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Journal of the Air Force Association

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About the cover: An F-15C lands at Leeuwarden AB, Netherlands. See "Forward and Ready, East and South," p. 30. USAF photo by SSgt. Ryan Crane.



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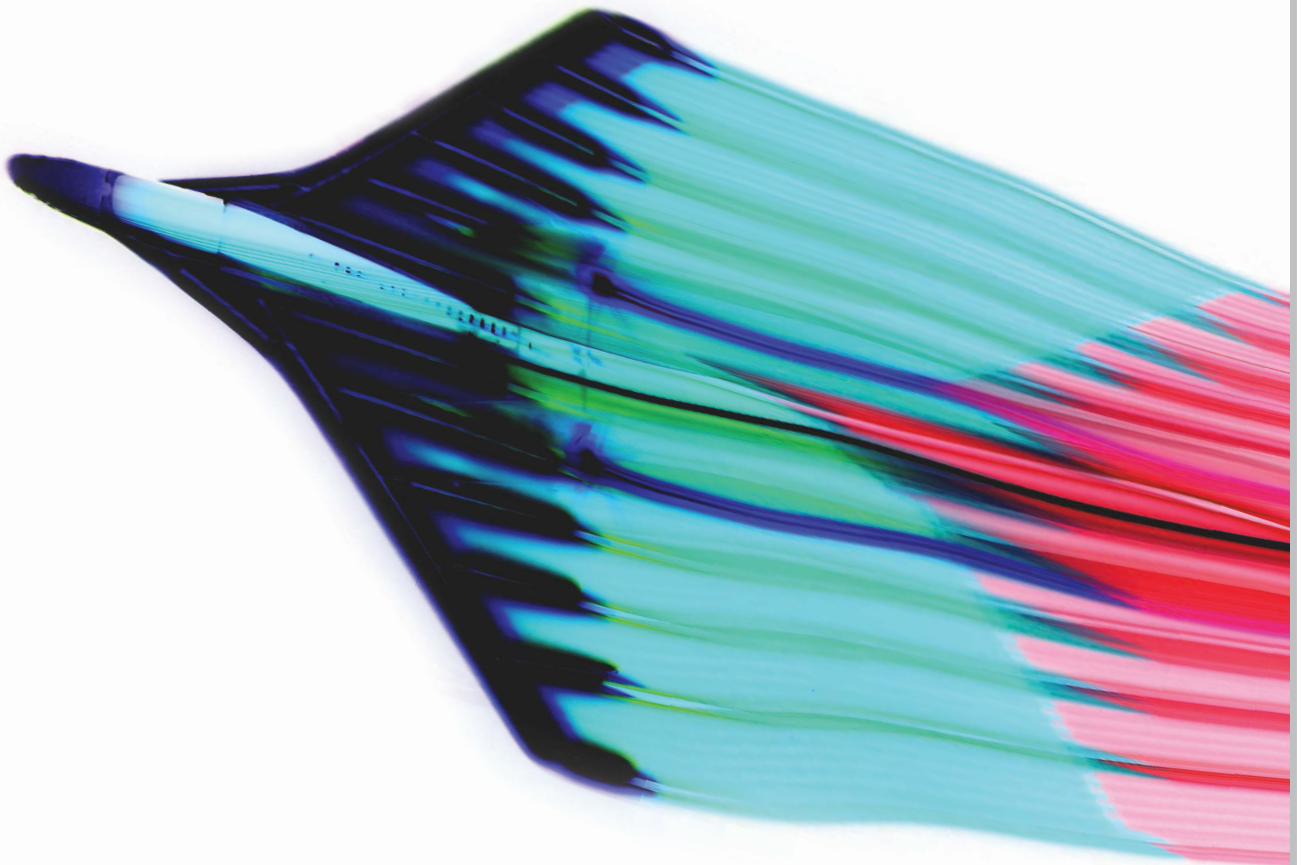


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The Tanker Imperative

The KC-46 next generation tanker program is entering the often-problematic stage in a military aircraft's development program. It must move beyond being a "paper airplane" and actually prove its capabilities in the air with real metal, electronics, and composites.

Early results have been mixed. A KC-46 test aircraft flew for the first time at the end of 2014, beating a deadline by days, but Boeing has also recently announced the program has gone \$808 million over the company's budget thus far.

This cost overrun is Boeing's problem (not USAF's or the taxpayers') because the KC-46 program is a firm, fixed-price contract. In fact, Boeing is believed to have deliberately underbid the price to win the contract—on the expectation that KC-46 work would later lead to other sales for the company.

USAF is watching the progress very closely. The KC-46 is one of the service's top three modernization priorities, along with the F-35 strike fighter and the Long-Range Strike Bomber. An often-overlooked flying gas station mission holds this high-priority status for good reason.

During the first three quarters of Fiscal 2015, USAF's KC-135 and KC-10 tankers put in 220,000 flying hours, transported 15,000 passengers, and performed nearly 1,000 aeromedical evacuations. And none of that is even an aerial refueling tanker's primary mission, which is to deliver fuel to the aircraft that need it.

USAF's tankers have been intensely involved in Operation Inherent Resolve, the air war against ISIS insurgents in Syria and Iraq. In that conflict alone, Air Force tankers flew 14,000 sorties and performed 90,000 aircraft refuelings during the operation's first year.

In July, to meet the continuous need for gas in this air war, the Air Force stood up a second expeditionary air refueling squadron at al Udeid Air Base in Qatar, from which the tankers can refuel aircraft based throughout the Middle East.

The fight against ISIS is but one of the global missions USAF's tankers make possible, and this is the new normal. The "entire US military is very

busy," said Gen. Darren W. McDew in an interview, adding, "I don't see that changing any time soon." In mid-August, McDew was head of Air Mobility Command but had been confirmed for reassignment as commander of US Transportation Command.

Indeed, thoughts that the Air Force would catch a breather after ending operations in Iraq and Afghanistan have fallen by the wayside. There has been a steady need for Air Force airpower in the Middle East; the demands in Africa are slowly increasing; threats and

Boeing and the Air Force must get the KC-46 right.

missions in Europe have ramped up; the vast distances in the Pacific make aerial refueling an automatic; and there are always CONUS-based missions and exercises to support. "There is not an operation anywhere we don't touch," McDew noted.

The airmen operating and supporting today's KC-135s and KC-10s are performing their missions with aircraft that are typically older than they are.

The KC-135 is a case study in managing aging aircraft. The 396 Stratotankers are continuously upgraded, such as through a Block 45 avionics upgrade that should reach initial operational capability early next year.

These tankers are run through depot every five years for a comprehensive refresh, but the KC-135's first flight was in 1956, and they take a lot of work. USAF invests \$700 million a year in their depot work, which typically covers 31,000 man-hours of labor over 126 days. When the aircraft return to their units, they may have a patchwork of new and old components, but they remain safe and reliable.

Even the KC-10s are now 31 years old. They too are continuously refurbished and upgraded, and an Extender avionics upgrade was due to reach initial operational capability last month.

The question is: How long can USAF keep this up? The KC-46 program will deliver 179 aircraft by 2027. This will only recapitalize a third of the tanker fleet, an inventory based on real-world

operational requirements—including the need to support US Strategic Command's nuclear combat mission.

When the KC-46 program wraps up, hundreds of remaining KC-135s will be 65 years old, and the combat needs will continue. One of the KC-46's key performance parameters is survivability—it will have defensive systems and be suitable for nighttime operations.

Defensive systems are a reflection of how tankers are used today. Radar warning receivers and Large Aircraft Infrared Countermeasures (LAIRCM) systems allow tankers to deploy and set up refueling tracks closer to combat zones, in turn giving fighters and bombers more gas for combat operations.

One hundred-forty Guard and Reserve KC-135s will receive LAIRCM upgrades, and USAF is also buying 35 LAIRCM pods that can be moved from one aircraft to another within 30 minutes. These systems protect large, slow aircraft from infrared missiles, and installations will begin in 2017.

That year is a big one for the KC-46 as well.

Boeing should have delivered 18 Pegasus aircraft to the Air Force by 2017. There is quite a lot riding on this schedule, as military construction programs, beddown plans, personnel assignments, and KC-135 retirements are all being planned with this specific KC-46 delivery schedule in mind. Top Air Force leaders are hopeful Boeing will meet the schedule but are certainly not taking it for granted. McDew said he is "a bit concerned" about where Boeing is on the timeline, but noted that a schedule slip would realistically be more along the lines of months than years.

Boeing made its 2014 deadline for a KC-46 first flight with three days to spare. The first flight of an all-up test vehicle has now slipped from the spring to October.

There will always be unforeseen missions springing up all across the globe. That is what makes the KC-46 so critical: Today's aerial refueling fleet will not last forever, old airplanes often find new ways to break, and global threats are proliferating. The new tanker must get into the force on time. ☛



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Educate the public on the critical need for unmatched aerospace power and a technically superior workforce to ensure US national security.

Advocate for aerospace power and STEM education.

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Back to the Future

It looks like we're going backwards. Recent articles pertaining to the Air Force's plan to acquire a new advanced jet trainer have thus far identified potential candidates that appear to be aerodynamically inferior to the T-38s that they are supposed to replace [*"Teeing Up the T-X," June, p. 48*].

In these challenging budgetary times, it appears obvious to me that a brand-new T-38 airframe, with futuristic new avionics, might be superior to any candidate thus far proposed and likely far less expensive (because the airframe is already proven). Higher quality at less cost. Worth consideration.

Col. David R. Haulman,
USAF (Ret.)
Ridgeland, Miss.

Night Flight Alright

Great story! I know there have been thousands of supersonic flights at Edwards [AFB, Calif.]. Not sure how many were night supersonic [*"Edwards Renaissance," July, p. 38*].

In 1972 while at Eglin AFB, Fla., I was the operational test and evaluation project manager of a replacement passive infrared sensor for the RF-4C. Part of the OT&E was to test the sensor resolution flying supersonic in fly-off between the new Honeywell AAD-5 and Texas Instruments revised AAS-18. Edwards was the only location we could fly supersonic at night and had the sensor array targets. Base officials even published a notice of the event, alerting all in the area of our week of night supersonic flights.

Maj. Gayle P. Johnson,
USAF (Ret.)
Watertown, Wis.

This is a minor comment about the "moving blades of metal" that play havoc with radars at Edwards Air Force Base. If you dig a little deeper into wind turbine technology, you will find blades are made of fiberglass composite with carbon composite in areas of high stress. In spite of fiberglass being an electrical nonconductor, the radar return may be only a few decibels down from metal. (Perhaps down several dB.) The few dB can still play havoc. Also blades typically have an ice sensor at the tip

with a wire running to the hub; this wire contributes to the radar return. Each blade has lightning protection, which is a conductor and enhances radar cross section. Older and smaller wind turbines likely have metal blades. The solution to the radar interference is not obvious.

Allen E. Fuhs
Wright-Patterson AFB
Dayton, Ohio

Counting Down

I have seen AC-47s fire in Vietnam and have always been amazed by the firing rate of miniguns: up to 6,000 rounds a minute. However, the claims that three of them could hit every square foot of a football field in a three-second burst don't seem to add up [*"Gunships on the Trail," June, p. 64*]. My math (admittedly, not one of my strengths) tells me that there are 48,000 square feet in an NFL football field (160 x 300 = 48,000). A firing rate of 18,000 rpm (rounds per minute) works out to 300 rps (rounds per second). At that rate, it seems to me that it would take about two minutes and 40 seconds to cover a football field. Or did I miss something?

MSgt. Stephen Childers,
USAF (Ret.)
Woodside, Del.

Finest

I would like to commend John Correll for his excellent article, "Their Finest Hour," in the July issue [p. 30]. His summary and characterization of the Battle of Britain was well-done and moving. I would like to add some background to the subsequent treatment of Air Chief Marshal Hugh Dowding. I call it, "The Rest of the Story."

Do you have a comment about a current article in the magazine? Write to "Letters," *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 22209-1198. (Email: 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.—THE EDITORS

In World War I, Hugh Dowding was a wing commander of the Royal Flying Corps that was under the overall command of Brig. Gen. Hugh Trenchard. Trenchard developed a broad policy of aggressive “offensive spirit”—attacking everywhere, everything in sight. Trenchard enforced his policy ruthlessly. One of the officers who dissented from Trenchard’s policy was Lt. Col. Hugh Dowding. This indomitable leader was one of the public school fellows who had joined the army early and served with distinction in India and the Orient. Back in England, he had learned to fly at his own expense and joined the RFC in his mid-30s. He had many of the same qualities as Hugh Trenchard—highly competent but uncompromising. The difference was that Dowding had a passionate concern for his aircrews and the high rate at which they were being consumed. While not opposing the offensive spirit in principle, he believed and advocated to Trenchard and others that the crews be given realistic and adequate training before being sent into combat. Instinctively, he knew the truth of the high loss rate curve that ruthlessly eliminated inexperienced pilots in their first few combat missions. Dowding’s wing contained four squadrons, one of which had suffered 50 percent casualties by early August 1915. After one of his squadron commanders and two flight commanders had been shot down, Dowding went to

Trenchard and requested the squadron be withdrawn from the line for a few weeks’ rest. Trenchard was upset with this request, and although he approved it, he privately thought Dowding’s compassion outweighed his duty. In official correspondence, he referred to Dowding as a “dismal Jimmy” and had him removed from command and sent back to England. Never being allowed back to the front in World War I, Dowding nevertheless rose to become the commander of Fighter Command in the Battle of Britain. Trenchard never forgot this episode. When the Battle of Britain ended in late 1940, Trenchard was one of the voices that persuaded Winston Churchill to retire Dowding!

This vignette is from my forthcoming book *Oswald Boelcke: Man of Valor*. I hope it is useful to you and your readers.
 Brig. Gen. R. G. Head,
 USAF (Ret.)
 Coronado, Calif.

A superb article by John Correll about the Battle of Britain. It details the perilous military and political situation for Great Britain in 1940. An apt subtitle would be, “How Winston Churchill Saved Western Civilization.” As is made very clear in the Churchill biography, *Warlord*, he was a man who broke all the molds for England in three wars. Infuriating as he might have been for the political establishment and military leaders, that characteristic made him precisely the

man to take over in the dark hours of 1940. Without him and the RAF fighter force, life since then would have been very different for England, the US, and Europe.

Lt. Col. Cal Taylor,
 USAF (Ret.)
 Olympia, Wash.

Being a dedicated [reader] and always interested in the aviation of the World War II, I found John T. Correll’s piece “Their Finest Hour” an entertaining and thought-provoking look back into another critical time for Britain, our nation (though most of the citizens were scarcely aware of it), and the world. The lessons of the so-called “Battle of Britain” should never be overlooked, as it pertains to readiness, resolve, and technical superiority! If it were not for the decisional errors of the Luftwaffe and German management (Goering and Hitler), the outcome of the battle and the war could have been far different.

I also wanted to commend Mr. Ivan Berryman on his excellent artwork and only regret I did not receive the copy with the cover showing the shootdown of the Dornier 17 by a Spitfire at the cliffs of Dover.

The artwork on pages 30 to 31 struck me initially as a bit odd, being captioned as a Spitfire chasing a Bf 109 during the Battle of Britain. What is odd to me is it portrays a Bf 109F, which did not enter service until very late during the

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battle, the major variant serving during the battle being the Bf 109E. The Bf 109F is painted in the colors of JG26, which was not equipped with Bf 109Fs until February 1941, when it was stationed at Dusseldorf. Thus, while unlikely to have been engaged during the battle, it's not impossible that Bf 109Fs did have a go against the RAF, but it is unlikely it was JG26. However, the Spitfire is also suspect, being in the markings of Wing Commander Douglas Bader after his promotion to wing commander in March 1941, well after the battle. Bader was shot down 9 August 1941, so it appears the time frame of this beautiful artwork would be during the period March to August 1941.

I hope my critique doesn't detract from an excellent and well-illustrated article, which I thoroughly enjoyed and whose lessons of history should never be ignored, particularly during these days. Thank you so much for your efforts to put together a well-balanced, timely, and informative magazine.

Robert Taylor
Ventura, Calif.

■ *Robert Taylor is correct in his interpretation of the artwork, and should any reader wish to purchase a copy of the July magazine with one of the four alternate covers, please contact our membership department at membership@afa.org. They will be happy to assist you.—THE*

EDITORS

Warrant Officers Warranted

I totally agree with Paul Stonehouse's comments in his letter on p. 7 of the July issue, especially concerning returning to the warrant officer position ["*Letters: Open it Up*"]. I was one of the last master sergeants to enter the warrant officer program, before the E-8/E-9 positions were established. The Air Force, in its infinite wisdom, decided that it wanted an all-commissioned officer corps. The command structure was strictly pilot-rated officers. I had one wing commander who held separate commander's calls for the rated and nonrated troops, referring to the nonrated as "overhead." Apparently that mind-set is still prevalent today!

The killing of the Air Force's warrant officer program left the remaining warrant officers in a state of limbo, with the loss of their specialized job ratings in the unit manning documents. In my case, I was very fortunate that I spent the last 12 years of my Air Force career filling field-grade officer positions. My last position was an assignment to the airborne battle staff of one of the major air commands.

Also, USAF's reasoning (at that time) that with the upcoming addition of the E-8/E-9 program, the warrant officer

position was no longer needed does not hold water. All the other military services still effectively maintain their warrant officer structure, even to the extent of adding an additional grade of W-5. With all due respect to the fine job our senior and chief master sergeants are doing, I personally, at the age of 90 and from a strictly finical standpoint, would rather retire at the W-4 or W-5 retired pay.

Yes, it is time the Air Force re-evaluated its command structure and tap into the wealth of talent down in the ranks!

CWO Robert V. Bush,
USAF (Ret.)
Swansboro, N.C.

Paul Stonehouse raised an interesting issue, if you can get beyond his obvious enlisted vs. officer slant. I agree with him that the Air Force should create a warrant officer branch for RPA pilots and other noncombat pilot positions. USAF is the only service in NATO that does not have a technical officer corps, and it restricts our ability to adapt to changing demands.

I was recalled to Active Duty in 2009 to fly RPAs after 10 years in retirement, along with some 40 other retired Air Force pilots assigned to Creech AFB, Nev. All of us were in our late 50s, most of us former fighter pilots. We named our group the "Knights of Viagra" and designed our own morale patch with the motto: "Always Stalwart"—or in Latin, "Semper Erectus."

Stonehouse was right in his assertion that the younger generation does a much better job of playing video games than us old fogies. But that doesn't qualify them to be pilots. We retrained the Knights of Viagra, brought them into the RPA community that was populated with mostly first-tour pilots and sensor operators. I often heard my younger crew members for help to get out of me of the operating computer commands and I appreciated their indulgence. But when it comes to killing people who dearly deserved to die, the experienced hand wins every time. Playing video games against imaginary zombies doesn't equate to me being a pilot.

As a prior-enlisted troop (E-5, 1972), prior warrant officer (CW-2, 1975), and retired Air Force pilot (O-5, 2013), let me cast my vote for the establishment of an Air Force warrant officer corps that will fix many of the pilot shortage problems we're facing today. Warrant officers should have an associate degree or 60 semester hours toward a bachelor's degree, and at least an FAA commercial license for entry into the RPA pilot program or certification to fly C-12s and such. But the finger on the trigger needs to be that of an officer.

Mr. Stonehouse, and all those other video gamers who think flying an MQ-1B Predator is simply a matter of computer

expertise, have no idea what it takes to fly a remotely piloted aircraft in common airspace, shared with fighters and transports and bombers in a hostile environment, while coordinating with troops under fire. Let the video geeks enjoy their pseudo wars, and leave the rest of us to defend the country without your silly contrivances.

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

After reading "Open it Up," July, p. 7, I felt it necessary to add my two cents. I could wholeheartedly agree with Mr. Stonehouse on many of the points he makes. I do take exception to his comment, "Today's enlisted Air Force is exceptionally educated, and yet they continue to be treated like the unschooled folks they might have been 50 years ago."

My experience in the Air Force of 65 to 42 years ago was that many of the airmen were equally as proficient in the technology of their time as the current airmen are today in technology in this current time. Thus my conclusion is they were adequately schooled for the tasks they faced. Similarly, current airmen are facing very different tasks, but seem to have the training/education to accomplish same.

Examples of the unschooled with whom I worked during my 22-year career: All the officers had college degrees in fields such as electrical engineering, electronic engineering, chemical engineering, chemistry, mathematics, aeronautical engineering, and general engineering (24 semester hours in five different engineering disciplines). Many of the NCOs and airmen were similarly qualified by schooling. My feelings are that they were all adequately schooled for the tasks at hand.

I must say that I do agree that the Air Force should make use of the warrant officer and limited-duty-officer program, which the Army and Navy seem to be able to use effectively. That certainly would have been seriously taken into consideration when I made the decision to retire at age 40.

CMSgt. Harold W. Thomas,
USAF (Ret.)
Sierra Vista, Ariz.

Captain Phillis

You omitted Capt. Steve Phillis from the list of A-10 Silver Star recipients ["*Airpower Classics: A-10 Thunderbolt II*," July, p. 80]. He gave his life protecting his wingman during Desert Storm. "Syph" was the epitome of a fighter pilot.

Col. John M. Poutier,
USAF (Ret.)
Yorktown, Va.



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A September Deadline

The Fiscal 2016 defense authorization bill screeched to a halt in late July when the House and Senate Armed Services committees deadlocked over cost-saving Pentagon proposals affecting military benefits.

In a replay of negotiations a year ago, those benefits—namely Tricare prescription co-pays and the basic allowance for housing—are the single biggest obstacle to hammering out a final bill or conference report. The House passed its version of the measure in May and the Senate followed suit in June.

A handful of other divisive issues, ranging from acquisition policy to the future of the military's controversial detention facility at Guantanamo Bay, Cuba, were not formally resolved before Congress's summer break, but those tracking the closed-door negotiations have repeatedly said those disagreements would essentially fall away once there is an agreement on benefits.

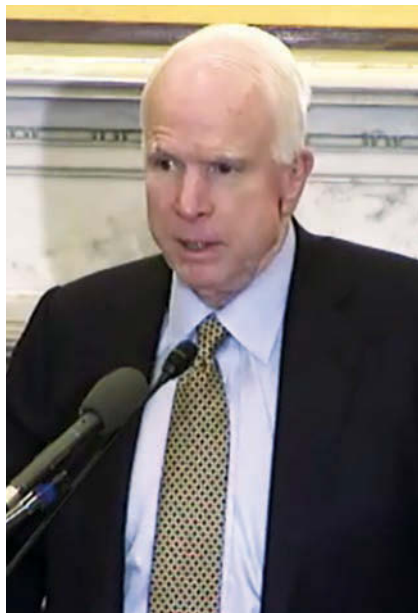
SASC Chairman Sen. John McCain (R-Ariz.) has refused to discuss the details of the bicameral talks, but he hinted at as much just before leaving Washington.

"You're always far apart until you get an agreement," McCain said broadly of the discussions, adding that he and his House counterpart, Republican Mac Thornberry of Texas, would continue their talks over the recess.

The goal, he said, is to finalize the bill in September. This would still put it in the legislative queue before an end-of-fiscal-year showdown over government spending.

But while the authorization measure does not actually allocate dollars, the spat over benefits underscores the fiscal pressures facing both the Defense Department and its benefactors on Capitol Hill. With stringent budget caps expected to go back in place in 2016, Pentagon officials and lawmakers alike must prioritize how defense dollars are allocated—and ultimately, what gets cut.

For the Pentagon, that means trimming military benefits and increasing some out-of-pocket costs for service members, military families, and retirees.



US Senate photo



Center for Strategic & International Studies photo

The armed services committees in the Senate—led by John McCain (left)—and the House—led by Mac Thornberry (above)—are at odds on benefits, hampering the attempt to pass a 2016 defense authorization bill.

Such proposals have traditionally been a third rail on Capitol Hill, where lawmakers have scrambled to preserve constituent-popular benefits packages for the military. But the Senate has endorsed much of the Pentagon's proposal for next year, viewing it as a modest step and a necessary move to preserve money for training troops, maintaining equipment, and sustaining the force. The total savings for the increase to the co-pays and the out-of-pocket housing costs would save \$1.4 billion next year and \$7.9 billion through 2020, according to estimates provided by the Congressional Budget Office.

The Senate bill would gradually increase the co-pays for both pharmacies and mail-order prescriptions. For generic retail drugs, for instance, the price would go from \$8 to \$14 for a one-month supply by 2025. The jump is bigger for brand-name drugs, which would grow from \$20 to \$46 over the next decade.

On the housing allowance, the Senate agreed to the Pentagon proposal for troops to pay an additional four percent out of pocket for their rent or mortgages, up from one percent today.

The House refused the proposals, however, and the Senate rejected their counteroffers—allowing for

some, but not all, of the increases—before the August recess.

While the Pentagon may have the Senate in its corner, the House's more generous approach has the support of several military service organizations. These MSOs have argued over the years that military benefits are a sacred promise to service members, retirees, and their families and a vital component to maintaining the all-volunteer force.

After much haggling, the two chambers will ultimately reach an agreement on the differences in the benefits, as they did last year. And if McCain and Thornberry have their way, the compromise will come sooner rather than later.

But the fact that these issues have now been the last resolved for the past two years signals that the battle over benefits is not yet over, especially if budget caps remain in place.

The Fiscal 2016 authorization bill is likely just the second of many legislative chapters on the cost of these benefits, an issue that will almost certainly arise again once the Pentagon submits its 2017 budget proposal to Capitol Hill early next year. 🗳️

Megan Scully is a reporter for CQ Roll Call.

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The F-35 “can’t fight”; New tactics; Marine Corps operational

TURN, TURN, TURN

The F-35 program is under attack again. This time the complaint, offered up by the “War is Boring” blog and rapidly picked up by the cottage anti-military think tanks, is that the F-35 can’t dogfight. Based on a leaked pilot’s report from a January sortie, the F-35 was sluggish to put its nose on an F-16 in the high angle of attack regime during a mock engagement. That’s aerodynamic-ese meaning the F-35 had its nose up while moving straight ahead—the same thing pilots do when they’re bleeding off speed, getting ready to land.

The blogger quoted the F-35 test pilot as saying, “There were not compelling reasons to fight in this region” of the flight envelope.

Exactly. The F-35 was not designed to excel in close-in, low-speed, turning dogfights, because that’s generally not how air combat happens anymore. The design emphasis of the F-35 was on other capabilities, more relevant for the future.

A little background: The F-35 was always conceived to be the tag team partner of the F-22 in 21st century air combat. Just as the F-15 and F-16 were intended in the 1970s to be the “high-low mix”—a smaller number of expensive F-15s clearing the sky so the many cheaper F-16s could hit a lot of targets—the F-22 and F-35 were to fill the same complementary roles. The F-22 was optimized for air-to-air combat with limited strike capability, while the F-35 was optimized for strike, with a pretty good dogfighting capability as one of its many secondary missions as the “backbone of the force.”

Air combat has evolved tremendously over 40 years, though. Radar and missile technology have gotten so good that if you can be seen and targeted by an enemy aircraft, you’re probably going to die. The days of actually closing with the target, rolling and turning to get behind your opponent, are pretty much over. That’s why the F-22 and F-35 were made stealthy: to give their pilots the first-shot/first-kill advantage, shooting from beyond visual range, without being detected. Practically every chief of Air Combat Command for the last decade has uttered some variation of the line that if an F-22 or F-35 actually gets into a close-in, turning dogfight with an opponent, the pilot’s made a grave mistake.

Statistics bear out this message. Since the 1991 Gulf War, a steadily increasing number of air-to-air victories have been achieved with either beyond visual range missiles or all-aspect missiles, while an ever-diminishing share was won with short-range missiles. The last gun-to-gun kill was recorded in 1988.

According to a recent Center for Strategic and Budgetary Assessments white paper on “Trends in Air-to-Air Combat,” situational awareness is rapidly superseding speed and maneuverability as the key attribute for success in air battles. Speed, acceleration, and agility “are much less useful now that aircraft can be detected and engaged from dozens of miles away,” the CSBA report concluded. Rising in importance are “minimal radar and [infrared] signature; space, payload, and cooling capacity; power for large-aperture long-range sensors; and very long-range weapons.”

The Air Force and its sister services took these trends to heart when the F-35 was being designed. That’s why it bristles

with sensors and relies on tens of millions of lines of computer code to see, identify, prioritize, and shoot air-to-air (as well as surface-to-air) threats long before they become a danger.

Not only that, but with the multisource onboard sensor data coming into the cockpit, coupled with the F-35’s Distributed Aperture System (DAS) giving the pilot 360-degree visibility, it will be tough to “bounce” or surprise the F-35 pilot. Tactics for the F-35 also emphasize formations, multiplying the number of sensors looking for danger. These inputs are merged with info coming from off-board sensors on satellites, AWACS jets, and the network of other platforms to build a comprehensive picture of the battlespace. This leaves as little as possible to chance.

All that said, F-35 pilots believe the jet will be a sterling dogfighter at need. The Air Force F-35A model was designed to turn at nine Gs with a full load of internal fuel and weapons—far outclassing any enemy lugging missiles and fuel tanks around. The Navy and Marine Corps versions are spec’d to 7.5Gs—the same as their current F/A-18s and AV-8Bs. With the DAS, however, and the F-35 pilot’s helmet, which allows him to see, select, and shoot at a target that he isn’t actually pointing at, F-35 pilots will have extraordinary awareness. The F-35 will be nimble enough, however, to help it evade any missiles actually fired at it.

STRENGTH IN NUMBERS

Though F-35 operators are understandably tight-lipped about tactics, they do explain that the F-35’s combination of stealth, electronic warfare, cyber capabilities, and—almost as a last resort—agility will seriously degrade each step in an enemy’s kill chain. That is, the opponent’s ability to detect, track, shoot at, and ultimately get close to the F-35 are degraded to near zero.

The F-35 System Program Office, responding to the “War is Boring” blog, noted that the F-35 in the test was the second one built and lacked the stealth coatings and “mission systems software ... that allows the F-35 to see its enemy long before it knows the F-35 is in the area.” It also lacked “the weapons or software that allow the F-35 pilot to turn, aim a weapon with the helmet, and fire at an enemy without having to point the airplane at its target.”

In fact, the test was less a dogfight than a series of “visual combat maneuvers to stress the system, and the F-16 involved was used as a visual reference to maneuver against,” the SPO said. The test was a success in showing the F-35’s ability “to maneuver to the edge of its limits without exceeding them, and handle in a positive and predictable manner,” but the SPO allowed that the results could result in a “misleading” interpretation. Test pilots afterward effused that the exercise actually showed there was plenty of room in the envelope to tweak the F-35’s performance to make it better.

The SPO also said that when a fully equipped four-ship of F-35s has engaged a four-ship of F-16s in “simulated combat scenarios, ... the F-35 won each of those encounters because of its sensors, weapons, and stealth technology.”

The program office offered a quote from Air Force Maj. Gen. Jeffrey L. Harrigan, head of the service’s F-35 integration of-



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face, who said, “It is too soon to draw any final conclusions on the maneuverability of the aircraft. The F-35 is designed to be comparable to current tactical fighters in terms of maneuverability, but the design is optimized for stealth. This will allow it to operate in threat environments where the F-16 could not survive.”

To be sure, the F-35 has had its problems and still faces formidable challenges in software development. At a Colorado defense symposium in July, Air Force Secretary Deborah Lee James acknowledged that the “biggest lesson” from the program is never to build in as much concurrency between development and production, or as she said, “Never again should we be flying an aircraft while we’re building it.” The F-35 “cost us way more money” than expected, she said.

“We’re very focused from now on to driving the costs down per unit, and they are coming down,” James asserted.

While she acknowledged the pilot’s report regarding the F-35/F-16 matchup, she also stated that the jet involved did not have the mission systems that will make the F-35 so powerful once it’s in service. When it is, it will be able to “see an enemy hundreds of miles” away, shoot first, “and the bad guys [won’t] know what hit them.”

The concept is not to have a close-in dogfight, she said, but “with that said, by the time we’re at full operational capability, we’ll be much better in that arena as well.”

Lt. Col. Andrew Allen, commander of the F-35 combined test force, said in a recent interview with *Air Force Magazine* that the F-35 is “not here to replace F-16s ... or F-18s ... or A-10s. ... That’s selling this aircraft short.” The F-35 is supposed to be applicable across the full spectrum of combat, from penetrating heavily defended airspace on Day One to performing urban close air support on Day 365. He said the jet is not there yet, but “are we going to get there? Yes. I fully believe that.”

PRIME TIME LIGHTNING

The Marine Corps declared the F-35B to have achieved initial operating capability on July 31—a major milestone on an acquisition journey that the Marines has been on since the early 1990s but one that won’t be over for another 15 years.

Commandant Gen. Joseph F. Dunford Jr.—confirmed to start as the new Chairman of the Joint Chiefs of Staff—made the announcement. It came on the last day of the July 2015 target set by the Marines in 2013, but well before the must-have date of December 2015. Dunford said Marine Fighter Attack Squadron 121 (VFMA-121) at MCAS Yuma, Ariz. had just passed an operational readiness inspection, where air-to-air, air-to-ground, close air support, armed reconnaissance, and other missions were demonstrated, some with live ordnance, and the F-35 passed with flying colors. He also said the F-35B did well in “multiple large-force exercises” in recent months. He said the unit had the requisite 10 aircraft of the same 2B configuration, plus 50 “trained and qualified” pilots, and about 500 maintainers to provide “autonomous, organic-level maintenance support,” thus meeting all IOC requirements.

Pentagon acquisition chief Frank Kendall cheered the announcement as a signal the F-35 program overall is “on track” and a sure sign it will deliver on its promises. In the same breath, though, he pointed out that “we still have work ahead” to deliver on software blocks and IOC for the Air Force and Navy with their versions of the F-35. The Air Force plans IOC with the F-35A for next August, and its requirements call for 12 to 24 aircraft in the 3I software configuration, plus spare parts and trained pilots. The Navy expects to be operational with the F-35C in late 2017.

The IOC announcement came with an asterisk: Marine Corps Lt. Gen. Jon M. Davis, deputy commandant for aviation, said though he was thrilled with the results of the ORI, “If I have any concern at this point, it is that the spare parts available to extract maximum value” from the F-35B “will be shy of what we truly need.” Davis said he hopes the F-35 will eventually be able to help the Marine Corps boost the full mission capable rate of its combat aircraft higher than the 70 to 75 percent range, where it is now.

A Lockheed Martin spokesman said it is working with the Marine Corps “every day to alleviate this concern.”

In several press conferences over the last year, Lockheed Martin F-35 Program Manager Lorraine M. Martin has said the parts issue stems from the fact that there are so many different configurations of the three F-35 variants—both flying and on the production line. Vendors are hard-pressed, she said, to make all the parts to both fill the operating needs of the 120

Lockheed Martin photo by Liz Kaszynski



The Marine Corps declared IOC for the F-35B.

or so F-35s now in service and provide modifications to bring older jets to current standards and to fill the supply racks for USMC and USAF units that need them to declare IOC.

After VMFA-121 is fully equipped with F-35Bs, Attack Squadron 211 is slated to trade its AV-8Bs in for Lightning IIs in 2016, and VMFA-122 will give up its F/A-18s for F-35s in 2018.

USMC plans to acquire 353 F-35Bs, as well as 67 F-35Cs, the big-deck carrier models. The Harriers will be fully retired in 2026, and the Marine F/A-18s will be phased out for F-35Bs by 2030. The F-35B will also replace USMC EA-6B Prowler electronic warfare jets, with one squadron transitioning in each of the years from 2017 to 2019. The Marine Corps expects to reach a peak production of F-35Bs in 2018, buying 20 to 24 aircraft a year.

The F-35B fulfills a Marine Corps vision from the early 1990s, when the service began planning for a replacement of the AV-8B. That program was referred to as the Advanced Short Takeoff/Vertical Landing (ASTOVL) aircraft.

Post-Cold War budget tightening compelled the Air Force to merge its multirole fighter (MRF) F-16 replacement and the Navy’s A/F-X attack airplane project with the Marine Corps ASTOVL. Harmonizing the disparate requirements of the three services fell to the Joint Advanced Strike Technology (JAST) office, which evolved into the Joint Strike Fighter program.

Lockheed Martin’s X-35 won the ensuing competition with Boeing’s X-32 in 2001, and the F-35A, B, and C efforts began what has become a 16-year development program. 🌟



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Two Air Commandos Die After Training Accident

Two special tactics airmen assigned to the 24th Special Operations Wing at Hurlburt Field, Fla., died from injuries sustained during an Aug. 3 military freefall training mission at nearby Eglin Air Force Base.

TSgt. Timothy A. Officer Jr., a tactical air control party airman, and TSgt. Marty B. Bettelyoun, a combat controller,

both assigned to the 720th Operations Support Squadron, were rushed to nearby hospitals but later died, according to an Aug. 4 news release.

Officer and Bettelyoun “were the epitome of a special tactics airman: professional, dedicated, and prepared to give their lives in service to their country,” said Col. Wolfe Davidson, 24th SOW commander. “Our community has

 screenshot

USAF photo by A1C Deana Heitzman




taken a huge loss with their deaths, and they will be sorely missed.”

Both air commandos were experienced combat veterans with multiple deployments in “combat zones and sensitive areas around the world,” states the press release. Officer received several medals for his “bravery against armed enemies” in Iraq and Afghanistan, including a Bronze Star Medal with Valor Device.

“They were respected by their peers for not only their ability on the battlefield, but also for their incredible commitment to friends and family,” said Davidson.

First Four-Star Leads AFGSC, New AETC Commander

Gen. Robin Rand took the reins of Air Force Global Strike Command from Lt. Gen. Stephen W. “Seve” Wilson during a



08.09.2015

An F-16 from the 31st Fighter Wing takes off from Aviano AB, Italy, on its way to Incirlik AB, Turkey, where it will be used for Operation Inherent Resolve. Six F-16s from the 31st deployed to Turkey after that country's leaders agreed to host US aircraft conducting anti-ISIS operations.



Defending the Base: USAF airmen from the 8th Security Forces Squadron perform a shoot, move, and communicate drill during a three-day combat readiness training exercise at Kunsan AB, South Korea, aimed at polishing their base defense skills. Tensions on the peninsula were high after the legs of two South Korean soldiers on border patrol were severed in explosions Aug. 4. The South Korean troops stepped on land mines planted by North Korean soldiers on the South Korean side of the demilitarized zone.

July 28 ceremony at Barksdale AFB, La., becoming the first four-star leader of the command.

Lt. Gen. Darryl L. Roberson took up Rand's former assignment, assuming command of Air Education and Training Command at JBSA-Randolph, Texas, July 21.

Roberson was tapped to take over AETC earlier this year, as the command transitioned from a four-star major command to a three-star billet in order to elevate the commander of AFGSC to a four-star position.

Wilson, who had served as AFGSC commander since October 2013, oversaw several initiatives and changes across the command, including the establishment of the Force Improvement Program—the bottom-up, commandwide initiative to reinvigorate nuclear operations, management, and leadership.

Falcon 9 Flaw Preliminarily Pinned

A support strut on a SpaceX Falcon 9 rocket failed at a fifth of its designed load, putting stress on an upper stage liquid oxygen tank and causing the rocket to explode during launch on June 28, according to the company's initial assessment.

The SpaceX-led investigation overseen by the Federal Aviation Administration, NASA, and the Air Force, is still ongoing, but engineering teams spent "thousands of hours going through the painstaking process of matching up data across rocket systems down to the millisecond to understand that final 0.893 seconds prior to loss of telemetry," according to a late July company news release.

"Despite the fact that these struts have been used on all previous Falcon 9 flights, ... SpaceX will no longer use these particular struts for flight applications," announced the company. "In addition, SpaceX will implement additional hardware quality audits throughout the vehicle to further ensure all parts received perform as expected."

The Air Force will not decide whether SpaceX remains certified to boost national security payloads until the investigation is complete. The company expects to return the Falcon 9 to flight this fall.

AEHF Reaches Initial Operational Capability

Air Force Space Command declared initial operational capability July 28 for the Advanced Extremely High Frequency joint communication system.

AEHF satellites—the first having launched in August 2010—provide 10 times more capability than the 1990s-era Milstar satellites, which remain in orbit, according to officials.

The 4th Space Operations Squadron at Schriever AFB, Colo., operates all three AEHF satellites currently on orbit. The Air Force expects to launch the fourth, fifth, and sixth AEHF satellites in 2017, 2018, and 2019, stated a news release.

F-16D Structural Fixes Complete

Air Force and industry teams at 10 bases recently completed structural modifications to correct cracking found on 83 of the Air Force's two-seat F-16Ds, officials announced. All 157 of the Air Force's F-16Ds were grounded following the discovery of canopy sill cracks on four aircraft at Luke AFB, Ariz., in July 2014.

Luke AFB, Ariz., hosts the largest F-16D fleet and was the top priority for the retrofits, the majority of them completed there by last December.

Technicians completed modifications to the Air Force's final F-16D this April, according to the press release.

Shaw F-16 Collides With Cessna

An F-16 assigned to the 20th Fighter Wing at Shaw AFB, S.C., was involved in a fatal midair collision with a Cessna 150 north of Charleston, July 7.

Maj. Aaron Johnson, an F-16 pilot from the 55th Fighter Squadron, "survived the collision by ejecting from his fighter," according to a base news release.

Civilian investigators with the National Transportation Safety Board issued a preliminary report later in July stating that Johnson was actively looking for and maneuvering to avoid the civilian aircraft before impact.

Recovered debris indicated the aft fuselage of the F-16 struck the Cessna head-on, grazing the civil aircraft's upper wing surface left to right, and obliterating the forward fuselage, which was largely unrecovered.

The aircraft collided at approximately 1,400 feet altitude and debris—including large portions of the Cessna's wings and aft fuselage—was contained within a relatively concentrated zone approximately 11 miles north of Charleston.

Both people aboard the Cessna—pilot Joseph Johnson, 30, and his father, Michael Johnson, 68—were killed. NTSB stressed that the report findings are preliminary and subject to later change.

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KC-46 Costs Boeing

Boeing announced a second-quarter penalty of \$536 million on its KC-46 tanker due to fixing problems with the jet's integrated fuel system.

Boeing is developing the tanker under a \$4.9 billion program that also includes setting up the factory, test, and delivering the first 18 jets by August 2017.

Boeing said the charge reflects "higher estimated engineering and manufacturing costs ... while holding to the program schedule" for first production deliveries. Boeing said it's "disappointed" but is "investing the necessary resources to keep this vitally important program on schedule for our customer."

The program calls for 179 aircraft to be delivered by 2027. The charge covers costs to redesign the fuel system, make factory changes to accommodate the redesign, certify the changes, and test them.

Boeing President and Chief Financial Officer Dennis Muilenburg said the company has "a clear understanding of the work to be done and believes strongly that the long-term financial value of the KC-46 program will reward our additional investment."

Liberty at Last

The Oklahoma Air National Guard's first MC-12W Liberty intelligence, surveillance, and reconnaissance aircraft arrived at Will Rogers ANGB, Okla., July 10.

The new flying mission marks the first time since 2007 that Will Rogers has hosted permanent flight operations, officials announced.

The Oklahoma unit lost its C-130s and moved to Tinker AFB, Okla., becoming a KC-135 associate unit with the Active Duty 507th Air Refueling Wing in 2007, leaving a detached headquarters at Will Rogers. The unit will be redesignated the 137th Special Operations Wing, operating 13 MC-12s in the manned ISR and Aviation Foreign Internal Defense roles.

The Air Force Special Operations Command-aligned ANG unit will preserve the Air Force's accumulated expertise in manned, tactical ISR, after Air Combat Command's divestiture of the mission.

The 137th ARW flew its final KC-135 sortie June 30.

Colombian Power Trip

A B-52 bomber from Minot AFB, N.D., launched July 9 on a 16-hour, nonstop training sortie, rendezvousing with Colombian air force aircraft over Colombia, US Strategic Command announced.

The 5th Bomb Wing crew also flew a demonstration as part of the international air show in Antioquia, Colombia.

Clean 'er Up: Maintainers work on a TF34 A-10C engine at Moody AFB, Ga. The 23rd Component Maintenance Squadron Propulsion Flight supplies the engines to the 74th and 75th Fighter Squadrons. Each A-10 is powered by two of the turbofan engines, which provide a high thrust-to-weight ratio.

The RPA Fix?

Newly trained pilots just out of undergraduate flight training will be assigned to fly remotely piloted aircraft as a stopgap measure to relieve an RPA pilot shortage, Air Force Secretary Deborah Lee James announced in July.

"We'll have 80 undergraduate pilot training graduates over the next 12 months and they will be assigned to RPA positions. ... After that tour they'll go on to another airframe," James said at a July 15 event in Arlington, Va.

Because of the high operational demand for pilots and a shortage of instructors, the RPA schoolhouse is currently producing a little over half the required number of RPA pilots. James said RPA operators are flying four times the amount that manned pilots do, logging an average of 850 to 900 flight hours annually.

"They fly six days in a row and are away from their families about 13 hours a day," she said. USAF also is implementing new incentive bonuses of \$15,000 a year for five- or eight-year commitments and petitioning Congress to reallocate \$100 million to address key RPA infrastructure and support needs, such as ground control stations, simulators, and facilities.

The funds also would allow USAF to hire additional civilian instructor pilots and speed technological developments, James said. Accelerating development of "automatic takeoff and landing will ultimately allow us to use fewer personnel in the launch and recovery part," she explained.

UPT graduates will begin shipping to RPA units in August and bonuses will take effect in 2016, she said.

"The aircraft's participation in this air show and the training conducted alongside our Colombian partners allow our strategic aircrews to maintain a high state of readiness and crew proficiency," US Strategic Command Commander Adm. Cecil D. Haney said in a release.

A B-52 conducted training in the US Southern Command area of responsibility last year during Exercise PANAMAX and also appeared at the Colombia international air show back in 2006, according to STRATCOM.



USAF photo by Ann Greg Nash

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Strike Eagle Return

Airmen flying and maintaining F-15Es at Seymour Johnson AFB, N.C.—the world's largest Strike Eagle base—are dealing with personnel shortages and age-related problems typical of old, heavily used fighters. But pilots and maintenance personnel recently told *Air Force Magazine* aircraft availability and combat readiness are actually on the upswing.

This was proved in a recent deployment to Southwest Asia, during the first half of 2015. Aircraft and personnel from Seymour Johnson's 4th Fighter Wing deployed to join the 380th Air Expeditionary Wing at an undisclosed location. They flew regular counter-ISIS missions on the deployment while flying significantly more often than is typical at home station.

The North Carolina base is home to four F-15E squadrons totaling 94 aircraft and has the largest maintenance

group in the Air Force. Every maintainer is needed (in fact the unit is actually significantly undermanned)—reflecting a widespread shortage of USAF maintainers.

At Seymour Johnson, officials say aircraft availability has improved compared to a year ago, when many F-15Es were stuck in depot longer than expected. The time aircraft spend in depot has improved, although the 25-year-old F-15Es seem to experience breakdowns in cycles, officials said. Recently, wiring and oxygen systems were among the problematic components.

Airmen asked not to be identified because of operational security concerns, but one maintainer noted that, ever since sequestration ended in 2013, maintainers have been supporting the same number of home-station sorties, plus deployments, with "a lot fewer people."

Airmen "were, and are, doing a lot more with less," he said.

Hill Inaugurates First F-35 Squadron

The 388th Fighter Wing at Hill AFB, Utah, activated its first F-35A Lightning II squadron in a July 17 ceremony, becoming the first operational Air Force unit to fly combat-coded F-35s.

The unit is slated to be one of three Active Duty F-35 squadrons at Hill, supported operationally by Air Force Reserve Command's 419th FW. The 34th FS was scheduled to receive its first F-35 airframe this month and grow to 15 aircraft by next summer, in time for the Air Force's planned initial operational capability.

The squadron was formerly one of Hill's F-16 units and stood down in 2010 as part of a downsizing.

Claude M. Bolton Jr., 1945-2015

Retired Maj. Gen. Claude M. Bolton Jr., who headed some of the Air Force's most classified and significant programs and oversaw Army acquisition, died July 28 in Chantilly, Va.

Bolton joined the Air Force through the ROTC program in 1969. He trained as a pilot and flew F-4 Phantom fighters. During the Vietnam War, he logged 232 combat missions, 40 of them over North Vietnam.

After the war, he became a test pilot and worked on the F-4, F-111, and F-16 programs. In 1982, he became the program manager for the Advanced Tactical Fighter, later to become the F-22. He went on to be the program element officer for the F-16, and then the head of the Low Observables Vehicle Division in the Office of Special Programs.

He was later deputy manager of the B-2 bomber program, before heading the AGM-129 stealth cruise missile project. Later jobs included commandant of the Defense Systems Management College at Fort Belvoir, Va., and assistant secretary of the Air Force for acquisition. He was program executive officer of fighter and bomber programs from 1998 to 2000 and closed out his USAF career as commander of the Air Force Security Assistance Center, retiring in 2002.

Shortly thereafter, President George W. Bush named Bolton assistant secretary of the Army for acquisition, technology, and logistics, a post he held until 2008. In retirement, he was executive in residence at Defense Acquisition University, mentoring rising military acquisition professionals.

New Bosses at 9th, 25th Air Forces

Maj. Gen. Bradford J. "B. J." Shwedo assumed command of 25th Air Force during an Aug. 3 ceremony at JBSA-Lackland, Texas. Shwedo, who previously served as director of capability and resource integration for US Cyber Command at Fort Meade, Md., replaced Maj. Gen. John N. T. "Jack" Shanahan, who was promoted to lieutenant general, following the change of command, for his new role as undersecretary of defense (intelligence) for joint and coalition warfighter support.

Maj. Gen. Mark D. Kelly Jr. assumed command of 9th Air Force from Maj. Gen. H. D. Polumbo Jr. during a July 31 ceremony at Shaw AFB, S.C. Kelly previously led the 455th Air Expeditionary Wing at Bagram Airfield, Afghanistan. Polumbo is slated to retire Oct. 1, according to his official biography.

Jersey Devils in Bulgaria

Eight F-16s and 150 pilots, maintainers, and support personnel from the New Jersey Air National Guard's 177th

Peek-a-Boo, I See You: SrA. Paul Cauge from the 274th Air Support Operations Squadron, uses a laser rangefinder designator for a close air support training mission at Grayling Air Gunnery Range in Michigan during Northern Strike 2015. The exercise involved military personnel from 20 states, as well as Canada, Latvia, Poland, and Australia.



USANG photo by MSgt. Scott Thompson

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The War on Terrorism

US Central Command Operations: Freedom's Sentinel and Inherent Resolve

Casualties

As of Aug. 11, four Americans had died in Operation Freedom's Sentinel in Afghanistan, and seven Americans had died in Operation Inherent Resolve in Iraq and Syria.

The total includes 10 troops and one Department of Defense civilian. Of these deaths, three were killed in action with the enemy while eight died in noncombat incidents.

There have been 35 troops wounded in action during OFS and one troop in OIR.

Incirlik Joins the Fight

After months of negotiations, Turkey agreed to allow US and coalition airplanes to launch air strikes against ISIS extremists from Incirlik Air Base, near the Syrian border, according to press reports.

The news came one day after President Barack Obama spoke with Turkish President Recep Tayyip Erdogan "about deepening our ongoing cooperation" in the fight against ISIS, according to the White House.

A US State Department official told Turkey's *Hurriyet Daily News* "that the Incirlik base was expected to open in early August to be used in the anti-[ISIS] fight."

Although Turkey already agreed to host training for Syrian opposition fighters, it previously prohibited the US-led coalition from launching strikes in support of Operation Inherent Resolve from its soil.

Tanker Squadron Activates at al Udeid

Air Forces Central Command activated the 22nd Expeditionary Air Refueling Squadron on July 24 at al Udeid AB, Qatar, to provide KC-135 tankers for operations over Iraq and Syria.

The 22nd EARS will operate as a second KC-135 squadron alongside the 340th EARS—US Central Command's largest tanker squadron, already operating at al Udeid.

The 22nd previously operated from the transit center at Manas, Kyrgyzstan, for operations over Afghanistan until the center's drawdown in 2014.

The 22nd EARS flew its final refueling mission from Manas on Feb. 24, 2014.

Iraqi F-16s Arrive at Balad

The first four Iraqi Air Force F-16s ferried to Iraq proper arrived at Balad AB, Iraq, on July 13, Turkey's *Daily Sabah* reported.

Due to Iraq's shaky security situation, Iraqi F-16 pilots are undergoing training with the Arizona Air National Guard's 162nd Fighter Wing in Tucson, where the initial two F-16s were delivered last December.

Eight of Iraq's 36 jets on order are slated for delivery to Tucson, where one was already lost in a fatal crash in June.

US State Department spokesman John Kirby said Iraqi pilots flying from Balad could potentially join the anti-ISIS coalition. "Our expectation is that if and when they start flying missions and combat sorties in Iraq, that's what they'll be used for," he said.

Controlled Flight Into Terrain

The F-16 pilot killed during an Operation Inherent Resolve sortie last December violated the safe minimum altitude for landing approach, was briefly disoriented, and flew into the ground, according to Air Combat Command.

The cause of the accident was "the mishap pilot's unrecognized descent into the ground," according to the accident report, released on July 13.

The F-16 was deployed to an undisclosed base in the Middle East and was returning from an abortive sortie with his wingman, who had suffered a minor mechanical malfunction, Dec. 1, 2014. The aircraft crashed some 11 miles short of the runway.

The board determined the pilot "intentionally" flew below the minimum safe altitude, beginning his landing approach "against" instrument procedures. This significantly reduced his reaction time, contributing to the accident.

The aircraft was assigned to the 77th Expeditionary Fighter Squadron deployed from Shaw AFB, S.C., at the time of the accident. In addition to the death of the pilot, destruction of the aircraft and its weapons is estimated to be a \$30.8 million loss.

147

By the Numbers

The number of "baseball-to-basketball-sized" chunks of space debris generated when a retired Defense Meteorological Satellite Program satellite exploded in February, according to Air Force Space Command's accident report, released July 20.

Fighter Wing at Atlantic City deployed to Graf Ignatievo AB, Bulgaria, for Exercise Thracian Star, July 13-24. (See "Tankers and Tigers," p. 60.)

"We came over here primarily to do air-to-air training in basic fighting maneuvers and tactical intercepts," said 119th Fighter Squadron Commander Lt. Col. Timothy Hassel. Thracian Star gave the pilots "a chance to fly against an actual MiG"—both MiG-21s and MiG-29s—and practice interoperability with allied aircraft from Greece, Poland, and Romania, according to a Hellenic air force press release.

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Bye, Bye Trucks in the Sky

C-145 Skytrucks began departing Air Force Reserve Command's 919th Special Operations Wing flight line at Duke Field, Fla., for "The Boneyard" in June.

Duke will retain five aircraft for its Aviation Foreign Internal Defense mission, retiring the rest of the 16-strong fleet through August, according to a July 10 release. The slimmed-fleet will ensure air advisors "stay current in an aircraft" while Air Force Special Operations Command plans to lease AvFID aircraft more tailored to the specific capacity-building needs of partner air forces.

"It's cheaper to do that. ... The chances you're going to buy the right airplane for the country you're going to work with was pretty slim," AFSOC Commander Lt. Gen. Bradley A. Heithold explained earlier this year.

Duke plans to stand up the 49th Special Operations Squad-

ron this fall. It will fly the larger Dornier C-146 Wolfhound for its new nonstandard aviation mission.

Air Advisor Academy Stands Down

The Air Force's Air Advisor Academy at JB McGuire-Dix-Lakehurst, N.J., inactivated and was subsumed into the US Air Force Expeditionary Center's schoolhouse during a July 10 ceremony. The training of specialized advisors to build foreign partners' capacity transitions from Air Education and Training Command to the center's Expeditionary Operations School under Air Mobility Command, according to a news release.

The move permits air advisor trainees to take advantage of shared training and range slots with the center's other courses and to enjoy more exchange of tactics and doctrine with complementary disciplines at the school.

The first class to graduate under the new arrangement began in June. USAF had elevated its air advisory course to a stand-alone school in June 2012.

Starter-Generator Caused Crash

A starter-generator failure led to the crash of an MQ-9A Reaper on Dec. 12, 2014, in the Central Command area of operations, according to an investigation report released June 30.

The Reaper, controlled by airmen operating from 28th Bomb Wing at Ellsworth AFB, S.D., was flying a combat support mission and briefly lost its satellite return link when the pilot noticed the starter-generator malfunctioned and the aircraft was being powered by backup batteries, according to the report.

The pilot and crew commander tried to send the Reaper to the emergency launch and recovery element; however, the aircraft did not have enough battery power to lower its landing gear. It crashed in the mountains 67 minutes after the starter-generator failed. The wreckage was not recovered, so the exact cause of the failure is not clear, but General Atomics said the "symptoms" of the failure were "similar to other starter-generator failures preceded by erratic voltage," states the report.

Keeping Mothers in Service

Airmen who recently gave birth now will have one year to pass their fitness test, instead of the previous six-month deferral, announced Air Force Secretary Deborah Lee James. The service also increased deferral for deployments, short tours, dependent-restricted assignments, and temporary duty assignments to one year.

"The goal is to alleviate the strain on some of our talented airmen who choose to leave the Air Force as they struggle to balance deployments and family issues, and this is especially true soon after childbirth," James said in a July 14 press release.

The Air Force is still considering extending its maternity and convalescent leave period. Airmen currently receive six weeks of maternity leave, according to the release.

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Senior Staff Changes

RETIREMENTS: Lt. Gen. Noel T. Jones, Lt. Gen. James M. Kowalski, Maj. Gen. Kurt F. Neubauer, Maj. Gen. Howard D. Stendahl, Lt. Gen. Thomas W. Travis.

CONFIRMATIONS: To be General: Carlton D. Everhart II. **To be Lieutenant General:** John N. T. Shanahan. **To be Major General:** Dondi E. Costin, Theron G. Davis. **To be Brigadier General:** Steven A. Schaick. **To be ANG Brigadier General:** David W. Ashley, Jeremy O. Baenen, Stephen F. Baggerly, Samuel W. Black, Christine M. Burckle, David B. Burgy, Janus D. Butcher, John D. Caine, Craig A. Campbell, Joseph S. Chisolm, Floyd W. Dunstan, Douglas A. Farnham, Laurie M. Farris, Jerry L. Fenwick, Dawn M. Ferrell, Douglas E. Fick, Arthur J. Floru, Donald A. Furland, Timothy H. Gaasch, Kerry M. Gentry, Jerome M. Gouhin, Randy E. Greenwood, Robert J. Grey Jr., Edith M. Grunwald, Gregory M. Henderson, Elizabeth A. Hill, John S. Joseph, Jill A. Lannan, James M. LeFavor, Jefferson A. Lewis, Timothy T. Lunderman, Eric W. Mann, Betty J. Marshall, Sherrie L. McCandless, Kevin T. McManaman, David J. Meyer, Steven S. Nordhaus, Scott W. Nomandean, Richard C. Oxner Jr., Kirk S. Pierce, Theresa B. Prince, David L. Romuald, Edward A. Sauley III, Keith A. Schell, Brian M. Simpler, Charles G. Stevenson, Bradley A. Swanson, Dean A. Tremps, William M. Valentine, Richard W. Wedan.

CHANGES: Brig. Gen. (sel.) Mark A. Baird, from Cmdr., AF Instl. Contracting Agency, AF Instl. & Mission Spt. Center, AFMC, Wright-Patterson AFB, Ohio, to Spec. Asst. to the Cmdr., AFMC, Wright-Patterson AFB, Ohio ... Maj. Gen. (sel.) Dondi E. Costin, from Command Chaplain, PACAF, JB Pearl Harbor-Hickam, Hawaii, to Chief of Chaplains, USAF, Pentagon ... Lt. Gen. Samuel D. Cox, from DCS, Manpower, Personnel, & Svcs., USAF, Pentagon, to Cmdr., 18th AF, AMC, Scott AFB, Ill. ... Gen. Carlton D. Everhart II, from Cmdr., 18th AF, AMC, Scott AFB, Ill., to Cmdr., AMC, Scott AFB, Ill. ... Maj. Gen. Sandra E. Finan, from Cmdr., AF Nuclear Warfare Center, AFMC, Kirtland AFB, N.M., to Spec. Asst. to the Asst. C/S, Strat. Deterrence & Nuclear Integration, USAF, Pentagon ... Brig. Gen. John R. Gordy II, from Exec. Officer to the Dep. Cmdr., USAF & SACEUR, Stuttgart, Germany, to Sr. Defense Official, Defense Intel. Agency, Ankara, Turkey ... Maj. Gen. Gina M. Grosso, from Dir., Sexual Assault Prevention & Response Office, USAF, Pentagon, to DCS, Manpower, Personnel, & Svcs., USAF, Pentagon ... Maj. Gen. Garrett Harencak, from Asst. C/S, Strat. Deterrence & Nuclear Integration, USAF, Pentagon, to Cmdr., AF Recruiting Svc.,

AETC, JBSA-Lackland, Texas ... Brig. Gen. Patrick C. Higby, from Cmdr., 81st TW, AETC, Keesler AFB, Miss., to Dir., Cyberspace Strategy & Policy, Office of Info. Dominance & CIO, OSAF, Pentagon ... Brig. Gen. (sel.) Cameron G. Holt, from Dir., Staff, AF Instl. Contracting Agency, AF Instl. & Mission Spt., AFMC, Wright-Patterson AFB, Ohio, to Cmdr., AF Instl. Contracting Agency, AF Instl. & Mission Spt. Center, AFMC, Wright-Patterson AFB, Ohio ... Maj. Gen. Scott W. Jansson, from AF PEO, Weapons, AF Life Cycle Mgmt. Center, AFMC, Kirtland AFB, N.M., to Cmdr., AF Nuclear Weapons Center, AFMC, Kirtland AFB, N.M. ... Maj. Gen. (sel.) James C. Johnson, from Cmdr., AF Recruiting Svc., AETC, JBSA-Lackland, Texas, to Dir., Sexual Assault Prevention & Response Office, Pentagon ... Gen. Darren W. McDew, from Cmdr., AMC, Scott AFB, Ill., to Cmdr., TRANSCOM, Scott AFB, Ill. ... Lt. Gen. John W. Raymond, from Cmdr., 14th AF (Air Forces Strat.), AFSPC, Vandenberg AFB, Calif., to DCS, Ops., USAF, Pentagon ... Brig. Gen. (sel.) Steven A. Schaick, from Command Chaplain, AETC, JBSA-Lackland, Texas, to Dep. Chief of Chaplains, USAF, Pentagon ... Gen. Paul J. Selva, from Cmdr., TRANSCOM, Scott AFB, Ill., to Vice Chairman of the JCS, Jt. Staff, Pentagon ... Lt. Gen. (sel.) John N. T. Shanahan, from Cmdr., 25th AF, ACC, JBSA-Lackland, Texas, to Dir., Defense Intel. (Warfighter Spt.) Office of the USD for Intel., Pentagon ... Maj. Gen. (sel.) Sarah E. Zabel, from Dir., Cyberspace Strat. & Policy, Office of Info. Dominance & CIO, OSAF, Pentagon, to Vice Dir., DISA, Ft. Meade, Md.

COMMAND CHIEF MASTER SERGEANT CHANGE: CMSgt. Craig A. Neri, from Command Chief, 45th SW, AFSPC, Patrick AFB, Fla., to Command Chief, 14th AF (Air Forces Strat.), AFSPC, Vandenberg AFB, Calif.

SES RETIREMENTS: Harry C. Disbrow Jr., Judith B. Oliva.

SENIOR EXECUTIVE SERVICE CHANGES: Monica A. Anders, to Resource Dir., AF Instl. & Mission Spt. Center, AFMC, JBSA-Lackland, Texas ... Scott M. Anderson, to Exec. Dir., AFSPC, Peterson AFB, Colo. ... Wendy Kay, to Dir., Security, Spec. Prgm. Oversight & Info. Protection, Office of the Administrative Asst. to the SECAF, OSAF, Pentagon ... John M. Miller, to Dep. Asst. Secy., (Acq. Integration), Office of the Assistant SECAF, Acq., Pentagon ... Rajesh R. Naik, to Chief Scientist, 711th Human Performance Wg., AFRL, AFMC, Wright-Patterson AFB, Ohio ... Robert C. Shofner, to Dep. Dir., Strat. Plans, Prgms, Rqmts., & Analyses, AFMC, Wright-Patterson, Ohio. ☉

Not-So-Mighty ISIS: A B-1B peels away from a USAF KC-135 after refueling in the skies over the Middle East July 23 during a mission for Operation Inherent Resolve. Coalition aircraft have now been striking ISIS targets, including staging areas, armored personnel carriers, and IED facilities, for more than a year.



USAF photo by SSGT. Sandra Weich



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Forward and Ready, East and South

By Marc V. Schanz, Senior Editor



It was only two years ago that Europe seemed an island of relative calm in an increasingly dangerous world. The US military's presence on the continent was smaller than at any point since the early Cold War, as the Pentagon shifted resources toward more pressing needs in the Asia-Pacific and Middle East.

That all changed beginning in February 2014, when Russian military forces in disguise swept into Crimea, and a “hybrid war” waged by both irregular troops and

Russian military units erupted in eastern Ukraine. European fears of a newly aggressive Russia prompted the US to move quickly in support of its NATO allies, training and exercising with them from the Baltic to Romania. USAF units in Europe have played a central role in the reinforcement and reassurance mission.

President Barack Obama, visiting Warsaw in June 2014, declared the US “commitment to Poland’s security, as well as the security of our allies in Central and Eastern Europe,” to be “sacrosanct”

and “the cornerstone of our own security.” He announced a new, billion-dollar, multiyear European Reassurance Initiative. The ERI—a special fund for exercises and cooperative activities with NATO allies—has supercharged Operation Atlantic Resolve, the umbrella program for the US response to the Crimea crisis. The measure provided some US war funding—known inside the Washington Beltway as the overseas contingency operations account—to pay for these noncombat assurance and deterrence

Engagement and partnerships show USAFE-AFAFRICA's solidarity with threatened allies.



Four F-15Cs based at RAF Lakenheath, UK, break formation. Lakenheath is due to receive F-35s in 2020.

operations and military construction and infrastructure projects across the continent.

These funds have enabled US-based military units to rotate more rapidly to Europe—and for longer stays. In January 2015, the Pentagon green-lighted Air Force theater security package (TSP) deployments to Europe to support and expand these activities. They range from

combined arms training to air policing to new heavy bomber rotations in theater, for the first time in years.

Then, in late August, top Air Force officials said the F-22 would soon make its first deployment to Europe, to support combatant commander requirements.

Gen. Frank Gorenc, head of US Air Forces in Europe-Air Forces Africa, said TSP rotations are one of the criti-

cal elements of America's reassurance plans. Speaking in June at the Paris Air Show, Gorenc said the TSP units have been "out and about in Europe—training and exercising, creating opportunities for airmen and for our allies."

Since NATO waged its 1994 and 1999 air campaigns in the Balkans—Operations Deliberate Force and Allied Force, respectively—US forces in Europe have



An A-10 approaches a KC-135 to receive fuel over Ramstein AB, Germany. The A-10s deployed from Davis-Monthan AFB, Ariz., as part of a theater security package for Operation Atlantic Resolve, the umbrella program for the US response to the crisis in Crimea.

USAF photo by SrA. Damon Kasberg.

dwindled. Even as Operation Atlantic Resolve ramped up in January, the Defense Department unveiled its European Infrastructure Consolidation (EIC) plan. The ERI will return 15 US military sites across Europe to their host nations. These include RAF Mildenhall in the UK, where KC-135s and the 352nd Special Operations Wing will shift to Germany by 2020.

The Pentagon claims the EIC moves will save about \$500 million a year—savings needed to stand up new theater capabilities such as an F-35 unit at RAF Lakenheath, UK, set to arrive in 2020. While some of these reductions will come from efficiencies, better technology, and organizational tweaks, a smaller footprint means USAF must be more creative in how it deploys its available forces.

From airfields in Bulgaria to training exercises in Morocco, USAF-AFAFRICA is finding new ways to project power as it faces potential threats ranging from resurgent Russia to terror groups in North Africa.

The US and its allies “don’t want to get caught flat-footed” after the events in Crimea, USAF-AFAFRICA plans, programs, and analyses chief Brig. Gen. Mark D. Camerer said, and so are amping up readiness and interoperability training.

While TSPs have been sent to the Asia-Pacific for years, Camerer observed, the ERI allows them to return to Europe in force, reanimating an exercise concept from the last years of the Cold War. “The [TSP] concept sort of goes back to Checkered Flag,” Camerer said, in reference to an old, regular rotational

exercise in Europe. More routine rotations through the TSP and concepts like Air National Guard partnerships will have a “significant” effect on readiness “over time,” he said.

EXPANDED THEATER TRAINING

The command’s responsibilities are different from what they were during the Cold War, though, he noted. The Ramstein AB, Germany-based organization now oversees engagement and operations in 104 countries, stretching from the Arctic Circle to sub-Saharan Africa. It must grapple with challenges as diverse as European ballistic missile defense to meeting surveillance needs for a pop-up crisis in Africa. USAF-AFAFRICA supported the July 2014 evacuation of the US Embassy in Tripoli, Libya, for example.

With no permanent forces based in Africa, managing the geography of response is a never-ending planning challenge, Camerer said. Ramstein is 1,000 miles closer to West Africa than forces assigned to Combined Joint Task Force-Horn of Africa in Djibouti, he said.

During the 1990s, then-USAFE comprised four separate staffs to manage operations in just Europe: USAF headquarters, 3rd Air Force, 16th Air Force, and 17th Air Force. Its forces were dispersed to 25 main operating bases, with some 72,000 permanently stationed airmen and 800 aircraft assigned to 34 squadrons. Today, after years of overseas basing cutbacks and reorganization, USAF-AFAFRICA supports two combatant commands directly (17th Expeditionary Air Force

serves as the air component for US Africa Command tasks; 17th Air Force was inactivated in 2012) and has just 23,000 permanently assigned Active Duty airmen.

Only seven main operating bases and nine aircraft squadrons remain, comprising about 200 aircraft. Six are fighter squadrons that US Central Command can also tap to meet its force structure needs and must also rotate home for training.

The European Reassurance Initiative has fueled an expanded theater training and engagement schedule for USAF-AFAFRICA’s combat forces and “enabled us to fund a lot of these [new] excursions,” said Col. David C. Trucksa, chief of the command’s training, readiness, and exercise division. It has “really opened up our aperture.”

With ERI dollars, KC-135s supported training events in Germany and Romania during the summer and paid for TSP rotations in-theater to supplement USAF unit training. A-10s visiting Europe, for example, helped train the 56th Rescue Squadron in full-up combat search and rescue at RAF Lakenheath, prior to the squadron’s CENTCOM deployment. The HH-60 crews would ordinarily have had to wait to go to a Red Flag or similar stateside event to get this training.

By late June, the first TSP rotation—12 A-10s of the 354th Expeditionary Fighter Squadron—had flown some 1,138 sorties. They participated in 12 different events, ranging from joint terminal attack controller training and certification in Germany and Romania

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Lt. Gen. Darryl Roberson, then 3rd Air Force and 17th Expeditionary Air Force commander, speaks with Klaus Rodens, mayor of Spangdahlem, in February.

USAF photo by SrA. Gustavo Castillo

to shorter events, such as Exercise Purple Windmill, a Dutch close air support exercise.

The second six-month TSP rotation saw F-15Cs dispatched from the Florida and Oregon Air National Guard. As the 159th EFS, it went in April to Leeuwarden AB, Netherlands, for Exercise Frisian Flag. They then went to Bulgaria for six weeks of training with the Bulgarian air force, additional ANG

F-15s from Louisiana, and NATO E-3 AWACS aircraft.

These units experience diverse conditions on these deployments. From Bulgaria to Poland, many of the forward locations where TSPs operate “are not full bases,” said Lt. Col. Bradley Brandt, chief of USAFE-AFAFRICA’s operations and training branch. These facilities have a much smaller support infrastructure for

combat air forces than Ramstein Air Base or Aviano AB, Italy. As these events continue, “we are trying to figure out” what capacities these installations have, “so if we want to do training or exercising in the future, we know what we need to bring or to put there,” Brandt said.

The new operating environment demands more flexible thinking about operations support, according to Brig. Gen.

An Oregon ANG F-15C lands at Leeuwarden AB, Netherlands, in April. ANG units conducted training there, alongside NATO allies, to strengthen interoperability as part of Exercise Frisian Flag.



USAF photo by SSgt. Ryan Crane

Bradley D. Spacy, USAFE-AFAFRICA's director of logistics, installations, and mission support.

"We are smaller and in a lot of ways more efficient" than the USAFE of old, he said. "We support operations on a smaller scale, too," with a smaller logistics footprint. "One way we do that is by helping with infrastructure," Spacy said, using ERI funding as a "speedy mechanism" to bolster "projects we have been wanting to get to for years." Such projects are notably helpful in countries where USAF has limited operational experience, such as in the Baltic states.

ERI funds contributed to 46 operations and maintenance projects and 23 military construction projects across Europe in Fiscal 2015-16, he pointed out. Much of the infrastructure improved is owned and operated by allies. In Latvia, Estonia, and Lithuania, for example, several projects are improving airfields for all-weather conditions. Hangars, runways, and barrier systems for aircraft have been upgraded, and facilities have been built to store indoors equipment that had been out in the elements. Bulk fuel locations are another priority, Spacy said, because "fuel is difficult to move; the more we can store forward the better."

Bulk storage facilities are also strategic

A French transport carrying US airmen and equipment taxis at Amari AB, Estonia, before a training exercise. USAF is working to improve airfields in Estonia so that they are able to operate in all weather conditions.

USAF photo by SSgt. Ryan Crane



A Florida ANG F-15C peels off from a formation near Leeuwarden.

USAF photo by SSgt. Rusty Frank



assets in some countries, he added, as several nations remain highly dependent on Russian oil and gas.

An essential element of engagement is building organic capabilities, such as firefighting, to support USAF and NATO air operations. After USAF logisticians, firemen, and security forces visit a location to build a project, then train the allied airmen in their skills, it lessens the size of the needed USAF logistics tail in the event of a crisis.

"If we can teach [crash fire and rescue] like we do, ... we don't need to occupy those facilities," Spacy said. The allies can then perform it to NATO standards, "and that's a real skill."

All these efforts allow NATO forces to be dispersed at more bases, permitting a more swift and comprehensive

response to aggression. NATO aircraft “could land, be serviced by a host nation, take off, and do their mission” in more places than before, he said. “All this gets us closer to that.”

Though airmen in Europe have trained with NATO allies for decades, the post-Crimea engagement surge in Eastern Europe fosters two-way learning as well. Many of the countries where USAF is sending assets and dispatching TSPs are former Warsaw Pact states. Their militaries are not only equipped with far different technology, they train and organize much differently than do US airmen, noted Brandt, who said, “That’s why it’s important for us to go there.”

The Bulgarian air force flies the MiG-29 Fulcrum, he said, and still

we want to do these [events], to build foundations, and limit those type of issues.” Understanding each other’s tactics and procedures is the foundation for joint coalition operations.

THE SURGE

As part of the Air Force’s cost-cutting, force-shaping actions to reduce its footprint in Europe two years ago, it pulled the A-10s of the 52nd Fighter Wing at Spangdahlem AB, Germany, back to Moody AFB, Ga.

Col. Joseph D. McFall, commander of the 52nd, was its vice commander in June 2013, when the A-10s were withdrawn from Spangdahlem.

“There was a limbo, and people wondered what was going to happen to the future of the base,” he recalled. Things

from checklists to conducting “lessons learned” assessments.

Teams of civil engineers, logisticians, and security forces have fanned out across Europe since the ERI was initiated. They support operations with allied militaries, improving semipermanent sites, and ensuring that when USAF jets land at a foreign base, “they had the capacity to operate,” said Capt. Tanner Smith, the director of operations for Spangdahlem’s 52nd Civil Engineering Squadron. As a result of these deployments through the first half of 2015, the USAFE-AFAFRICA staff is “already leaning on our experiences, on what we want to do with these bases ... to get the best bang for the buck” in the future,” said Lt. Col. Chris Meeker, the 52nd CES commander.

USAF photo by A1C Trevo McBride



uses Soviet-era navigation aids. “We get to see each other’s capabilities,” he said, noting that USAF F-15C aircrews recently demonstrated how they debrief training exercises with the P5 training pod. It records flight data, simulated weapons shots, and “kills” during live air-to-air training.

At the same time, “we get to fly against them” in training, seeing firsthand how MiG-29s in Bulgaria or MiG-21s in Romania stack up in simulated combat.

“A lot of this is honing skills and predictability,” Brandt explained, such as knowing what to do if an F-15C pilot gets a radar spike, which might be a friendly MiG rather than a bad guy. “That’s why

were different when he returned in February. “I roll back in and the [EIC] changes are announced, ... and now we are the belly button for any TSP expedition.”

The surge has required new thinking about how deployments work in Europe, said Lt. Col. Matthew Higgins, the deputy operations group commander of the 52nd Operations Group at Spangdahlem. “We will own [some] jets that will never land here,” he said. But crews will deploy and work with allies in new scenarios and challenge themselves. “From a tactical perspective, [if] we’re going to fight together, we have to figure it out together,” Higgins said. The things to practice range

SSgt. Cameron Hawkes, deployed from Davis-Monthan for Atlantic Resolve, performs maintenance on an A-10 at RAF Lakenheath, UK.

Even as it conducts these engagements, USAFE-AFAFRICA is adjusting its own structure, a big chunk of which will bed down at Spangdahlem. As part of the EIC process, Spangdahlem will give up its 606th Air Control Squadron to Aviano Air Base and take on the 352nd Special Operations Wing. This was surprising to some outside observers, but Spangdahlem officials said the move was partly influenced by the heavy investments made at the base over the last decade. These include new clinics,



USAF photo by SSgt. Joe W. McFadden

Lt. Col. Steven Behmer prepares to taxi an A-10 deployed from Davis-Monthan at Campia Turzii, Romania. NATO allies, such as Romania, are investing in systems to increase interoperability with US forces.

schools, and base infrastructure—some \$373 million worth of improvements between 2004 and 2015, known as the “northwest expansion.” USAF officials have said one of the main reasons for divesting Mildenhall is the cost of necessary updates to the base’s facilities.

The buildup came as the base steadily lost iron to fleet reorganizations. After losing the A-10s in 2013, only one fighter squadron remains at Spangdahlem, the F-16s of the 480th FS. From airfield space to hardened shelters, “now, we have significant capacity,” Meeker stated. “We brought in an entire unit [from Mildenhall] for an exercise, and we had zero impact on F-16 operations,” he said. It was the available room—plus the close relationship with the local German community—that prompted DOD to choose the base for the SOW’s new home. The move will

allow the unit to better support operations across Europe and Africa alike.

The era of “one trick pony” bases is coming to an end, USAFE-AFAFRICA planning officials observed. Mildenhall’s tankers will be parsed out to Spangdahlem and Aviano by 2020, preserving USAF units’ ability to reach the European and African theater quickly.

IF YOU BUILD IT

Utilities and groundwork get put in at Spangdahlem in 2017, followed by new buildings a year later. By 2020, Meeker said, the plan is to have a new aircraft apron, a refurbished runway, support and maintenance hangars, a wing headquarters, and a special tactics squadron facility complete, all built on or near places that used to host A-10s or were underused. This new infrastructure will eventually support

10 CV-22 Ospreys and 10 MC-130J Commando IIs.

No one expects USAFE-AFAFRICA’s operating tempo to let up anytime soon. The theater security packages are just the first phase of a deep engagement plan with European allies, Camerer asserted. Now that the first round of upgrades is winding down, the command is looking at locations warranting further investments, such as hardened facilities and defensive capabilities.

Partner nations are investing in new systems to increase interoperability with US forces in the next few years, as well. Romania, for example, purchased 12 surplus F-16s from the Portuguese, Brandt noted. This fall, Alabama ANG F-16s will deploy to Campia Turzii Air Base to conduct training and help familiarize Romanian airmen with F-16 operations.

There are more new opportunities than there are logistical and operational challenges, McFall observed.

“For the last 14, 15 years, we’ve deployed to these massive bases [in US Central Command], where we’ve built up with manning and support,” he said. Today, across Europe, a lean expeditionary mindset is being tested in response to threats few predicted just two years ago.

“We are telling lieutenant colonels, ‘Here’re your 250 folks for maintenance, operations, and supplies, go make it happen,’” McFall said. “It’s a fantastic leadership opportunity, and it gets back a bit to the nature of what we were trying to do” in the Partnership for Peace era immediately after the Cold War—“small deployments, small footprints, and the ability to get some really major things done with that, and that’s really cool.” ★

A C-17 laden with equipment for the F-15C theater security package from the Florida and Louisiana Air National Guard units, touches down at Leeuwarden.



USAF photo by SSgt. Ryan Crane

Buying the Future

By John A. Tirpak, Editorial Director



The MQ-1 Predator started out as a concept demonstration. It proved highly successful. The Air Force wants to make experimentation and prototyping routine, to keep service and industry innovation healthy.



USAF photo by Scott M. Ash

William LaPlante, USAF acquisition chief, enforces a strict policy of not starting programs the service can't later afford.

The Air Force's acquisition chief talks about how to cram a half-century of modernization into just over a decade.

USAF photo by A1C Christian Clausen

The Air Force faces a Herculean labor: replacing more than \$400 billion worth of obsolete equipment before it either completely breaks down or a world adversary takes advantage of the situation.

“We’re living off the capital investments, in many of these fundamental areas,” that were made during the 1980s, said Air Force acquisition chief William A. LaPlante. In an interview with *Air Force Magazine*, he noted, “It was never planned” that any of the systems now overdue for replacement would remain in service as long as they have, and now the day of reckoning has simply arrived.

The shopping list is extremely long—entire fleets of fighters, bombers, ICBMs, tankers, trainers, surveillance airplanes, rescue helicopters, and more—and the window for replacement is uncomfortably small. In fact, of the Air Force’s top five acquisition priorities, three—the Long-Range Strike Bomber (LRS-B), a replacement airborne ground surveillance radar jet, and the T-X trainer—are all supposed to yield their first deployable asset in 2023. That year, too, is when a host of technology demonstrators and concept experiments involving lasers, microwave weapons, hypersonic missiles, and more are supposed to bear fruit in the form of a near-producible capability.

END OF THE WAITING GAME

What’s special about 2023? Is that deadline driven by the threat or some kind of acquisition cycle?

“I think you’d have to look case by case,” LaPlante said, but what those programs have largely in common is that most replace a Cold War system. Since the early 1990s, the question has been asked “multiple times” and is going to be asked again: “Well, can we wait even longer?”

The answer is, “No.”

“We have pressed the age limits on these capital investments as long as we possibly can,” he asserted. “Many of those systems have been delayed already, multiple times,” and “it’s remarkable that we’ve kept some of these systems around as long as we have.” He ticked off the now-clichéd anecdotes of B-52 pilots flying the jets their grandfathers flew, that most of the Air Force’s fighters now qualify for antique license plates, and that the launch control centers for Minuteman ICBMs date back to the Kennedy Administration. The other services are in a similar bind, he added.

So, how to pay for all that, and seemingly, all at once?

“This is worked every day by the programmers in the Air Force [and] by the leadership of the Air Force, by looking deep in detail at the next 10 years,” LaPlante explained. The old method of doing a five-year plan has been abandoned; now the service has a high-fidelity 10-year plan and “lower-fidelity” 20- and 30-year plans that sequence the order that new systems will have to be acquired.

Gone are the days when programs were launched in the hope that funding would appear downstream. Now, if there isn’t room in the expected budget, needed though a system may be, it’s no-go.

“We call it the affordability analysis,” he said, observing that this term is often misunderstood. It means making sure “the phasing ... hangs together,” so as one program waxes, another wanes, all the while living within expected funding. The master plot of these purchases “we call ... sand charts,” he said. It’s taxing work, because the budget built within the service is carefully dovetailed to make sure that all the collective moving parts work in concert. The

“uncertainty factor” is when Congress doesn’t agree, and the plan has to be redrawn, LaPlante said.

A key part of USAF’s plan is to take some things out of service—the A-10, U-2, and some of the E-8 JSTARS fleet are headliner examples—and use the savings to fund the new gear.

“We understand, we are not the decision-makers,” LaPlante acknowledged, but each perturbation of Congress denying permission to take a system down causes a return to the drawing board. Meanwhile, the calendar marches on.

“It’s a hard problem,” he said, but USAF has taken a hard-nosed approach that it won’t start any program until it’s sure it can carry it through. He cited as a recent example the Space Fence, which was delayed by sequestration. In 2013, USAF had to delay a contract for the Space Fence, a radar system designed to detect, count, and track orbital objects, urgently needed to replace a system too antiquated to support anymore.

“We would have awarded the contract in September or October of that year,” LaPlante recalled, “and we said, ‘We cannot award this contract,’” because there was no certainty the funds would be there to pay for it. Not until after a bipartisan plan to temporarily lift sequestration spending caps was reached—the following spring—did USAF go ahead with the award.

The Air Force wants to finance needed new programs by reducing old force structure, like the U-2. Congress does not always agree, forcing USAF to reassess what it can afford.

“We figured out it cost us more money” to delay, he noted, “but we had no choice but to stop and wait.”

This will also be the default mode if programs enter a prolonged delay—whether caused by contractor protests, or technical setbacks, or Congress. “That’s how those situations are ... handled,” he said. It means that “some programs don’t happen, ... or at least we can’t do [them] now,” and it may be a while before the opportunity comes around again.

Three programs are so compelling—the bomber, the F-35 fighter, and the KC-46 tanker—that USAF will make changes in other programs to protect them. But some—he put the JSTARS recapitalization program in this category—are in a “gray area.”

“Depending on how that phasing is done, and which assumption is made in the budget, [JSTARS is] right on the line” between being in or out of the budget, LaPlante said. A Milestone A decision that would have funded some contractors to define their prospective JSTARS solutions was to have gotten the green light in August, but LaPlante said the program won’t really be on firm ground until Milestone B, which is a go for development. “That’s when the

Capt. Brandon Rieker, an air battle manager with the Georgia Air National Guard, mans his station on an E-8 JSTARS. Replacing JSTARS is a high priority, but sequestration is the wild card.

ANG photo by SrA, Karl Giles



Lockheed Martin photo

decision-makers at that time will say, ‘OK, do we have the money or not?’”

He suggested that the T-X trainer is safe. It’s something the Air Force has “wanted and needed ... for a while now. We’ve waited as long as we can.” Turns out, the year 2017, “when we really start to put money in the T-X,” is the ideal time to launch the program, in context with all the others.

BOMBER WINDOW

“We picked that time because it was a very nice opportunity, when we had money available.” LaPlante added, “If we pushed it to the right five years, or had a time machine and pushed it to the left five years, it wouldn’t work.”

Not only development, but production has to be plotted on the sand chart. The new bomber will have a flyaway price,



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in 2010 dollars, of \$550 million a copy. At that price, assuming a first flight circa 2024, “it’s probably in the ballpark of 10,12,14 a year,” LaPlante said. At that rate, and with production beginning in the early ’20s, the LRS-B program would last anywhere from five to 10 years, depending on whether the final buy is closer to the projected low of 80 jets or the high of 100. The idea is not to start and stop or have spikes in production, but to “set up a stable and constant production line cycle,” with a good learning curve and a timetable that helps the supply chain be most efficient. That will help keep the price down, he said.

Discipline in the acquisition process has been saving real money for three years, LaPlante asserted. As one example,

five maxims he hopes will bring USAF’s new programs online with a minimum of turbulence.

The first of these, he said, is to “get the high priority programs right and keep them on track.” He told the group that spending more time making sure the requirements are precise, and reflect what’s truly needed, and then avoiding any changes is the surest way to prevent the upheaval that drives cost up. “To go fast, start slow,” he explained. If the job is done right before a program is in motion, once it gets going, it should go smoothly and predictably. He made the comment in the context of answering a question about when the LRS-B contract would be announced, saying he wouldn’t turn

down a request from any part of his organization to “check one more thing” before letting the contract.

The second element in LaPlante’s code is to improve relationships with industry and be more “transparent” about what the service needs, and when. The longer companies know exactly what they’re working toward, the better the solutions they can offer, LaPlante stated. The “transparency” extends to the military user, so it knows the art of the technically feasible and doesn’t demand capabilities

When requirements are well-understood and don’t change, it’s possible to use fixed-price contracts, as was done with the Boeing KC-46 tanker, shown here in development, on a test flight.



Boeing photo

LaPlante tells a Senate Armed Services subcommittee that speed in acquisition saves money, but the complexity of approvals within the Pentagon and from Congress slows things down.

he said there have been no engineering design changes on the KC-46, “which is, of course, how you do a fixed-price contract.”

But acquisition law requires that program managers budget for engineering changes, resulting in an unused pot of money at the end of the year. Congress takes that money away to spend elsewhere, but it’s often reported publicly as “funding slashed” on the tanker or whatever program is in question. “Sometimes it’s good things that happen,” LaPlante observed.

In a July speech at the Center for Strategic and International Studies in Washington, D.C., LaPlante laid out





Beyond the F-35, USAF is exploring technologies that will provide future air dominance. The result may not be another airplane, but hypersonics, directed energy, and cyber capabilities are all expected to play a role.

that offer relatively small utility but drive a big surge in cost.

The third element is for the government to “own the technical baseline” for key programs. Traditionally, companies have been able to get the inside track on upgrades and improvements for products they build, but if the government owns the tech data, it can hold competitions for upgrades. Usually, competition pushes costs down. Such a scheme is the plan for the LRS-B, which will be built in a series of block upgrades, he said.

Fourth, LaPlante wants to build on the “Better Buying Power” initiatives of Pentagon acquisition, logistics, and technology chief Frank Kendall. These include adopting best practices from industry and especially ensuring that small business—which frequently offers the best innovations—gets to compete for work and be involved, even in major projects. An example of this is a new competition USAF is running, where it will award a prize of \$2 million to the entrant able to develop a new class of high-efficiency, lightweight, and highly reliable turbine engines in the 100-horsepower class. Such engines would have application across a wide range of USAF needs, particularly in remotely piloted aircraft.

Finally, LaPlante is looking to ensure that the Air Force keeps the long-term strategy in mind, doing the experimentation and innovation necessary to build and keep a technological edge, capturing what Chief of Staff Gen. Mark A. Welsh III has termed “strategic agility.”

These initiatives—and particularly Air Force performance in stabilizing programs and bringing down costs—are

restoring the service’s reputation, once tarnished as being unable to manage competitions and programs effectively.

During the late 1990s and early 2000s, a number of USAF acquisition projects went spectacularly wrong, incurring either huge cost overruns or resulting in big-ticket acquisitions being thrown out and started over. Among these were the SBIRS early warning satellite and a replacement for the KC-135 aerial tanker. Understandably frustrated, senior Pentagon leaders took away some of the Air Force’s acquisition authorities. However, as successes have built up with the rerun of the tanker, the LRS-B, and new initiatives like the T-X, USAF is getting some of that authority back.

CONFIDENCE GAME

Though he said he could only speak to the two years since he’s been in the Air Force acquisition shop, LaPlante said, “Every year we send a memo to [Kendall’s office on] which programs we would like the delegation to be returned to the Air Force, and the justification. And every year, ... we’re getting them back.” LaPlante’s office later provided a list of some of these “returned” programs. They include the F-22 Baseline Program, returned in October 2013; the JASSM/JASSM-ER standoff missile programs, returned in September 2014; the RQ-4A/B Global Hawk, returned in February; and the F-22 Increment 3.2B upgrade, returned in April. LaPlante said he and Kendall often talk about the subject. “What’s most important to us is that there’s a good acquisition plan—good strategy and execution—more

than whether [authority lies with] him or me.” LaPlante said he’ll sometimes defer to Kendall “even if I’m the acquisition authority on a program.”

However, LaPlante acknowledged that there is a morale and process disadvantage in not having full authority. It “affects the speed of approvals for people” and has “a real impact on the organization.” He said he and Kendall “understand that if you want to be really agile, you try to push [decision-making authority] as far down as you can.”

He added that “the higher you have it, the more ‘help’ you’re going to get, and that’s frustrating to people.”

Because of its size, the LRS-B contract would “by law” be awarded at Kendall’s level, LaPlante said. Though previous USAF leaders congratulated themselves for a “protest-proof” eventual tanker choice, LaPlante said the opportunity to appeal is a necessary element in the system and compels the Air Force to do a good job. The way to avoid a protest, or at least prevail in it, is to “do what you say you’re going to do,” he asserted. “If you say how you’re going to evaluate, that it’s clear and unambiguous, and then you evaluate it ... in a credible and substantive way, that you followed exactly the process you said you’d follow,” then there shouldn’t be a problem, he said.

LaPlante also mentioned that only about 150 out of more than 100,000 Air Force contract awards were protested last year, and of those, only two were sustained. So, the rate of successful protests is “very low.”

The T-X and the JSTARS, because they are new, will pioneer some of LaPlante’s philosophies about how to structure pro-

Pilots practice touch-and-go maneuvers in a T-38 Talon during training at Sheppard AFB, Texas. The Talon is set to be replaced after decades of service by what is now called the T-X. Requirements for the new trainer were released in March, far ahead of the usual timeline.

USAF photo by Danny Webb



grams. In both cases, industry has been brought in early to discuss what the Air Force needs, explain what the available technologies can deliver, and discuss trade-offs regarding the optimum performance for the lowest cost. It may be, for example, that a slightly shorter radar is far easier to maintain and integrate on a business jet than the unit now flying underneath the JSTARS fuselage.

On the T-X, LaPlante said, the Air Force started out by looking for an “off-the-shelf” solution—namely, a jet already in service that could be adapted to USAF’s needs at minimal cost and delivered with greater speed. However, “we didn’t want to exclude clean-sheet designs,” LaPlante said. “What we cared about was ... in those requirements,” released in March, well ahead of when requirements would usually be unveiled in such a program.

He has noted that off-the-shelf is usually a misnomer and that systems procured that way are almost always heavily reworked—as the British Hawk trainer was significantly altered to serve as the Navy’s T-45 trainer. But to level the playing field as much as possible, a hard-cost bogey will likely be created so companies have a good idea of what to shoot for.

“We’re going to put some form of ... cost requirement for source selection into it, such that the cost is actually a key factor.” USAF wants to “illuminate ... what we’re willing to pay for and what we’re not willing to pay for.” Cost may be a key performance parameter on the program, as it will be on the LRS-B.

The Pentagon is pushing hard to rapidly insert new technologies in its combat

systems, to recapture some of the technology edge it has lost to competitors. Top Pentagon and Air Force leaders say they will urge more prototyping to make this happen, to stimulate innovation and speed up the delivery of new systems.

There was a similar push in the 1990s that yielded some significant successes—the RQ-1 Predator remotely piloted aircraft is one example—but a lot of promising projects never bore fruit because there was no set process to propel them all the way through the system.

THE VALLEY OF DEATH

“It seemed to lose steam after about three years,” LaPlante acknowledged. The lesson learned is that there has to be a way to “institutionalize” the transition of experiments and prototypes into usable products.

In the past, such programs were “very personality-dependent. Leadership has to drive it,” he explained. But when the prototyping champions left, the impetus for experimentation often went with them. There was no obvious route forward for promising concepts, and they entered what he called the “valley of death” between research and development and acquisition.

Now, though, “I own the landing pad,” LaPlante said, and he’s working to create a smooth conduit for the transition. He’s making it clear that program offices are “expected” to mine the R&D accounts and experiments for capabilities they can use to upgrade their systems, or for unconventional solutions to new requirements. He said he’s hoping to create “an institutional ability to continue past the

ins and outs of differing personalities, including my own.”

One of the biggest programs looming in the future is a capability to succeed the F-22 Raptor. It is not imminent. LaPlante’s office said the Raptor’s life expectancy easily stretches through the 2040s and possibly longer. However, it is a program that will depend on prototyping, experimentation, and new operational concepts, because no one is at all sure if what is needed will even be another airplane.

The new program is being explored through Air Dominance 2030, a multi-service survey of the technologies and requirements needed to control the air in the era beyond 2030. LaPlante said the heavy work being done now is to find out what the “kill chain” will look like by 2030-35.

While it’s “very early right now,” he thinks USAF is “successfully putting the right pieces together” from Air Force Research Laboratory, operators, and industry to explore how hypersonics, directed energy, and other nascent technologies will play in the air superiority mission, along with space, cyber, and electronic warfare.” It is defining possibilities, not an airplane.

Some have suggested that adversary advances in detection capabilities—such as new radars and infrared sensors—have rendered stealth obsolete for the next generation of weaponry. LaPlante rejected that theory outright.

“You take all the stealth you can get,” he said. “If you can drive stealth further, you’ll do it, and you don’t give that up.”



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THE CLEARING ZONE

By Aaron M. U. Church, Associate Editor



Combat controller TSgt. Thomas Bauhs was injured, trapped on a rooftop with a dying comrade, facing relentless fire.

It was to be one last mission for combat controller TSgt. Thomas Bauhs, before the end of his tour in Afghanistan. Deployed from the 23rd Special Tactics Squadron at Hurlburt Field, Fla., he was embedded with a 12-man Army Special Forces team to coordinate close air support.

The spring fighting season was reaching its crescendo in May 2014. Bauhs' mission was to support the team on a large clearing operation with Afghan National Security Forces in Nangarhar province in eastern Afghanistan. Nangarhar's mountain valley is the gateway to neighboring Pakistan and consequently a key NATO supply route subject to relentless insurgent activity.

"Basically, our operation was to disrupt the insurgent activities in there, ... remove the fighters, their supplies, and their weapons from the battlefield," recounted Bauhs. This particular area of the central valley was "one of the bad areas. ... We had gone to places in that vicinity several times prior, and that was one of the spots that we were likely, if not guaranteed, to make contact."

The combined force inserted under cover of darkness on May 31. The troops encountered periodic gunfire through the night, but the team was accustomed to it and pressed on, suppressing "a few scuffles" along the way, Bauhs said.

By early afternoon, random gunfire sharpened to more accurate probing. Snipers were taking shots from less than 200 meters away, prompting Bauhs and the Green Beret team leader, Capt. Jason B. Jones, to fire back with rifles and M203 grenade launchers.

The exchange "wasn't anything concerning at that point," though.

After half an hour, the pair's suppressive fire caught the insurgent's attention and "fire really started to focus" on their position.

About six hours after the operation began, Bauhs and Jones—whose troops were widely spread out—took up a defensive position in a small shelter

on the rooftop of a larger, abandoned compound. It was part of a complex the combined Afghan and Special Forces troops had taken and were holding. The structure had windows to the north and west, giving Bauhs a good vantage to direct air strikes, if needed, and a clear field of fire. "That's when we started taking pretty effective machine gun" fire and an accurate barrage of rocket-propelled grenades. Enough was enough. "Time to get some backup here," Bauhs concluded.

He set up to coordinate a series of strikes, and several F-16s dispatched to support him arrived overhead. He began relaying coordinates and targeting information to the F-16 pilots.

TAKING FIRE

"They were very good and I got them on one of the enemy positions pretty quickly," he said. The pilots notified Bauhs they were ready to engage as he was reloading his grenade launcher.

Before he could clear the pilots for weapons release, however, an 82 mm shell smashed through the shelter wall. "I was in a kneeling position, and it flattened me," he said. The blast disoriented him, but he shook it off and grabbed the radio. "I didn't know exactly where the F-16s were in their run in, ... so I communicated that they were approved to release the ordnance on target" and the fighters released a pair of 500-pound bombs.

While Bauhs tried to gather his senses, the insurgents reloaded and adjusted their aim. A second recoilless rifle shell "hit about three feet above my head, collapsing part of the structure" on top of Bauhs and Jones. The explosion gave him a traumatic brain injury, perforating his eardrums, and left Bauhs temporarily deaf.

The dust and smoke inside the rooftop hut were so thick that Bauhs couldn't see Jones, much less pick out targets and direct the aircraft overhead. He called combat controller SSgt. Elias

Left: TSgt. Thomas Bauhs in Afghanistan. He was providing close air support to a 12-person Army Special Forces team when they came under heavy fire.

Bauhs (left), in Afghanistan with a joint special operations military member (face obscured for security purposes), was on his last mission in-country when the clearing operation turned deadly.

Enge—embedded with another group two kilometers away—“screaming into the radio” to take control of coordinating his air support and get the heat off his team.

“I said, ‘Hey, we’re getting hit pretty badly over here. ... I need you to take the stack and start making it happen, and then start working nine-line medevac to get our wounded.’” Bauhs still couldn’t hear and was counting on Enge to understand the information and run with it.

As the dust settled enough for a quick assessment, Bauhs realized the wall he and Jones were sheltering behind



was “pretty much gone.” The heavy machine gun, RPG, and recoilless rifle fire weren’t letting up and he shouted to Jones, several feet away, that they had to find better shelter. He couldn’t get Jones’ attention or even see him, so he low-crawled close enough to shake Jones’ boot. He got no response.

“I could see him when I got a bit closer, [but] he was kind of hunched over” and apparently unconscious, said Bauhs. He propped Jones against the

wall, trying to rouse him. It was then he made the grim discovery that the team leader had “significant trauma to the back of his head.” Bauhs knew Jones’ condition was life-threatening—and they were still pinned down on a rooftop. He rendered what aid he could to prep Jones for movement.

Enge, with the scant information he had, managed to call for a medevac helicopter and was calling in air strikes to support both his team and Bauhs’.

Bauhs (second from left) and other joint special operations team members on a nighttime mission in Afghanistan.

“His element was taking contact—he was dropping danger-close munitions to my element and his element,” Bauhs said, adding that Enge “was doing a great job.” Enge directed the F-16s and several AH-64 Apache attack helicopters that had arrived on scene and was even able to take out an anti-



Capt. Jason B. Jones, KIA

Despite the best efforts of his comrades, Army Capt. Jason B. Jones died on June 2, 2014, a day after being medevaced from the battlefield to a hospital in the provincial capital of Jalalabad, Afghanistan, according to US Army Special Forces Command.

Jones, 29, was serving his second combat tour, deployed as the commander of a 12-man Special Forces “A-team” of the 3rd Special Forces Group (Airborne), from Fort Bragg, N.C. A 2007 West Point graduate, he received a degree in nuclear engineering. Jones completed Airborne and Ranger schools and deployed for Operation Iraqi Freedom the following year, earning the Bronze Star. After his first deployment, he volunteered for Special Forces selection, completing the highly demanding qualification course.

TSgt. Thomas Bauhs credits the fact that he made it out alive to the Green Berets of Jones’ team. “There are four Army guys I owe my life to on that mission,” he said. The Green Berets braved enemy fire to help pull Jones from the roof. “There were some heroics that happened on the Army side,” Jones commented. “Those guys were awesome.”



aircraft weapon that the insurgents “had laid flat and were shooting at us,” said Bauhs.

Still “fuzzy” from the blast, Bauhs spent several minutes trying to figure out how to drag Jones with him to a safer location. “I’m trying to grab and drag Jason and my dexterity and grip strength [were] really not there,” Bauhs said. Almost 30 feet of wide-open rooftop lay between the ruined mud wall and the stairway down from the compound. He didn’t want to cross it “at all,” he said.

THREE LOCATIONS

Bauhs finally got a break when a strike directed by Enge hit the insurgents who’d been firing on the compound. He scrambled to grab Jones and radioed his team to help him “get Jason off the roof.” Two of Jones’ fellow Green Berets rushed to assist against “some pretty significant enemy fire” just as the medevac helicopter approached. “We were pretty lucky to get off that rooftop in one piece,” he said. His hearing was still impaired but he could now hear “well enough” to communicate. Still reeling from his concussion, he knew he needed to establish a medevac landing zone. Bauhs picked a clearing, north of the compound, that offered relatively safe ingress and egress routes.

Enge directed the Apaches to cover the evacuation. “We were able to load Captain Jones and the injured Afghans,” who had been hit during the firefight, onto the medevac helicopter.” It departed safely. The air strikes tamped down the insurgent fire long enough for the team

Above, Captain Jones in Afghanistan and (right) in dress blues. Jones was killed in the firefight. Bauhs, concussed from a close call with a rifle shell, identified a medevac landing zone and got Jones and injured Afghans away from the relentless small-arms fire.

to regroup. “We determined that we were going to continue on with the mission and exfil at the regular time,” explained Bauhs. He elected to stay with the team despite his injuries.

An hour later the insurgents re-emerged and “we were taking sporadic fire pretty much constantly throughout the day.” He and the Special Forces soldiers “re-established security” at the compound site and deployed an Afghan element north toward where the insurgents had been firing from earlier.

Unfortunately, the Afghan forces “set up security in a bad spot” and rapidly found themselves pinned down by renewed insurgent fire. Bauhs and several SF team members took shelter in a ditch with a clear view of both the Afghan forces and the enemy firing positions. They were being engaged from three locations.

From his vantage point, Bauhs could see enough to pass information to an AC-130W Stinger II gunship, now nearby. He cleared the gunship to fire, but its 30 mm chain-gun jammed. That left Bauhs with a few lightly armed Army OH-58 Kiowa scout helicopters as his only air assets. The choppers weren’t his preferred solution but their “harassing and suppressing” fire kept the insurgents

down just enough to allow the Afghans to pull back.

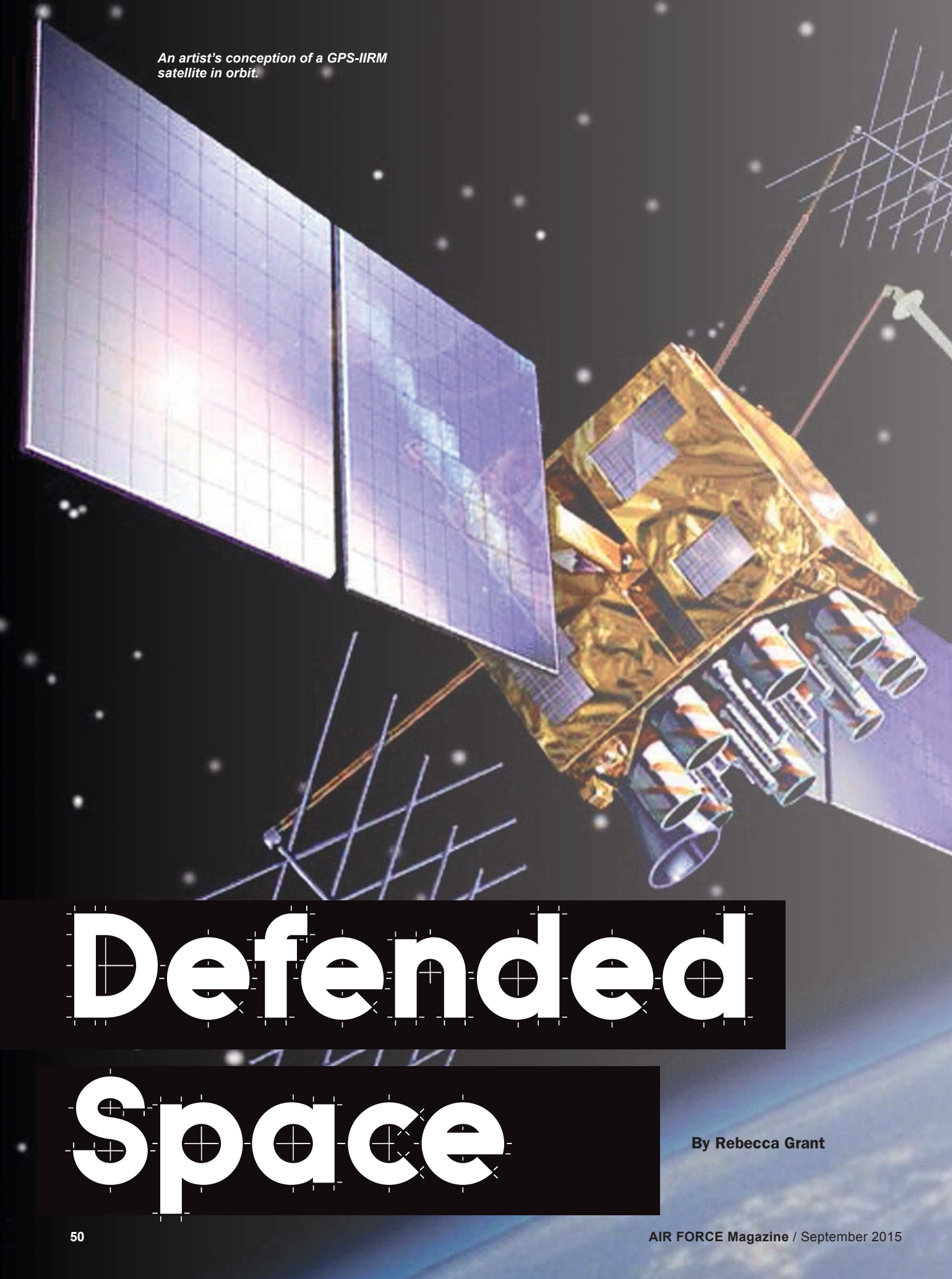
“They were shooting danger close, about 70 meters from the Afghans, helping those guys,” said Bauhs.

Soon thereafter, a flight of AH-64 Apaches arrived to lay down fire that was “a bit more lethal.” In the meantime, the gunship crew unjammed the Stinger’s gun, joined in the fray, and stopped enemy resistance in a little less than an hour, Bauhs said.

Assessing the more than 12-hour engagement, Bauhs called it a “really good, synchronized effort between the special tactics airmen on the ground, ... the Army Special Forces team, and all the supporting aircraft from the medevac helicopters, attack helicopters, the AC-130s, and fast-CAS.” Procedures worked “really well. Everybody stepped up and made it happen.”

The team had been ambushed by a force of about 50 insurgents and recovered more than 30 enemy dead. However, Jones did not survive, and six Afghans were injured. Despite that, “it was an overall effective mission,” Bauhs said. All told, “we were able to take out anti-aircraft weapons, we were able to take out recoilless rifles, dozens of enemy fighters and weapon caches, and ultimately complete the operation against a determined insurgent force.”

Bauhs received the Bronze Star Medal with Valor Device in a ceremony at Hurlburt earlier this year for his tenacity calling in continued air support and caring for his gravely wounded comrade, while under intense fire.



An artist's conception of a GPS-IIRM satellite in orbit.

Defended

Space

By Rebecca Grant

The right to self-defense includes the space realm, and the US is ramping up efforts in that arena.

It's time to defend space. Or at least 73 trillion cubic miles of it.

"Historically, we designed and built our space systems to operate in an environment that was not contested," Air Force Secretary Deborah Lee James said in her address to the national Space Symposium in April. "This is no longer the case. We need to change our thinking in order to confront the threat of a possible conflict that one day could extend into space."

Challenges ahead may one day include having "warfare effects in space," James asserted.

In case anyone missed that message, Gen. John E. Hyten, head of Air Force Space Command, expanded on it in a "60 Minutes" TV appearance on April 26. "If we're threatened in space, we have the right of self-defense, and we'll make sure we can execute that right," Hyten told correspondent David Martin.

The Pentagon is adding \$5 billion in the next budget to improve command and control and real-time options for protecting America's space capabilities. For space, the new goal is self-defense.

FALSE JADE

China's multiplying space achievements are a principal reason why American military leaders are emphasizing space defense.

In 2013, China became only the third nation to land a vehicle on the moon, with its lunar rover "Jade Rabbit." But it's the steady progress in potential military space capabilities that could change international policies.

"Without question, China is mounting a serious aerospace challenge against the United States," said Deputy Secretary of Defense Robert O. Work in a June address at the RAND Corp. The Chinese "are pursuing a range of counterspace capabilities while at the same time improving their own space capabilities because they are obviously thinking that they will have to fight to maintain space superiority in the future."

China's bold moves began with a missile shot that took down one of their own satellites on Jan. 11, 2007. The incident infamously spewed more than 3,000 new pieces of debris into orbit, and led to international condemnation.

"The direct-ascent ASAT system China tested could threaten satellites in LEO [low Earth orbit].

These include US military satellites used for reconnaissance, remote sensing, surveillance, electronic surveillance, and meteorology," wrote Phillip C. Saunders and USAF Col. Charles D. Lutes in an analysis for *Joint Forces Quarterly* shortly after the event.

In 2009, People's Liberation Army Air Force Commander Gen. Xu Qiliang called militarization of space a "historic inevitability." He retracted the remark after high-level criticism, but Xu was later promoted to the higher position of vice chairman of the Central Military Committee—the first air force officer to hold the job and a sign the remark didn't really bother his superiors.

China followed up with a space launch of a similar profile in July 2014, a fact highlighted in the Pentagon's 2015 annual report on Chinese military power.

"China continues to develop a variety of capabilities designed to limit or prevent the use of space-based assets by adversaries during a crisis or conflict, including the development of directed-energy weapons and satellite jammers," concluded the report.

Even more worrying was a May 2013 launch to a peak orbit at 30,000 kilometers (18,600 miles) above the Earth's surface. The 2007 test had demonstrated capabilities in low Earth orbit. The 2013 shot "could ... have been a test of technologies with a counterspace mission in geosynchronous orbit," theorized the Pentagon in its report.

China has not acknowledged a space weapons capability. But at least one Chinese military writer said, "Destroying or capturing satellites and other sensors ... will deprive an opponent of initiative on the battlefield and [make it difficult] for them to bring their precision guided weapons into full play."

The US and China come at the space problem from different angles. "Where to the Chinese, [space] is an area that needs to be protected in times of crisis, to the US it's a place that needs to be open to prevent that crisis," USAF School of Advanced Air and Space Studies professor Everett C. Dolman told Australia's *Sydney Morning Herald*.

WARFARE EFFECTS

Of course, defending space is not just a bilateral problem. Ten nations besides the US can launch objects into orbit. "Soon every satellite in every orbit will be able to be held at risk," said USAF Lt. Gen. John W. "Jay" Raymond, then commander of 14th Air Force (Air Forces Strategic) at the Space Symposium.

For the Air Force, providing space superiority has long been a core function. Since its formation in 1982, the airmen at AFSPC "have basically developed the capabilities that fundamentally changed warfare forever. And we're not going to go back to the way we used to fight," attested Hyten, speaking in April to the Defense Writers Group in Washington, D.C. USAF space capabilities enable joint operations of every type.

What's shifting is US policy. Official statements are shaking off some of the Cold War-era prohibitions against the use of force in space. President Barack Obama in the 2015 National Security Strategy gave this warning: "We will also develop technologies and tactics to deter and defeat efforts to attack our space systems; enable indications, warning, and attributions of such attacks; and enhance the resiliency of critical US space capabilities." The new stance brings forward strong claims to self-defense.

Of course, the Outer Space Treaty signed in 1967 is still in effect. But the treaty language shows why it is now only a partial basis for future steps. When the

treaty was signed in London in January 1967, the focus of US-Soviet activity was banning military bases on the moon and dialing-down nuclear tensions.

“The moon and other celestial bodies shall be used by all states parties to the treaty exclusively for peaceful purposes,” stated the treaty. “The establishment of military bases, installations, and fortifications, the testing of any type of weapons, and the conduct of military maneuvers on celestial bodies shall be forbidden,” the treaty partners agreed. The historic treaty removed the moon from sovereignty claims, established liability for satellite owners, and opened up space for free exploration. The treaty also banned nuclear weapons in space. But it didn’t address a world where the US alone has 500 satellites in orbit, accompanied by dozens of international projects and over 23,000 known pieces of space debris.

Nearly 50 years later, it’s the rising activity in satellite orbit bands that is creating competition. A creature of its time, the treaty did not directly address issues such as space debris, much less the use of objects as weapons in Earth orbit. According to the State Department, this was a “nonarmament” treaty, like a predecessor document that banned the militarization of Antarctica. As a result, the language leaves gaps.

US officials are treading carefully. “There is not an agreed-upon code of conduct,” said James, who also appeared in Hyten’s “60 Minutes” report.

REVEALING

USAF has revealed much this year about its posture for ensuring space control. Beyond this, technologies and mission requirements point to several possible applications of power in or from space—and nearly all are likely to involve USAF.

The first challenge is to defend vital capabilities from disruption or outright attack. Job One is making the satellites and their support systems more resilient. “When it comes to GPS, the thing I worry about first is jamming,” Hyten told the Defense Writers Group. “When it comes to SATCOM, the thing I worry about first is jamming.” It’s a long-standing concern, in part because basic jamming devices are easy to acquire outside the US.

Space domain awareness is another critical step. Programs underway for several years are ready to deliver what Hyten termed an “exquisite understanding of what’s going on in all domains in space.” The goal is “give the commander of the Joint Functional Component Command for Space and the commander of Strategic Command the ability to actually do things.”

What about interfering with a satellite? The US demonstrated anti-satellite capabilities in the 1980s and again with the 2008 destruction of a satellite making an unpredictable re-entry. But there’s much more to space control.

In jamming, for instance, the US is hardening its own satellite systems against interference, but that doesn’t rule out the use of jamming as a space control tool. “We have a capability called



USAF photo by Duncan Wood

Secretary of the Air Force Deborah Lee James speaks at the annual Space Foundation symposium in Colorado Springs, Colo., in April. James makes no bones about the fact that space defense is imperative.

a countercommunications system that is built to deny an adversary the use of space communications. All I can say is it’s a capability that exists on the ground

USAF photo by Michael Stonecypher



The X-37B on the runway at Vandenberg AFB, Calif., in 2010, after its 220-day maiden voyage. The spacecraft has since logged a mission lasting 675 days.

and it does not create debris in any way,” Hyten told “60 Minutes.”

Deorbiting is another example. Old satellites are either parked or flown into the atmosphere so they burn up on re-entry. Managing satellite life cycles often includes planning for how to deorbit the satellite by nudging it slightly. Space superiority may be partly a game of maneuver. Deorbiting a satellite can bump it out of a useful orbit or send it spiraling into the atmosphere.

Deorbiting was conceived to redirect satellites into position to break up as they re-entered. Many techniques can be used—and some may have the potential to be aggressive. One way to deorbit a satellite is to use a burst of fuel such as compressed gas to change the orbit and slow it down. Another method is a tether. A long tape unfurls behind the satellite, creating electromagnetic charges from the magnetic fields surrounding Earth. The friction results in a small amount of drag. Releasing a balloon accomplishes the same task.

Not all deorbiting happens on purpose. In 2013, Ecuador launched that nation’s first satellite, a small Cubesat named Pegaso. It suffered a “lateral collision with

particles” of a 1980s Soviet S14 fuel tank at an altitude of 404 miles, somewhere over the Indian Ocean, according to the Joint Space Operations Center. It later spiraled out of control, ending its mission.

Then there is the X-37 research testbed. Since its first launch in April 2010, the X-37 orbital spaceplane has been enticing observers with its endurance and mysterious missions.

“It could be a space bomber, ... a spy plane, [or] on a mission ... to take out satellites” or deploy spy satellites, speculated London’s *Daily Mail* on June 1, 2015. The X-37B spaceplane launched for its fourth mission in May 2015. The spacecraft is just 29 feet long and has logged one mission lasting 675 days.

The mission “cannot be specified,” USAF spokesman Capt. Christopher Hoyler told Space.com. Hoyler said the X-37B was “investigating an experimental propulsion system” as part of research for reusable space vehicles. He also said USAF’s Rapid Capabilities Office would “host a number of advanced materials onboard the X-37B for the National Aeronautics and Space Administration to study the durability of various materials in the space environment.”

“It’s really for cool things,” Hyten said of the X-37 during his interview with “60 Minutes.” Right now the missions can’t be discussed in part because “we’re experimenting,” he said.

USAF also shed light on advanced capabilities affecting higher, geosynchronous orbits. Put simply, there are new kids on the block in GEO.

“I think they’ll be able to threaten every orbital regime that we operate in. Now we have to figure out how to defend those satellites, and we’re going to,” Hyten said. Specifically, Space Command has “deployed two highly maneuverable surveillance satellites to keep watch on what other countries are doing high up in geostationary orbit,” Hyten announced on the CBS show. “We want people to understand that we’re watching. There will be no surprises in GEO. ... It’s way too valuable for us to just be surprised.”

Gen. Xu Qiliang, chief of the Chinese air force, during a visit to India in 2008. Xu has said the militarization of space is inevitable, and China is moving boldly in that direction.

CHANGING ATTITUDES

Changing attitudes toward self-defense in space could extend to missile defense, too. Though it was once banned by treaty, a defensive weapon in space could become part of the missile defense kill chain.

“If the US is to get serious about defending itself from ballistic missile attacks of all ranges and scales, it will have to revive the space-based missile defense interceptor approach,” urged Michaela Dodge of the Heritage Foundation, in a *Space News* article. The 1972 Anti-Ballistic Missile (ABM) Treaty squelched development of space-based weapons to counter ballistic missiles. To the Nixon Administration the treaty was essential for homeland security and reduced the Soviet Union’s incentive to deploy more offensive nuclear ballistic missiles.

However, President George W. Bush pulled the US out of the treaty in June 2002, citing the rise of rogue threats. Ground- and sea-based missile defenses flourished, stimulated with nearly \$8 billion per year in funding.

In the early 1990s, the Global Protection Against Limited Strikes program included a space-based component. This child of “Star Wars” was an update on the Brilliant Pebbles concept, once part of the Reagan-era Strategic Defense Initiative. Approximately 1,000 small objects in low Earth orbit would be in position to kinetically attack enemy missiles in the boost phase. Attacking in this part of their flight is appealing because an early intercept might destroy the missiles before they maneuvered or deployed countermeasures. Strengthening the kill chain by destroying even a portion of missiles during the boost phase would leave fewer potential targets for the midcourse Ground-Based Interceptor and deployed terminal defenses such as Patriot and THAAD to catch.

Technical risk still raises concerns and so far, no Administration has invested in space-based missile defense, noted adjunct RAND analyst Marvin Schaffer. Presidents Reagan and George H. W. Bush supported space-based missile defense but abided by the ABM Treaty. The George W. Bush and Obama Administrations invested in sea-based and ground-based systems.

Small, rogue arsenals like those of North Korea and Iran could be effectively targeted with space-based systems. They wouldn’t replace terminal intercept, but could help guard against rogue missiles reaching their targets or overwhelming current defenses.





USAF photo by A1C Ian Dudley

Gen. John Hyten, head of Air Force Space Command, taping an interview with the television show “60 Minutes” at Vandenberg. Basic jamming equipment is easy to procure outside the US, so Hyten is focused on making US satellites more resilient.

China is driving threat complexity here, too. “China is working on a range of technologies to attempt to counter US and other countries’ ballistic missile defense systems, including maneuverable re-entry vehicles (MaRVs), MIRVs, decoys, chaff, jamming, and thermal shielding,” noted the 2015 Pentagon China report.

STRIKE OPTIONS?

What about directing kinetic kill vehicles or other weapons from space orbits onto terrestrial targets? Like the ICBM-riding global strike proposals, the notion of strikes—sometimes referred to as “Rods from God”—gets around issues of speed and survivability by using the formidable power of gravity.

The Air Force has clearly stated it does not have space weapons. Yet speculation continues. Storing weapons on-orbit for conducting surface strikes may have tactical advantages but it also comes with drawbacks. Weapons would have to be launched to orbit, then remain available for years. The number of weapons stored in space would be an object of debate and prices would be very high. Technical factors might limit the deterrent value of a space-based arsenal.

One popular use for a future space weapon might be a global effort to divert or break up asteroids big enough to survive re-entry and cause damage.

The European Union’s NEOshield experiment has researched ways to intercept asteroids. The best option is to intercept a space rock when it is still very far away, when a physical or

gravitational nudge can change its course slightly and steer it away from Earth.

“If we want to stop an asteroid on collision course with the Earth from hitting us, we’ll need to fire at it many years ahead of time.” So said Frank Schäfer of the Fraunhofer Institute for High-Speed Dynamics, Ernst-Mach-Institut in Freiburg, Germany, quoted in a 2013 interview with *Science Daily*.

Collisions aren’t frequent, but are devastating when they happen. A meteor over 60 feet wide blazed through the atmosphere and exploded over Chelyabinsk, Russia, in February 2013. More than 1,500 people were injured, mostly by flying broken glass, from the meteor’s shockwave.

A larger such event in Siberia in 1908 flattened and burned trees for dozens of miles. Arizona’s Meteor Crater also bears witness to the potential for impact. Scientists believe the object that hit Earth 50,000 years ago, forming the crater, was 150 feet across. It left a crater more than half a mile wide.

NOT ALONE

Threats and technologies are converging, and this is opening up the space policy debate.

“The question facing us today is whether we can muster the courage and political will to advance space exploration and ensure that cooperation continues to trump competition,” Deputy Secretary of State William J.

Burns said at State Department talks on space exploration, a few months before his 2014 retirement.

Regional rivalries are also fueling competition. “Asia’s space arrangements are highly nationalistic, sometimes secretive, and mostly competitive,” wrote James Clay Moltz in a January 2015 piece for *The Daily Beast*. Japan in 2008 ended its ban on military activities in space—probably in direct response to China’s direct-ascent test. Also in 2008, India ramped up its space program with a lunar orbiter and new Mars programs. North Korea has attempted to put working satellites in space. Meanwhile, China formed a space consortium including Bangladesh, Thailand, and Mongolia.

Regional rivalries like these deviated from the pattern of European cooperation and US-Soviet joint missions. “The recent linkages between space and hostile forms of military nationalism could get out of hand, absent regionwide talks to defuse tensions and identify common threats in space, such as harmful orbital debris,” Moltz explained.

The good news is, the threats are still under development, “but they’re very close to fruition and we need to make sure that we’re prepared for that,” Hyten told reporters.

Whatever happens, the US will stand with its closest allies. Australia is hosting a new C-band radar assisting with tracking space debris. The US and Japan are deepening ties. Other close allies have joined coalition space operations.

According to Hyten, the JSPOC is already a coalition space operation center. “We have a Canadian chief of combat ops; we have an officer from the United Kingdom who is our chief of plans and strategy,” he told defense reporters in April. “We’re going to continue to expand” international space partnerships.

Hyten said in a speech at the Air Force Association’s Air & Space Conference last year, “The United States will employ a variety of measures to help ensure the use of space for all responsible parties.”

He continued, “Consistent with the inherent right of self-defense, [we will] deter others from interference and attack, defend our space systems, and contribute to the defense of allied space systems, and if deterrence fails, defeat efforts to attack us.”

Rebecca Grant is president of IRIS Independent Research. Her most recent article for Air Force Magazine was “A Prelude to War” in August.

By Robert S. Dudley

A Matter of Stars

"The appointment of a four-star [general] sends a powerful message to our airmen, allies, and any would-be enemy. It speaks to our commitment and promise to our airmen and nation to ensure a safe, secure, and effective nuclear deterrence and global strike capability with the right level of leadership emphasis. ... Having a four-star general responsible for the world's most powerful weapons is critically important."—**SECAF Deborah Lee James, on appointment of Gen. Robin Rand as the first four-star general to head Air Force Global Strike Command, press statement, July 28.**

Air Boss Speaks

"One hundred percent of our success in Desert Storm was based on lessons learned from Vietnam, on how not to run a war. We were not going to drag that war out. We were going to fight as viciously as we possibly could and get it over with and have the least loss of life. [Secretary of Defense Dick] Cheney and [President George H. W.] Bush were both very good about letting us run the show, and it paid off. ... It really helps when you have wise politicians who know when to fight and how hard to fight. If you're going to kill somebody, you better kill 'em. And you'd better have a damn good reason."—**Retired USAF Gen. Charles A. Horner, Desert Storm "air boss," quoted in Northwest Florida Daily News, Aug. 1.**

Word From The Donald

"When you see the other side chopping off heads, waterboarding doesn't sound very severe."—**Presidential candidate Donald Trump, on the morality of US waterboarding, ABC's "This Week," Aug. 2.**

Schumer Says "No"

"I have decided I must oppose the [US-Iran nuclear] agreement. ... If Iran's true intent is to get a nuclear weapon, under this agreement, it must simply exercise patience. After 10 years, it can be very close to achieving that goal, and, unlike its current unsanctioned pursuit of a nuclear weapon, Iran's nuclear program will be codified in an agreement signed by the United States and other nations. To me, after 10 years,

if Iran is the same nation as it is today, we will be worse off with this agreement than without it. ... Better to keep US sanctions in place, strengthen them, enforce secondary sanctions on other nations, and pursue the hard-trodden path of diplomacy once more, difficult as it may be."—**Sen. Charles E. Schumer (D-N.Y.), top Democratic leader, statement issued Aug. 6.**

Obama Says "Yes"

"Congressional rejection of this deal leaves any US Administration that is absolutely committed to preventing Iran from getting a nuclear weapon with one option: another war in the Middle East."—**President Barack Obama, at American University, Aug. 5.**

Peace In Our Time

"[President Obama] is carrying on in the finest tradition of Neville Chamberlain."—**Sen. John McCain (R-Ariz.), comparing Obama, in his dealings with Iran, to the British Prime Minister long reviled for appeasing Adolf Hitler, AP dispatch, Aug. 6.**

Why Russia Is Worst

"We have a nation [Russia] that has used force to change internationally recognized boundaries. Russia continues to occupy Crimea. Russian forces now are in the Donbass in eastern Ukraine. So this nation has used force to change international boundaries. And this is a nation that possesses a pretty vast nuclear inventory and talks about the use of that inventory very openly in the past."—**USAF Gen. Philip M. Breedlove, Supreme Allied Commander, Europe, on scale of Russian threat, on PBS NewsHour, July 29.**

Airpower Vs. Caliphate

"In my opinion, this is not the same fight as it was when it started, and I look at that based on the effects that we have had on [ISIS]. ... Air strikes have gone a long way to degrade [ISIS]' ability to mount large offensive attacks, as well as reducing their ability to openly control towns and cities, where they so often inflict terror on those civilian populations."—**USMC Brig. Gen. Kevin J. Killea, chief of staff of Combined Joint Task Force-Operation Inherent Resolve**

against Islamic State, DOD press briefing, July 31.

Gracious Sakes

"Sadly, the Army that stayed cohesive in Iraq and Afghanistan even after losing 5,000 dead is now being broken ... by an ungrateful, ahistorical, and strategically tone-deaf leadership in Washington. ... Other services suffer reductions and shortages. But only the Army breaks. Someone please tell those of us who served why the service that does virtually all the dying and killing in war is the one least rewarded."—**Retired Army Maj. Gen. Robert H. Scales, well-known Army apologist, Washington Post, July 31.**

False Sovereignty

"I believe those [Chinese] facilities [on the Spratley Islands] are clearly military in nature. They are building ports that are deep enough to host warships and they're building a 10,000-foot runway at Fiery Cross Reef. A 10,000-foot runway is large enough to take a B-52, almost large enough for the space shuttle. ... They're building revetted aircraft hangars at some of the facilities there that are clearly designed, in my view, to host tactical fighter aircraft. Certainly, those islands ... extend a surveillance network that could be in place with radars, electronic warfare capabilities, and the like. ... China is changing facts on the ground ... essentially, creating false sovereignty ... by building man-made islands on top of coral reefs, rocks, and shoals."—**Adm. Harry B. Harris Jr., commander of US Pacific Command, remarks at Aspen Security Forum, July 24.**

RPAs in Air Combat?

"The SAB [Air Force Scientific Advisory Board] found that both the MQ-9 and RQ-4 [remotely piloted aircraft] could be modified in specific ways to provide utility in contested environments at various levels of [threat]. There's about 3,000 pounds of payload capacity on most of those platforms. You could put quite a few additional systems on to them; they have the size, weight and power to be able to run these systems."—**Werner J. A. Dahm, SAB chairman, on preparing defenseless RPAs to survive in a hostile air environment, flightglobal.com, Aug. 4.**

Ghostrider Gains and

Air Force Special Operations Command's next generation gunship, the AC-130J Ghostrider, has had a turbulent year of testing but is nonetheless making steady progress toward initial operational testing and evaluation this fall.

AFSOC plans to purchase and convert 37 C-130 airframes to the AC-130J configuration as part of its \$2.4 billion program to replace its legacy AC-130U/W gunship fleets. The aircraft will allow AFSOC and the Air Force to continue to address evolving operational needs.

The first Ghostrider prototype was delivered to Eglin AFB, Fla., last year to conduct developmental testing. As of early August, the aircraft had been grounded at Eglin since April while a mishap investigation took place. Meanwhile, a second aircraft is busy spinning up for IOT&E at neighboring Hurlburt Field.

In February 2014, less than a month after its first postmodification flight, the first airframe "departed controlled flight" during handling trials and "exceeded some speed and load limits" in the recovery maneuver, the Director of Operational Test and Evaluation revealed in a report released earlier this year.

The same aircraft was grounded following a second in-flight mishap on April 21, but "returned to base and safely landed

without further incident or any injuries to the crew," Air Force Materiel Command officials said in a statement. After a preliminary investigation, the accident was raised from a Class C to a Class A mishap after "structural analysis suggested damage greater than the \$2 million monetary threshold for a Class A incident," AFMC said in the statement.

In July, AFSOC stood up the 1st Special Operations Group, Det. 2, tasked with AC-130J operational testing at Hurlburt. The unit received its first airframe—the second prototype—on July 29, detachment commander Lt. Col. Brett DeAngelis told *Air Force Magazine*.



The new AC-130J gunship should head to

Pains

By Aaron M. U. Church, Associate Editor

While the developmental prototype was still grounded, the second prototype was cleared to fly to validate several design changes based on lessons learned during developmental testing and to train flight and maintenance crews.

The Air Force handpicked a team of 60 aircrew and maintainers with experience on legacy gunships and the C-130J airlifter the new platform is based on. Schedule delays began during the second prototype's modification process, and having only one flightworthy airframe makes the window for training crews ahead of IOT&E in October very tight.

Nevertheless, the crews "will be training on the airplane, getting all the qualifications and hands-on experience we need to be able to perform operational testing in order to give an exact picture of how this plane will operate in a real-world environment," maintenance superintendent MSgt. Michael Ezell stated in a release.

"Putting it through these tests will allow us to wring out the AC-130J in a simulated combat environment, instead of the

more rigid flight profiles in formal developmental testing" conducted at Eglin, DeAngelis added.

Testers plan to complete the initial operational test phase in spring 2016.

The first two aircraft represent the early AC-130J configuration, designed to carry the precision strike package—including a 30 mm cannon and the ability to launch Griffin missiles and drop Small Diameter Bombs. New mission equipment includes all-weather synthetic aperture radar and dual electro-optical/infrared sensors.

AFSOC plans to add a 105 mm gun and a ninth crewman to the third prototype, which will more closely resemble the gunship's final production configuration. This third prototype will primarily support follow-on operational test and evaluation, largely focused on the new gun, according to the FY 2014 Director of Operational Test and Evaluation's report released this year.

Long-term plans even call for the eventual integration of laser and directed energy weapons, according to AFSOC leadership.✦



operational testing this fall.

An AC-130J Ghost Rider prototype No. 12-5753 at Eglin AFB, Fla. The aircraft is grounded pending the results of a mishap investigation.



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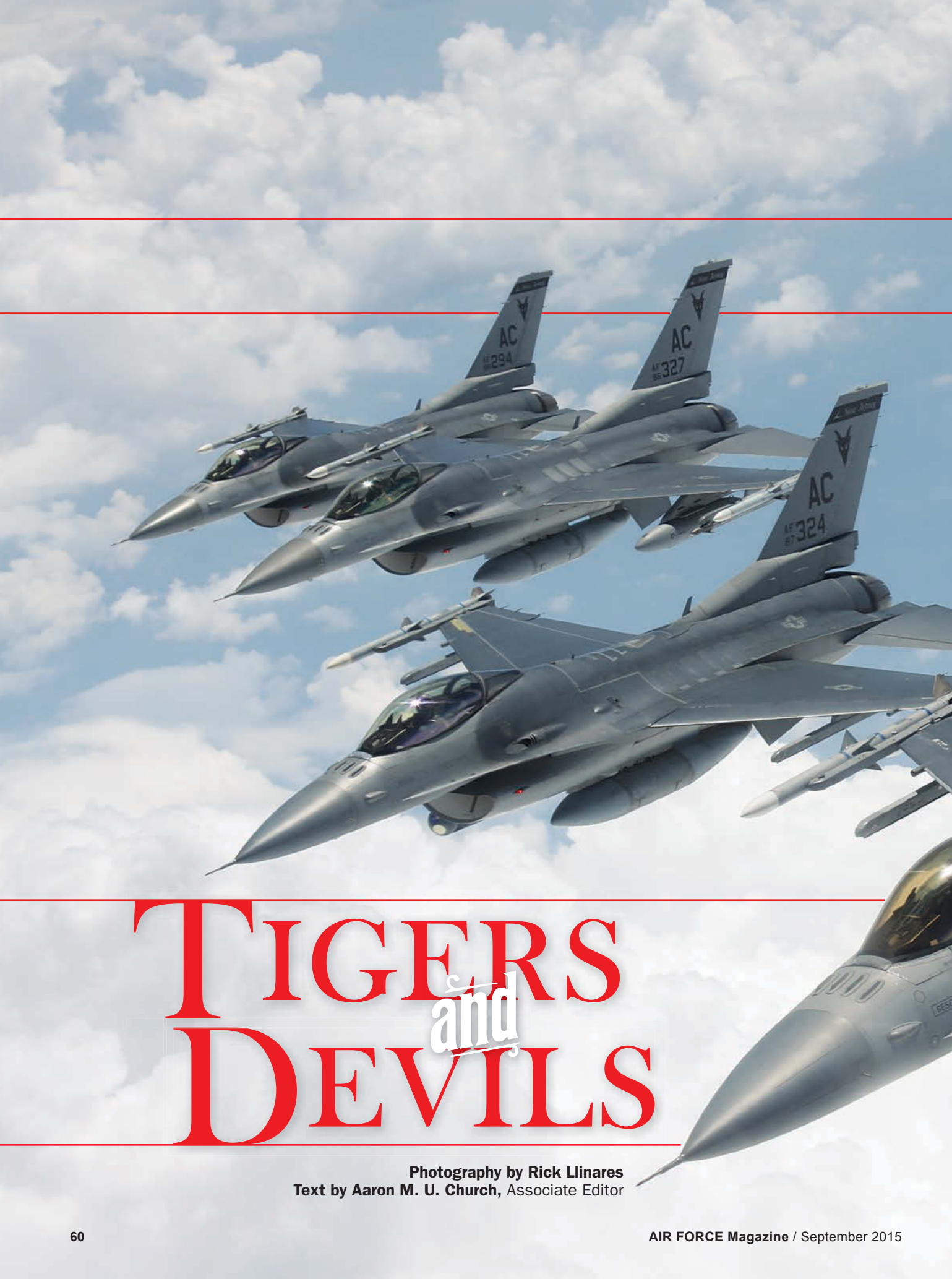
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TIGERS and DEVILS

Photography by Rick Linares
Text by Aaron M. U. Church, Associate Editor

The New Jersey Guard keeps its airmen, KC-135s, and F-16s ready for action.



F-16Cs of the New Jersey Air National Guard's 177th Fighter Wing—nick-named "Jersey Devils"—assemble to refuel over North Carolina. They were en route to a Combat Archer air-to-air weapons employment evaluation at Tyndall AFB, Fla., on May 1.

The New Jersey Air National Guard's flying units—the 177th Fighter Wing at Atlantic City and the 108th Wing at Joint Base McGuire-Dix-Lakehurst—give the state both firepower and reach. After the Sept. 11, 2001, terrorist attacks, the 177th's F-16s took to the skies over the Eastern seaboard for combat air patrols—later named Operation Noble Eagle—reassuming a NORAD aerospace control alert tasking. It was charged to defend Philadelphia, and even New York City, if called on. Last year, New Jersey's F-16s

deployed on a Pacific theater security package with the District of Columbia ANG to South Korea and Australia, and this summer headed to Bulgaria for Exercise Thracian Star. The 108th recently shed its air refueling wing designation, though it still flies tankers as one of its many missions. Guardsmen and KC-135s from the 108th departed in June for operations in Afghanistan. [1] The 177th's flagship, No. 86-0333—jokingly dubbed "Triple Cripple" by maintainers because of its reputation for needing frequent repairs—received special markings on

its tail depicting Atlantic City's beachfront skyline. [2] A1C Lucas Dowling (left) and MSgt. Frank Dilberto Jr. ready a 108th KC-135 on the McGuire flight line. [3] F-16 pilots Maj. Michael Kawan (foreground), Col. Bradford Everman, Capt. Michael Gallinoto, and Lt. Col. Jared Humbert (l-r) go over notes at the 177th's operations facility in June. [4] Avionics specialists A1C Brandon Debarth (left) and SrA. David Gallagher, 177th Maintenance Group, troubleshoot systems at Atlantic City Airport in Egg Harbor Township, N.J.



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The 177th Fighter Wing's lineage goes back to 1917, as the 119th Aero Squadron, a World War I Active Duty training squadron. [1] A 108th AW KC-135R taxis out for a refueling sortie from McGuire, emblazoned with the unit's "Tigers" mascot on the tail. [2] 177th Operations Group commander Everman reviews aircraft maintenance forms with crew chief A1C Shane Dietrich before a launching at Atlantic City. [3] SrA. Mostafa Eldasher of the air refueling wing's 108th Maintenance Group shows off the tail flash on a unit KC-135's towering vertical stabilizer. [4] Capt. Brian Bradke and Maj. Jason Halversen break away from the boom on the flight to Florida, June 1. Like most ANG F-16 units, the 177th's 119th Fighter Squadron maintains a pair of two-seat F-16Ds for check and training rides, public outreach, and the occasional incentive ride.



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The 108th Wing traces its origins to 1928, with the organization of the 119th Observation Squadron. As the wing fact sheet puts it, "The mission continuously changes." Its varied units now include the 204th Intelligence Squadron and the 108th Contingency Response Group, and it operates discreet executive airlift with a small fleet of C-32s. |1| Crew chief Dilberto marshals forward a 108th KC-135 tanker at McGuire during launch-out on a mission to refuel the state's F-16s. |2| The 177th's F-16 Block 30s are upgrading to the Helmet-Mounted Integrated Targeting (HMIT) system. It improves a pilot's situational awareness and enhances weapons employment. In this photo, though, pilot 1st Lt. Wesley Womble still sports the old-style helmet. |3| Just before a sortie, crew chiefs SrA. John Koster and MSgt. Bryan Hicken (l-r at the fuselage) give a 177th F-16 a second look during an end-of-runway check with weapons troops SrA. Desmond Charles (far left) and A1C Viviana Lara (far right). |4| KC-135 boom operator MSgt. Edwin Montalvo prepares to make contact with an F-16.

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[1] A “clean” F-16, flown by Gallinoto and configured without external fuel tanks, gets airborne from Atlantic City in June. Jets are usually configured with a pair of 370-gallon wing tanks to extend their flying time. Alert jets often sport a 300-gallon centerline tank, sacrificing range for enhanced agility. [2] TSgt. Joseph Searle, an aircrew flight technician, checks a parachute for repacking into the pilot’s ACES II ejection seat in an Atlantic City Airport backshop. [3] This version of the Rigger Pledge bears a 1956 date.



2

3



- I WILL** keep constantly in mind that until men grow Wings their Parachutes must be Dependable.
- I WILL** pack every Parachute as though I am to Jump with it myself, and will stand ready to Jump with any Parachute which I have certified as properly inspected and packed.
- I WILL** remember always that the other man's Life is as dear to him as mine is to me.
- I WILL** never resort to Guesswork, as I know that Chance is a fool's god and that I, a parachute Rigger cannot depend on it.
- I WILL** never pass over any Defect, nor neglect any Repair, no matter how small, as I know that omissions and mistakes in the Repair and Packing of a Parachute may cost a Life.
- I WILL** keep all Parachute equipment entrusted to my care in the best possible condition, remembering always that Little Things left undone cause Major Troubles.
- I WILL** never sign my name to a Parachute Inspection or packing Certificate unless I have Personally performed or directly supervised every step, and am entirely Satisfied with all the Work.
- I WILL** never let the idea that a piece of work is “good enough” make me a potential murderer through a careless mistake or oversight, for I Know there can be no compromise with Perfection.
- I WILL** keep always a wholehearted respect for my vocation, regarding it as a High Profession rather than a day-to-day task, and will keep in mind constantly my Grave Responsibility.
- I WILL** be SURE—Always

78-67(DEC 56)



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[1] The two-ship formation leader—the aircraft of 119th Fighter Squadron Commander Lt. Col. Timothy Hassel—shows a pair of travel pods carrying aircraft support equipment required for a training deployment. **[2]** Weapons troop Lara inspects an inert AIM-120 during an end-of-runway check. **[3]** KC-135 crew chief TSgt. Raymond Demarco III waits to talk to the aircrew over the intercom set during a launch at McGuire.



1



[1] Squadron commander Hassel (foreground) and Womble fly in formation. Aircraft No. 238 carries a Litening targeting pod. **[2]** Aircrew flight equipment specialist A1C Matthew Cruz finesses the HMIT “monocle”—essentially an in-helmet head-up display for the pilot. **[3]** Pilot Gallinoto “models” the new HMIT system. **[4]** Boom operator Montalvo secures cargo aboard a KC-135.

With the 177th Fighter Wing and the 108th Wing, the New Jersey ANG is unusual in conducting two completely different but complementary flying missions: operating both fighters and tankers. ✪

Airpower Comes of Age

By James Kitfield



An RC-135 Rivet Joint flies over Afghanistan during Operation Enduring Freedom. ISR aircraft such as Rivet Joint have changed the air battlespace for good.

The seemingly sudden eruption of the so-called Islamic State of Iraq and Syria caught the US Intelligence Community by surprise last year. In one of the most improbable offensives in modern military history, thousands of ISIS shock troops slipped across the northern border of Iraq and, together with allied Sunni tribes, launched a juggernaut that captured a string of northern cities and overran four Iraqi army divisions. Iraqi security forces rapidly folded, allowing


ISIS to capture advanced US weaponry, including artillery pieces accurate to more than 15 miles.

As ISIS advanced on the Sunni belt surrounding Baghdad on three sides, the Obama Administration realized it had only weeks to check the offensive, or Americans would likely have to evacuate the Iraqi capital in a historic and humiliating retreat.

In the chaos and confusion, the Pentagon turned to a little-known unit headquartered at JB Langley-Eustis, Va., to

help cut through the fog of battle in Syria and Iraq. In just a few hours, the 480th Intelligence, Surveillance, and Reconnaissance (ISR) Wing redirected the focus of the US military's vast electronic intelligence network toward the region.

Because it is geographically dispersed around the world, operates largely in cyberspace, and is constantly monitoring multiple global crises, the ISR network can rapidly shift focus and direct its intelligence gathering into a "hard stare" at any place on Earth.



After a quarter-century of continuous combat, USAF is much closer to achieving the battlespace dominance that airpower pioneers envisioned.

Within days, the 480th had aircraft in the battlespace, to include MQ-1 and MQ-9 Predator and Reaper remotely piloted aircraft, high-altitude U-2 spy aircraft, and Navy P-8 surveillance airplanes. From tasking just a couple of ISR missions over Syria and Iraq the previous month, the 480th conducted 80 missions in June 2014, ramping up since to 300 a month under what has become known as Operation Inherent Resolve.

Analysts with the 480th fused the raw data from those ISR platforms

with signals, human, and open source intelligence collected by the wider US Intelligence Community, distilled it into a common intelligence picture, and shared it in real time with leaders at US Central Command. In the initial days of the crisis, CENTCOM chiefs used that alarming intelligence picture to build a broad anti-ISIS coalition and gain basing rights for US aircraft in the region. Data on the positions, movement, and internal communications of ISIS forces also formed the

basis for the Inherent Resolve air campaign that began with precision US and coalition air strikes on ISIS positions in August 2014.

With only a few hundred US ground forces in Iraq in a train-and-assist role, Inherent Resolve has destroyed or damaged more than 7,600 ISIS targets, to include 472 staging areas, 2,045 ISIS-occupied buildings, more than 1,800 fighting positions, nearly 100 tanks, and 325 Humvees. To date the air campaign has denied ISIS sanctuaries in its stronghold



USAF photo by TSgt. Efrain Lopez

An MQ-1 Predator goes through postflight inspection. In 2000, an unarmed Predator tracked a man thought to be Osama bin Laden. The incident led to the next step: arming the surveillance aircraft.

of Raqqa, Syria, and it proved crucial in helping Kurdish forces defend the northern Syrian city of Kobane and expel ISIS from much of Kurdish territory in northern Iraq.

American air support of Iraqi security forces and militias also proved decisive in their successful counteroffensive to recapture the city of Tikrit earlier this year. According to senior US officials, the campaign had killed more than 10,000 ISIS fighters as of June 2015.

The rapid response, global reach, and lethality of USAF in Operation Inherent Resolve, some experts believe, is just the latest indicator of a paradigm shift that has seen airpower become increasingly decisive in modern conflict. A primary force driving that change is a revolution in the realm of ISR, which has seen an increase of 2,300 percent in the number of missions launched per day since 2001. Many of those missions are flown by RPAs with the ability to loiter over targets or battlefields for 20 hours or more to detect “patterns of life” among unsuspecting targets. The number of RPAs in the Air Force arsenal has ballooned from just 167 in 2002 to about 6,000 today.

The network-centric style of operations the Air Force developed to leverage all those collected data led to the expansion of the Distributed Common Ground System. The DCGS is an intelligence fusion hub at Langley, connected to other network nodes by a superhighway

of bandwidth. It moves huge amounts of data around the globe instantaneously for real-time analysis and exploitation, creating a reachback capability that is revolutionizing concepts of command and control and force dispersal. Meanwhile, advances in sensor technology have greatly improved the precision of airborne weaponry, even as standoff weapons and stealth can increasingly hold even well-defended targets at risk. Underscoring all of those technological advances is an unprecedented level of expertise in an Air Force that has been fighting continuously and honing its combat edge for decades.

RAPID RESPONSE REVOLUTION

“When the Air Force first responded to the ISIS crisis last year, we were already closely monitoring operations and crises in Libya, Somalia, Yemen, Ukraine, and the South China Sea, so this concept of truly distributed operations and the ability to swing our focus rapidly in response to new demands or crises really is revolutionary.” So said Air Combat Command chief Gen. Herbert J. “Hawk” Carlisle in an interview. That revolution is propelled by an ISR enterprise that can rapidly place an “unblinking eye” of manned and remotely piloted aircraft and spy satellites over any place in the world, he said, and a DCGS that processes, exploits, and disseminates that intelligence picture around the world in real time.



Major Bishane, an MQ-9 Reaper pilot, controls a remotely piloted aircraft from Creech AFB, Nev.

“Add to that capability the increased precision of our weapons that allows us to control collateral damage to a greater degree than ever before, and combine all that with the experience level of an Air Force that has been operating in combat-like conditions for the last 25 years,” said Carlisle. “The result is airpower that has become increasingly decisive in combat operations. For those of us who have studied the evolution of airpower, it seems to finally be reaching the potential that its earliest pioneers envisioned.”

All militaries innovate and experiment under the intense pressures of

combat, as technologies are pulled from the laboratory bench and rushed to the front lines, and new concepts of operations are created on the fly to leverage that technological edge. The paradigm shift in the effectiveness of airpower arguably began when USAF deployed to the Middle East to fight in the Persian Gulf War in 1990-91—and never really came home. Air Force leaders and airmen continued to introduce new technologies and hone operational concepts throughout the 1990s in operations Northern and Southern Watch over Iraq and in the 1999 Operation Allied Force air campaign against Serbia.

Since the 2001 terrorist attacks, the Air Force has conducted nearly uninterrupted combat operations in Afghanistan

and Iraq and, as part of the global war on al Qaeda terrorists, in places such as Pakistan, Yemen, Somalia, and Libya. Ongoing operations in Inherent Resolve are just the latest campaign in a quarter-century of conflict.

During Operation Desert Storm, two technologies in particular represented a major step forward in airpower effectiveness: precision strike weapons and stealth. In terms of precision strike, a World War II-era B-17 Flying Fortress dropping “dumb bombs” was accurate within only about a half-mile radius; in airpower-speak, it had a half-mile circular error probable, or CEP. By the time of Desert Storm, USAF’s stockpile of precision guided munitions was small, and only a handful of aircraft such as the F-15E Strike Eagle and F-117 stealth bomber could employ them. But laser guided bombs had a CEP of just a few feet and proved devastating against Iraq’s command and control centers and Republican Guard forces.

The air campaign was also greatly aided by the introduction of stealth technology in the form of the arrowhead-shaped, radar-evading F-117. It was able to slip through Iraqi air defenses to hit strategic nodes in the Iraqi command and control system in the first hours of the air campaign.

Building on those lessons, the Air Force greatly expanded its arsenal of

precision guided munitions. By the time of Allied Force in 1999, that arsenal included the Joint Direct Attack Munition, or JDAM, an all-weather precision guidance system utilizing the satellite guidance of the Global Positioning System. JDAMs could be attached to unguided dumb bombs relatively cheaply. The new AGM-130 munition essentially turned a standard bomb into a rocket-boosted, GPS guided cruise missile with a range over 35 miles, heralding an era of affordable “standoff” weapons that could be delivered outside the range of enemy air defenses. By the end of the decade, a single B-2 stealth bomber armed with JDAMs could accurately hit 20 targets on a single bombing sortie, representing orders of magnitude improvement in effectiveness over unguided bombs. Global precision strike had come of age.

The Balkan conflicts of the 1990s also witnessed the first combat deployments of the Predator RPA. Though Predators were initially flown line of sight—like their radio-controlled junior cousins sold in hobby stores—US airmen in the Balkans designed a novel concept of remote split operations. This method bounced a Predator’s signal and video feed off a satellite to a mobile ground station housed in a leaky trailer crammed with equipment and stationed in nearby Hungary.

An MQ-9 waits out a sandstorm under a shelter at JB Balad, Iraq, in 2008. The remotely piloted aircraft are performing ISR and combat duties for Operation Inherent Resolve today.



USAF photo by SSgt. Vernon Young Jr.

USAF photo by A1C Jason Epley

After one of the experimental Predator surveillance aircraft in the Balkans captured video of Serbian troops committing atrocities in Bosnia, the Air Force refined the machine. It developed computer software that attached precise GPS coordinates to the images and gave the Predator a laser designator, transforming it from strictly a surveillance platform to a target acquisition and designation platform.

The Predator's game-changing potential in the realm of counterterrorism was proved out in 2000, when a video feed clearly showed a white-robed man, probably Osama bin Laden, at one of his terrorist training camps in Afghanistan. Because there were no aircraft in the vicinity capable of launching weapons, however, the chance to take out the terrorist who had declared war on the US was lost.

"When that video made the rounds of the Air Force leadership, [then ACC chief Gen. John P. Jumper] had the idea to put weapons on the Predator, and he ordered us to make it happen," said a senior Air Force official. "Less than four months later we conducted the first test of an armed Predator that was strapped to a piece of concrete and fired a Hellfire missile that we borrowed from the Army. Luckily, the wing didn't come off."

ARMING THE PREDATOR

Those advances in airpower capability were employed with devastating effect beginning on Oct. 7, 2001, when, less than a month after the 9/11 terrorist attacks, CENTCOM launched Operation Enduring Freedom in Afghanistan, unleashing an air armada of attack and ISR aircraft. Using Special Forces teams on the ground to coordinate air support for lightly armed Afghan militias, CENTCOM targeted Taliban formations and defensive positions with precision, toppling the group from power in a matter of weeks.

Enduring Freedom also marked the first combat deployment of the armed Predator. As a result of refinements in the concept of remote split operations that transmitted its signals through fiber-optic cables under the Atlantic Ocean, Predators were flown by aircrews in the US, and their full-motion video feeds were projected into command and control and intelligence fusion centers both at home and abroad. During the early phases of Enduring Freedom, the Air Force developed a method for streaming the Predator videos directly into the cockpits of AC-130 gunships and to Special Forces teams on the ground via Rover video

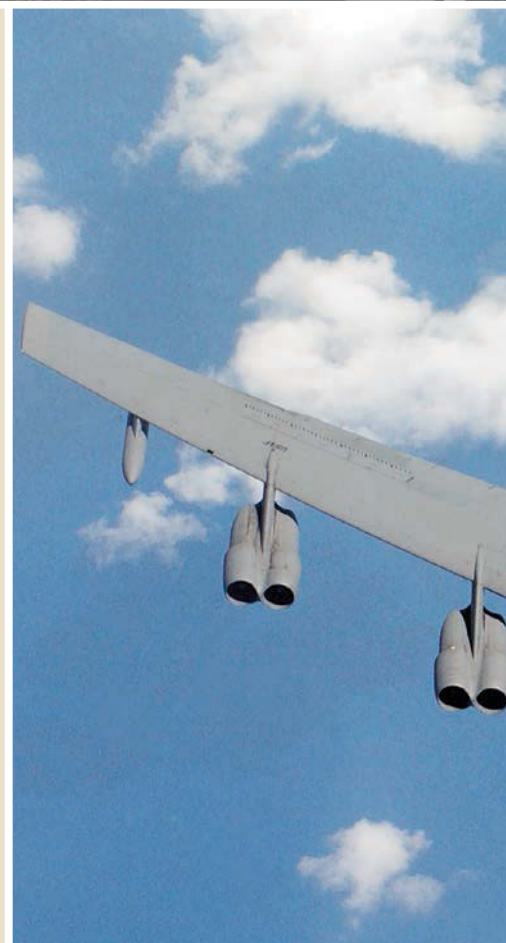
USAF photo



uplink transmitters the size of suitcases. Today, Rover transmitters have shrunk to the size of smart phones, and in response to the US military's insatiable demand for full-motion video from RPAs, the Air Force has fielded 20,000 of them.

In its hunt for al Qaeda terrorists and insurgents during the long Iraq War, Joint Special Operations Command task forces further refined an intelligence-driven cycle of operations dubbed F3EA, for find, fix, finish, exploit, and analyze. It leveraged the unique attributes of persistence over the target, the lethality of RPAs, and the vast command and control and intelligence analysis network USAF developed alongside the Intelligence Community to support them.

Over the last decade of conflict, the Air Force strengthened every link in that operational chain, greatly increasing the number of platforms designed to find and fix enemy targets, the precision weapons to finish them, and the analysts tasked with exploiting all of that raw data and turning it into actionable intelligence. Along the way, its communications infrastructure of digital bandwidth increased exponentially. In the decade between Operation Desert Storm in 1991 and Enduring Freedom in 2001, for instance, the bandwidth at the combined air operations center in the Middle East grew from the equivalent of a single fiber-optic T-1 line, able to carry 24 digitized voice channels, to the equivalent of nearly 100 high speed T-1 lines—a hundred-fold increase.



"People talk about how many RPAs we can put in the air, but the key is the concepts of operations that we developed to exploit them," said Carlisle. "From remote split operations, we created this incredible reachback capability that al-



USAF photo by SSgt. Aaron C. Marcus



USAF photo TSgt. Richard Freeland

Clockwise from top left: Airmen work the Distributed Common Ground System, USAF's globally networked intelligence, surveillance, and reconnaissance weapon system. They collect and analyze data from ISR assets worldwide. Gen. John Jumper, then ACC chief and pictured here with German Lt. Gen. Peter Vogler, came up with the idea to arm Predators, and ordered the armed RPA delivered within four months. A B-52 loaded with Joint Direct Attack Munitions on a close air support mission to Iraq during Operation Iraqi Freedom.

lows us to keep our operational footprint largely inside the United States.” He said the Air Force is still figuring out the right mix of forward deployed vs. reachback, “but that ability to provide accurate situational awareness in real time to the joint warfighter from [the US] truly is revolutionary. It’s changed the way people think about operations.”


On a recent afternoon in the 480th ISR Wing’s darkened command center, a three-person crew monitored an Air Force airdrop of relief supplies to Yazidi tribesmen stranded on a mountaintop in northern Iraq. The Yazidis were surrounded by ISIS fighters who had captured and killed many of the tribe’s men and sold its women into sexual slavery.

GORGON STARE

An analyst monitored the video feed from a Predator in Iraq that was being flown by an aircrew at Creech AFB, Nev., watching intently as a line of parachutes blossomed onto his greenish screen and drifted gently to earth. At the same workstation, another analyst took screenshots from the video for collection into an intelligence report for the operational commander. Between them sat a “screener,” who constantly updated intelligence on the mission’s progress in multiple classified chat rooms monitored on his split-screen computer. No one had to tell the enlisted airmen, who make up the vast majority of the 480th’s 6,000 personnel, that their mission had real, life-and-death consequences for the people on their video screens.

At similar workstations in the sprawling command center, kept dark for optimum screen monitoring and chilly for the sake of the computers, crews tracked scores of other ISR missions being conducted around the globe. Raw data from a host of ISR platforms poured into the control room for rapid distillation and analysis. When the Air Force initially fielded the Gorgon Stare wide-area surveillance system in Afghanistan, it created so much data that it overwhelmed the analysts’ bandwidth, forcing the 480th to deploy a team directly to Bagram to help digest the “data crush.”

Though the public naturally equates RPAs with their signature full-motion video, the analysts at the 480th routinely correlate data from multiple sensors and spectrums: synthetic aperture radars, ground moving target indicators, electro-optical and infrared radars, hyperspectral imagery, electronic communications intercepts, and even spectral thermograph sensors that can “sniff” the air for chemi-



AC-130H Spectre aircraft on the ramp at Cannon AFB, N.M. USAF streamed Predator video into the cockpits of the gunships during Operation Iraqi Freedom via Rover video uplink transmitters.

calls such as those associated with bomb-making. The experts at the 480th will tell you the true art of ISR is combining all of those myriad streams of intelligence into a coherent, seamless picture.

“There’s always an overreliance on video and what people can see, but the art in this business is fusing that video with other sources of intelligence that add context and layers of information, and frames it in a particular time and space,” said Col. Timothy D. Haugh, commander of the 480th ISR Wing. “Being able to mass that kind of data, and fuse it into an intelligence picture that empowers a decision-maker or frontline commander, that’s the challenge that mentally engages my airmen.”

As ISR technology and operations have matured, and US commanders around the world become more comfortable with the reachback capability that the 480th ISR Wing represents, demand for that kind of high-fidelity intelligence has soared. Between June 2014 and March 2015, the wing flew 3,700 missions and logged 57,000 hours of ISR collection just in support of Operation Inherent Resolve. Globally it conducted 13,000 ISR missions in the past year alone.

In the meantime, airpower experts believe the 480th is on the cutting edge of fundamental changes to the nature and effectiveness of airpower. Retired Lt. Gen. David A. Deptula, now dean of the Mitchell Institute for Aerospace Studies, commanded the initial Enduring Freedom air campaign and was USAF’s first deputy chief of staff for ISR.

“Everyone focuses on this little piece of fiberglass flying around called an unmanned aerial vehicle,” Deptula observed, “but it’s just a host for sensors that provide data to this vast analytic en-

terprise we call the Distributed Common Ground System, which turns the data into information and hopefully knowledge.” This is the “revolution underway, and we’re still in its earliest stages,” he said in an interview.

The first hundred years of flight were spent trying to figure out the “finish” part of the F3EA equation, he noted. Now the Air Force has largely achieved the ability to strike any target, in all kinds of weather, rapidly, and with precision.

“Now we’re starting to figure out the ‘finding’ and ‘fixing’ parts of the airpower equation, which will lead towards a better understanding of what effects we are actually trying to achieve,” said Deptula. “That will bring us closer to the vision of dominant airpower of early pioneers like Billy Mitchell and Giulio Doughet, who didn’t have the technologies to back up their theories. Now the technology is finally catching up with airpower theory, but it has outpaced the organizational, command, and social structures we have to leverage it. When we get that right you will see the real paradigm shift.”

BRINGING THE A-GAME

Demand among Special Forces engaged in counterterrorism operations was so high that Air Combat Command recently established the 363rd ISR Wing devoted specifically to targeting.

In that sense, the Air Force’s ISR enterprise is a victim of its own success. The 480th Wing’s analysts routinely work 12-hour shifts, often six days a week, and average 220 hours a month. Air Force psychological studies have

found widespread stress among not just RPA pilots and operators, but also among the ISR analysts in the 480th and 363rd. In some cases analysts may track the same individual for months or even years in order to establish a pattern of life, culminating in that target disappearing in the blast cloud of a Hellfire missile. Doing that year after year exacts a heavy, if poorly understood, mental toll.

“Along with RPA aircrews, we’re kind of unique in that we deploy in-place and fight from our home garrisons. There are great advantages to that but it means we never leave the fight,” said Haugh. ACC’s surgeon general is conducting a study to better understand and mitigate the resultant stresses, beginning with trying to reduce a 220-hour-per-month workload that Haugh readily admits is unsustainable. The wing has opened a 24/7 gymnasium and is considering round-the-clock daycare, and it now boasts a full-time psychologist and chaplain.

“You know, in the Air Force I joined, we used to have to scratch for realistic training, but some of these younger airmen have been in combat continuously for more than a decade and it’s all they’ve ever known,” said Haugh. “Every day they come to work expecting to be involved in combat operations, knowing that the work they do will impact lives and what happens on the ground in a combat zone. So every day they have to bring their ‘A-Game,’ and that makes them very good. Now we need a more mature understanding of the stresses placed on a force that never really leaves the fight.”

James Kitfield is a senior fellow at the Center for the Study of the Presidency & Congress. His most recent article for Air Force Magazine, “US Airpower in Africa,” appeared in June 2013.

T. R.'s "Man in the Arena"

Theodore Roosevelt had been out of the White House for about a year, and the former President was, as usual, restless. He embarked on a world tour. In April 1910, he arrived in Paris, where he gave a most famous speech. His University of Paris audience heard T. R. deliver a powerful endorsement of determined action, even at risk of failure. This section began on p. 7 of his 35-page text. It was titled, "The Man in the Arena," and it has had a special appeal to military men and women ever since.

In the long run, success or failure will be conditioned upon the way in which the average man, the average woman, does his or her duty, first in the ordinary, everyday affairs of life, and next in those great occasional crises which call for the heroic virtues. The average citizen must be a good citizen if our republics are to succeed. The stream will not permanently rise higher than the main source; and the main source of national power and national greatness is found in the average citizenship of the nation. ...

Let the man of learning, the man of lettered leisure, beware of that queer and cheap temptation to pose to himself and to others as the cynic, as the man who has outgrown emotions and beliefs, the man to whom good and evil are as one. The poorest way to face life is to face it with a sneer. There are many men who feel a kind of twisted pride in cynicism; there are many who confine themselves to criticism of the way others do what they themselves dare not even attempt. There is no more unhealthy being, no man less worthy of respect, than he who either really holds, or feigns to hold, an attitude of sneering disbelief toward all that is great and lofty, whether in achievement or in that noble effort which, even if it fails, comes second to achievement. A cynical habit of thought and speech, a readiness to criticize work which the critic himself never tries to perform, an intellectual aloofness which will not accept contact with life's realities—all these are marks, not, as the possessor would fain think, of superiority, but of weakness. They mark the men unfit to bear their part manfully in the stern strife of living, who seek, in the affectation of contempt for the achievements of others, to hide from others and from themselves their own weakness. The role is easy; there is none easier, save only the role of the man who sneers alike at both criticism and performance.

It is not the critic who counts; not the man who points out how the strong man stumbles, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood; who strives valiantly; who errs, and comes short again and again, because there is no effort without error and shortcoming; but who does actually strive to do the deeds; who knows the great enthusiasms, the great devotions; who spends himself in a worthy cause; who at the best knows in the end the triumph of high achievement; and who at the worst, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who know neither victory nor defeat. Shame on the man of cultivated taste who permits refinement to develop into a fastidiousness that unfits him for doing the rough work of a workaday world. Among the free peoples who govern themselves there is but a small field of usefulness open for the men of cloistered life who shrink from contact with their fellows. Still less room is there for those who deride or slight what is done by those who actually bear the brunt of the day; nor yet



"Citizenship in a Republic"

President Theodore Roosevelt
Speech at University of Paris
April 23, 1910

Find the full text on the
Air Force Magazine's website
www.airforcemag.com

"Keeper File"

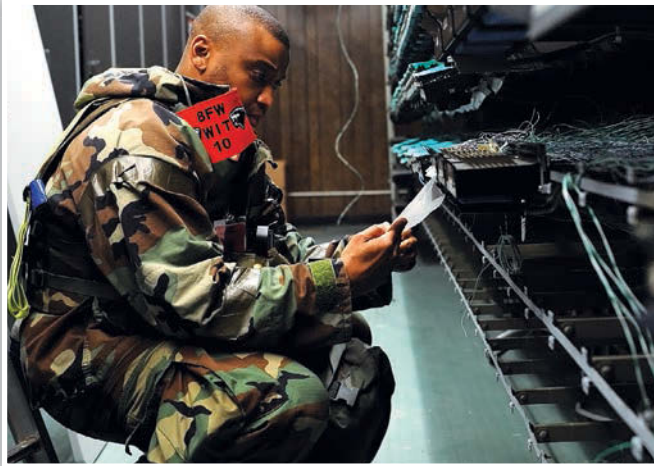
for those others who always profess that they would like to take action, if only the conditions of life were not what they actually are. The man who does nothing cuts the same sordid figure in the pages of history, whether he be cynic, or fop, or voluptuary. There is little use for the being whose tepid soul knows nothing of the great and generous emotion, of the high pride, the stern belief, the lofty enthusiasm, of the men who quell the storm and ride the thunder. Well for these men if they succeed; well also, though not so well, if they fail, given only that they have nobly ventured, and have put forth all their heart and strength. It is war-worn Hotspur, spent with hard fighting, he of the many errors and the valiant end, over whose memory we love to linger, not over the memory of the young lord who "but for the vile guns would have been a soldier."

The good man should be both a strong and a brave man; that is, he should be able to fight, he should be able to serve his country as a soldier, if the need arises. There are well-meaning philosophers who declaim against the unrighteousness of war. They are right only if they lay all their emphasis upon the unrighteousness. War is a dreadful thing, and unjust war is a crime against humanity. But it is such a crime because it is unjust, not because it is war. The choice must ever be in favor of righteousness, and this whether the alternative be peace or whether the alternative be war. The question must not be merely, Is there to be peace or war? The question must be, Is the right to prevail? Are the great laws of righteousness once more to be fulfilled? And the answer from a strong and virile people must be, "Yes," whatever the cost. Every honorable effort should always be made to avoid war, just as every honorable effort should always be made by the individual in private life to keep out of a brawl, to keep out of trouble; but no self-respecting individual, no self-respecting nation, can or ought to submit to wrong.



Outstanding

AIRMEN OF THE YEAR



SMSGT. HAROLD J. TERRANCE JR.

Section Chief, Cyber Systems
18th Communications Squadron (PACAF)
Kadena AB, Japan
Home of Record: New Roads, La.

Terrance directed a team of 112 personnel as they provided communications support for seven major commands, 22,000 personnel, and the \$6 billion aircraft fleet for the largest combat wing in the Air Force. As the maintenance leader, he oversaw 16,000 upgrades, executed 190 maintenance inspections, and resolved 4,000 jobs with a remarkable 98 percent quality efficiency pass rating. Additionally, he implemented the Air Force's first 24/7 software patching scheme. The proactive approach eliminated 113,000 vulnerabilities and delivered his network the Air Force's best US Cyber Command readiness inspection score. Terrance led his unit to its second consecutive Air Force Best Large Communications Squadron of the Year Award and earned the 2014 Air Force's Outstanding Cyber Operations SNCO of the Year.

MSGT. JOSEPH Y. BOGDAN

NCOIC, Airman and Family Readiness Center
60th Force Support Squadron (AMC)
Travis AFB, Calif.
Home of Record: Tacoma, Wash.

Bogdan led 17 airmen through 10 diverse Social Service programs in Air Mobility Command's largest Airman and Family Readiness Center. Through his leadership, his team was named the 2014 Air Force's Best Large Airman and Family Readiness Center. His team executed 45 courses and connected 2,200 customers to more than \$800,000 in services. As the Air Mobility Command lead master resiliency trainer, he led 260 instructors as they trained personnel within the command. He expertly led the command's Leadership Pathways program where he benchmarked and developed a tracking platform implemented at all 18 wings. Bogdan's sustained superior performance, dedication, and commitment earned him the 2014 Air Mobility Command General Billy J. Boles Mentorship Award.



MSGT. TIMOTHY A. MASON

Command Hydraulics-E&E Functional Manager
HQ Air Education and Training Command (AETC)
JBSA-Randolph, Texas
Home of Record: Hanover, Md.

Mason's exceptional work enabled headquarters support to 18 Total Force wings, 32,000 personnel, and more than 1,700 aircraft within the command. As a repair network integration core team member, his expertise guided the reorganization of A-10, F-15, and F-16 maintenance support, reducing 34 hydraulic repair centers down to nine. He also led a 13-member test team to validate the T-38 protection panel circuit card upgrade, replacing a 60-year-old design. Additionally, Mason devised an F-16 electrical systems training plan for the Iraqi air force. Dedicated to professional development, he completed a master's degree in management and was selected as a Distinguished Graduate of the Air Force SNCO Academy's Advanced Leadership Experience.



The Air Force Outstanding Airman program annually recognizes 12 enlisted members for superior leadership, job performance, community involvement, and personal achievements.

The program was initiated at the Air Force Association's 10th annual National Convention, held in New Orleans in 1956. The selection board comprises the Chief Master Sergeant of the Air Force and the command chief master sergeants from each USAF major command. The selections are reviewed by the Air Force Chief of Staff.

The 12 selectees are awarded the Outstanding Airman of the Year ribbon with the bronze service star device and wear the Outstanding Airman badge for one year.



TSGT. TAMARA R. ACFALLE

Airman Leadership School Instructor
45th Force Support Squadron (AFSPC)
Patrick AFB, Fla.
Home of Record: Puyallup, Wash.

Acfalle served as acting commandant for the Patrick Airman Leadership School and was instrumental in securing \$65,000 in funding to fuel the \$590,000 renovation of the wing's Professional Development Center. She led the installation of \$47,000 in interactive smart boards, forming 21st century classrooms. Acfalle's iPad initiative reduced the school's operating costs and was chosen by the Chief Master Sergeant of the Air Force to be briefed at the Enlisted Force Development Panel in Washington, D.C. Ultimately, her proposal was adopted as the future Air Force standard. She also led 183 volunteers through 47 events, raising more than \$1.5 million in proceeds that were donated to charity, and she completed the Noncommissioned Officer Academy, garnering the John L. Levitow Award.

SSGT. KRESSTON L. DAVIS

Security Forces Journeyman
908th Security Forces Squadron (AFRC)
Maxwell AFB, Ala.
Home of Record: Prattville, Ala.

Davis deployed to Manas, Kyrgyzstan, where she provided unwavering security for 200,000 transients, 40 million gallons of fuel, and 57 million pounds of cargo in support of Operation Enduring Freedom. She executed 200 anti-terrorism measures and conducted 11 off-base patrols. While deployed, Davis also completed Airman Leadership School correspondence training, obtained her associate degree in criminal justice through the Community College of the Air Force, and continued to work on her bachelor's degree in information systems. Her professionalism and commitment to core values led to her selection as the 908th Airlift Wing Airman of the Year, 22nd Air Force Airman of the Year, and Air Force Reserve Command Airman of the Year.



SSGT. LINDSEY H. FUENTES

Biomedical Equipment Journeyman
366th Medical Support Squadron (ACC)
Mountain Home AFB, Idaho
Home of Record: Peachland, N.C.

Fuentes expertly managed the Medical Maintenance department during a three-month, 66 percent manning shortfall, overseeing the completion of more than 1,000 work orders and enabling \$15 million in medical care. Her unwavering dedication was a pivotal factor in the 366th Medical Group's selection as ACC's 2014 Best Hospital of the Year. Her keen technical insight was essential as her team calibrated 17 dental X-ray units, eliminating a \$10,000 service contract and supporting 13,000 yearly dental exams. A natural leader, she guided two ALS flights with 32 students to a 100 percent graduation rate and was the recipient of the John L. Levitow Award. Her professionalism, expertise, and commitment to the core values led to her selection as USAF's 2014 Biomedical Equipment Technician Airman of the Year.



Outstanding **AIRMEN OF THE YEAR**



SSGT. KURTIS V. HARRISON

Command, Control, Communications, and Computers Systems Project Manager
96th Communications Squadron (AFMC)

Eglin AFB, Fla.

Home of Record: Irondale, Ala.

Harrison was selected as AFMC's Outstanding Cable and Antenna Systems NCO of the Year while serving as C4 systems project manager. He accelerated weapons data fielding by engineering a cable purchasing solution that reduced acquisitions processing time from 105 days to 14 and was instrumental in the awarding of a \$5 million telecommunications contract that expedited C4 requirements and eliminated a two-year backlog. He also managed a \$1.1 million tool program that certified 931 assets and was named a "Best Practice" by the inspector general during the wing's unit effectiveness inspection. Harrison completed six college classes, earning 18 credits toward a Bachelor of Science degree in information systems management and was named to the dean's list.

SSGT. TRAVIS R. JORDAN

Combat Control Journeyman

320th Special Tactics Squadron (AFSOC)

Kadena AB, Japan

Home of Record: Wingdale, N.Y.

Jordan deployed to Operation Enduring Freedom where he served as the primary joint terminal attack controller attached to a Special Forces team. He controlled 62 aircraft on 19 combat missions and directed six air strikes during multiple armed skirmishes. His actions directly contributed to the elimination of two Taliban commanders and rescued four teammates by controlling their medical evacuation. As a quick-reaction force member, he responded to secure a key security checkpoint, preventing an overrun and safeguarding the base. As the sole JTAC on a 200-man, two-day mission, he directed 16 aircraft while under fire. Finally, Jordan participated in an Afghan-American culture exchange, designed to cultivate rapport, where he dined and shared experiences with partner units, ultimately strengthening regional stability.



SSGT. DOUGLAS P. KECHIJIAN

Pararescue Journeyman

103rd Rescue Squadron (ANG)

Westhampton Beach, N.Y.

Home of Record: New York

Kechijian excelled as a pararescue element leader in support of Combined Joint Task Force-Horn of Africa. While deployed, he single-handedly saved 12 critically injured soldiers during two improvised explosive device incidents. He was the element leader on a medevac mission aboard USS *James E. Williams*, recovering two injured sailors at sea. Kechijian created and took charge of the casualty collection point during a high-risk operation and expertly triaged several patients. He trained 12 US Army infantry soldiers to ensure tactical level interoperability with a dedicated recovery search and rescue security team. Additionally, he completed his doctorate in physical therapy from Columbia University with a 3.6 GPA.





SRA. ALLEN R. CHERRY III

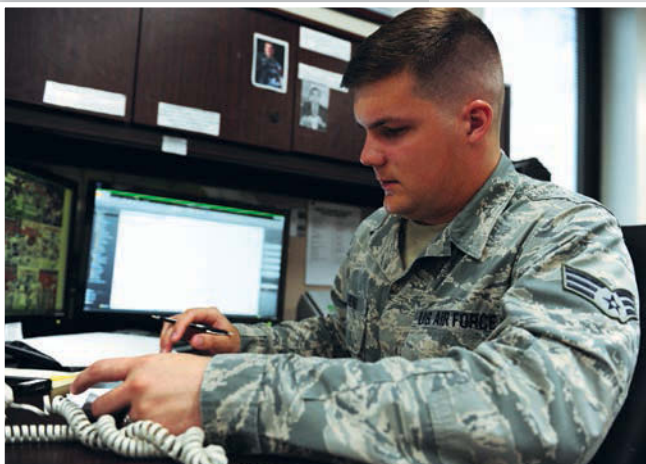
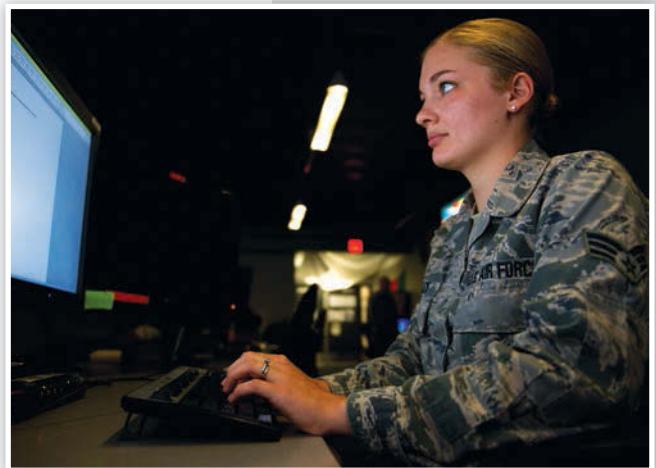
Public Health Technician
86th Aerospace Medicine Squadron (USAFE-AFAFRICA)
Ramstein AB, Germany
Home of Record: Cibolo, Texas

Cherry was selected as the Air Force Medical Service 2014 Public Health Airman of the Year while serving in the deployment medicine section. He validated over 3,000 medical requirements for 406 deployers with zero discrepancies, enabling fit and ready forces for three combatant commands and Operation United Assistance in support of the Ebola crisis in Africa. Cherry led the reintegration of 360 redeployers, coordinating a multiagency process into a one-stop shop that saved 2,000 man hours and returned airmen to their families sooner, while upholding all DOD medical requirements. As a proud member of the Ramstein Air Base Honor Guard, he performed 27 ceremonies while recruiting and training 11 new ceremonial guardsmen.

SRA. MEAGHAN G. HOLLEY

Geospatial Intelligence Analyst
Geospatial-Intelligence Analysis Squadron (AFDW)
Wright-Patterson AFB, Ohio
Home of Record: Duluth, Minn.

Holley was instrumental in analyzing data and imagery collected by national systems in support of the Intelligence Community, combatant commands, and national mission partners. She led a 10-member target analysis team that located and relayed the positions of more than 4,300 compounds to coalition forces, leading to the seizing of three weapon caches and more than \$2 million in narcotics. As a national intelligence report editor, Holley revised 42 reports and fixed 587 errors while boosting team production by 45 percent. Additionally, she completed six college classes and 12 leadership and management courses with a stellar 4.0 GPA, earning her Community College of the Air Force degree in intelligence studies and technology, and completing the requirements for a Bachelor of Science degree in behavioral science.



SRA. MASON S. MEHERG

Financial Services Technician
509th Comptroller Squadron (AFGSC)
Whiteman AFB, Mo.
Home of Record: Winfield, Ala.

Meherg coordinated all separations and retirements for Whiteman Air Force Base during 2014's force management initiatives, leading to 562 final payments totaling more than \$5 million. While serving in an NCOIC position, he oversaw more than 16,000 case resolutions, averaging a 10-day close vs. the 45-day standard. Meherg audited over 3,000 military pay documents with a 99 percent accuracy rating and validated 450 military pay records while authorizing 20,000 accrued leave days. As a leader at his wing, he also led the Whiteman Airmen's Council by representing 1,800 airmen through three multiday events. Additionally, he completed 12 financial management modules and earned his DOD Level 1 certification two years ahead of schedule.

Photochart of USAF Leadership

Office of the Secretary of the Air Force



Secretary of the Air Force
Deborah Lee James



Undersecretary of the Air Force
Lisa S. Disbrow
(acting)



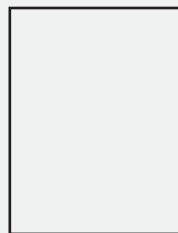
Assistant Secretary of
the Air Force (Acquisition)
William A. LaPlante



Assistant Secretary of
the Air Force (Financial
Management &
Comptroller)
Lisa S. Disbrow



Assistant Secretary of
the Air Force (Installations,
Environment, &
Energy)
Miranda A. A. Ballentine



Assistant Secretary of the
Air Force (Manpower &
Reserve Affairs)
(vacant)



Deputy Undersecretary of
the Air Force (International
Affairs)
Heidi H. Grant



Deputy Undersecretary of
the Air Force (Space)
Winston Beauchamp



Auditor General
Daniel F. McMillin



General Counsel
Gordon O. Tanner



Inspector General
Lt. Gen. Gregory A.
Biscone



Chief, Information
Dominance &
Chief Information Officer
Lt. Gen. William J. Bender



Director, Legislative
Liaison
Maj. Gen. Thomas
Bergeson



Director, Public Affairs
Brig. Gen. Kathleen A.
Cook



Director, Small
Business Programs
Mark S. Teskey



Administrative Assistant to the
Secretary of the Air Force
Patricia J. Zarodkiewicz

As of Aug. 14, 2015

The United States Air Force Air Staff



Chief of Staff
Gen. Mark A. Welsh III



Assistant Vice Chief of Staff
Lt. Gen. John W. Hesterman III



Chief Master Sergeant of the Air Force
CMSAF James A. Cody



Air Force Historian
Walt Grudzinskas



Judge Advocate General
Lt. Gen. Christopher F. Burne



Surgeon General
Lt. Gen. Mark A. Ediger



Chairman, Scientific Advisory Board
Werner J. A. Dahm



Chief of Chaplains
Maj. Gen. (sel.) Dondi E. Costin



Chief of Safety
Maj. Gen. Andrew M. Mueller



Vice Chief of Staff
Gen. David L. Goldfein



Chief Scientist
Greg L. Zacharias



Chief of Air Force Reserve
Lt. Gen. James "JJ" Jackson



Director, Air National Guard
Lt. Gen. Stanley E. Clarke III



Director, Test & Evaluation
Devin L. Cate



Director, Sexual Assault Prevention and Response
Maj. Gen. Gina M. Grosso

The United States Air Force Air Staff A1- A10

A1 Manpower, Personnel, & Services



Deputy Chief of Staff
Lt. Gen. Samuel D. Cox



Director, Force
Development
Russell J. Frasz



Director, Military Force
Management Policy
Brig. Gen. Brian T. Kelly



Director, Manpower,
Organization, &
Resources
Brig. Gen. Richard M.
Murphy



Director, Plans &
Integration
Michelle S. LoweSolis



Director, Air Force
Services
Brig. Gen. Lenny
J. Richoux



Director,
Civilian Force
Management
Debra A. Warner

A2 Intelligence, Surveillance, & Reconnaissance



Deputy Chief of Staff
Lt. Gen. Robert P. "Bob" Otto



Director, ISR
Capabilities
Brig. Gen. John T.
Rauch Jr.



Director, ISR Innovation
James G. Clark



Director, ISR Strategy,
Plans, Policies, & Force
Development
Kenneth Dumm



Director, Special
Programs
Joseph D. "Dean" Yount



Director, ISR Strategy,
Plans, Doctrine, & Force
Development
Brig. Gen. Thomas W.
Geary

A3 Operations



Deputy Chief of Staff
Lt. Gen. John W. "Jay"
Raymond



Director, Operations
& Readiness
Maj. Gen. James N.
Post III



Director, Future
Operations
Maj. Gen. Martin
Whelan

A4 Logistics, Engineering, & Force Protection



Deputy Chief of Staff
Lt. Gen. John B. Cooper



Director, Logistics
Maj. Gen. Kathryn J.
Johnson



Director, Resource
Integration
Lorna B. Estep



Director, Security Forces
Brig. Gen. Allen J.
Jamerson



Director, Civil
Engineers
Maj. Gen. Timothy
S. Green

A6 Office of Information Dominance & Chief Information Officer



Chief, Information Dominance & Chief Information Officer
Lt. Gen. William J. Bender



Director, Cyberspace Strategy & Policy
Brig. Gen. Sarah E. Zabel



Director, Cyberspace Operations & Warfighting Integration
Peter E. Kim (acting)



Director, Warfighter Systems & Cyberspace Integration
Brig. Gen. (sel.) Kevin B. Kennedy



Director, Cyberspace Capabilities & Compliance
Michael V. Sorrento

A5/8 Strategic Plans & Requirements



Deputy Chief of Staff
Lt. Gen. James M. "Mike" Holmes



Director, Operational Capability Requirements
Maj. Gen. Paul T. "PJ" Johnson



Director, Strategic Plans
Brig. Gen. Timothy G. Fay



Director, Strategy, Concepts, & Assessments
Maj. Gen. John F. "Jeff" Newell III

A7/9 Studies, Analyses, & Assessments



Director
Kevin E. Williams



Deputy Director
Lynne E. Baldrighi

A10 Strategic Deterrence & Nuclear Integration



Assistant Chief of Staff
Maj. Gen. Garrett Harencak



Deputy Assistant Chief of Staff
Michale R. Shoultz



Associate Assistant Chief of Staff
Billy W. Mullins

Major Commands

Air Combat Command

Hq. JB Langley-Eustis, Va.



Commander
Gen. Herbert J. "Hawk" Carlisle



Vice Commander
Maj. Gen. Jerry D. Harris Jr.



Command Chief
Master Sergeant
CMSgt. Steve K. McDonald



1st Air Force/
Air Forces Northern
Lt. Gen. William H. Etter
Tyndall AFB, Fla.



25th Air Force
Maj. Gen. Bradford J. "BJ"
Shwedo
JBSA-Lackland, Texas



9th Air Force
Maj. Gen. Mark D. Kelly
Shaw AFB, S.C.



US Air Forces Central Command
Lt. Gen. Charles Q. Brown Jr.
Southwest Asia



12th Air Force/
Air Forces Southern
Lt. Gen. Marc C. Nowland
Davis-Monthan AFB, Ariz.



US Air Force Warfare Center
Maj. Gen. Jay B. Silveria
Nellis AFB, Nev.

Air Education and Training Command

Hq. JBSA-Randolph, Tex.



Commander
Lt. Gen. Darryl L. Roberson



Vice Commander
Maj. Gen. Leonard A. Patrick



Command Chief
Master Sergeant
CMSgt. Gerardo Tapia



2nd Air Force
Maj. Gen. Mark Anthony Brown
Keesler AFB, Miss.



Air University
Lt. Gen. Steven L. Kwast
Maxwell AFB, Ala.



59th Medical Wing
Maj. Gen. Bart O. Iddins
JBSA-Lackland, Texas



19th Air Force
Maj. Gen. James B. Hecker
JBSA-Randolph, Texas



Air Force Recruiting Service
Maj. Gen. James C. Johnson
JBSA-Randolph, Texas

Air Force Global Strike Command

Hq. Barksdale AFB, La.



Commander
Gen. Robin Rand



Vice Commander
Maj. Gen. Michael E. Fortney



Command Chief
Master Sergeant
CMSgt. Terry B. West



8th Air Force/Air Forces Strategic
Maj. Gen. Richard M. Clark
Barksdale AFB, La.



20th Air Force
Maj. Gen. Jack Weinstein
F. E. Warren AFB, Wyo.

Air Force Materiel Command

Hq. Wright-Patterson AFB, Ohio



Commander
Gen. Ellen M.
Pawlikowski



Vice Commander
Maj. Gen. Warren
D. Berry



Command Chief
Master Sergeant
CMSgt. Michael J. Warner



Air Force Life Cycle
Management Center
Lt. Gen. John F. Thompson
Wright-Patterson AFB, Ohio



Air Force Test Center
Maj. Gen. David A. Harris
Edwards AFB, Calif.



Air Force Nuclear
Weapons Center
Maj. Gen. Sandra E. Finan
Kirtland AFB, N.M.

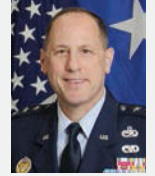


Air Force Installation &
Mission Support Center
Maj. Gen. Theresa C. Carter
JBSA-Lackland, Texas



Air Force Research Laboratory
Maj. Gen. Thomas J. Masiello
Wright-Patterson AFB, Ohio

National Museum of the US Air Force
John L. "Jack" Hudson, Director
Wright-Patterson AFB, Ohio



Air Force Sustainment Center
Lt. Gen. Lee K. Levy II
Tinker AFB, Okla.

Air Force Reserve Command

Hq. Robins AFB, Ga.



Commander
Lt. Gen. James "JJ"
Jackson



Vice Commander
Maj. Gen. Richard
S. Haddad



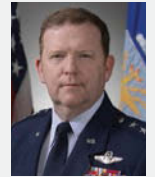
Command Chief
Master Sergeant
CMSgt. Cameron B.
Kirksey



4th Air Force
Maj. Gen. John C.
Flournoy Jr.
March ARB, Calif.



22nd Air Force
Maj. Gen. Stayce D. Harris
Dobbins ARB, Ga.



10th Air Force
Maj. Gen. Richard W.
Scobee
NAS Fort Worth JRB, Texas

Air Force Space Command

Hq. Peterson AFB, Colo.



Commander
Gen. John E. Hyten



Vice Commander
Maj. Gen. David D.
Thompson



Command Chief
Master Sergeant
CMSgt. Patrick F. McMahon



14th Air Force/
Air Forces Strategic
Maj. Gen. David J. Buck
Vandenberg AFB, Calif.



Space & Missile Systems Center
Lt. Gen. Samuel A. Greaves
Los Angeles AFB, Calif.



24th Air Force
Maj. Gen. Burke E. "Ed" Wilson
JBSA-Lackland, Texas

Air Force Network Integration
Center
Col. John J. Dunks
Scott AFB, Ill.

Air Force Spectrum Management
Office
Col. David B. Bosko
Ft. Meade, Md.

Major Commands (cont.)

Air Force Special Operations Command

Hq. Hurlburt Field, Fla.



Commander
Lt. Gen. Bradley A.
Heithold



Vice Commander
Maj. Gen. Eugene
Haase



Command Chief
Master Sergeant
CMSgt. Mathew M. Caruso

1st Special Operations Wing
Col. Sean M. Farrell
Hurlburt Field, Fla.

27th Special Operations Wing
Col. Benjamin R. Maitre
Cannon AFB, N.M.

24th Special Operations Wing
Col. Matthew Davidson
Hurlburt Field, Fla.

Air Force Special Operations Air
Warfare Center
Col. David Tabor
Hurlburt Field, Fla.

Air Mobility Command

Hq. Scott AFB, Ill.



Commander
Gen. Carlton D. Everhart II



Vice Commander
Maj. Gen. Rowayne A.
"Wayne" Schatz Jr.



Command Chief
Master Sergeant
CMSgt. Victoria Gamble



18th Air Force
Maj. Gen. Thomas J. Sharpy
Scott AFB, Ill.



US Air Force
Expeditionary Center
Maj. Gen. Frederick H. "Rick"
Martin
JB McGuire-Dix-Lakehurst, N.J.

Pacific Air Forces

Hq. JB Pearl Harbor-Hickam, Hawaii



Commander
Gen. Lori J. Robinson



Vice Commander
Maj. Gen. Mark C. "Marshal"
Dillon



Command Chief
Master Sergeant
CMSgt. Harold L.
"Buddy" Hutchison



5th Air Force
Lt. Gen. John L. Dolan
Yokota AB, Japan



7th Air Force
Lt. Gen. Terrence J.
O'Shaughnessy
Osan AB, South Korea



11th Air Force
Lt. Gen. Russell J. Handy
JB Elmendorf-Richardson,
Alaska

United States Air Forces in Europe-Air Forces Africa

Hq. Ramstein AB, Germany



Commander
Gen. Frank Gorenc



Vice Commander
Maj. Gen. Timothy M.
Zadalis



Command Chief
Master Sergeant
CMSgt. James E. Davis



3rd Air Force
Lt. Gen. Timothy M. Ray
Ramstein AB, Germany

Direct Reporting Units

Auxiliary

Air Force District of Washington

JB Andrews, Md.



Commander
Maj. Gen. Darryl W. Burke

Air Force Operational Test & Evaluation Center

Kirtland AFB, N.M.



Commander
Maj. Gen. Matthew H. Molloy

United States Air Force Academy

Colorado Springs, Colo.



Superintendent
Lt. Gen. Michelle D. Johnson

Civil Air Patrol-USAF

Maxwell AFB, Ala.



Commander
Col. Michael D. Tyynnismaa

Civil Air Patrol

Maxwell AFB, Ala.



National Commander
CAP Maj. Gen. Joseph R. Vazquez

Air Force Generals Serving in Joint and International Assignments

Joint Chiefs of Staff

Gen. Paul J. Selva
Vice Chairman of the Joint Chiefs of Staff
Pentagon



Gen. Mark A. Welsh III
Chief of Staff, United States Air Force
Pentagon



US European Command/NATO

Gen. Philip M. Breedlove
Commander, and NATO Supreme Allied
Commander, Europe
SHAPE, Belgium



Gen. Frank Gorenc
Commander, Allied Air Command
Ramstein AB, Germany



US Pacific Command

Gen. Lori J. Robinson
Air Component Commander
JB Pearl Harbor-Hickam, Hawaii



US Transportation Command

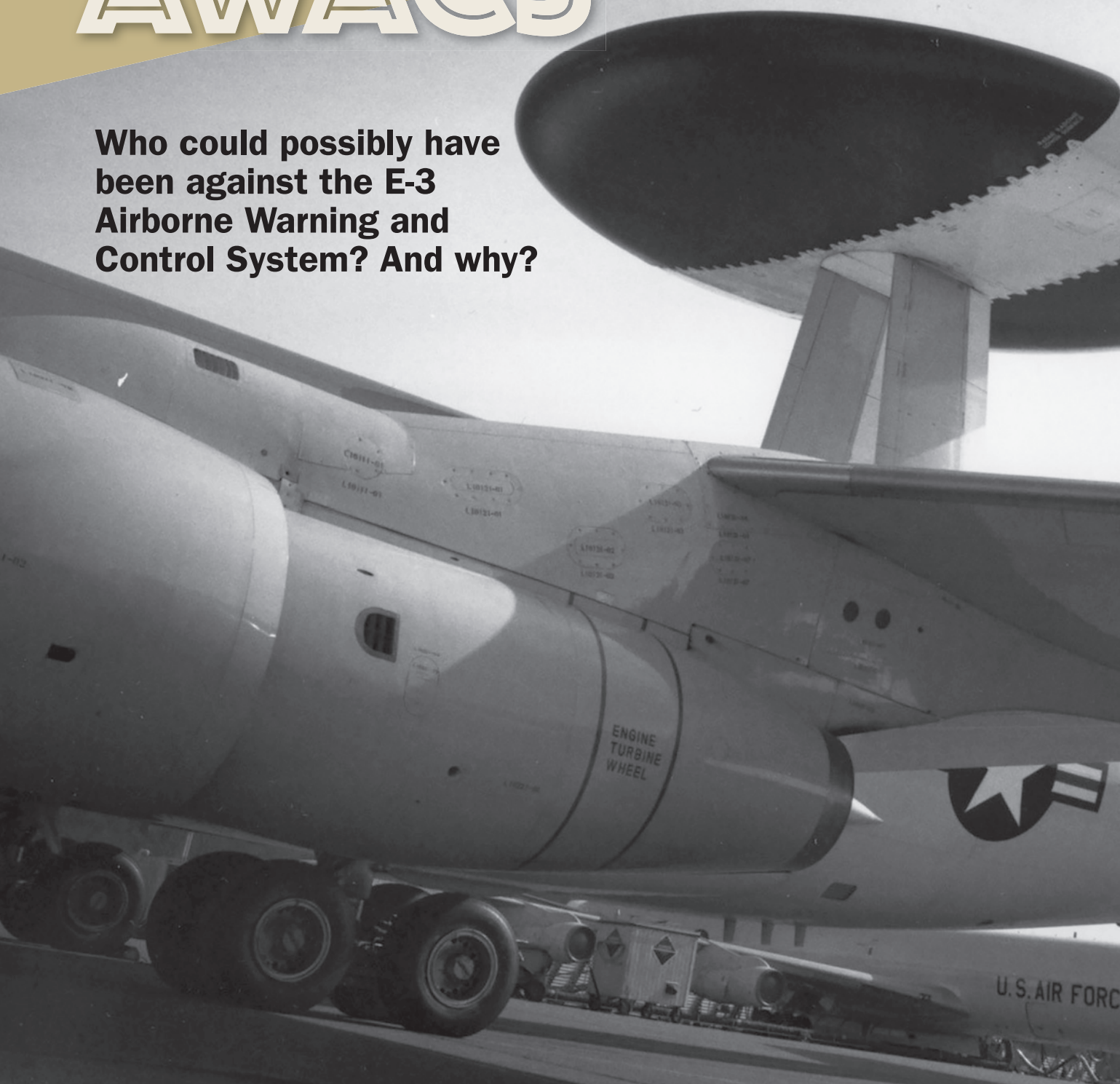
Gen. Darren W. McDew
Commander
Scott AFB, Ill.



OPPOSING AWACS

By John T. Correll

Who could possibly have been against the E-3 Airborne Warning and Control System? And why?



In operational tests prior to entering service with Tactical Air Command, the E-3 overcame the best efforts of almost 300 aggressor aircraft to jam or attack it.

THE E-3 Airborne Warning and Control System would surely make any short list of the most valuable military aircraft of all time. When it entered service in 1977, AWACS instantly changed the whole regime of air combat. The pulse Doppler radar in its rotating dome could reach out for hundreds of miles in all directions to find and track every airplane moving within the airspace.

AWACS could direct the battle so adeptly that it multiplied the effectiveness of the forces it controlled. The commander of Tactical Air Command pronounced

it “the most significant single tactical improvement since the advent of radar.” The program was also well-managed. The first production airplane was delivered within four months of target date and within four percent of target cost.

Since then, AWACS has seen action in every conflict from Grenada and the Gulf War to Iraq and Afghanistan. It was the first aircraft ever acquired by NATO to be operated as an alliance asset and flown by international crews. After the terrorist attacks on New York and Washington in 2001, the US relied not only on its own AWACS fleet but also on reinforcement by NATO E-3s to maintain a patrol against further attacks.

Today, after almost 40 years of service, AWACS is still going strong and is universally well-regarded—but it was not always so. In its early days, AWACS was confronted constantly by those who wanted to curtail it or kill it outright.

One of the first critics was Sen. William Proxmire (D-Wis.), who had gained fame for exposing waste and fraud in govern-

ment. Proxmire accused the Pentagon of waste in the AWACS program in 1971 and later called it “a plane in search of a mission.”

Sen. Thomas F. Eagleton (D-Mo.)—described by *The New York Times* as “waging a one-man war against the AWACS program”—said AWACS was an “apparently irresistible gadget which has no real combat utility,” a “sham” and a “disastrous failure” that “contributes nothing and has a zero chance of surviving attack.”

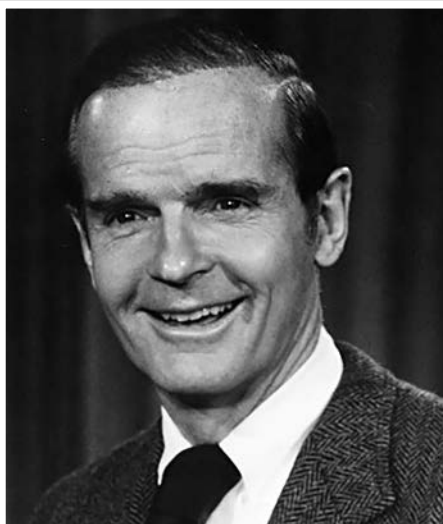
The news media and the General Accounting Office chimed in, apparently unimpressed by test exercises where some 300 aggressor aircraft could not defeat AWACS. In 1976, Rep. Patricia S. Schroeder (D-Colo.) nominated AWACS as the “Turkey of the Year” and attempted to delete all funding for it.

Opposition surged when the Ford, Carter, and Reagan administrations proposed foreign military sales of AWACS to allies. In 1980, critics objected to offering AWACS to Saudi Arabia, arguing concurrently the E-3A was a flop operationally and that it would be a mortal threat to Israel.





The first flight of the AWACS testbed on Feb. 9, 1972.



Condemnation of the program in general continued. Pundit Alexander C. Cockburn, writing in *The Wall Street Journal* in 1981, said that AWACS was an “airborne disaster” and “an ocean of gravy” for the contractors. The real secret of AWACS, he said, was that “it does not work.”

AWACS was an unlikely candidate for such invective, and there was no indication of the trouble to come when the program requirement was laid down in the 1960s.

A NEW KIND OF RADAR

The military value of radar was demonstrated in the Battle of Britain in 1940 and was clearly understood. However, attackers soon learned to avoid detection by flying low. The beam of traditional ground radar went out in a straight line and could see only what was above the horizon. Anything behind the curvature of the Earth was hidden.

An airplane flying at an altitude of 100 feet, for example, could penetrate unseen to within about 13 miles of the average ground radar. Even with airborne radar systems, low fliers were

Above, l-r: Sen William Proxmire (D-Wis.), one of the first critics of the AWACS. He called it “a plane in search of a mission.” Sen. Thomas Eagleton (D-Mo.) waged what The New York Times called a “one-man war against the AWACS program.” Rep. Patricia Schroeder (D-Colo.) called the E-3 the “Turkey of the Year.”

lost in the “ground clutter,” a hodgepodge of signals reflected up from the Earth’s surface.

Air Defense Command began operating the EC-121 Warning Star in 1953. It was a radar-picket version of the Lockheed Constellation airliner, with radomes mounted above and below the fuselage. Two variants of the EC-121 later saw extensive service in Vietnam. The radar did well enough in tracking aircraft at medium and high altitudes, but could not separate air traffic below from the ground clutter.

The Navy introduced the E-2 Hawkeye warning and control aircraft, a twin-turboprop considerably smaller than the EC-121, in 1961. Early models of the Hawkeye had serious reliability problems. When it worked, the Hawkeye

was successful in surveillance over water, but like the Air Force's EC-121, it was unable to detect and track targets amid ground clutter over land.

Around 1960, the Air Force came to believe that technology, especially the miniaturization of electronics, had reached the point that the ground clutter issue could be solved. The key was a phenomenon known as the Doppler shift.

If a radar beam bounces off a moving object, the electronic signal returns at a different frequency from the one at which it was sent out. Radar operating in pulse Doppler mode can track a flying object based on its speed relative to the radar, not just its position. If the object is approaching the radar, the wavelength is compressed; if it is going away, the wavelength is stretched out. Computers, processing the raw radar returns, could filter fast-moving airplanes out from slow-moving or stationary objects on the ground.

In 1962, Tactical Air Command and ADC issued a joint Specific Operational Requirement for an airborne warning and control system to detect and track large numbers of targets at long range. ADC wanted the system for continental air defense against bombers. TAC wanted to see the enemy fighters and a capability to manage the air battle.

Three aircraft entered the competition to be the airframe for AWACS: the Boeing Co. 707, the Douglas Aircraft Co. DC-8, and the Lockheed Georgia Co. C-141. Lockheed dropped out in 1966. A system program office was established at the Electronic Systems Division at Hanscom AFB, Mass., in 1967.

Exploratory research and development proved the technological feasibility of AWACS, and in July 1970, the Air

Force announced the selection of Boeing as the prime contractor. In 1972, after a lengthy competition, Westinghouse was chosen to provide the radar. AWACS, now designated the E-3A, entered full-scale development in 1973.

AS THE DOME TURNS

The original plan was for 64 AWACS aircraft, but the procurement was cut to 42 in 1970 and then to the final total of 34 in 1973. This was partly for cost reduction reasons but also because the emphasis on defense against enemy bombers had diminished with the advancement of ICBMs. In 1974, TAC was named as the single manager of AWACS when it went into operational service.

Critics at the time said the AWACS air defense mission was gone, but it is still around 40 years later. For example, after the September 2001 terror attacks, every AWACS available was called in to guard the approaches to the United States.

The E-3A's most obvious feature was the huge rotating dome, 30 feet wide and six feet thick, jutting up from the fuselage on two struts. Half of this "rotodome" contained an IFF (identification, friend or foe) system, and the other half a powerful radar antenna.

AWACS was more than a flying radar. It was a complete command and control center with computers to process the raw data and nine mission consoles for surveillance, weapons direction, and battle management. Every 10 seconds, the E-3A's rotating radar furnished a new position of the aircraft it was tracking, each of them glowing cleanly as a blip on the console screens.

In the pulse Doppler mode, the radar could reach out for more than 250 miles and sort out low-flying aircraft from the

Every 10 seconds, the E-3A radar provided the command and control crew with a new position for every aircraft it was tracking.





Maj. Gen. Lawrence Skantze said AWACS was “survivable,” not “immortal.” It could be defeated if an enemy was willing to allocate enough resources and take enough losses.

trees and hills. As a side benefit, the radar was not bothered by chaff, which drifted through the air too slowly to register as a flying object. It could also be used in a plain non-Doppler pulse mode, which extended the range to about 350 miles but without the ground clutter filtering.

Most of the criticism of AWACS focused on its supposed vulnerability to jamming and attack by enemy fighters. In fact, the E-3A could be jammed or shot down—if an enemy was ready to devote enough resources and take enough losses to do it.

“It is scientifically impossible to come up with a radar that is totally jam-proof,” said Maj. Gen. Lawrence A. Skantze, E-3A program director from 1973 to 1977. “But the AWACS radar is beyond any comparable system ever built, and it exploits the latest state of the art to the fullest.”

A radar system’s primary vulnerability to jamming stems from the so-called antenna side lobes—energy radiated not along the system’s main beam but off to the sides. An enemy could try to jam the E-3A radar by aiming a strong electronic signal at its beam to cause interference. The E-3A transmitted a highly directional, very narrow radar main beam. When the radar main beam swept by a jamming source, targets within the beam were obscured. The jammed signal was displayed as a line or strobe on the E-3A screen. Targets outside the strobe could be tracked in the usual way.

Because of the long range of its radar, the aircraft could orbit too far away for most enemy fighters to locate or to attack even if they could locate it. Since the E-3A could see an enemy coming, it could summon and direct friendly fighters in its own defense. If necessary, it had enough speed to evade.

One test determined that an enemy would have to sacrifice between 60 and 100 of its own airplanes to bring down a single AWACS. “I said the E-3A is survivable,” Skantze pointed out. “I didn’t say it was immortal.”

THE CRITICS PILE ON

AWACS was barely out of the starting gate when the critics opened fire. In April 1971, Proxmire cited waste in AWACS and

other programs in a broad-ranging call to cut defense spending. He made several speeches about it in Congress, including one in 1975 when he said the E-3A was “known in some Pentagon circles as the BBO, which is the Boeing Bailout.”

Others also depicted AWACS as a pork barrel project. A *New York Times* article said it “was conceived several years ago when the Boeing Company was in serious financial difficulty on its transport program,” neglecting to mention that two other aircraft companies were in the competition for several years.

Eagleton attacked the program again and again, charging that AWACS could be “jammed from 200 miles away by cheap and simple electronics, making it useless for its primary mission.” He depicted it as “a technical marvel in search of a mission,” and “a marvel that we can no longer afford.” Both Proxmire and Eagleton trumpeted several GAO reports critical of the E-3A for high cost and limited utility.

A group of officials from the Kennedy and Johnson administrations, led by former Assistant Secretary of Defense for International Security Affairs Paul Warnke, recommended scrapping AWACS altogether.

Peter J. Ognibene, a former member of the political science faculty at the Air Force Academy, writing in *The New Republic* in 1974, chastised the Defense Department for keeping the program alive after the continental air defense mission had diminished and called AWACS “the plane that would not die.”

Ognibene said that AWACS would require “an airborne armada to protect it from Soviet fighters such as the trisonic Foxbat” and that long-distance jammers would leave it “blind and incapable of directing the strike aircraft under its control.” The defense budget, he said, contained “pouches of flab. AWACS is one.”

The efforts by Eagleton and like-minded colleagues to kill AWACS failed, but they persuaded the Senate to require the Secretary of Defense to certify the performance of the airplane based on additional testing. In one such test, AWACS defeated two EB-57 jamming aircraft that attempted to mask a simulated attack by an F-4 fighter. In another test, AWACS successfully controlled 134 friendly aircraft against 274 aggressor aircraft.

Accordingly, DOD certified to Congress that AWACS could indeed perform its mission in a hostile environment. TAC took delivery of the first E-3A in March 1977. In the introductory



NATO E-3A Component photo by Wouter Langen

four jet engines, flew at 530 mph compared to 375 mph for the twin-turboprop Hawkeye.

NATO, with strong support from defense ministers of member nations, agreed in December 1978 to buy 18 AWACS aircraft. But a new round of opposition erupted in 1980 when the Carter Administration proposed selling AWACS to Saudi Arabia. Carter's main concern was protecting Saudi oil production, six million barrels a day to the world market. Iran had already made an air attack on a Kuwaiti oil installation in the course of the Iran-Iraq war and Carter worried that Iran might try to close the Strait of Hormuz and oil shipments from the Persian Gulf.

The Reagan Administration picked up the plan and proposed offering Saudi Arabia five AWACS aircraft. Critics protested that this would create a danger of technology compromise and pose an unacceptable risk to Israel. Cockburn, sneering in his *Wall Street Journal* article, declared in any case Saudi Arabia would only be getting "five costly pieces of junk."

The Senate approved the Saudi sale in October 1981 with the proviso that some features of greatest concern to Israel be eliminated from the aircraft.

AWACS GOES ON AND ON

The NATO AWACS reached initial operational capability in 1983. By then, the United States was regularly dispatching its E-3As in instances of crisis or trouble in various parts of the world.

Opposition receded as the E-3A demonstrated its capability and worth, but there was one final spurt. The British had been interested in AWACS since the middle 1970s but held off because of protectionist pressure to buy a home-grown command and control aircraft, the Mark 3 Nimrod, instead. Nimrod was a modification of the de Havilland Comet airliner and primarily designed for maritime patrol. After lengthy debate, the Conservative Margaret Thatcher government chose AWACS in 1986, pointing out that Nimrod did not work nearly as well. The Labor Party complained it was "a bad decision because a country can only defend itself on the strength of its own industrial and technological base" and the procurement "handed Boeing a worldwide monopoly in early warning systems."

AWACS was one of the first aircraft to deploy to Operation Desert Shield in 1990 when US forces in the Persian Gulf were still thin in the region. It kept constant watch on the activities of the Iraqi Air Force during the buildup and subsequently flew more than 7,000 combat hours in Operation Desert Storm in 1991.

The E-3 AWACS based on the original Boeing 707 airframe is currently in service with France, NATO, Saudi Arabia, the United Kingdom, and the United States. Japan operates four AWACS hosted on the Boeing 767-200ER.

Of the 34 AWACS produced for the US Air Force, 31 still remain in the inventory. They have been upgraded several times with enhanced computers and electronics and improvements to the airframe. The E-3B upgrade in 1994 added five more mission consoles in the aircraft's command center. The 552nd Air Control Wing at Tinker AFB, Okla., is presently receiving the latest upgrades to the E-3G model, with more improvements to the fleet projected through 2020.

Back when AWACS was new, Skantze predicted that it might continue in service for 20 or even 30 years. The ultimate rebuttal to the critics is that AWACS is in its 38th year of operation with the end nowhere in sight. ✦

John T. Correll was editor in chief of Air Force Magazine for 18 years and is now a contributor. His most recent article, "The Year of the Kamikaze," appeared in the August issue.

The E-3A was the first airplane ever acquired by NATO as an alliance asset to be operated by international crews.

shakedown period with TAC, the AWACS aircraft, radar, and computers consistently exceeded the standards set by the Air Force. The system achieved initial operational capability in May 1978.

SALES PROPOSED AND PROTESTED

The Ford Administration generated new uproar about the E-3A when it proposed in December 1975 to sell 10 of the aircraft to Iran—then regarded as a stalwart US ally in an unstable Middle East. Among other considerations, the government hoped to recoup some of the research and development costs.

The Carter Administration also wanted to provide AWACS to Iran, and Congress approved a reduced sale of seven aircraft in October 1977, with some of the more advanced features stripped out. None of them were ever delivered. The AWACS offer was canceled, along with a pending sale of F-16 fighters, when the Shah of Iran was overthrown by the Islamic revolution in February 1979.

The *New York Times* reported in April 1975 that NATO was considering a "mammoth order" for AWACS. If it happened, it would be the first time the alliance acquired an aircraft that it would operate as an international asset. Protests ranged from the usual shots about performance and vulnerability to complaints that the offer price of \$68.7 million per airplane was too low. Eagleton tried to block the deal, accusing the Pentagon of "a patent subterfuge to obtain backdoor funding" by selling AWACS at an artificially low price that amounted to "a theft on the US taxpayers."

David Marash, writing in *New York Magazine* in May 1977, introduced a novel objection. He said that Grumman, located on Long Island, had been forbidden by the Pentagon to bid against AWACS for the NATO contract. Marash argued that NATO should have considered Grumman's E-2C Hawkeye, "one of the most advanced electronic systems in existence," established "through years of successful use in the Navy as an early warning plane with effective battlefield command and control capabilities."

The E-2C, which did not enter fleet service until 1973, corrected some of the problems of the previous Hawkeye models, but it still could not see through the ground clutter over littoral regions and land. Marash said the "slow-moving" AWACS would be easy to "knock down," oblivious to the fact that the E-3A, with

Seek Eagle's experts make certain bombs, missiles, and pods play nicely with the aircraft that carry them into battle.

By Aaron M. U. Church, Associate Editor

Eglin's Middle Men

Samuel Burnham from USAF's Seek Eagle office configures a horn antenna before testing a Litening pod on an F-15 at Eglin AFB, Fla.

USAF photo

An F-16CJ carrying two GBU-38 JDAMs and an AGM-88 HARM completes air refueling before an air strike on Syria. Seek Eagle experts were able to provide USAF with safe parameters to fly the configuration.

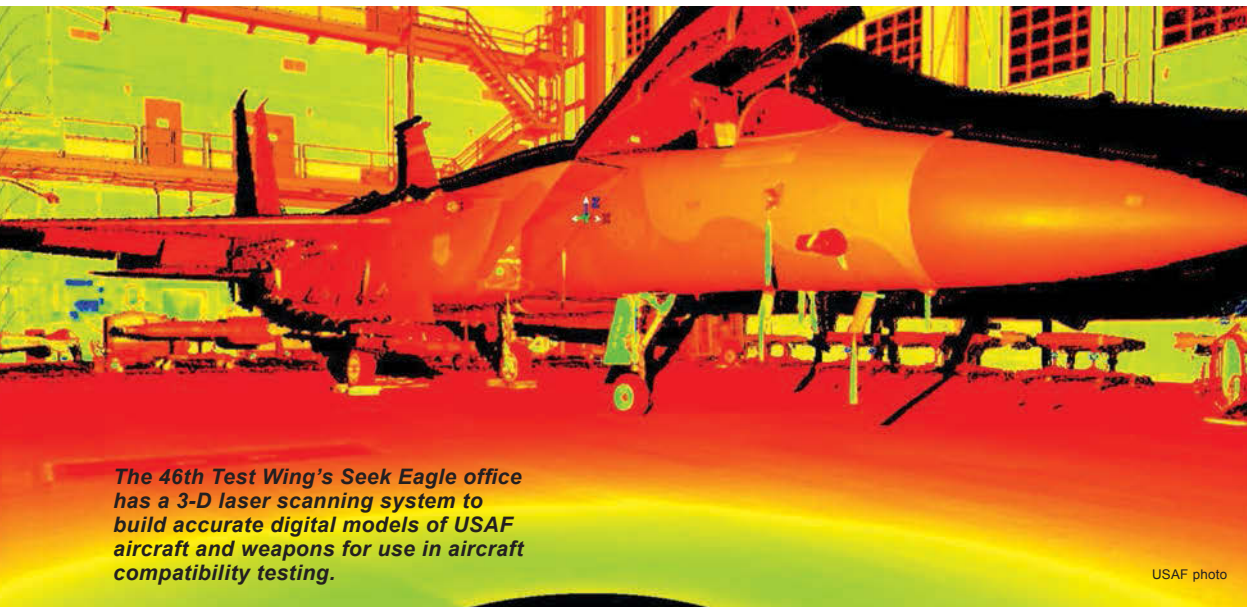


In the business of air combat, there are aircraft, and there are weapons, and most of the time they don't come neatly packaged together. This is where the Air Force's Seek Eagle office at Eglin AFB, Fla., comes in.

"Aircraft stores compatibility is what we're about," Seek Eagle Technical Director Dale Bridges briefed to *Air Force Magazine* during a reporter's visit there in June. Anytime USAF wants to add something external onto an aircraft—whether as mundane as a baggage pod or as complex as a guided smart weapon—every aspect must be checked for symbiotic operation. Both the aircraft and the add-on must be able to do their intended job without damaging or destroying them.

In the high-Mach, high-G, and electronically charged atmosphere of a modern fighter aircraft, a lot of things can cause debilitating or even catastrophic problems. "We've got guys who buy airplanes, build airplanes, we've got guys who build bombs and buy bombs, and sometimes they talk to each other," quipped Mike Johnson, principal technical advisor. "We kind of act as a middle man," he observed, and often it requires a fair bit of "head scratching."

Seek Eagle is made up of about 75 Air Force civilians—mostly engineers and a few mathematicians, complemented by 75 civilian contractors. "The vast majority are very technical—a lot of advanced degree folks, a lot of Ph.D.s," noted Bridges. The



The 46th Test Wing's Seek Eagle office has a 3-D laser scanning system to build accurate digital models of USAF aircraft and weapons for use in aircraft compatibility testing.

USAF photo



USAF photo

office is organizationally part of Eglin's 96th Test Wing, but is directly funded to ensure weapons can be evaluated, certified, and deployed operationally as efficiently as possible. "They created this office for a reason," said Bridges.

Following a tidal wave of new and increasingly sophisticated weapons during the Vietnam War, the Air Force turned to Seek Eagle as a means of quickly evaluating urgently needed weapons and speed them to the field. "Before they set up [the] Seek Eagle office, they really didn't have control over what work got done when," Bridges explained. Because it has its own budget, technical experts, and resources, Seek Eagle is more nimble and far cheaper than working through industry contracts. "This organization turns quickly—it's a lifesaver, and that right there earns its pay every time," Bridges said.

On the developmental side, Seek Eagle is responsible for aircraft stores compatibility on Air Force fighter platforms, including the F-15, F-16, F-35, and A-10, and often lends its expertise to bomber programs such as the B-1, B-2, and B-52. Seek Eagle's engineers and technical experts cover eight main disciplines and are divided into specialized teams with skills including weapon and aircraft stores fit, ballistics, carriage and release, safe escape, planning software development, and historical weapons data.

NERDS IN THE FIGHT

Seek Eagle's work isn't just about new weapons and stores but also about mixing operational aircraft and weapons in different ways, as was the case during Operation Odyssey Dawn in 2011.

Lockheed Martin photo



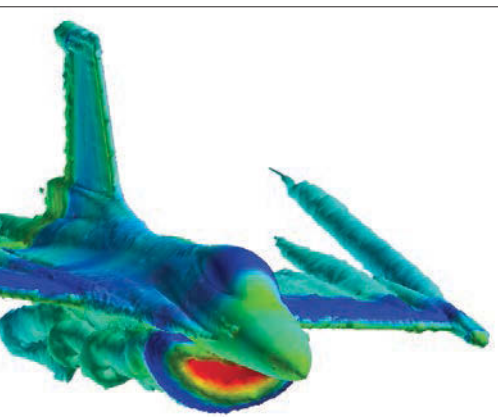
This F-35 graphically displays the vast combination of weapons loadouts possible on a modern combat aircraft. Seek Eagle must evaluate each of them for cross-compatibility, safety, and mission effectiveness.

USAF photo

F-16CJs tasked to suppress Libyan air defenses were also striking ground targets, often in dense urban areas. Planners were keen to limit collateral damage and called on Seek Eagle to see if the F-16's loadout could be altered without wrecking its stability. The jets were flying mixed loads—a single High-speed Anti-Radiation Missile for suppression of enemy air defenses and a single 2,000-pound Joint Direct Attack Munition for ground targets. "They needed, as fast as they could get it, a 500-pound JDAM in place of that 2,000 pounder," recalled Ted Welch, principal technical

advisor. No flight testing was required, so the office's technical team ran their calculations to evaluate the weight, balance, and flutter risks to ensure the "aircraft wasn't going to oscillate in a bad way," said Welch.

Within five days, the team identified several potential pitfalls, but recommended clearing the configuration for flight within specific guidelines. The F-16 system program office took the recommendation, and 97 percent of the Air Force F-16 sorties over Libya from that point on "were the loadings given to them by that five days of work," Welch



This Seek Eagle-developed 3-D F-16 computer model shows the magnitude of vortices and air pressure (shown by color) over the aircraft's surface during a maneuver.



said. "That's why we're here and have our own budget. ... The warfighter can call and we execute."

The Air Force has invested a great deal over the years to build a team of experts and a set of analytical capabilities that are "second to none anywhere in the world," Welch stated.

Seek Eagle's reputation, however, wasn't built overnight. "Our guys have been around for a while, so weapons and tactics officers in the units know them by name, and the relationship is awesome. ... They know we'll jump when they call," he said.

Getting It Right From the Get-Go

Seek Eagle often saves industry dollars and headaches by bringing to bear its expertise on compatibility even before a weapon is built, Technical Director Dale Bridges told *Air Force Magazine*. "We see every aircraft, we see every store" coming through certification, and "everything we've learned, we can apply" to help industry avoid the mistakes and pitfalls of previous programs, he said.

With its models and historical data, Seek Eagle is able to tell industry, "Here's your box—mass, size, properties, and if you get outside this box, your program's going to get very expensive," stressed Bridges.

A prime example is Raytheon's next generation Advanced Medium-Range Air-to-Air Missile, the AIM-120D. It just completed operational testing earlier this spring. "When they first started building the missile, it was going to be too heavy," said Seek Eagle Principal Technical Advisor Ted Welch. The existing AIM-120 had already been thoroughly tested, but if the company exceeded certain limits—especially important for the F-16—they would have to "flutter-flight test the whole book, which is years of effort," Welch noted.

As a result of Seek Eagle's analysis and expertise, Raytheon's engineers were able to get the missile's weight down and "avoided a lot of flutter testing by working together," he said.

Sometimes companies take the advice and "sometimes they don't," Welch conceded, but when they do, "we've saved them a lot of time and money, and they get a good product to the warfighter in the end."

USAF photo by Ilka Cole



MAKING MODELS

No part of this work is trivial, and seemingly innocuous factors like whether a weapon physically fits on the aircraft sends industry and the Air Force back to the drawing board. "It's amazing how often fit problems have occurred in the past," Welch said, pointing out a cruise missile evaluated for fit on the F-15E as a recent example. The stores loader raises the missile into place using a custom pallet that, in the F-15's case, would gouge the aircraft's main tire.

Since there is little that can be done for already fielded weapons, Seek Eagle

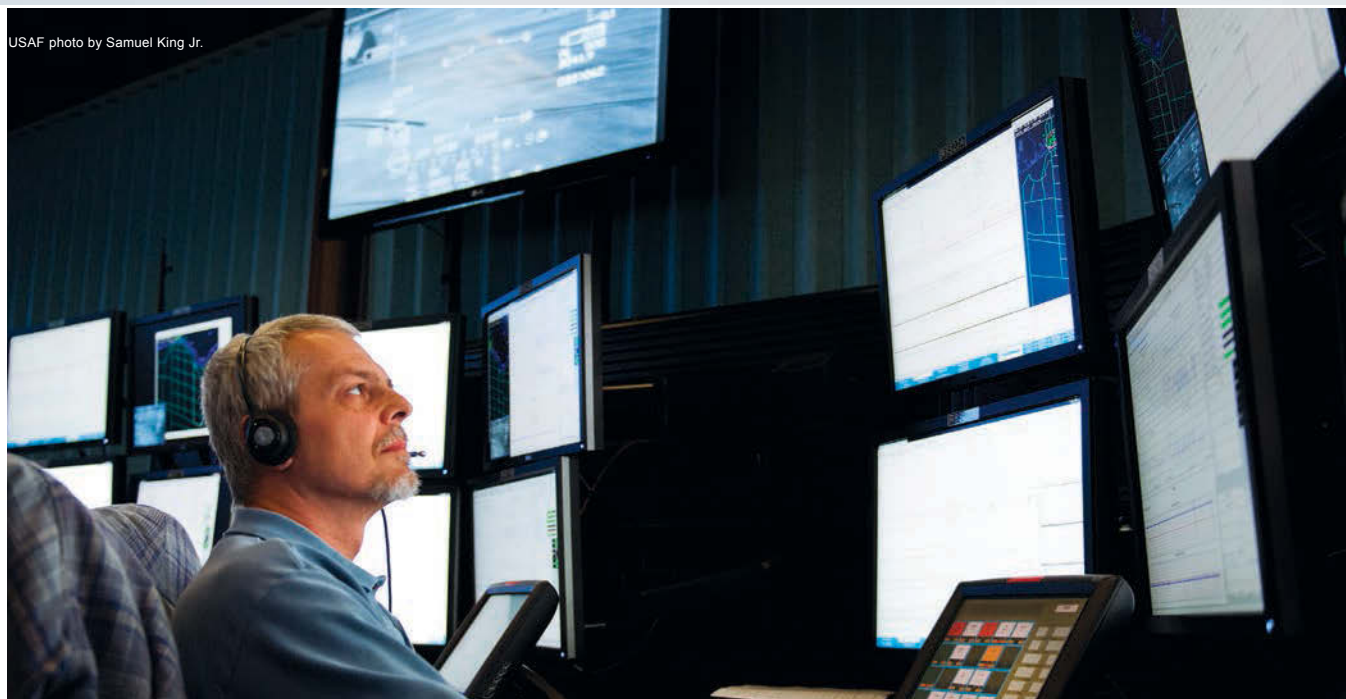
David Senter, a Seek Eagle ordnance equipment specialist, steadies a JASSM at the Mass Properties Measurement Facility at Eglin.

tries to work with industry ahead of time. At a minimum, the office likes to fit-check future weapons using computer models of the airframes, "so if you do find a problem, you can change your outer mold line," said Welch.

Accurate computer modeling and simulation saves vast sums of time and money—not to mention hardware damage—and Seek Eagle has developed some of the best tools in the industry.



USAF photo by Samuel King Jr.



James Dubben monitors the beginning of a flutter test from the Central Control Facility at Eglin, checking to make sure aircraft wing vibration is within safe limits, considering airspeed, altitude, G-force, and payload.

“We have computerized physical fit, which is pretty state-of-the-art stuff,” Bridges explained. In the case of the F-15, it highlighted the problem without ever ramming a pallet into a jet. “We do a lot of this stuff ... before we even touch the actual hardware, which saves a lot of time and money—that’s the name of the game,” he added.

The office recently acquired two 3-D laser scanners, greatly enhancing Seek Eagle’s ability to create accurate and useful computer representations. The large volume scanner can map an entire

aircraft to the subtlest contour, and the handheld unit is perfect for scanning weapons.

Welch said, “In our day and age, almost everything that is produced is proprietary”; the Air Force would need to get industry permission to disseminate and share representations of their products. However, “if we laser scan those things and build a model ... and not tie it back to the original proprietary data, we own that,” Welch explained. Unlike the mismatched and often inaccurate industry-supplied aircraft and weapon models, Seek Eagle now generates its own. “We can do a picture of [a Lockheed Martin] F-16, and it’s got a Boeing JDAM, a Northrop Grumman targeting pod, a Raytheon missile,” and Seek Eagle can distribute it to any agency or industry partner that needs it, Welch noted.

For the future Long-Range Standoff missile competition, Seek Eagle is doing exactly that. “For LRSO, you have four competitors and of course the owners of those aircraft don’t really want to share,” Welch pointed out. “We can give them the aircraft models and pylons, and we’ve done that, ... and it helps them come up with a better design quicker.”

The team has scanned everything from the B-2 bomber to a German air force Tornado strike aircraft. As part of NATO’s extended nuclear deterrent, the Panavia Tornado IDS will need to be cleared to carry the upgraded B61 Mod 12 tactical nuclear weapon. Neither the Air Force Nuclear Weapons Center nor the Germans “have a model of that aircraft,” said Welch, so the team paid a visit to the Luftwaffe’s Tornado training unit, conveniently located

An F-35 fires an AIM-120 air-to-air missile over a military test range in California. Seek Eagle provided the missile makers data that allowed the company to keep the weapon's weight down, thus avoiding time-consuming and expensive flutter-flight testing.

Lockheed Martin photo

at Holloman AFB, N.M. Models generated from one of the aircraft in New Mexico will now be used in testing and certification of the life-extended B61.

FLUTTER AND FLUID DYNAMICS

Scanning static aircraft is really only the most basic modeling and simulation work Seek Eagle does. Evaluating the stress loads, aerodynamic forces, and electromagnetic fields modern aircraft and weapons exert on each other requires “a lot of high-tech stuff,” said Bridges. Certain aircraft, especially the F-16, are susceptible to potentially damaging vibrations known as aerodynamic flutter. Hanging fuel tanks, bombs, missiles, and targeting pods on aircraft wings causes them to flex and move, and “it alters the behavior quite a bit,” explained subject matter expert Vin Sharma.

Different external configurations change the aerodynamic characteristics of the aircraft affecting stability and control, and the added mass exerts various loads and stresses on the airframe—all of which must be validated for safety. The data Seek Eagle gleans makes its way into everything from flight manuals and maintenance instructions to weapon delivery software produced in-house.

Every combination would ideally undergo full flight testing, but the number of possible loadouts and aircraft is staggering, making it budget and time prohibitive. “I’ve got 72,000 possible different combinations, ... and the boss says, ‘Great, I’m going to let you go test three of them,’” said Johnson. Picking the most valuable configurations to fly with the neighboring 40th Flight Test Squadron, or other test units, is a “heavy challenge,” Johnson admitted, but his biggest task is designing “simulations

that will hopefully reduce the amount of testing that we need to do.”

Building a solid understanding of an aircraft’s behavior and developing accurate models requires years of effort, and the amount of data is daunting. Seek Eagle is gearing up for the F-35 and “we’re going to be working on that for a few years here before we’re anywhere near the fidelity of an F-16,” Sharma, who is working on the F-35 models, said. Modern computing has enabled the team to turn myriad mathematical equations into an animated, visual representation of airflow around the aircraft to virtually “fly” the aircraft using computational fluid dynamics. “It’s only with the advances in computers that we’re able to take advantage of those formulations and we’re still not there, but we’re close,” said Sharma. These simulations allow Seek Eagle to analyze the aircraft’s behavior under dynamic conditions, because “when you execute a maneuver, the flow is extremely complex” and can “cause all kinds of problems for stability,” he said.

Even modern computers have trouble digesting and processing something as complex as the flight characteristics of a loaded F-35, though. “To analyze a large structure that has millions of degrees of freedom takes quite a bit of time,” explained Sharma. Each configuration can take as much as 20 minutes and at that rate “we can’t afford to run 20,000 configurations,” he said. Instead of dealing with all the variables at once, his team decided to break the jet into smaller pieces, “analyze each component separately, and then put them together.”

Using this “component mode synthesis” reduced the amount of time required to flutter-test a configuration by as much as 40 times. “Rather than 20 minutes, we can get the job done in 20 seconds. ... We’ve proven it,” Sharma said.

LIGHTNING LEARNING

Figuring out how to extrapolate answers from the available data is important, too, especially when it comes to the F-35. Since it’s a joint service program with three different variants, “they may go do a test on the carrier variant” rather than the Air Force’s F-35A, and Seek Eagle has to find a way to translate and use the data, said Johnson. Adverse interactions can be electrical, as well as physical, and he faces similar challenges dealing with electromagnetics.

Almost everything on the F-35 operates on the electromagnetic spectrum—from fly-by-wire flight controls to integrated sensors. So do most of the smart weapons,

targeting pods, and electronic warfare stores the Air Force plans to fly on the jet. “They [produce] a lot of radio frequency radiation,” Johnson said, and “our job is to determine if they will play nicely” together in an operational environment.

For example, GPS guided weapons like the Joint Direct Attack Munition rely on satellite data links to find and hit their targets. “If the airplane is interfering with that in any way, the bomb will come off and go stupid,” said Johnson. Some systems can generate enough energy to “actually detonate” a weapon inside the aircraft in a worst-case scenario, he warned.

The speed of electrons and the danger and/or expense of physically switching things on, make simulation invaluable. “I can get computers to be smart enough to predict some of this stuff—help me decide if that bomb is going to be safe or do its job in the environment around an airplane, and vice versa,” Johnson explained. For the F-35, he was able to test what effects a lightning strike would have on the aircraft and its systems to see where the current would go, what it could affect, “and do we care?”

As it turns out “we cared,” Johnson said. “We just gave them the bad news: I looked at your baby and it’s ugly,” he chuckled.

As with aerodynamic modeling, electromagnetic models are often used in tandem with testing to predict and validate a result—or even explain something unexpected.

Once energy from a radar, antenna, or sensor “starts to interact with all the metallic parts and angles and bits and pieces of an airplane, it gets these weird contours,” Johnson detailed. “It comes off and goes places you don’t really expect and bounces around in places it probably wasn’t intended to.” This is often difficult to picture.

In terms of visualizing, Seek Eagle benefits from having so many areas of expertise under the same roof—not to mention, just across the street, the 40th FLTS with a flight line of actual F-15s, F-16s, and A-10s. “It’s a really good partnership all around Seek Eagle,” Johnson said, noting that he often borrows models from other teams to build his simulations. “We can all work together putting out the simulation product. ... It’s a fun job,” he said. Working together, Seek Eagle is “able to tell you what will work. We’re also able to tell you some things you’ll not want to go do, like break a wing [or] interfere with instrumentation. ... As a middle man, we’re able to communicate both” weapon to aircraft and aircraft to weapon, he explained. ✦

GAS



Three London air raid wardens, taking part in a 1941 mock attack on London, wear a new type of gas mask designed for the elderly.



A warden, in standard mask, peers skyward.



English schoolgirls don masks while at play.

In World War II Britain, fear of poison gas attack was ever-present. Widespread use of gas in the 1914-18 Great War convinced many that a reprise was inevitable, and that cities would be the targets of the Luftwaffe. British citizens of all ages were issued gas masks of varying types, as seen in these images, and wore them routinely, at least for a few years. Germany certainly had large stockpiles and the means of delivery. However, Germany's fear of retaliation in kind was also great, and deterrence held.



Is your health care coverage enough coverage?

At a time when the health care landscape is changing and medical costs keep rising, it's more important than ever to be sure your family is protected.

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[†]Information includes costs, exclusions, limitations and terms of coverage.
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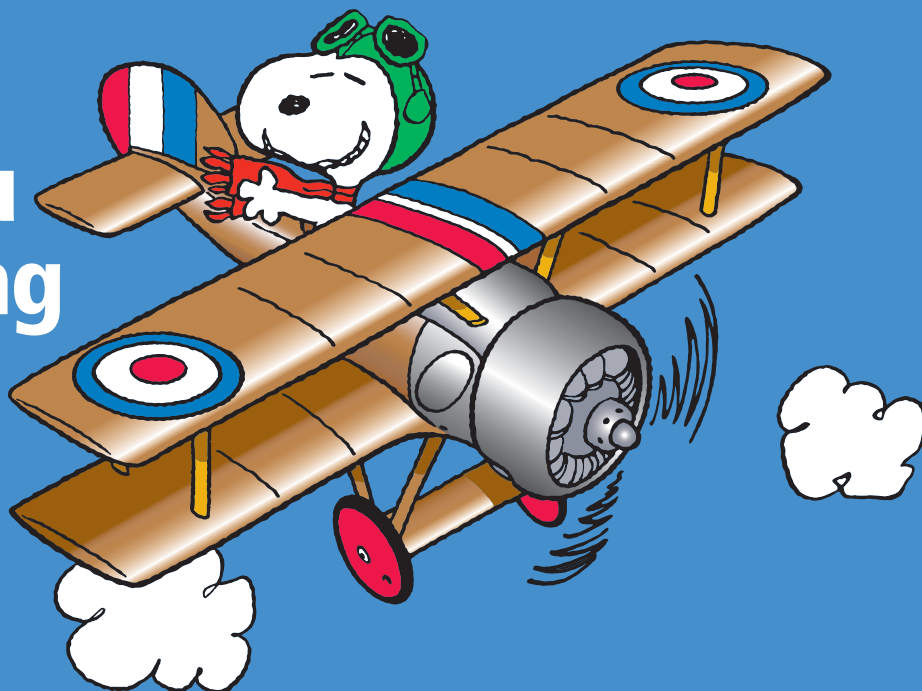
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*Savings from enrolling in the MetLife Preferred Dentist Program will depend on various factors, including how often participants visit the dentist and the costs for services rendered. Like most group benefits programs, benefit programs offered by MetLife, MetLife group policies contain certain exclusions, limitations, waiting periods and terms for keeping them in force. Ask your MetLife group representative for costs and complete details.
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AFA Almanac

By Frances McKenney, Assistant Managing Editor

Donald W. Steele Sr. Memorial Award

Air Force Association unit of the year

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

AFA Membership

Year	Total	Life Members	Year	Total	Life Members
1946	51,243	32	1981	170,240	3,515
1947	104,750	55	1982	179,149	7,381
1948	56,464	68	1983	198,563	13,763
1949	43,801	70	1984	218,512	18,012
1950	38,948	79	1985	228,621	23,234
1951	34,393	81	1986	232,722	27,985
1952	30,716	356	1987	237,279	30,099
1953	30,392	431	1988	219,195	32,234
1954	34,486	435	1989	204,309	34,182
1955	40,812	442	1990	199,851	35,952
1956	46,250	446	1991	194,312	37,561
1957	51,328	453	1992	191,588	37,869
1958	48,026	456	1993	181,624	38,604
1959	50,538	458	1994	175,122	39,593
1960	54,923	464	1995	170,881	39,286
1961	60,506	466	1996	161,384	39,896
1962	64,336	485	1997	157,862	41,179
1963	78,034	488	1998	152,330	41,673
1964	80,295	504	1999	148,534	42,237
1965	82,464	514	2000	147,336	42,434
1966	85,013	523	2001	143,407	42,865
1967	88,995	548	2002	141,117	43,389
1968	97,959	583	2003	137,035	42,730
1969	104,886	604	2004	133,812	42,767
1970	104,878	636	2005	131,481	43,094
1971	97,639	674	2006	127,749	43,266
1972	109,776	765	2007	125,076	43,256
1973	114,894	804	2008	123,304	43,557
1974	128,995	837	2009	120,507	43,782
1975	139,168	898	2010	117,480	43,954
1976	148,202	975	2011	111,479	44,182
1977	155,850	1,218	2012	106,780	43,686
1978	148,711	1,541	2013	102,540	43,851
1979	147,136	1,869	2014	96,017	43,720
1980	156,394	2,477	2015	92,829	43,936

Profiles of AFA Membership

As of June 2015 (Total 92,829)

37%	One-year members
16%	Three-year members
47%	Life members
15%	Active Duty military
53%	Retired military
13%	Former service
5%	Guard and Reserve
9%	No military service
4%	Cadet
2%	Spouse/widow(er)

Of AFA's service members who list their rank:

70%	are officers
30%	are enlisted

Of AFA's retired military members who list their rank:

70%	are officers
31%	are enlisted

AFA Chairman's Aerospace Education Achievement Award

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

2009	ExxonMobil Foundation
2010	USA Today
2011	The National Science Foundation
2012	The Military Channel
2013	The Civil Air Patrol Aerospace Education Program
2014	Department of Defense STARBASE Program
2015	Northrop Grumman Foundation

H. H. Arnold Award Recipients

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

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

John R. Alison Award Recipients

AFA's highest honor for industrial leadership.

1992	Norman R. Augustine, Chairman, Martin Marietta
1993	Daniel M. Tellep, Chm. and CEO, Lockheed
1994	Kent Kresa, CEO, Northrop Grumman
1995	C. Michael Armstrong, Chm. and CEO, Hughes Aircraft
1996	Harry Stonecipher, Pres. and CEO, McDonnell Douglas
1997	Dennis J. Picard, Chm. and CEO, Raytheon
1998	Philip M. Condit, Chm. and CEO, Boeing
1999	Sam B. Williams, Chm. and CEO, Williams International
2000	Simon Ramo and Dean E. Wooldridge, missile pioneers
2001	George David, Chm. and CEO, United Technologies
2002	Sydney Gillibrand, Chm., AMEC; and Jerry Morgensen, Pres. and CEO, Hensel Phelps Construction
2003	Joint Direct Attack Munition Industry Team, Boeing
2004	Thomas J. Cassidy Jr., Pres. and CEO, General Atomics Aeronautical Systems
2005	Richard Branson, Chm., Virgin Atlantic Airways and Virgin Galactic
2006	Ronald D. Sugar, Chm. and CEO, Northrop Grumman
2007	Boeing and Lockheed Martin
2008	Bell Boeing CV-22 Team, Bell Helicopter Textron, and Boeing
2009	General Atomics Aeronautical Systems Inc.
2010	Raytheon
2011	United Launch Alliance
2012	Boeing
2013	X-51A WaveRider Program, Boeing, Aerojet Rocketdyne, and Air Force Research Laboratory
2014	C-17 Globemaster III, Boeing
2015	F-22 Raptor, Lockheed Martin

W. Stuart Symington Award Recipients

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

1986	Caspar W. Weinberger, Secretary of Defense
1987	Edward C. Aldridge Jr., Secretary of the Air Force
1988	George P. Schultz, Secretary of State
1989	Ronald W. Reagan, former President of the United States
1990	John J. Welch, Asst. SECAF (Acquisition)
1991	George Bush, President of the United States
1992	Donald B. Rice, Secretary of the Air Force
1993	Sen. John McCain (R-Ariz.)
1994	Rep. Ike Skelton (D-Mo.)
1995	Sheila E. Widnall, Secretary of the Air Force
1996	Sen. Ted Stevens (R-Alaska)
1997	William Perry, former Secretary of Defense
1998	Rep. Saxby Chambliss (R-Ga.) and Rep. Norman D. Dicks (D-Wash.)
1999	F. Whitten Peters, Secretary of the Air Force
2000	Rep. Floyd Spence (R-S.C.)
2001	Sen. Michael Enzi (R-Wyo.) and Rep. Cliff Stearns (R-Fla.)
2002	Rep. James V. Hansen (R-Utah)
2003	James G. Roche, Secretary of the Air Force
2004	Peter B. Teets, Undersecretary of the Air Force
2005	Rep. Duncan Hunter (R-Calif.)
2007	Michael W. Wynne, Secretary of the Air Force
2008	Gen. Barry R. McCaffrey, USA (Ret.)
2009	Sen. Orrin G. Hatch (R-Utah)
2010	John J. Hamre, Center for Strategic & International Studies
2011	Rep. C. W. "Bill" Young (R-Fla.)
2012	Gen. James L. Jones, USMC (Ret.)
2013	Michael B. Donley, Secretary of the Air Force
2014	Ashton B. Carter, former deputy Secretary of Defense
2015	William A. LaPlante, Asst. SECAF (Acquisition)

AFA Lifetime Achievement Award Recipients

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

2003	Maj. Gen. John R. Alison, USAF (Ret.); Sen. John H. Glenn Jr.; Maj. Gen. Jeanne M. Holm, USAF (Ret.); Col. Charles E. McGee, USAF (Ret.); Gen. Bernard A. Schriever, USAF (Ret.)	2011	Natalie W. Crawford; Lt. Gen. Thomas P. Stafford, USAF (Ret.); Gen. Larry D. Welch, USAF (Ret.); Heavy Bombardment Crews of WWII; Commando Sabre Operation-Call Sign Misty
2004	Gen. Russell E. Dougherty, USAF (Ret.), Florene Miller Watson	2012	Gen. James P. McCarthy, USAF (Ret.); Vietnam War POWs; Berlin Airlift Aircrews; Korean War Airmen; Fighter Pilots of World War II
2005	Sen. Daniel K. Inouye; William J. Perry; Patty Wagstaff	2013	Maj. Gen. Joe H. Engle, USAF (Ret.); US Rep. Sam Johnson; The Arlington Committee of the Air Force Officers' Wives' Club—"The Arlington Ladies"
2007	CMSAF Paul W. Airey, USAF (Ret.)	2014	Brig. Gen. James A. McDivitt, USAF (Ret.); Civil Air Patrol—World War II veterans; American Fighter Aces
2008	Col. George E. Day, USAF (Ret.); Gen. David C. Jones, USAF (Ret.); Harold Brown	2015	R. A. "Bob" Hoover; Eugene F. "Gene" Kranz; Gen. Michael V. Hayden, USAF (Ret.)
2009	Doolittle Raiders; Tuskegee Airmen; James R. Schlesinger		
2010	Col. Walter J. Boyne, USAF (Ret.); Andrew W. Marshall; Gen. Lawrence A. Skantze, USAF (Ret.); Women Airforce Service Pilots		

Gold Life Member Card Recipients

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

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

Dottie Flanagan Staff Award of the Year

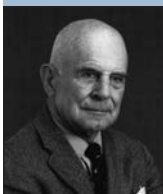
A donation from the late Jack B. Gross, national director emeritus, enables AFA to honor staff members each quarter. Those members become eligible for the staff award of the year.

1992	Doreatha Major
1993	Jancy Bell
1994	Gilbert Burgess
1995	David Huynh
1996	Sherry Coombs
1997	Katherine DuGarm
1998	Suzann Chapman
1999	Frances McKenney
2000	Ed Cook
2001	Katie Doyle
2002	Jeneathia Wright
2003	Jim Brown
2004	Pearlie Draughn
2005	Ursula Smith
2006	Susan Rubel
2007	Ed Cook
2008	Michael Davis
2009	Chris Saik
2010	Bridget Wagner
2011	Merri Shaffer
2012	Caitie Craumer
2013	Pamela Braithwaite
2014	Bridget Dongu

The Twelve Founders

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

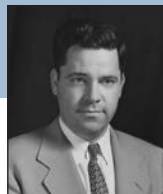
AFA Chairmen of the Board and National Presidents



Jimmy Doolittle
President, 1946-47
Chairman, 1947-49



Edward P. Curtis
Chairman, 1946-47



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



C. R. Smith
President, 1948-49
Chairman, 1949-50



Robert S. Johnson
President, 1949-51



Carl A. Spaatz
Chairman, 1950-51



Harold C. Stuart
President, 1951-52
Chairman, 1952-53



Arthur F. Kelly
President, 1952-53
Chairman, 1953-54



George C. Kenney
President, 1953-54
Chairman, 1954-55



John R. Alison
President, 1954-55
Chairman, 1955-56



Gill Robb Wilson
President, 1955-56
Chairman, 1956-57



John P. Henebry
President, 1956-57
Chairman, 1957-58



Peter J. Schenk
President, 1957-59



James M. Trail
Chairman, 1958-59

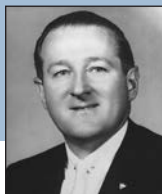
AFA Chairmen of the Board and National Presidents (cont.)



Howard T. Markey
President, 1959-60
Chairman, 1960-61



Julian B. Rosenthal
Chairman, 1959-60



Thos. F. Stack
President, 1960-61
Chairman, 1961-62



Joe Foss
President, 1961-62
Chairman, 1962-63



John B. Montgomery
President, 1962-63



W. Randolph Lovelace II
President, 1963-64
Chairman, 1964-65



Jack B. Gross
Chairman, 1963-64



Jess Larson
President, 1964-67
Chairman, 1967-71



Robert W. Smart
President, 1967-69



George D. Hardy
President, 1969-71
Chairman, 1966-67
Chairman, 1971-72



Martin M. Ostrow
President, 1971-73
Chairman, 1973-75



Joe L. Shosid
President, 1973-75
Chairman, 1972-73
Chairman, 1975-76



George M. Douglas
President, 1975-77
Chairman, 1977-79



Gerald V. Hasler
President, 1977-79
Chairman, 1976-77



Victor R. Kregel
President, 1979-81
Chairman, 1981-82



Daniel F. Callahan
Chairman, 1979-81



John G. Brosky
President, 1981-82
Chairman, 1982-84



David L. Blankenship
President, 1982-84
Chairman, 1984-85



Edward A. Stearn
Chairman, 1985-86



Martin H. Harris
President, 1984-86
Chairman, 1986-88



Sam E. Keith Jr.
President, 1986-88
Chairman, 1988-90



Jack C. Price
President, 1988-90
Chairman, 1990-92



Oliver R. Crawford
President, 1990-92
Chairman, 1992-94



James M. McCoy
President, 1992-94
Chairman, 1994-96



Gene Smith
President, 1994-96
Chairman, 1996-98



Doyle E. Larson
President, 1996-98
Chairman, 1998-2000



Thomas J. McKee
President, 1998-2000
Chairman, 2000-02



John J. Politi
President, 2000-02
Chairman, 2002-04



Stephen P. Condon
President, 2002-04
Chairman, 2004-06



Robert E. Largent
President, 2004-06^a
Chairman, 2006-08^b



Joseph E. Sutter
Chairman, 2008-10



S. Sanford Schliitt
Chairman, 2010-12



George K. Muellner
Chairman, 2012-2014



Scott P. Van Cleef
Chairman, 2014-

^a The office of National President, an elected position, was disestablished in 2006.

^b AFA's Chairman of the Board also serves as Chairman of both AFA affiliates, the AFA Veteran Benefits Association and the Air Force Memorial Foundation.

AFA Executive Directors/Presidents/CEOs



Willis S. Fitch
Executive Director
1946-47



James H. Straubel
Executive Director
1948-80



Russell E. Dougherty
Executive Director
1980-86



David L. Gray
Executive Director
1986-87



John O. Gray
Acting Executive Director
1987-88, 1989-90



Charles L. Donnelly Jr.
Executive Director
1988-89



Monroe W. Hatch Jr.
Executive Director
1990-95

AFA Executive Directors/Presidents/CEOs (cont.)



John A. Shaud
Executive Director
1995-2002



Donald L. Peterson
Executive Director
2002-06^c
President-CEO
2006-07



Michael M. Dunn
President-CEO
2007-12



Craig R. McKinley
President
2012-15



Mark A. Barrett
Acting President
2015



Larry O. Spencer
President
2015-

^c The position of Executive Director was replaced in 2006 by President-CEO. In 2012, the position was redesignated President.

Vice Chairmen for Field Operations

Joseph E. Sutter	2006-08
James R. Lauducci	2008-10
Justin M. Faiferlick	2010-12
Scott P. Van Cleef	2012-14
David A. Dietsch	2014

Vice Chairmen for Aerospace Education

L. Boyd Anderson	2006-07
S. Sanford Schlitt	2007-10
George K. Muellner	2010-12
Jerry E. White	2012-15

National Secretaries

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

National Treasurers

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

AFA's Regions, States, and Chapters

These figures indicate the number of affiliated members as of June 2015. Listed below the name of each region is the region president.

CENTRAL EAST REGION	10,300	GREAT LAKES REGION	6,286
F. Gavin MacAloon		Paul Lyons	
Delaware	423	Indiana	1,141
Brig. Gen. Bill Spruance	120	Central Indiana	338
Delaware Galaxy	303	Columbus-Bakalar	90
		Fort Wayne	176
District of Columbia	340	Grissom Memorial	168
Nation's Capital	340	Lawrence D. Bell Museum	169
		Southern Indiana	200
Maryland	1,937	Kentucky	606
Baltimore*	674	Gen. Russell E. Dougherty	349
Central Maryland	417	Lexington	257
Thomas W. Anthony	846		
Virginia	7,410	Michigan	1,318
Danville	37	Battle Creek	73
Donald W. Steele Sr.		Lake Superior Northland	112
Memorial	3,617	Lloyd R. Leavitt Jr.	293
Gen. Charles A. Gabriel	1,149	Mount Clemens	840
Langley	1,108		
Leigh Wade	153	Ohio	3,221
Northern Shenandoah Valley	248	Capt. Eddie Rickenbacker	
Richmond	525	Memorial*	489
Roanoke	265	Frank P. Lahm	395
Tidewater	308	Gen. Joseph W. Ralston	348
		North Coast*	185
West Virginia	190	Steel Valley	115
Chuck Yeager	190	Wright Memorial*	1,689
FAR WEST REGION	8,471	MIDWEST REGION	5,816
Lee Barnby		Russell A. Klatt	
California	7,845	Illinois	2,191
Bob Hope	536	Chicagoland-O'Hare	855
Brig. Gen. Robert F. Travis	534	Heart of Illinois	174
C. Farinha Gold Rush	987	Land of Lincoln	211
Charles Hudson	61	Scott Memorial	951
David J. Price/Beale	295		
Fresno*	252	Iowa	518
Gen. B. A. Schriever		Fort Dodge	42
Los Angeles	736	Gen. Charles A. Horner	188
General Doolittle		Northeast Iowa	222
Los Angeles Area*	776	Richard D. Kisling	66
Golden Gate*	464		
High Desert	145	Kansas	546
Maj. Gen. Charles I. Bennett Jr.	174	Lt. Erwin R. Bleckley	370
Orange County/Gen. Curtis		Maj. Gen. Edward R. Fry	176
E. LeMay	516		
Palm Springs	325	Missouri	1,400
Robert H. Goddard	427	Whiteman	410
San Diego	694	Harry S. Truman	467
Stan Hryn Monterey Bay	151	Spirit of St. Louis	523
Tennessee Ernie Ford	466		
William J. "Pete" Knight	306	Nebraska	1,161
		Ak-Sar-Ben	950
Hawaii	626	Lincoln	211
Hawaii*	626		
		NEW ENGLAND REGION	3,037
FLORIDA REGION	7,896	Ronald M. Adams	
Dann D. Mattiza			
Florida	7,896	Connecticut	616
Brig. Gen. James R. McCarthy	236	Flying Yankees/Gen. George C. Ken-	
Cape Canaveral	821	ney	361
Central Florida	964	Lindbergh/Sikorsky	255
Col. H. M. "Bud" West	219		
Col. Loren D. Evenson	327	Massachusetts	1,408
Eglin	1,043	Minuteman	240
Falcon	473	Otis	204
Florida Highlands	264	Paul Revere	695
Gulf Coast	542	Pioneer Valley	269
Hurlburt	737		
Miami-Homestead	355	New Hampshire	646
Red Tail Memorial	499	Brig. Gen. Harrison R. Thyng	646
Sarasota-Manatee	285		
Waterman-Twining	1,131	Rhode Island	182
		Metro Rhode Island	147
		Newport Blue & Gold	35
		Vermont	185
		Green Mountain	185

NORTH CENTRAL REGION 2,818
James W. Simons

Minnesota 929
Gen. E. W. Rawlings 765
Richard I. Bong 164

Montana 338
Big Sky 245
Bozeman 93

North Dakota 341
Gen. David C. Jones 163
Happy Hooligan 94
Red River Valley 84

South Dakota 396
Dacotah 205
Rushmore 191

Wisconsin 814
Billy Mitchell 814

NORTHEAST REGION 5,632
Maxine Rauch

New Jersey 1,321
Brig. Gen. Frederick W. Castle 245
Hangar One 152
Highpoint 80
Mercer County 108
Sal Capriglione 235
Shooting Star 206
Thomas B. McGuire Jr. 295

New York 2,065
Albany-Hudson Valley* 361
Finger Lakes 256
Gen. Carl A. Spaatz 149
Genesee Valley 182
Iron Gate 240
L. D. Bell-Niagara Frontier 286
Long Island 492
Pride of the Adirondacks 99

Pennsylvania 2,246
Altoona 117
Joe Walker-Mon Valley 226
Lehigh Valley 170
Liberty Bell 517
Lt. Col. B. D. "Buzz" Wagner 130
Mifflin County* 102
Olmsted 265
Pocono Northeast 182
Total Force 297
York-Lancaster 240

NORTHWEST REGION 4,336
Mary J. Mayer

Alaska 565
Edward J. Monaghan 429
Fairbanks Midnight Sun 136

Idaho 432
Snake River Valley 432

Oregon 853
Bill Harris 228
Columbia Gorge* 625

Washington 2,486
Greater Seattle 814
Inland Empire 651
McChord Field 1,021

ROCKY MOUNTAIN REGION 5,102
Bob George

Colorado 3,700
Gen. Robert E. Huyser 114
Lance P. Sijan 2,007
Mel Harmon 172
Mile High 1,407

Utah 1,088
Northern Utah 378
Salt Lake City 395
Ute-Rocky Mountain 315

Wyoming 314
Cheyenne Cowboy 314

SOUTH CENTRAL REGION 6,208
James M. Mungenast

Alabama 2,080
Birmingham 297
Montgomery 1,095
South Alabama 200
Tennessee Valley 488

Arkansas 811
David D. Terry Jr. 472
Lewis E. Lyle 339

Louisiana 921
Ark-La-Tex 513
Maj. Gen. Oris B. Johnson 408

Mississippi 864
Golden Triangle 272
John C. Stennis 388
Meridian 204

Tennessee 1,532
Chattanooga 121
Everett R. Cook 326
Gen. Bruce K. Holloway 576
H. H. Arnold Memorial 111
Maj. Gen. Dan F. Callahan 398

SOUTHEAST REGION 6,664
John R. Allen Jr.

Georgia 2,853
Carl Vinson Memorial 955
Dobbins 1,389
Savannah 308
South Georgia 201

North Carolina 2,214
Blue Ridge 446
Cape Fear 214
Kitty Hawk 63
Pope 550
Scott Berkeley 310
Tarheel 631

South Carolina 1,597
Charleston 469
Columbia Palmetto 366
Strom Thurmond 362
Swamp Fox 400

SOUTHWEST REGION 6,010
Ross B. Lampert

Arizona 3,249
Cochise 98
Frank Luke 1,777
Prescott/Goldwater 325
Tucson 1,049

Nevada 1,474
Thunderbird 1,474

New Mexico 1,287
Albuquerque 870
Fran Parker 285
Llano Estacado 132

TEXOMA REGION 10,953
Richard D. Baldwin

Oklahoma 1,763
Altus 186
Central Oklahoma (Gerrity) 1,066
Enid 173
Tulsa 338

Texas 9,190
Abilene 362
Aggieland 158
Alamo 3,235
Austin 1,055
Concho 197
Del Rio 123
Denton 491
Fort Worth 1,380
Gen. Charles L. Donnelly Jr. 200
Northeast Texas 390
San Jacinto 857
Seidel-AFA Dallas 742

AFA's Overseas Chapters

CHAPTER LOCATION

US Air Forces in Europe-Air Forces Africa

Charlemagne Geilenkirchen, Germany
Dolomiti Aviano AB, Italy
Ramstein Ramstein AB, Germany
Spangdahlem Spangdahlem AB, Germany
United Kingdom Lakenheath, UK

Pacific Air Forces

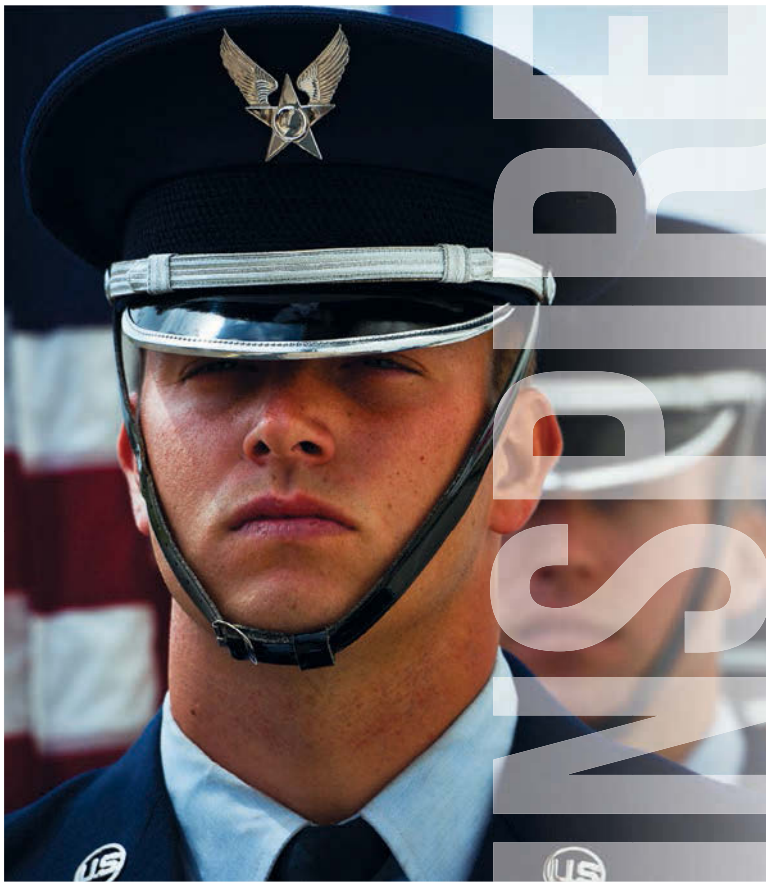
Keystone Kadena AB, Japan
MiG Alley Osan AB, South Korea
Tokyo Tokyo, Japan

AFA Member of the Year Award Recipients

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

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

*These chapters were chartered prior to Dec. 31, 1948, and are considered original charter chapters; the North Coast Chapter of Ohio was formerly the Cleveland Chapter; and the Columbia Gorge Chapter of Oregon was formerly the Portland Chapter.



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Members of the Thunderbird Society come from all walks of life and include AFA in a bequest or other planned gift.

In doing so, they are making a tremendous difference in ensuring a strong and free America for generations to come.

FOR MORE INFORMATION CONTACT:

Wesley Sherman, Manager - Development
1.800.727.3337 703.247.5831
wsherman@afa.org

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By Frances McKenney, Assistant Managing Editor

Dancing

The **Ramstein Chapter** modeled its contest on the popular TV series “Dancing With the Stars” but called its version a “Dancing With Our Heroes” gala.

Rather than pairing celebrities with professional dancers and having them compete in a Los Angeles TV studio, the AFA event in Germany pitted airmen and civilians performing at the Ramstein Air Base Officers Club.

Instead of paying contestants, the dancing in Deutschland raised money for wounded warriors in the community and those transitioning through Germany from deployments—the heroes alluded to in the title.

So was it a contest or a fund-raiser? “There was a competition,” replied Chapter President SMSgt. Bradley A. Williams, “but all of [the] dancers were committed to the cause more than the competition.”

In fact, SrA. Alicia Garcia said, “This is a way that I can use my passion to support a great cause and our warriors.”

Along with partner SrA. Joshua Plucinski, she won overall honors with a tango. A country swing dance earned SSgt. Jennifer Jordan and Caleb Jordan second place. SrA. Aaron Blackmon partnered with Alexis Underwood for a waltz that took third place. In fourth place, Mary Miracle and SrA. Tyler Goodloe performed something called an East Coast Mash Up.

Williams counted 153 guests, including wing and squadron commanders, staff members representing US Air Forces in Europe, expatriate retirees, Army personnel, and even several Marines en route to deployments.

The contest generated so much excitement that “some of the dancers’ families flew in to see the event,” Williams wrote in an email.

He credits chapter member SSgt. Sadie D. Martin with organizing the dance and Life Member SrA. Shabree N. Heasel—one of USAF’s 2014 Outstanding Airmen of the Year—for stepping in when he and Martin had to go TDY.

A large group of nonmembers volunteered to help, too, most notably SrA. Josiah Austin as the choreographer.

The volunteers even arranged for child care—with meals—and for a community sponsor, Grace Studio, to entertain the audience with two numbers.

Chapter President Williams said Dancing With Our Heroes raised \$1,700.

A Motivating Major General

Retired AFRC Maj. Gen. Gerald C. Still, president of the **Lehigh Valley Chapter** in Pennsylvania, presented Civil Air Patrol cadets Rachel Scheller and Ian Martinez-Morel with CAP awards in July. A CAP press release stated that Martinez-Morel, who received the Amelia

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Earhart Award, and Scheller, who earned the Ira C. Eaker Award, were thrilled to have Still at their award ceremony. "I hope that when the younger cadets see a major general handing me that certificate, it will inspire and motivate them to become leaders," Scheller commented.

Try, Try Again

"I'm busy, but here's my business card." You might be discouraged by

such a noncommittal reply when recruiting a new member. But not **Genesee Valley Chapter** President Alfred E. Smith. When he ran into Charles Price at another New York function, he again asked him to join AFA, and this time the Tuskegee Airman said yes. Price worked in intel in World War II with the 1000th Signal Company, attached to the 332nd Fighter Group in Italy. He retired from the Rochester, N.Y., police

department as a captain and today speaks to groups about his service with the US military's first African-American aviators.

Wider Audience for the Story

In Florida, the **Eglin Chapter's** treasurer, Steve Czonstka, presented the Doolittle Raiders' *Last Reunion* book to the Heritage Museum of Northwest Florida, located in Valparaiso. The chapter donated the book so the story of the 1942 raid on Tokyo, led by Jimmy Doolittle, could be shared with more people. ✪

Photo by William Noyes



At Whiteman AFB, Mo., Science Olympiad team members from Macon County High School examine the inside of an A-10. Whiteman Chapter's aerospace education VP, TSgt. Steven Brevelle, guided these students on a base tour. It was all part of the kids' instructor, Clint Coffey, being selected as the chapter's High School Teacher of the Year.

Look for more chapter news in *Wingman Magazine*.

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Reunions

20th FW Assn (1930-today). Oct. 14-18, Hilton New Orleans Riverside. **Contact:** (770-429-9955) (abbyndavid@aol.com).

B-26, including 3rd Bomb Wg, 17th BW, 452nd BW, 12th Tactical Recon Sq (Korean War). Oct. 6-8, Langley Inn at JB Langley-Eustis, VA. **Contact:** Antonio Fucci (805-491-0686) (afucci@msn.com). ■

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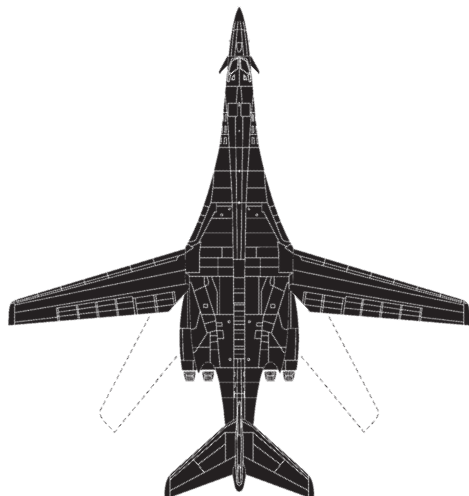
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B-1



America's sleek, powerful B-1 combat aircraft gave supersonic punch to USAF's long-range heavy bomber force. Designed strictly for nuclear war, the B-1 in the 1990s became something different—a highly effective conventional bomber. The four B-1As never were given an official name; the moniker "Lancer" was applied only to the 100 B-1B aircraft.

Rockwell International's basic B-1 design featured a blended wing-and-body configuration, variable-sweep wings, four turbofan engines, triangular fin control surfaces, and a cruciform tail. The wing-sweep could swing from 15 degrees to 67.5 degrees, giving the B-1 high lift for takeoff and landing and low drag for high-speed dash. Presi-

dent Jimmy Carter canceled the B-1A in 1977, only to see the program revived by President Ronald Reagan as the B-1B. USAF built 100 B models, which traded some of B-1A's blazing speed for more payload and a smaller radar cross section.

The bomber was later modified to deliver precision and nonprecision weapons. It was first used in combat against Iraq in Operation Desert Fox in 1998. A few months later, B-1Bs flew in Operation Allied Force against Serbia, delivering 20 percent of the war's ordnance while flying only two percent of the combat sorties. In the air wars over Afghanistan and Iraq, the B-1B's contribution was even greater. It has since flown in the 2011 campaign in Libya and against Islamic State forces.

—Robert S. Dudley with Walter J. Boyne

This aircraft: USAF B-1B Lancer—#86-0129, *Black Widow*—of the 34th Bomb Squadron, Ellsworth AFB, S.D., as it looked in August 2005 at the MAKS air show in Russia.



In Brief

Designed, built by Rockwell (now part of Boeing) ★ first flight Dec. 23, 1974 ★ number built 104 ★ crew of four (commander, copilot, two weapon systems officers) ★ four General Electric F101-GE-102 turbofan engines ★ defensive armament RWR, jammers. **Specific to B-1B:** max payload 125,000 lb (75,000 internal, 50,000 external) of conventional munitions (gravity bombs, PGM, missiles, naval mines, cluster munitions) ★ max speed 900+ mph ★ cruise speed 685 mph ★ max range approx. 7,000 mi (unrefueled) ★ weight (loaded) 326,000 lb ★ span 79 ft (swept) and 137 ft (spread) ★ length 146 ft ★ height 34 ft ★ ceiling more than 30,000 ft.

Famous Fliers

Mackay Trophy: 2008—Norman Shelton, Boyd Smith, Kaylene Giri, Louis Heidema. 1995—Doug Raaberg, Gerald Goodfellow, Rick Carver, Kevin Clotfelter, Chris Stewart, Steve Adams, Kevin Houdek, Steve Reeves; 1989—Joseph Day, Jeffrey Beene, Vernon Benton, Robert Hendricks; 1987—Pilots of Det. 15, AFPRO and SPO. **DFC:** Gerald Goodfellow (OAF); Chris Wachter, Sloan Hollis, Joe Runci, Fred Swan (OIF). **Notables:** Joseph Brown (flew with one wing forward, one back); Dustin Willard, Jeremy Stover, Anthony Rocco, Travis Keene (2012 LeMay Award); Stephen Wolborsky (commander, first B-1B combat flight); Matt Brown (longest B-1 combat mission, 21 hrs, 42 mins). **Test Pilot:** Douglas Benefield (killed in 1984 accident).

Interesting Facts

Boasts largest weapons payload of any US aircraft ★ nicknamed "Bone" ★ holds some 60 world records for speed, payload, range, time of climb ★ stands alone as the only variable-sweep aircraft in active US service ★ achieved top speed of 2.2 Mach (B-1A) ★ presents radar cross section similar to one of a small fighter ★ used in unsuccessful April 7, 2003, raid to kill Saddam Hussein ★ featured in James Bond film, "Never Say Never Again" (1983) and "Transformers: Revenge of the Fallen" (2009).



A B-1B Lancer on a training mission from Ellsworth AFB, S.D.



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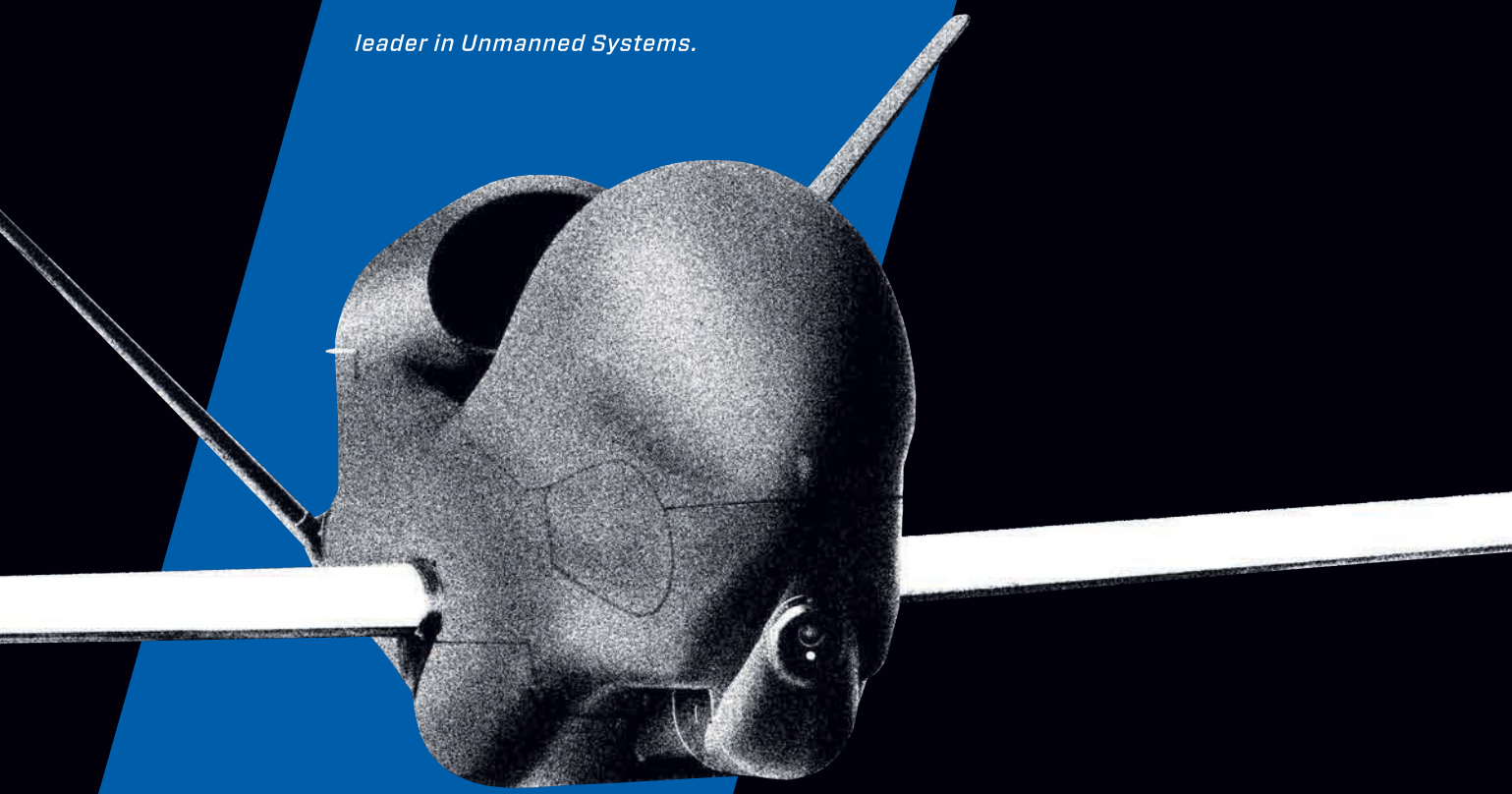
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