mm howitzer scored approximately half a million.

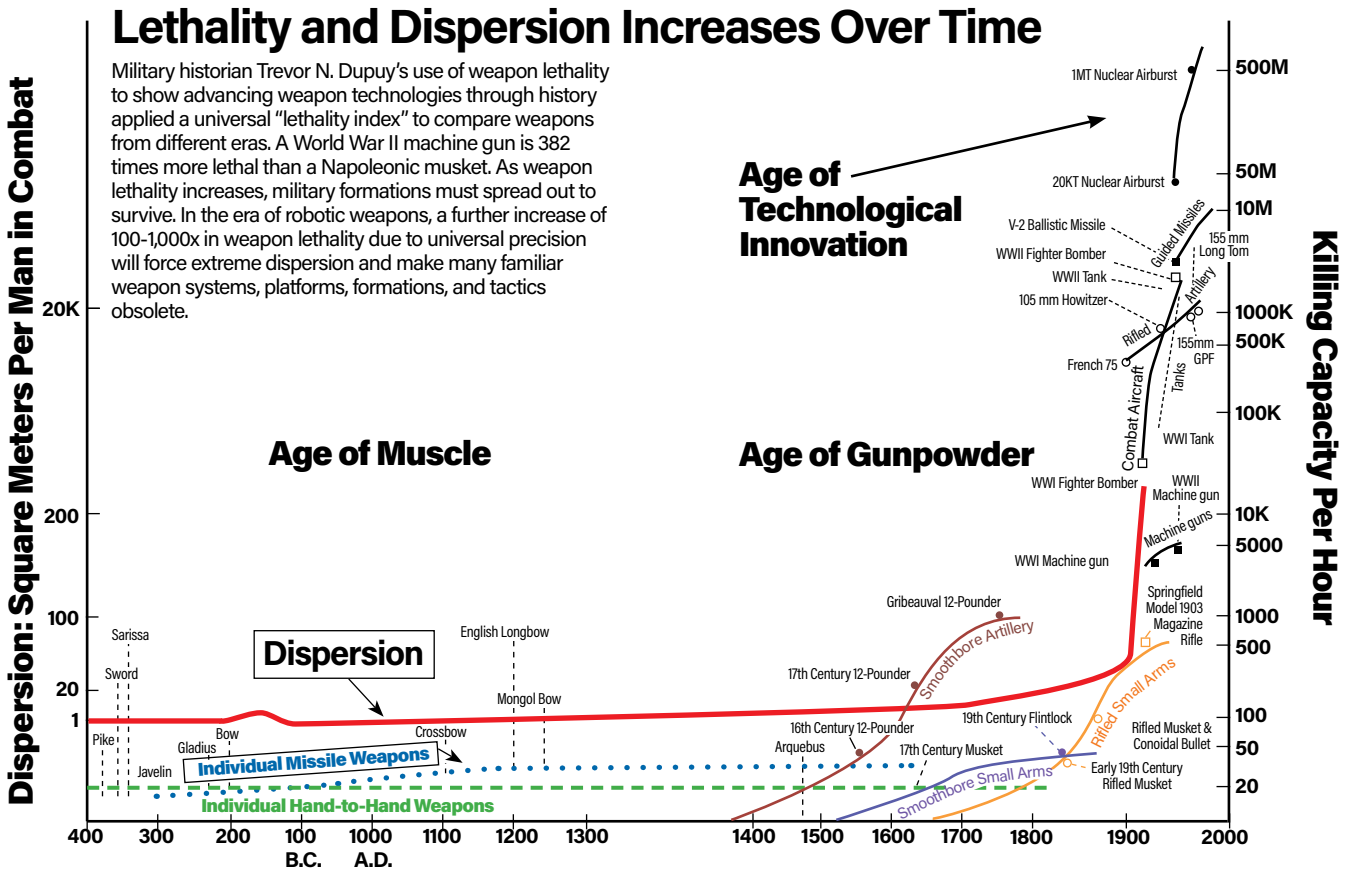
According to Dupuy's index, a World War II-era machine gun was 382 times as lethal as a Napoleonic musket, and the World War II 155 mm howitzer about 125 times as lethal as a Napoleonic field gun. There is no doubt that a Napoleonic regiment would have been cut down in minutes on a World War II battlefield. Due to the tremendous increase in weapon lethality, the shape of military units and their tactics had to change dramatically between those periods. In particular, Dupuy noted that greater weapon lethality forced greater dispersion of military formations. He even proposed a mathematical relationship between weapon lethality and dispersion. World War II forces fought in much more dispersed formations, used low-visibility colors and camouflage, and emphasized mobility.

In the past, short ranges and low weapon lethality required the massing of forces. In the era of robotic weapons, long effective ranges and high lethality replace mass with "effective mass," which is the massing of effects. The tightly packed formations of the Napoleonic period helped units to mass the firepower of their low-lethality muskets. However, those formations would be serious liabilities when facing the more lethal weapons of World War II.

Dupuy didn't anticipate modern precision-guided weapons. He assumed that accuracy or precision was always about the same. As we have seen, a further increase in lethality of one hundred to one thousand times is reasonable in going from unguided munitions to "one shot, one kill" precision. That's similar to the increase between the Napoleonic Wars and World War II. We can expect similarly dramatic changes to forces and tactics as a result. We can expect that a present-day force such as an armored battalion would be cut down in minutes on a

National Museum of Scotland/Tom Aitken

**Before precision guidance, vast quantities of munitions were expended for minimal effect because almost all of them would miss. This image shows shell casings expended by British artillery in a futile attempt to breach German trench lines in World War I.**




Source: Trevor H. Dupuy, *The Evolution of Weapons and Wafare* (Indianapolis/New York: The Bobbs-Merrill Company, Inc. 1980)

future robotic battlefield. Many other features of today's forces that made sense in the past may also become liabilities in the age of universal precision.

## WEAPON-TARGET ASYMMETRY

Size itself may become a liability. The increasing lethality of smaller weapons due to precision is breaking the centuries-old symmetry between weapons and targets. Since the days when individual Soldiers faced each other with hand weapons, a weapon system could only be reliably defeated by a weapon system of at least similar size. For example, small warships fared poorly against bigger ones. The only gun capable of penetrating a battleship's armor was the heavy battleship gun, which required another battleship to carry it. Similarly, it was a truism of armored warfare that the best anti-tank weapon was another tank. As bigger tanks emerged that carried thicker armor, their opponents needed bigger tanks to carry the heavier guns used to penetrate that armor. Engineers strove to build weapons that were ever bigger and more powerful. In the aggregate, this meant that opposing forces tended to be symmetric with each other. If a fleet had a dozen battleships, an enemy fleet seeking to defeat it needed a similar number of battleships, and so on. Military leaders and statesmen compared the numbers of battleships, tanks, aircraft, and Soldiers that they possessed to those of their allies and adversaries to assess the balance of power.

This symmetry held across different weapon types because of poor precision. For instance, an antiaircraft shell could theoretically bring down a large bomber. However, the shell had to be fired from a large antiaircraft gun, and due to poor precision thousands of shells had to be fired to shoot down the bomber. Defeating a bomber reliably required a combination of antiaircraft guns and shells that was similar in magnitude to the bomber. In fact, analysts in World War II calculated that the average cost for German antiaircraft gunners to bring down a heavy bomber was $106,976, which was comparable to the cost of a B-17 bomber at the time.

When Gen. Billy Mitchell demonstrated in 1921 that early bomber aircraft could sink a battleship, U.S. Senator William Borah asked, "If a $30,000 airplane can sink a $40,000,000 dollar battleship," why build battleships? The effects of poor precision made that idea premature, but it started to become real in World War II when the first precision-guided weapons such as Germany's Fritz X really did allow single bombers to cripple large warships under wartime conditions. Battleships largely disappeared after the war. Some observers are asking today: If a Javelin missile or an even cheaper armed drone can destroy a multimillion-dollar tank, why build tanks?

Today, a single F-35 fighter costs over $80 million and requires over 40,000 man-hours of labor to build. Yet a small robotic weapon that can destroy it or another advanced warplane, particularly when the plane is sitting on the ground, costs a tiny fraction. As part of a U.S. Naval Postgraduate School (NPS) project back in 2006, students used a radio-controlled plane to build a simple remote-controlled "aerial IED" capable of attacking parked aircraft. As they reported, "not including the cost of an explosive payload, the midshipmen were able to build this aircraft for a little under $300. Imagine a terrorist or insurgent group trading a $300 guided aerial IED for a $200 million C-17," according to a thesis paper by Jeffrey A. Vish and published by NPS in 2006. Recent Ukrainian attacks have destroyed Russian bombers and transports using that very method. Advances in autonomy enable those kinds of attacks in large numbers. When those kinds of exchange ratios occur due to weapon-target asymmetry, the staggering economic costs are nearly as powerful as battlefield losses in forcing change.

Weapon-target asymmetry describes the increasing ability of

small, inexpensive weapons to reliably destroy large, expensive targets. It is a key consequence of the advance of precision weapons, and it's a powerful tool for predicting future changes to the character of warfare and military forces. With so much of the precision revolution still to come, this asymmetry will be an increasingly visible factor on the battlefield.

## SURGICAL FIRE: 100 PERCENT HITS IS NOT THE LIMIT

When the circular error probable, or CEP, of a weapon decreases to less than the size of the target, the probability of achieving a hit on the target approaches 100 percent. However, achieving 100 percent hits is not the ultimate limit. The trend can continue much further.

As weapon precision continues to improve, it enables a weapon not only to hit the target but to hit a specific aimpoint within that target. In Operation Desert Storm, laser-guided bombs demonstrated that capability against large buildings. In one famous example, an F-117 pilot directed a laser-guided bomb into the central ventilation shaft of the Iraqi Air Defense headquarters, devastating the building with a single hit. Precision munitions have often been used to strike specific parts of large structures, such as the structural supports of Vietnamese bridges or the access tunnels of al-Qaeda cave complexes. Now, next-generation anti-ship missiles are providing the capability for an operator to choose specific aimpoints within a ship. That allows a relatively small missile to damage critical systems such as a ship's engine or radar. Some very precise U.S. drone strikes have hit an individual terrorist sitting in a specific seat within a motor vehicle while sparing the other occupants of the vehicle. Ukrainian drone operators have showcased their ability to drop small anti-tank grenades precisely onto the weak points of Russian armored vehicles, even into open hatches. That enables a small, cheap grenade to destroy a multimillion-dollar tank.

The capability to hit points within a target with surgical precision increases the lethality of small munitions against large targets. Even small weapons can be devastating if they are precisely directed against critical vulnerable points. There are many examples of powerful targets being disabled by "lucky hits." For example, in 1940, Britain's largest battlecruiser, HMS Hood , was destroyed by a single shell from the German battleship Bismarck. It pierced her deck in just the right spot to travel into an ammunition magazine and ignite an instantaneous secondary explosion that blew the Hood to pieces. Imagine that, soon, such "lucky hits" will not be improbable accidents but the normal result of any attack. Large targets will become only as strong as their weakest point. In the hands of the fictional assassin "John Wick," even a pencil could be a lethal weapon when used to precisely strike an opponent's critical points.

Surgical-level precision increases weapon-target asymmetry. It gives a potent attack capability to small platforms that might have been unable to carry effective weapons in the past, like small observation drones. It also means that a given combat platform can carry many more weapons. For instance, an aircraft that in the past might have carried four 500-pound bombs for use against armored vehicles could potentially carry up to eighty 25-pound surgical fire munitions, enabling the aircraft to disable 20 times as many vehicles during a single mission.

Today, the early examples of surgical fire attacks require manual selection of aimpoints, for instance by using a laser designator or the careful video-guided positioning of a small drone. Soon, active terminal guidance powered by AI could automate that process. Image-processing algorithms could automatically identify the type of target under attack, look up the vulnerable points associated with it, and steer the weapon into one of those vulnerable points. Hence, robotic weapons could automatically use surgical fire to ensure that every hit is a lucky hit.

## THE ACCELERATION OF COMBAT

Universal precision also implies a dramatic acceleration in the speed of combat. When it takes only one shot instead of many to destroy a target, combat happens much faster. When large precision weapons were first used at scale in Desert Storm, the efficiency of precision-guided bombing meant that air forces could attack and hit many targets at the same time resulting in shock and paralysis. As Gen. Ronald Fogleman, the Air Force Chief of Staff, put it in 1995, when the transition to precision-guided attack is complete, U.S. air forces "may be able to engage 1,500 targets in the first hour, if not the first minutes, of a conflict." The result could be a conventional attack with the speed and shock of a nuclear strike, but with much greater discrimination.

Those concepts became codified as a new airpower doctrine of effects-based operations, based on parallel attack. As precision guidance migrates to smaller weapons, the same dynamic of speed, shock, and paralysis will apply to tactical engagements on the ground. An increase of 100 to 1,000 times in weapon lethality due to precision may result in a similar increase in speed. Because it will only take a short time to hit every visible target, high-intensity battles or firefights may only last a few minutes, perhaps even a few seconds in many situations.

The traditional spectacles of massed forces moving into battle, such as columns of tanks or fleets of ships, will likely disappear. Instead of representing power, such displays will represent dangerous vulnerability. Visible forces may become like targets paraded in a shooting gallery. During the Russian invasion of Ukraine, Russian armored battalion tactical groups advanced in concentrated formations. Ukrainian drones monitored their approach, and they fell into ambushes by Ukrainian infantry


Ukrainian Security Service

**Ukraine's use of small FPV drones to destroy Russian bombers on the ground demonstrates the asymmetric effects precision and automation can have on the modern battlefield.**

with modest numbers of precision-guided anti-tank missiles. Stinging losses forced the armored battalions to withdraw. In the future, similar forces that so brazenly expose themselves to observation will be attacked simultaneously and wiped out in moments.

Without a dramatic change in the form of military forces, this accelerating effect may create a crushing advantage of attack over defense. Consider that in the past, the opening shots of any large campaign or small-unit firefight served to commence the hostilities, but they were unlikely to change the situation dramatically because most of the weapons that were fired would miss. In contrast, in the era of "one shot, one kill," the opening salvos could tip a battle or the campaign decisively. An initial strike such as the Pearl Harbor attack, but using precision weapons, would be much more lethal and crippling. If the forces of one side can be targeted by the other, surprise attack becomes a dangerous temptation. In this manner, the calculi of conventional engagements may come to resemble, in miniature, those of Cold War nuclear confrontations. To reduce the temptation to strike first lest one's own forces be wiped out, dispersion, camouflage, and other arts of concealment will be critical.

## COMBAT AS A CONTEST TO FIND AND FIX THE ENEMY

On the future battlefield ruled by precision weapons, anything that can be seen can be hit and killed. Therefore, we can expect future forces to strive not to be seen, while making maximum effort to locate the enemy. Combat may change from a struggle to hit the enemy into a struggle to find and target the enemy.

A strike using a precision weapon includes a sequence of steps called a "kill chain." Most of the steps are about collecting and processing the necessary information to target the enemy. The simplest version of the kill chain is "find, fix, and finish." "Find" means detect the presence of the target, "fix"means tag it precisely with an aimpoint, and "finish" means destroy it with a weapon. More detailed versions, which specify additional steps such as "track" and "assess," have since become popular. In all cases, the actual weapon strike is just a culminating step.

The contest to find and fix the enemy will become more explicit and intense. The U.S. Air Force and other military services have built a colossal multilayered intelligence, surveillance, and reconnaissance (ISR) information enterprise to provide the information to feed today's kill chains. It encompasses sensors ranging from small tactical drones, to powerful airborne systems like the airliner-based Rivet Joint and E-7, to constellations of surveillance satellites. The U.S. even established a new military service, the Space Force, to operate the growing network of space systems to collect and move data.

All those are backed by armies of intelligence specialists analyzing ISR data and making it useful for battlefield commanders. Data networks bring all this data together to create a real-time picture of the battlespace and coordinate actions by friendly forces, a process sometimes called network-centric warfare. When there are many networked sensors and weapons, they form a kill web that lets a kill chain be completed using any combination of those networked forces.

Targeting decisions lie at the center of network-centric warfare. If warfare was about wholesale destruction, only nuclear weapons would be valued because they accomplish that far more effectively. To the contrary, in real war, choosing targets carefully is vital, and decisions involve a lot more than just pulling a trigger. The military understands targeting as a comprehensive process. Current U.S. joint doctrine describes targeting as "the process of selecting and prioritizing targets and matching the appropriate response to them, taking account of command objectives, operational requirements and capabilities." This is a systematic and multidisciplinary process and a command responsibility that requires a commander's oversight and involvement. The process involves different areas of expertise and internal checks, starting with intelligence gathering and including the designation of the aimpoint for the munition. It then includes the assessment of effects following the attack. The responsibilities of targeting place a tremendous burden on those overseeing the use of precision weapons.

## AI TO ASSUME SOME TARGETING RESPONSIBILITIES

The flood of ISR data is rapidly outstripping the capacity of human analysts to absorb it. In 2019 the U.S. director of national intelligence stated that under current trends, American intelligence organizations will need more than 8 million imagery analysts, more than five times the number of individuals that hold top-secret clearances in the entire government. That's before the rise of universal precision. That burden can't be pushed onto warfighters. Modern warfighters are already saturated with demands. As history shows, successful robotic weapons use their "smarts" to take the burden off the warfighter.

The advance of AI is helping to address this barrier of complexity and burden. Analysts in intelligence centers can use AI to efficiently scan vast amounts of video to quickly find potential targets. Warfighters and decision-makers can use AI to help analyze complex and rapidly evolving pictures of the battlespace, to distinguish important changes from unimportant ones and make faster and better-informed decisions.

Unmanned systems can use AI to do some of their own analysis and lower-level decision-making without sending burdensome raw data. After all, this is what we expect of manned systems. For instance, the crews of patrol aircraft looking for enemy vessels don't simply beam back video to headquarters for analysts to assess. They do their own assessment and send notice when they find something. Edge computing using AI will allow unmanned ISR systems to act in a similar way to build a real-time digital picture of the battlespace.

In addition, AI will enable the countless precision-guided weapons to find their targets without overburdening the human warfighters. While it might sound radical, early forms of AI have long provided capabilities that allow smart weapons to perform some targeting tasks. "Fire and forget" missiles are already common in air and naval combat. Such homing weapons must be able to distinguish their targets from background clutter or other noise. They also must reject interference from countermeasures like infrared flares or radar-reflecting chaff that is intended to confuse or spoof them. New weapons use high-definition imaging sensors and image processing software to assess which objects in view are real and which are flares, decoys, or the results of electronic interference or background noise, and they then decide which object to pursue. They examine scenes in different parts of the electromagnetic spectrum, called "multispectral imaging," and look for distinctive shape or movement.

It is only a short step from selecting the real target among fake ones to selecting the target from among other objects.

***Col. George Dougherty*** *has served as a senior leader in defense laboratories, military headquarters, and the Office of the Secretary of Defense. He co-authored the Department of the Air Force's* Science and Technology Strategy. *He has served in the Active and Reserve forces and, as a civilian, is a business strategist who helps companies navigate disruptive change. Any opinions expressed here are his own.*

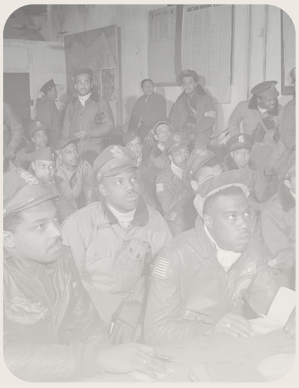


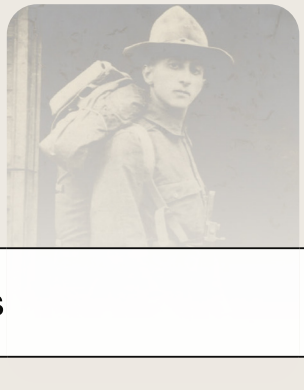


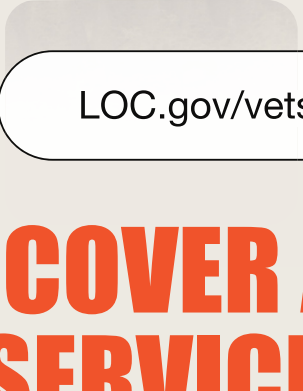




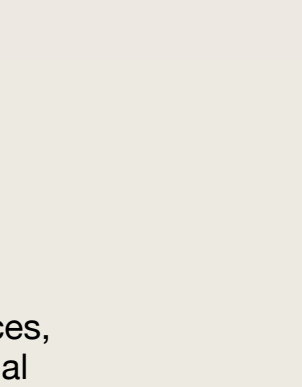
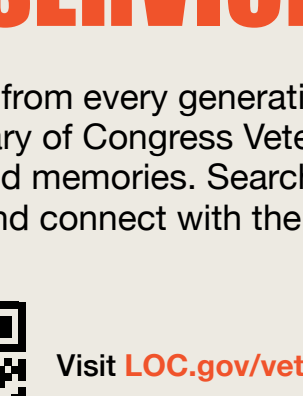
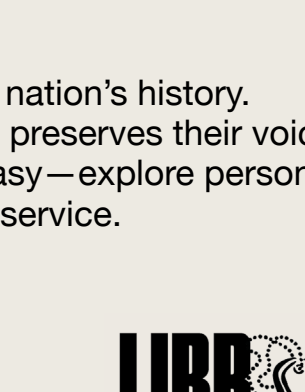








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By Juanita Henry

# AFA's Heritage Hall Honors the Legacy of the Air Force and Space Force


Jud McCrehiin/staff

**The new Heritage Hall at AFA Headquarters tells the story of military flight on one side and of military space on the other, tracing each from their roots into the future through images, quotes, and historical artifacts.**

Inside the Air & Space Forces Association (AFA) headquarters in Arlington, Va., two striking walls line the main corridor that draw visitors into a vivid journey through the history of American airpower and spacepower. Known as the Heritage Hall, this installation chronicles the evolution of the U.S. Air Force and U.S. Space Force and is designed to educate and inspire those who visit.

The display covers more than a century of key historical developments, figures, and innovation that embody the fabric of American air- and spacepower—from the Wright Brothers' first flight in 1903 to the establishment of the U.S. Space Force in 2019. It traces major conflicts, technological breakthroughs, individual acts of courage, and strategic milestones that have defined the evolution of both services.

## THE VISION BEHIND THE HALL

The creation of the Heritage Hall was a collaborative effort across AFA's staff and leadership. The visual design was led by longtime AFA Creative Director Zaur Eylanbekov, who brought 20 years of experience to the project. He worked closely with Lt. Gen. David Deptula, USAF (Ret.), Dean of the Mitchell Institute for Aerospace Studies; Doug Birkey, Executive Director of the Mitchell Institute; Col. Charles Galbreath, USSF (Ret.), Director of Mitchell Institute for Spacepower Center of Excellence; Tobias Naegele, Editor-in-Chief of Air & Space Forces Magazine; and others who helped shape the timeline and select key milestones to feature across both the air and space displays.

"This hall is a celebration of the proud heritage of the Air Force and Space Force," said Eylanbekov.

To enrich the historical depth and authenticity of the exhibit, Birkey contributed original artifacts and archival materials that connect visitors directly to the eras being represented—including a World War I propeller blade, a piece of a B-17, as well as control wheels from a B-47, B-52, and C-5. Items from AFA's collections were also highlighted, like original newspapers covering the early days of the Space race, an Apollo 15 mission patch that was flown to the moon and back, along with key documents that tie to the founding of the Space Force. Deptula also added some very rare historical pieces—including a map used on night one of the Desert Storm

Jud McCrehin/staff

**The allies could not have defeated Nazi Germany in World War II without the B-17 Flying Fortresses of the 8th Air Force. Images and a body panel from a B-17s that flew in the war bring history to life in AFA's Heritage Hall.**

air campaign and an MQ-1 propeller. Combined, these artifacts, dozens of images, and quotations from air and space leaders yields a narrative structure and set of high impact visuals that reflect the evolution of airpower and spacepower over time.

"This project was more than documenting history—it is designed to show how strategy, innovation, and leadership have shaped the Air Force and Space Force—two services that are intrinsic to our nation's security," Deptula said. "We wanted these timelines to reflect not just what happened, but why it mattered."

Designed with layered timelines, curated imagery, and clean, modern visuals, the hall creates a museum-like experience that blends storytelling with historical context.

"Walking through the hall gives you a powerful sense of the Air Force and Space Force journey—and how deeply AFA has been connected to that story," Naegele said.

## CELEBRATING A CENTURY OF AIRPOWER

The Air Force side begins with the Wright Brothers' 1903 flight at Kitty Hawk, which paved the way for aviation in combat. It then moves through the rapid advances of World War I and II, highlighting the critical role of airpower in securing key effects.

**Highlights include:**

- 1903-1916: Origins of Flight
- 1917-1938: Foundations of Airpower
- 1939-1945: Global Conflict (World War II)
- 1946-1991: Cold War Era
- 1992-Present: Modern Air Force

Historic photos of figures like Capt. Eddie Rickenbacker, Gen. Hap Arnold, Gen. Carl Spaatz, Gen. Ira Eaker, Gen. Curtis LeMay, and operational aircrews, along with images of aircraft, various quotes, and artifacts guide viewers through milestone events of U.S. Air Force history. It's a tribute to the continual evolution and technological progress that define American airpower.


Jud McCrehin/staff

**The military and the Air Force in particular played a central role in helping America win the space race in the 1960s.**

## WHERE LEGACY MEETS PURPOSE

"This isn't just decoration—it's a learning tool. It tells our unique story of air and space superiority," said Lt. Gen. Burt Field, USAF (Ret.), President & CEO of the Air & Space Forces Association. "We want visitors to leave with a deep understanding of the history and heritage of the Air Force and Space Force and give a greater appreciation for the challenges and opportunities ahead."


Jud McCrehin/staff

**This framed image of Gen. Bernard Schriever on the cover of Time Magazine in April 1957 was in Schriever's personal collection. Nearly 80 years later, it is a reminder that the pioneers of air and space were heroes, featured on the covers of national magazines.**

The Heritage Hall is more than a tribute—it's a living reminder of AFA's mission: to promote dominant U.S. Air & Space Forces as the foundation of a strong national defense; to honor and support Airmen, Guardians, and their Families; and to remember and respect our proud heritage. Formed in 1946, a year before the Air Force became an independent service, AFA has long championed the preservation of military history while driving innovation forward.

Whether it's a cadet exploring history for the first time, a veteran reflecting on their service, or a policymaker gaining perspective on air and space strategy, AFA's Heritage Hall offers a powerful, immersive experience—connecting generations through the shared story of airpower and spacepower.

The timelines end with "20XX," a deliberate choice that points toward the unknown challenges and achievements still to come. It invites visitors not only to reflect on the past, but to imagine the future of the Air Force and Space Force still being written.

AFA invites all visitors—military, civilian, and community members—to experience the Heritage Hall and reflect on the incredible journeys of the Air Force and Space Force.

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

# James H. Doolittle

## Leader—Warrior—Scholar.

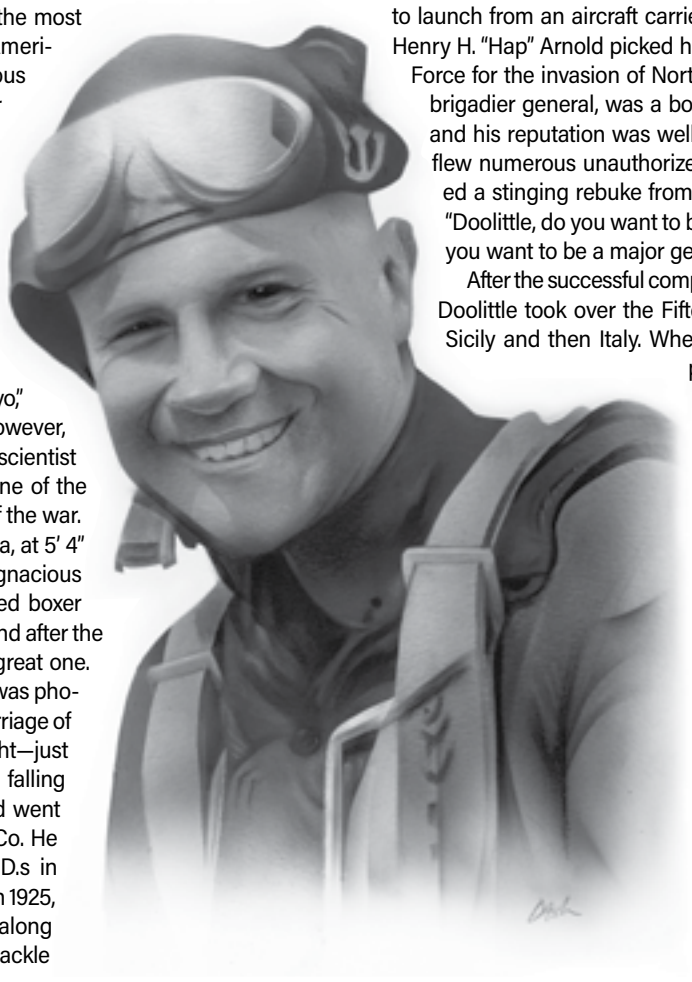

Illustration by Dash Parham/staff; photo resource USAF

Jimmy Doolittle is perhaps the most recognizable aviator in American history. He was famous throughout the interwar period for his daredevil stunts and racing plane exploits. Soon after Pearl Harbor he flew the legendary raid on Tokyo, leading a group of B-25s that took off from the deck of an aircraft carrier. He was awarded the Medal of Honor for that deed, which was also made into a movie, "Thirty Seconds over Tokyo," starring Spencer Tracy. In truth, however, Doolittle was far more—he was a scientist and aviation pioneer and also one of the great air combat commanders of the war.

Raised in Alaska and California, at 5' 4" tall, but strong, Doolittle was pugnacious even as a youth and was a noted boxer growing up. He became a pilot, and after the World War he developed into a great one. He won numerous air races and was photographed sitting on the undercarriage of an Air Service aircraft during flight—just to prove he could do it without falling off. He left the Army in 1930 and went into business with the Shell Oil Co. He had earned one of the first Ph.D.s in aeronautics in the U.S., from MIT in 1925, and used those academic skills, along with his uncanny flying ability, to tackle aviation problems.

Perhaps the greatest bane for pilots in those years was weather. Once flying into clouds, normal sensory perceptions are unreliable—invariably the pilot becomes disoriented, stalls and goes into a spin, and then crashes. Doolittle designed and tested the first "blind flying" instruments that allowed pilots to fly through weather by using cockpit instrumentation only. This was revolutionary. Today, no pilot with any sense would dare to take off without such instruments.

In addition, while at Shell Oil, he pushed for the development of high-octane gasoline. This too was revolutionary. High-performance aircraft depend on high-performance engines, and such engines in turn require high octane gasoline: without it, engines "ping" and lose performance—or simply quit. Such gasoline was not in great demand in the 1930s because medium-performance commercial airliners didn't need it. One does not put high-octane fuel in a VW Bug. Fighter aircraft, however, needed such gasoline. Thanks to the aggressive pushing of Doolittle, 100-octane fuel was available before World War II. It has been said this fuel won the Battle of Britain by giving Royal Air Force fighters a decisive margin of superiority over the Luftwaffe.

When the war broke out, Doolittle returned to uniform, and one of his first duties was to train bomber crews for the short takeoffs necessary to launch from an aircraft carrier and bomb Tokyo. Afterward, Gen. Henry H. "Hap" Arnold picked him to command the new Twelfth Air Force for the invasion of North Africa in 1942. Doolittle, by then a brigadier general, was a born leader and a dedicated operator, and his reputation was well known by all his subordinates. He flew numerous unauthorized combat missions, which prompted a stinging rebuke from his boss, Gen. Dwight Eisenhower: "Doolittle, do you want to be a lieutenant and fly Spitfires, or do you want to be a major general and command my air force?"

After the successful completion of the North African campaign, Doolittle took over the Fifteenth Air Force for the invasions of Sicily and then Italy. When Eisenhower moved to London in preparation for Operation Overlord, he brought Doolittle with him. Doolittle took command of the Eighth Air Force and led it for the rest of the war. Losses in the strategic bombing campaign were high: the Luftwaffe was a very formidable opponent. He studied the problem and realized it was largely a question of doctrine. To him, a sign at VIII Fighter Command headquarters summed up the problem: "The First Duty of the Eighth Air Force Fighters is to Bring the Bombers Back Alive." He ordered it removed and replaced it with one that read: "The First Duty of the Eighth Air Force Fighters is Destroy German Fighters." The result of this deceptively simple semantic change was dramatic. The fighter pilots were released from their passive role of convoy protection and again became hunters. Air superiority, essential for the success of the Normandy invasion, was soon achieved.

When the Nazis were defeated, Doolittle transitioned the Eighth Air Force into B-29s and took it to Okinawa to participate in the strategic air campaign against Japan. The war ended soon after.

Doolittle, a genuine American hero, returned to the U.S. as a lieutenant general, retired, and went back into business and government service. In 1946, he became the founding president of the Air Force Association and remained an instantly recognizable hero. In 1985 President Ronald Reagan promoted him to full general.

Doolittle was one of the great Airmen in American history, but he was also one of its greatest combat leaders. He was there for all the tough jobs: Tokyo, Twelfth Air Force, Fifteenth Air Force and finally, the crucial Eighth Air Force in the final drive against Germany. The general died at age 96 in 1993. ***I Could Never Be So Lucky Again*** (Bantam, 1991), is Doolittle's autobiography; the best biography of his life is by Dik Daso, ***Doolittle: Aerospace Visionary*** (Brassey's, 2003).

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